“Data in the disciplines”
Curricula development at Bielefeld University

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Strategies beyond borders, December 10, 2019
Agenda

Literacies for the Digital Age

The DatKom project at Bielefeld University
  • The organizational perspective
  • The teaching perspective

Data literacy education as a joint task
Literacies for the Digital Age

Or are they just new terms for old competencies?
Literacies for the Digital Age

Digital Transformation

Understanding and using technologies and data

Shaping Digital Transformation
What is Data Literacy?

“Data literacy is the ability to collect, manage, evaluate and apply data in a critical manner.”
Ridsdale, et al. (2016)

Data literacy is a future skill in all sectors and all disciplines.

Data literacy is a prerequisite for active citizenship.
Why do we need Data Literacy?

Christmas is all around
And so is data!
Why do we need Data Literacy?

Individuals have to be empowered to responsibly handle data…

…and to understand information derived from data
Data Literacy Skills and Competencies

Conceptual Framework
Introduction to data

Data Collection
Data Discovery and Collection
Evaluating Quality of Data and Sources

Data Management
Data Organisation
Data Manipulation
Data Conversion
Metadata Creation and Use
Data Curation, Security and Re-Use
Data Preservation

Data Evaluation
Data Tools
Basic Data Analytics
Data Interpretation (Understanding Data)
Identifying Problems Using Data
Data Visualization
Data Presentation (verbally)
Data Driven Decision Making

Data Application
Critical Thinking
Data Culture
Data Ethics
Data Citation
Data Sharing
Evaluation Decisions based on Data

Strategies and Best Practices for Data Literacy Education – Knowledge Synthesis Report (Dalhousie University) Ridsdale et al., 2015
Data Literacy Skills and Competencies

6 fields of competence

(A) Establish a data culture
(B) Provide data
(C) Analyze data

Data

System

Data product

Production

Reception

(D) Interpret results
(E) Interpret data
(F) Derive action

Remove context
Add context
How can we teach Data Skills?

- Raise awareness for data competencies at an **early stage**
- Emerging teaching approaches
- **Iterative, project based learning** with complementary skills integrated
- Increasing engagement with the content by using **real world data**
- **collaboration** between educators, organizations, and institutions to ensure goals are being met by all stakeholders
The DatKom Project at Bielefeld University
Vision of the DatKom Project

**Data Literacy Education**

Integrate data-competencies into the curricula of all degree courses

- Discipline specific courses
- Interdisciplinary courses
- Sustainable educational (online-) resources

**Data Awareness**

Raise and sharpen awareness for data and data-competencies throughout Bielefeld University

- Events
- Exchange
Vision of the DatKom Project

Make Data Literacy Education an integral part of the curriculum for every student at Bielefeld University

~ 25,000 students
118 degree programs
Organization is everything...

- Project coordination
- "richtig einsteigen."
  ("getting a good start")
- Center for Teaching and Learning (ZLL)

Bielefeld Center for Data Science

- + Interdisciplinary
- + Collaborative
- + Needs-orientated
How can we reach as many students as possible?

Bielefeld University’s study model:

- **Standard module sizes** (10 CPs) -> share or exchange teaching units between subjects and across degree programs
- **General examination regulations** for all the university’s degree programs
- **Elective Module** -> 30 CPs for Bachelor students, 20 CPs for Master students

**Development of a novel Elective Module:**

Input:
- 6 lecturers (Educational Sciences, History, Sociology, Business Administration, Data Science)
- Administration
- 4 months

Output: …
Data Literacy Module

„Data Literacy – cultural technology of the 21st century“

Lecture series & tutorials
Data Literacy for all students from an interdisciplinary perspective
I. The role of data in the modern world
II. How do we face data?
III. Transformation of data into knowledge

Connecting courses (different faculties)
Selectable courses
Hands-on
Project-based
Analysis tools
Programming languages
Visualisation and presentation
...

Big Data is watching you!
How to deal with data in the modern world.
Part I
The role of data in the modern world

The data based perspective
From idea to data – part I
From idea to data – part II
Data-based decision making - experts from local economy and administration*

Part II
How do we face data?

Data management (quantitative focus)
Data management (qualitative focus)
Data protection and data ethics*

Part III
Transformation of data into knowledge

Explorative data analysis with R
Tools for data analysis
Tutorial for data analysis with R**
Data modeling (quantitative focus)
Tutorial for data analysis with R**
Data Science-Toolbox
Data modeling (qualitative focus)
Machine Learning*

*Invited Speakers
**Tutorials
Big data is watching you!

213 registered participants
42 different major subjects
Big data is watching you!
Curricular integration

Establishing Data Literacy as a goal for teaching and learning

Development of (discipline-specific) concepts:

- Which are the key data competencies for which discipline?
- How can these competencies fit into existing curricula?
- Which requirements have to be met (i.e. training, infrastructure)?
- Evaluate if basic data courses can be opened for students of other disciplines
- Exchange for teachers
Quality Fund for Teaching

Internal call for proposals for innovative teaching concept (up to 5,000 €/concept)

Summer term 2019 and winter term 2019/2020: call for concepts to support literal, mathematical and data competencies

-> The majority of proposals has a clear focus on data literacy education
Data Story Center

Find, share and understand data

Web portal for students, teachers and scientists

Resource for real world data

Case studies for analysis, visualisation and interpretation of different types of data
Data Literacy Education as a Joint Task
Data Literacy Education.nrw

State funding program

OWL = Ostwestfalen-Lippe
DataLiteracySkills@OWL

Aims of the concept:

1. Raising Data Awareness
2. Developing and anchoring data competencies as a subject in teaching and learning for all disciplines
3. Paving the way for lecturers
4. Developing a corporate data literacy education framework as a basis for an OWL-wide data literacy certificate

Data Literacy Skills for science, economy and society in OWL and beyond
Conclusion

The Digital Turn is cause and consequence for novel skills and competencies…

…but how can we implement them?

Develop strategies to bring these competencies into the curricula

Bring together stakeholders, foster interdisciplinarity

Overcome borders to learn from each other and join forces
Thank you!

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