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FAKULTÄT
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DIGITAL DATA LITERACY COMPETENCIES: THE ROLE OF UNIVERSITY TEACHER TRAINING

Two main dimensions of data literacy

1. Understanding data, which means the dealing with or the handling of data
2. Teaching data as well as teaching with data,

Understanding Data

"Digitisation is not a purely technical issue. It becomes the most pertinent process of knowledge construction in a Digital Age impacting collective memory and consciousness – even on a global scale" (Ceesay et al. 2022: 2)

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Teaching Data – Teaching with Data

Technology and especially Open Educational Resources (OER) can support education worldwide and develop access even under difficult conditions (UNESCO 2021).

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Teaching Data – Teaching with Data

"One prerequisite for quality improvements is that digital teaching formats are underpinned by didactic concepts. At present, this is not realized in all cases. Concepts do exist, but they are not adapted to the specifics of different subjects and are not yet anchored across the board at universities. Also, learning theory approaches should be used more intensively to reflect on formats, teaching-learning methods, and instruments and its impact on different learning goals" (Wissenschaftsrat 2022: 45; translated by Iwers).

Requirements on digitalisation and data literacy

Data Literacy Charta

Data Literacy Reflection via 4 questions:

- What do I want to do with data?
- What can I do with data?
- What am I allowed to do with data?
- What should we do with data? (Schüller et al. 2021: 1)

Guiding principles

1. Data literacy must be accessible to all people.
2. Data literacy must be taught throughout life in all areas of education.
3. Data literacy must be taught as interdisciplinary competence across all subjects from three perspectives: the application-oriented (What is to be done?), the technical-methodological (How is it to be done?) and the socio-cultural (What is it to be done for?) and therefore needs interdisciplinarity
4. Data literacy must systematically cover the entire process of insight and decision-making with data.
5. Data literacy must include knowledge, skills, and values for a conscious and ethically sound handling of data (Schüller et al. 2021: 2-4)

Definition of Data Literacy

"Data literacy is the ability to collect, manage, evaluate, and apply data, in a critical manner" (Ridsdale et al 2015: 2).

Heidrich et al. (2018) affirm this definition and describe its dimensions as fundamental for Data literacy and its development as core competence or key competence of the 21st century.

Definition of Data Literacy

- Forming the issue, asking the right questions
- Data collection
- Data analysis
- Data interpretation
- Decision making and communication (Schüller et al., 2019)

The Data Literacy Cycle

Thefairtraide.com

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Future Skills – a Framework for Data Literacy

The study is based on a broad definition of data literacy:

"Data literacy is the cluster of all efficient behaviors and attitudes for the effective execution of all process steps for value creation or decision making from data" (Schüller et al 2019: 26)

21st century skills framework and assessment (Binkley et al 2012)

The Knowledge category includes all references to specific knowledge or understanding requirements for each of the 10 skills

The Skills category includes the abilities, skills and processes that curriculum frameworks are designed to develop in students based on their knowledge

The Attitudes, Values, Ethics category refers to the behaviors and aptitudes that students exhibit in relation to each of the 10 skills.

21st century skills framework and assessment (Binkley et al 2012)

Ways of Thinking:

- Creativity and innovation
- Critical thinking, problem solving, decision making
- Learning to learn, metacognition

Ways of Working

- Communication
- Collaboration (teamwork)

21st century skills framework and assessment (Binkley et al 2012)

Tools for Working

- Information literacy (includes research on sources, evidence, biases, etc.)
- ICT literacy

Living in the World

- Citizenship – local and global
- Life and career
- Personal & social responsibility – including cultural awareness and competence

The framework of Prado & Marzal 2013

1. Understanding data

1.1. What is data?

Competency: Learners need to know what is meant by data and be aware of the various possible types of data.

Contents: Data definition; types of data (depending on origin, format, usage license and so on).

1.2. Data in society: A tool for knowledge and innovation.

Competency: Learners need to be aware of the role of data in society, how they are generated and by whom, and their possible applications, as well as the implications of their use.

Contents: Data producers and consumers; data lifecycle; data applications: their impact on science and society; copyright and licenses influencing data reuse.

The framework of Prado & Marzal 2013

2. Finding and/or obtaining data
3. Reading, interpreting and evaluating data
4. Managing data
5. Using data

Models of Data Literacy

Different competency models like these two in comparison show a fundamentally different systematic,

- either presenting knowledge, skills and values as different dimensions of a competence
- or treating them as different competency dimensions.

Future Skills – a Framework for Data Literacy

The model combines

- competence areas derived from a general process of data processing,
- the analysis of partial competencies for each field or subject, with regard to ascending levels sensu Bloom (1976); Kratwohl & Bloom (1997).
- the dimensions knowledge, skills/abilities as well as attitudes/ values/ ethics and
- a qualification level (here classified as basic, advanced and expert level) (Schüller et al. 2019)

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Outline category one: the data process

Coding

- Establishing data culture
- Providing data
- Analyzing data
- Deleting context

Decoding

- Derive actions
- Interpreting data
- Interpreting results
- Adding context

Outline category 2 – 4 of the framework

2: partial competencies for each field

3: KSAVE: Analysis of knowledge, skills/abilities as well as attitudes.

4: Level specifications that represent a simplification of the EQF levels (basic, advanced, expert)

Future Skills – a Framework for Data Literacy

"On the coding side, data literacy shows up in the awareness of which contextual knowledge is removed or added in the process (...) - and which message is thereby transported with the data. On the decoding side, data literacy shows up in the awareness of which information is actually contained in the statistic/graph and which is added in the decoding process or "forced" by coders (...). Both require a deep and broad expertise in the respective discipline." (Schüller et al 2019: 28, translated by Iwers).

Teacher Training

- Enhance the knowledge, skills, attitudes, values and ethics of students dealing with any kind of data. Methods to train processes of coding as well as processes of decoding for our students therefore have to be developed systematically.

- Enhance the digitally based didactic competencies of our teachers and teacher trainees. Digitalization places high demands on the teachers' competences regarding didactics, methodology, communication, interaction, and organization

Summarizing questions

- Which didactics fit to which competencies
- How can innovative teaching methods be developed based on modern learning theories and learning approaches
- What teacher training program is needed for our future teachers
- To which results does it lead us to transform these questions into history education with a focus on digitalized archives?