Digital Transformation in Higher Education Learning and Teaching: The Quality Digital Literacy We Need

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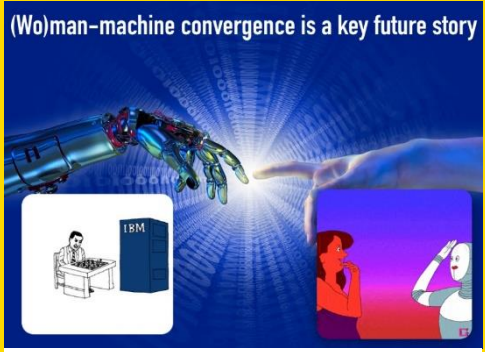

- **Introduction and background**
- **Leading questions and methodology**
- **Quality literacy in Digital Transformation (DT)**
  - **Networked concept**
  - **DT literacy dimensions followed in EDUDIG project**
- **Implications and conclusions**
- Limitations of study/open questions for further research

Introduction and background

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Digital Transformation (DT) – Fourth Industrial Revolution (4IR) – Industry 4.0: topic of increasing importance in many societies since the last two decades or so

In higher education DT is still a major topic

- "No shortage of **DT projects** and innovations" particularly in higher education learning and teaching (L&T),
- Multiple studies show: **DT** is not just a technical innovation but rather a **transformation of academic, curricular, organisational und structural issues** towards digitalisation → **DT** of L&T processes is not a sure-fire success but is **based on complicated negotiation processes** (HFD, 2016)
- Exogeneous factors such as, for example, the effects of the Corona pandemic put pressure on digitalisation efforts
- Developments are of ambivalent success so far, not widespread because of vario obstacles (e.g. **data privacy**; **doubts about benefit/cost ration**; **technology rejection**;)

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Introduction and background

Ambitious understanding of DT:

'the transformation of all sectors of our economy, government and society based on the large-scale adoption of existing and emerging digital technologies' (Randall *et al.*, 2018, p. 4).

DT is a complex and continuous transitional process influencing all organisational structures and processes and involving all relevant and affected stakeholders

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Introduction and background

Workable definition of **DT in higher education institutions** (HEIs) (cf. Rampelt *et al.*, 2019, p. 8)

- **Intrudes and pervades all** processes, spaces, formats and objectives of teaching, learning, researching, Third Mission and administration
- Comprises the design and implementation of **new infrastructures**
- Incorporates the **increasing use of digital media and technologies** for L&T, research, support services, administration **including the four Cs** (communication, critical thinking, collaboration, creativity)
- Includes the need of students and staff to **develop new digital skills** for their current and future activities and tasks

DT is not an easy task in terms of **organisational and personal transformation and learning required**, and it can be expensive with respect to material and human resources

Introduction and background

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A few desiderata of practice in HEIs

- **Why** and **how** could **DT** be achieved **in multiple-hybrid organisations embedded into a complicated network of political steering, organisational self-governance, institutional autonomies, and diverse subject fields**
- Many/most of the digitalisation efforts in HE are initiated by **contingent events and grants**, **project-based**, **incorporate digital technology into existing processes** – understandable and pragmatic approach – runs the **risk of not enabling actual structural change and innovation** (Orr *et al.*, 2019a; Orr *et al.*, 2019b)
- Gap between stakeholders' **assessment of high importance of digitalisation** and its rather **low developmental state** in (public) universities (Gilch *et al.*, 2019)
- **Digitalisation of the L&T processes is lagging behind** the use of digitalised communication and entertainment facilities (Grossek *et al.*, 2020)

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Leading questions and methodology

Main goal: unfold concept of academic **digital literacy in higher education L&T** with emphasis on DT issues, i.e., the **digital competencies required for DT** to be successful.

- Adapting a networked concept of quality literacy of L&T (Leiber & Seyfried, 2021) by treating the following questions:
  - **Most important tasks and activities** for HEIs to make DT including Artificial Intelligence (AI) a successful reality in L&T**?**
  - **DT competencies required** for teachers, students, quality managers, leadership**?**
  - **Recommendations** about organisational, pedagogical, social changes required **for sustainable DT** in HEIs**?**

Leading questions and methodology

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Methodologically

- Mainly **conceptual** research based on **qualitative content analysis** of the ongoing discourse on the topic

  (see, e.g., Bates *et al.*, 2020; Bond *et al.*, 2018; Cope *et al.*, 2020; Maltese, 2018; Marks *et al.*, 2020; Renz & Hilbig, 2020; Royakkers *et al.*, 2018; Zawacki-Richter *et al.*, 2020)

- Work is **further pursued theoretically and empirically** and informed by preliminary results of the Erasmus+ project "Enhancing the development of educators digital competencies" (EDUDIG, 2021; Leiber, 2022)

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Answers to leading questions emerge from **strategic SWOT analysis** (Leiber, 2022) (stocktaking and recommendations for action) **of integrative quality literacy in DT** consisting of competencies in the four dimensions of quality literacy (Leiber & Seyfried, 2021)

- quality **strategies** towards DT
- **quality management** approaches in DT
- quality **practices** in DT and
- quality **culture** towards DT

See Table 1

Quality literacy in DT in HE L&T – main changes, activities, competencies needed

DT quality strategy	DT quality management	DT quality practice	DT quality culture
		Mainly pursued in the EDUDIG project	
DEVELOP an institutional POLICY FOR DT of L&T – relevant goals are: - Development & implementation of **DT-related pedagogies** - Development & implementation of **infrastructure** towards DT - Development of **digital skills** of the academic community including teachers, students & administration - Stimulation of **organisational innovation** in DT	**Implement, manage, & share DT resources** across organisational units, performance areas & subject fields **Carry out quality assurance & enhancement evaluations with respect to DT** **Evaluate students' learning progress & learning gain through DT** (e.g. learning analytics) **Offer further education in DT literacy for internal stakeholders** **Reinforce cyber security** by adopting appropriate safety measures & accreditations	**Implement and manage DT-adequate pedagogies** **Foster professional development of educators** **Facilitate learners' DT competencies** **Enhance & augment assessment through DT** **Support students' learning progress through DT** (e.g., learning analytics) **Improve digital platforms** (e.g., LMSs such as Moodle) **Exploit innovations in mobile technology for communication & collaboration**	**Share espoused values, expectations & commitment to quality (enhancement)** in L&T according to strategic, management & practical competencies **Advocate values of academic freedom** of L&T **Create new team structures** ("learning organisation in DT") consisting of internal and external stakeholders **Strengthen a climate of DT culture** by supporting & fostering communication, critical thinking, collaboration/ participation, & creativity (the four Cs)

Table 1. Quality literacy with respect to Digital Transformation (DT) in higher education L&T; for more details see (Leiber, 2022)

Quality literacy in DT in HE L&T – main changes, activities, competencies needed

DT quality strategy	DT quality management	DT quality practice	DT quality culture
DEVELOP an institutional POLICY FOR DT of L&T – relevant goals are: - Provision of framework conditions for the **issuance of certified DT qualifications** & the validation of acquired DT skills - **Design & implementation of L&T spaces** that are fully equipped from a DT perspective - **Collaboration with industry partners** specialised in software tools for supporting & augmenting L&T	**Increase financial allocations for DT** projects including their **sustainable implementation**	**Exploit innovations in mobile technology for communication & collaboration** **Leverage cloud technologies for communication & collaboration** **Launch AI pilot projects** (e.g., AI conversational interfaces for admission process, online talks with teachers, chat bot to answer queries) **Implement & manage DT-adequate administration services**	

Table 1. Quality literacy with respect to Digital Transformation (DT) in higher education L&T; for more details see (Leiber, 2022)

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Research-and-practice example for improving quality literacy in DT (as depicted in Table 1):

Approach of DigCompEdu Framework (Redecker, 2017) is further developed in **EDUDIG project** (EDUDIG, 2021)

- DigCompEdu Framework identified/ defined educators' professional and pedagogic competencies as well as learners' competencies, categorised in **six areas, 22 sub-areas, 147** cognitive and action **competencies, six** accumulative **levels of progression** (Newcomer, Explorer, Integrator, Expert, Leader, or Pioneer)

- EDUDIG project partners:
  - **University of Applied Sciences Upper Austria** (Hagenberg, Linz, Steyr, Wels; Austria), lead partner/coordinator
  - **Laurea University of Applied Sciences** (Uusimaa region at six different campuses, Finland)
  - **Evaluation Agency Baden-Wuerttemberg** (evalag, Mannheim, Germany)
  - **University of Aveiro** (Aveiro, Portugal)

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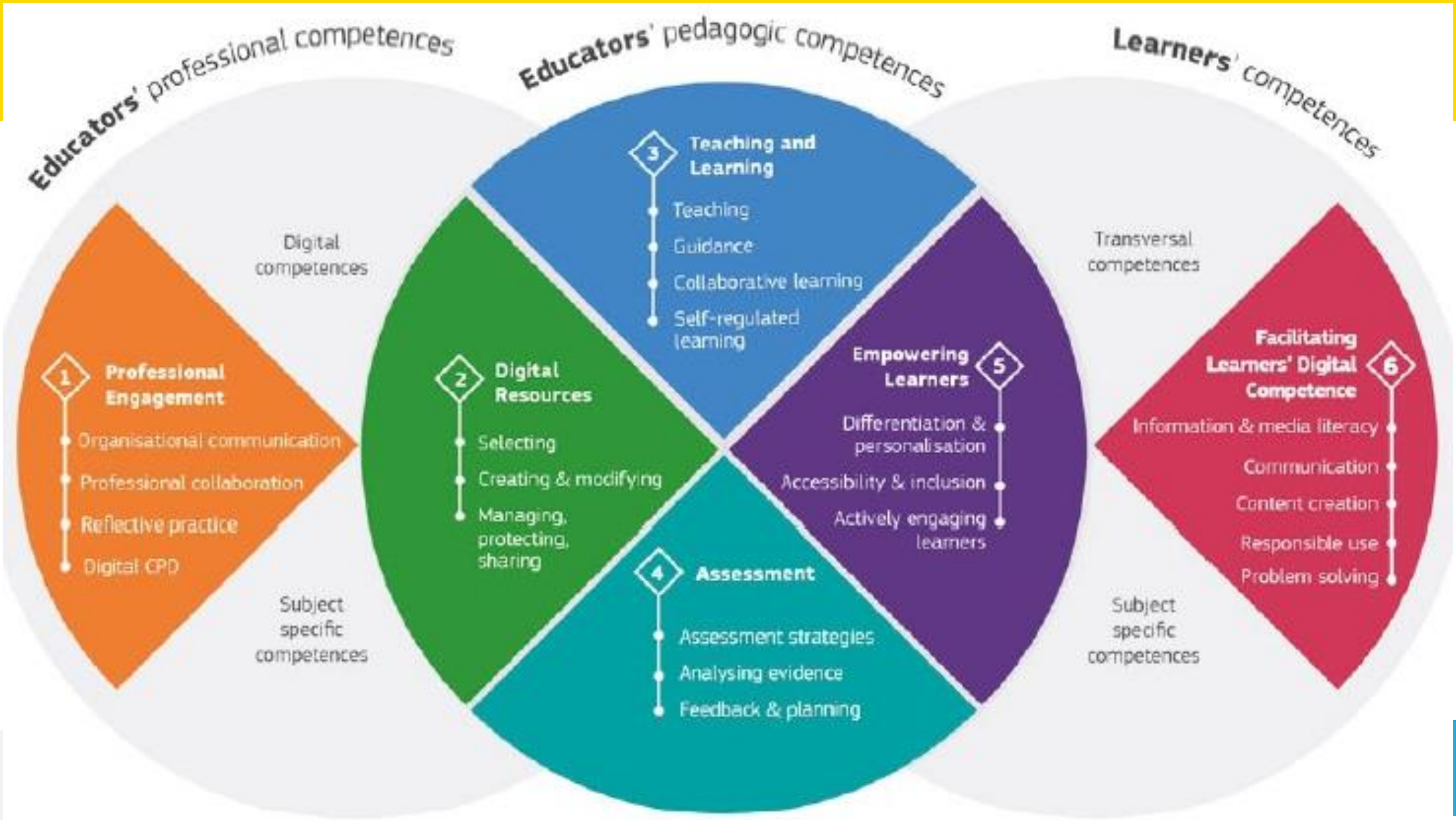

CPD = continuous professional development

(Redecker, 2017, p. 19)

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- DigCompEdu activities remain rather abstract, do not provide educators and learners with sufficient operational information on how to achieve and implement the outlined competencies or learning goals in practice

- Erasmus+ project EDUDIG attempts **to fill the DigCompEdu Framework with operational content** and concrete examples, to

  - Develop an online course for acquiring the relevant competencies on selected levels of progression

  - Establish an e-teaching handbook for self-paced learning towards DT for teachers and students (EDUDIG, 2021)

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A first step: operationalisation of the DigCompEdu Framework competencies

Revised cognitive and action competencies (learning goals) for digitally educated educators and learners for exemplary competency sub-area **3.1 Teaching** of the area 3 Teaching and Learning

a) **To know and understand** digital classroom technologies (e.g., electronic whiteboards, mobile devices, E-portfolio, Digitalised Personal Learning Network (DPLN), Virtual Learning Environment (VLE)) to support digitalised instruction (to reinforce the achievement of the learning objectives).
b) To consider, structure, set up and manage digitalised learning sessions and lessons including content and collaboration in L&T, i.e**., to use an adequate combination** of digital classroom technologies (to reinforce the achievement of the learning objectives).
c) **To reflect on the effectiveness and appropriateness of the pedagogical/ educational strategies** chosen for digitalised teaching according to (a) and (b) and flexibly adjust methods and strategies.
d) **To experiment with and develop new formats and pedagogical methods** for digitalised instruction (e.g., flipped classroom).

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Another example is **DT in Assessment** (Redecker, 2017, pp. 62ff.):

Cognitive and action competencies for exemplary sub-area **4.1 Assessment strategies**

- 'To use digital assessment tools to monitor the learning process and obtain information on learners' progress.' [learning analytics]
- 'To use digital technologies to enhance formative assessment strategies, e.g. using classroom response systems, quizzes, games.'
- 'To use digital technologies to enhance summative assessment in tests, e.g. through computer-based tests, implementing audio or video (e.g. in language learning), using simulations or subject-specific digital technologies as test environments.'
- 'To use digital technologies to scaffold learners' assignments and their assessment, e.g. through ePortfolios.'
- 'To use a variety of digital and non-digital assessment formats and be aware of their benefits and drawbacks.'
- 'To critically reflect on the appropriateness of digital assessment approaches and adapt strategies accordingly.'

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Cognitive and action competencies for exemplary sub-area **4.2 Analysing evidence**

- 'To design and implement learning activities which generate data on learner activity and performance.'
- 'To use digital technologies to record, compare and synthesize data on learner progress.'
- 'To be aware that learner activity in digital environments generates data that can be used to inform teaching and learning.'
- 'To analyse and interpret available evidence on learner activity and progress, including the data generated by the digital technologies used.'
- 'To consider, combine and evaluate different sources of evidence on learner progress and performance.'
- 'To critically value the evidence available to inform teaching and learning.'

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Cognitive and action competencies for exemplary sub-area **4.3 Feedback and planning**

- 'To use digital technology to grade and give feedback on electronically submitted assignments.'
- 'To use assessment management systems to enhance the effectiveness of feedback provision.'
- 'To use digital technologies to monitor learner progress and provide support when needed.'
- 'To adapt teaching and assessment practices, based on the data generated by the digital technologies used.'
- 'To provide personal feedback and offer differentiated support to learners, based on the data generated by the digital technologies used.'
- 'To enable learners to evaluate and interpret the results of formative, summative, self- and peer-assessments.'
- 'To assist learners in identifying areas for improvement and jointly develop learning plans to address these areas.'
- 'To use digital technologies to enable learners and/or parents to remain updated on progress and make informed choices on future learning.'

DigCompEdu (2017)

Realisation step 2

Navigation
- D1 Area
- D2 Competence
- D3 Levels
- D4 Topic – Content
- Autolink
- Search (+Advanced search)

Sub-area

Proficiency level

Competencies

D1 Area → D2 Competence → D4 Content / Topic / Activities → D5 Example of application → D6 More information

D1	D2	D4	D5	D6
3 Teaching and learning	3.1 Teaching	Activity example: ~~To structure the lesson so that different (teacher-led and learner-led) digital activities jointly re-inforce the learning objective~~. Knowledge: Types of blended Learning • Flipped classroom	Flipped classroom is a type of blended learning where students are introduced to content at home and practice working through it at school. This is the reverse of the more common practice of introducing new content at school, then assigning homework and projects to completed by the students independently at home. I can choose appropriate content, elaborate it for distance learning: interactive content, videos, audio files. I have created the exercises and activities for face2face meetings	Flipped classroom More: link H5P tool – creating interactive content More: link Audacitiy tool – edit audio file More: link

* D xxx Reformulated dimension
D xxx New dimension

Website Concept

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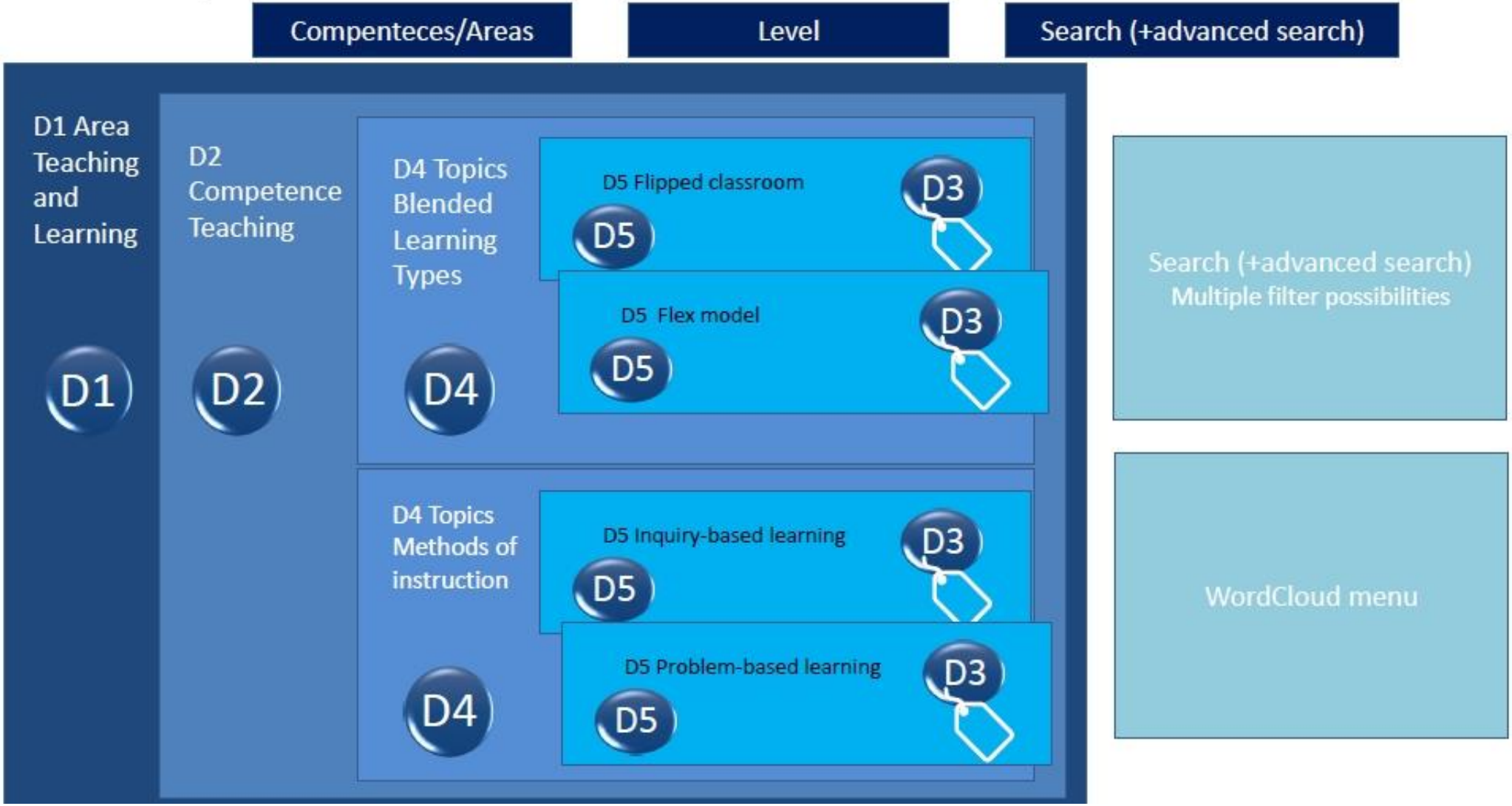
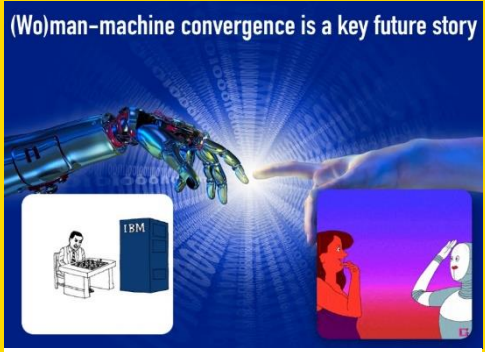
Website Concept



Implications and conclusions



Relevance of results of qualitative conceptual analysis of the networked concept of quality literacy in DT in higher education L&T and EDUDIG project (preliminary):

- Clarify and better understand the **complexity of quality literacy in DT** (incl. AI)
- Identify **tasks and activities for universities** to make DT a successful reality
- Identify and **operationalise DT competencies** required for teachers, students, quality managers, leadership, other stakeholders
- Support further **(self-)education of teachers and learners** towards DT competencies

Implications and conclusions

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Overarching networked concept of **quality literacy in DT** in multiple-hybrid organisations

- Needed for **analysis/classification of issues around DT** (here focus on: HEIs, L&T, main stakeholders: teachers, students, quality managers and leadership)
- Shows that different dimensions of DT quality are endogenous to each other and can evoke different quality strategies and ways of quality management that may lead to different styles of quality practices and quality work causing different outcomes and effects that, in turn, produce feedback to quality strategies.
- Could enable actors to detect and better understand these mechanisms and **successfully implement quality enhancement in DT by applying the PDCA** (Plan-Do-Check_Act) cycle (Moen & Norman, 2011) or the more refined Seven Step Action Research Process Model (SSARPM) of evidence-informed organisational development (Leiber, 2019, pp. 325f.)
- An example will be an **e-teaching handbook for self-paced learning for teachers and students** towards DT to augment the DigCompEdu Framework and function as a self-evaluation and learning tool in DT competencies for educators and learners
- Corresponds with the overall idea of **HEIs as learning organisation:** 'systematic problem-solving; experimentation with new approaches; learning from their own experience and history; learning from the experience and best practice of others; and transferring knowledge quickly and efficiently throughout the organisation. Each is accompanied by a distinctive mind-set, tool kit, and pattern of behaviour' (Garvin, 1993, p. 5)

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Limitations of study/ open questions for future research

- Any (strategic) **SWOT analysis may be improved**
- Desirable to have **further intensive case studies on the status of DT in HEIs**, particularly for **different countries** and **HE systems**, different **institutional types**, and different **faculties** and **subject fields**
- Application and critical reflection/ **evaluation of EDUDIG results required**
- …

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