



# teknosofikum

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# Teknosofikum

Funded by UFM 2020-2023  
6 iterations of the course  
~ 100 participants



Royal  
Danish  
Academy

Architecture  
Design  
Conservation

IT-UNIVERSITETET I KBH

KØBENHAVNS  
PROFESSIONS  
HØJSKOLE **KP**

 Ministry of Higher  
Education and Science  
Denmark



# The Team



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Developer



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**Teddysofikum**  
Mascot

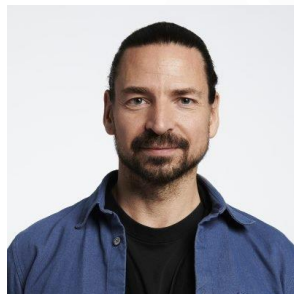


# Project Group



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Assoc. Prof., Royal  
Danish Academy



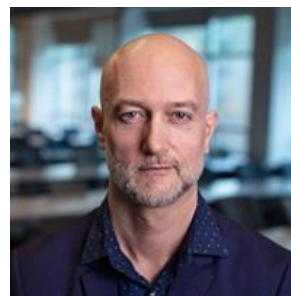
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# Steering Group



**Mathilde Aggebo**

Dean of Design, Royal  
Danish Academy, 2021 -23



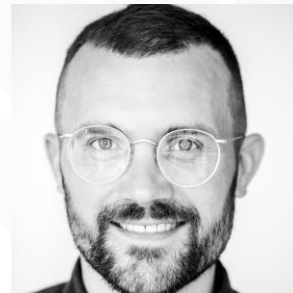
**Eva Kappel**

Head of Education,  
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**Lone Malmberg**

Head of Digital Design  
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**Peder Hjort-Madsen**

Head of TEACH, KU  
2022-23



**Martin Sønderlev**

Head of Institute of  
Didactics and  
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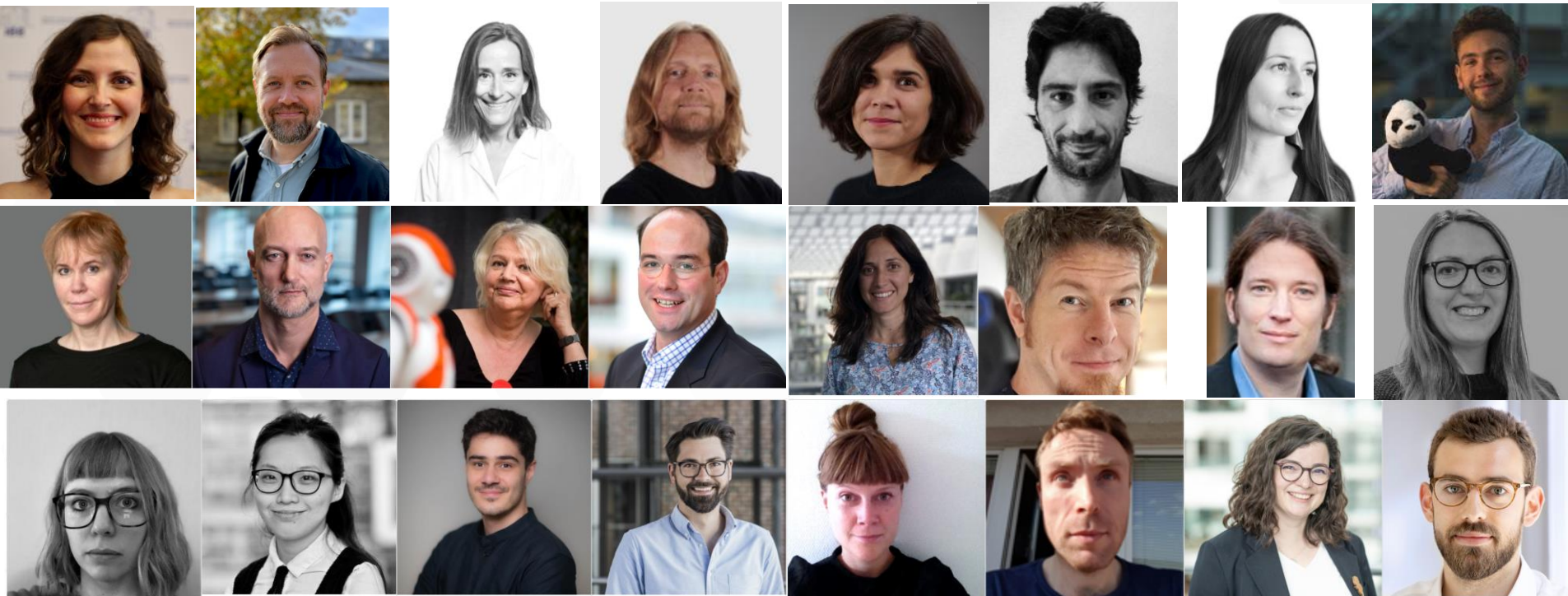
**Kristian Lauts**

Prorektor, University of  
Copenhagen, 2020-22



# The many experts (not limited to...)

Technology Education made relevant  
by experts from Law, Design, IT and Education





# Looking back to 2021...

We failed fast  
Embraced the needed changes  
To focus on the common ground  
Of pedagogies and didactics:

A place to meet and share  
To be inspired  
To learn new ways  
The future of  
digital  
technology  
education



*image generated by Jeppe, Silbera Møller using Midjourney,  
based on text made with ChatGPT.*



# A mindset of innovation

Create a common ground and vision

A space for everyone's professional expertise and individual personalities

Flat hierarchy

Not a predetermined solution

Gather and be open for feedback

Failure and change is part of the process

Iterate-iterate-iterate



*image generated by Jeppe Kilberg Møller using Midjourney,  
based on text made with ChatGPT.*



# A design vision

## Accessible quality content

- Focus on usability
- Beauty\* in visual design and videos

## High focus on the user

- Embrace inter-disciplinarity
- Empower them to choose
- Motivate to consume
- Gather feedback continuously

*\*It's not just WHAT we show, but also HOW we show it*



*image generated by Jeppe Kilberg Møller using Midjourney,  
based on text made with ChatGPT.*



# Feedback, qualitative

*Very professional setup. Super interesting topics, and if a topic was less interesting, I just chose another because there were so many good topics.*

*Both, the workshops and online meeting were engaging. Good activities! I liked and appreciated the diversity of the groups. Good mixture of working in groups [...]*

*Very informative and highly recommendable*

*Super relevant. It sparked many good ideas.*

*Very interesting content. I do not like so much the long podcasts. I like more the shorter video sections with small tasks in between.*

*Engaged facilitators, aesthetically and knowledge-appealing platform with solid content. Interesting cross-sector discussions.*

*I liked the courses that consist of many parts and varies with interactivity.*

*(Online): Even though 1,5 hours seem like much, especially the two sessions seemed too short. We could probably [...] use the double amount of time discussing.*



# Evaluations, quantitative

	Spring '22*	Fall '23*	Average*
I found the Workshop(s) and/or Online Meetings engaging:	4,0	4,6	4,2
I learned something from the Workshop(s) and/or Online Meetings:	3,9	4,4	4,3
I found the online content engaging:	3,9	3,8	3,9
I learned something from the online content:	4,3	4,2	4,2
I found potential activities to use in my teaching:	4,3	4,2	4,0
How likely are you to introduce new elements into your own teaching based on your learnings achieved in Teknosofikum?	<i>not asked</i>	4,6	4,3
*Scale: 1-5			
Would you recommend Teknosofikum to a colleague?	82%	100%	91%

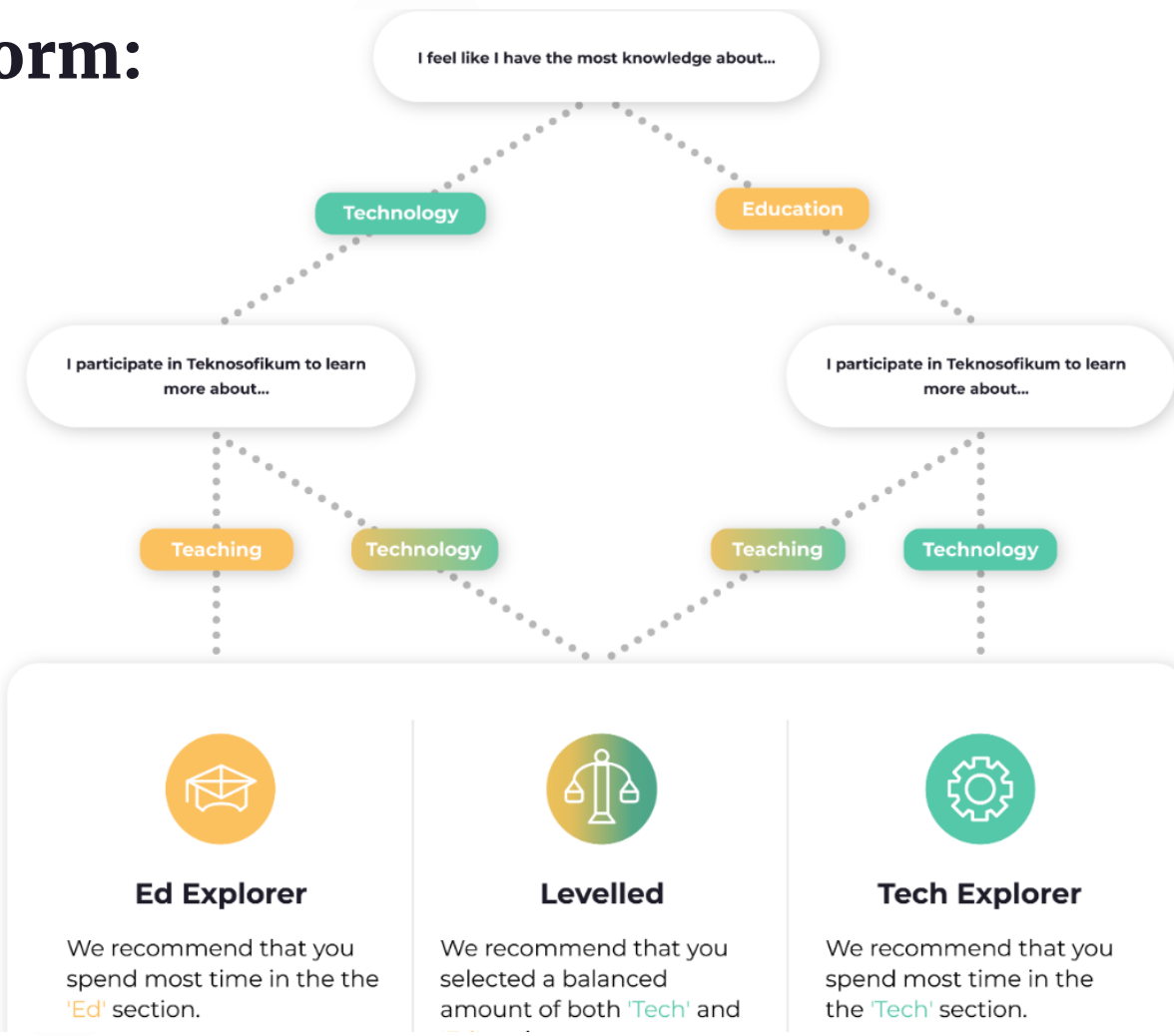


# Design, platform: Onboarding.

Challenge:

**How to navigate 40+ topics easily?**

- Acknowledge different needs
- Help make qualified decisions





# Design, platform: Navigation.

1. Categorize
2. Overview for user decision
3. Visualise it
4. Show how long it takes
5. Celebrate progression!



## Courses



### Teaching Styles

2

What is good teaching? How to motivate students to learn? The most effective teachers vary their styles depending on the subject matter, the audience, the phase of the course, and many other factors. Here, we explore some new strategies, techniques, and ideas.

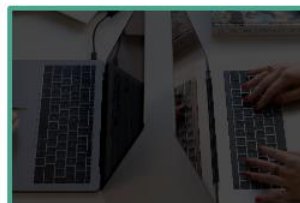
3



Workshop  
The 5 Teaching Objectives

30 min

4



Education  
Technology Ownership

40 min

✓ Completed

5



Education  
Learning Strategies

40 min

✓ Completed



# Design, platform: Engagement

1. Summarise what will happen
2. Show progression
3. Relevant and inter-disciplinary

**Online learning should be active learning!**

## What is Computational Thinking?

1

Computational Thinking is a highly contentious subject with many diverging meanings and definitions. Watch the video to understand a bit more about this concept.



*\*You will find the paper from the video on the last slide of this topic.*

2

► English Video Transcript

► Danish Video Transcript

On the following 2 slides we propose different activities related to your disciplinary field.

Please choose the case that relates mostly to your expertise and go to the respective forum to give your professional advice.

3

### IT

You are tasked with modelling theft risk for an insurance company and find a correlation between zip code and number of burglaries.

[In the forum](#) discuss pros and cons of including zip code as a feature in a machine learning application.

### Law

A machine learning application is trained on public available data (e.g., licensed under GNU GPLv3 and CC BY 4.0); that is, it does not include licensed data or source code, but only algorithms are trained on such data.

[Discuss](#): Which terms apply to this application? What if the system has the capability of reproducing licensed material in verbatim (e.g., source)

### Design

Find an example of a manual task that can effectively be automated using ML. Determine the different stakeholders for this problem, and sketch personas for each.

[Discuss](#) how these personas can aid data collection for a robust and fair distribution of data.



# Evaluation Methods

We used mixed methods for feedback  
– and tracked it over time:

## 1. Timeliness:

Gain insights on topics just after completion.

## 2. Qualitative evaluations of the workshops

## 3. Quantitative course survey

1

I found The 5 Teaching perspectives topic..

Mode: Anonymous

(1=low to 5=high scale)

Informative

☐ (1) ☐ (2) ☐ (3) ☒ (4) ☐ (5)

Inspiring

☐ (1) ☐ (2) ☐ (3) ☐ (4) ☒ (5)

Relevant for my teaching

☐ (1) ☐ (2) ☐ (3) ☒ (4) ☐ (5)

If you have additional comments, please comment here:

I like how...

2

## Questions for plenary on teaching perspectives

Did anyone see a huge difference in the various columns across perspectives?

Then importance of paying attention to responsive processes learning

With so much emphasis on karakteras how can we foster creativity?

Do you think that that technology has changed the way students see themselves and, in extension, their view on their education?

Disharmony between students and teachers expectations and aims.

How do the different teaching perspectives or teaching styles influence the teaching activities- for example can you do peer to peer teaching for all five

Issue with student eceptions for detailed reuirements for learning process and exam versus teachers Intentions to activate students and make them more responsible for learning process.

What to do when students find peer to peer activities hard because they don't respect each others knowledge?

Want to have the students reflect, but the students are scored, do not have the basic knowledge/ do not dare to not have the right answer

3

Engaging?	Learned?	T-idea	T-plan	Other?	Online C?	Learned O?
Q03_7->I f	Q03_7->I f	Q04_11	Q05_11	Q06_11	Q07_Onlir	Q08_7->I f
Q08_7->I f	Q08_7->I f	Q08_7->I f	Q08_7->I f	Q08_7->I f	Q08_7->I f	Q08_7->I f
5	5	Good. I de	Creating v	I really ap	4 : I compl	5
5	5	Short and	Engaging	They were	4 : I compl	5
4	4	Great to v	A good ex	I think the	3 : I compl	4
5	5	I liked ven	It was goo	Both, the	4 : I compl	5
4	4	I was hap	It was ver	I liked the	4 : I compl	4
4	4	Useful act	This was	very useful.	4 : I compl	4
4	4		Very nice	Nice to be	4 : I compl	5
5	5	Very inspi	I find that	The meta	3 : I compl	4
5	5	Generally	It was ver	good to a	3 : I compl	4
4	4	It was good	to have i	n the sec	4 : I compl	5
4	4	That was	It was pro	I found m	3 : I compl	4
4	4	It was good	to have i	n the sec	4 : I compl	5
4	4	That was	It was pro	I found m	3 : I compl	4
4,4	4,4					4,4
						4,3



# Change of Scenery

*image generated by Jeppe Kilberg Møller using Midjourney,  
based on text made with ChatGPT.*



**teknosoftkum**



Teknosofikum course/concept

# Design principles

Magda Pischetola

Assistant professor  
University of Copenhagen



Photo by Jason Leung on Unsplash



participation

complete a total of **12 topics**

participation +  
final assignment

Hybrid

Online

On-site workshop #1

Online kick-off

Virtual learning  
platform and  
midway meeting

On-site workshop #2

Online roundup



# **How to design for professional development in technology education?**



# Theoretical premises

## Professional development concept

- in-service HE teachers
- different disciplinary fields / digital skills
- meaningful shift of practices

## HE teachers' digital competences

- Technical/computational skills
- pedagogical skills (uses but also beliefs!)
- critical skills

DBR





# Theoretical premises

professions



**ASSEMBLAGE**



digital competences

heterogenous composition of **human, social, and material components** – some more visible (e.g. physical buildings, disciplinary curricula) – some less visible (e.g. institutional relations, professional groups, market interests, personal beliefs) that meet in specific situated contexts



# The initial plan: eight modules

- Digital learning
- Computational trends, thinking & doing
- Design in a digital world
- Digital law and rights
- Digital macro trends
- Data analysis and data visualization
- Intro to programming and IT thinking
- Intro to basic IT user



# The initial plan: ~~eight~~ **six** modules

- Digital learning
- Computational trends, thinking & doing
- Design in a digital world
- Digital law and rights
- Digital macro trends
- Data analysis and data visualization
- Intro to programming and IT thinking
- Intro to basic IT user



# Methods: Design-Based Research

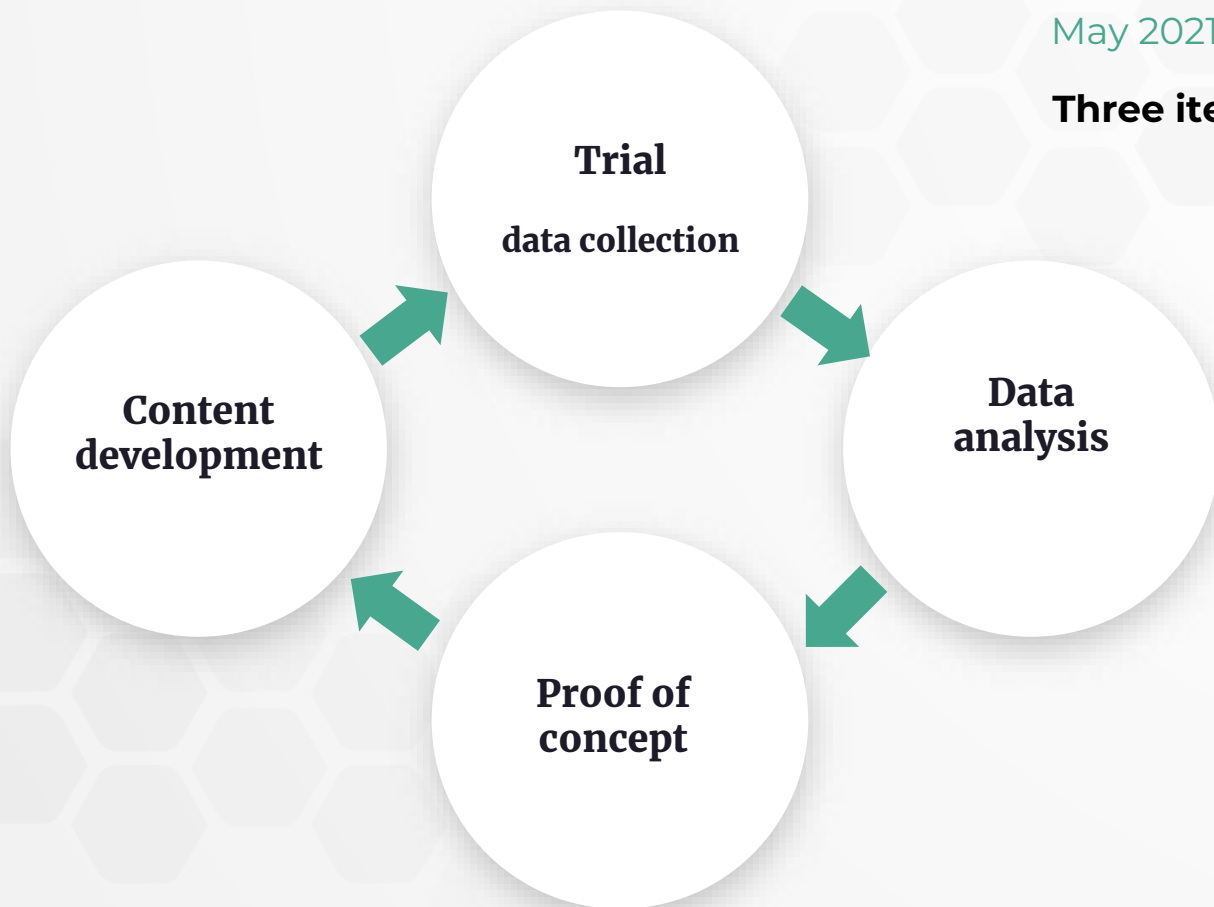
- Investigates **real-life settings** + designs an **intervention**
- **Iterative method** in three phases (preparation, experimentation, retrospective analysis)
- **Bridge** between educational theory, research, and practice
- Useful for **technology education** as it addresses the complexity of a setting → generates a learning theory



# Design-Based Research

May 2021-May 2022

**Three iterations**





# Methods: participants

<b>Participants</b>	<b>Iteration #1 (May 2021)</b>	<b>Iteration #2 (Oct 2021)</b>	<b>Iteration #3 (March 2022)</b>	<b>Tot</b>
<b>Hybrid format</b>	--	22	20	42
<b>Online format</b>	7	--	15	22
				64



# Methods: data collection

**Qualitative data** collected along 3 iterations (I-III):

- **Online group interviews** with 7 course participants (I)
- **Online group meetings** with 15 course participants (III)
- **Participant observation** at on-site workshops (II/III)
- Posts on **online forums** (I/II/III)
- **Feedback surveys** with participants (II/III)



# First trial

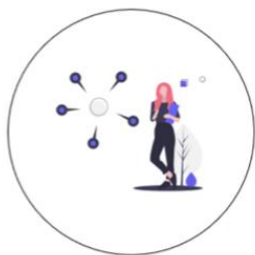
Design principles:

- **Individual skills**
- **Linearity** (4 modules, one per discipline)
- **Instrumental tech**

## Module 1 – Digital learning



Thoughts about  
online teaching



Teaching  
perspectives

## Module 2 – Computational trends



Invisible women



Smart  
technologies

## Module 4 – Digital law



Technology and  
Regulation



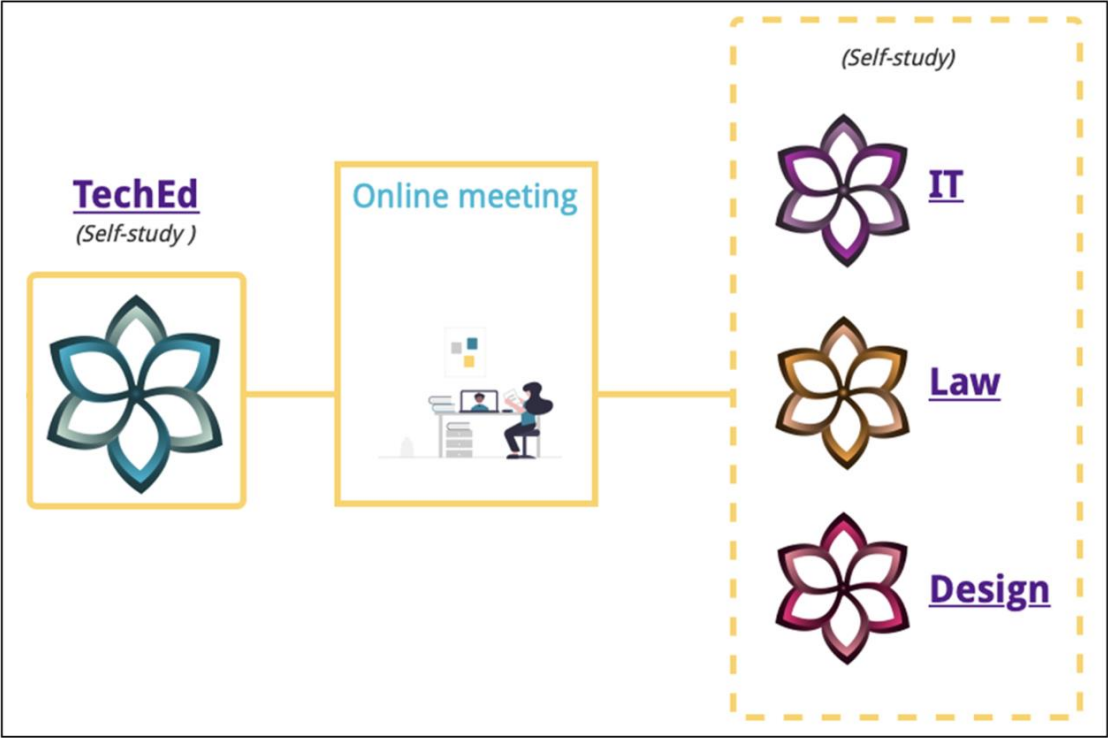
About the GDPR



# Second trial

Design principles:

- Individual skills **Practices**
- Linearity**
- Instrumental tech **Critical tech**





# Third trial

## Technology

### Introduction to the Tech section

In this section, you will find many different topics that relate to computational trends and the way that technology is transforming all professions.

The topics are not necessarily linked to each other, and they are also not comprehensive of all the elements regarding a particular trend.

Watch the intro to know more about our definition of technology and then pick the topics you find most relevant to discuss the transformations in your field.



## TOPICS



IT 45 min  
Technological Attentionality



IT 30 min  
Tech and Society



IT 30 min  
Machine Learning



IT 45 min  
Big Data and modern AI



IT 45 min  
Blockchain



IT 30 min  
Regulation, Organizations, and IT



IT 30 min  
Biases in Algorithms



Law 15 min  
Law and Technology

## Design principles:

- — Practices **Praxis**
- — Linearity **Non-linearity** (20 topics, 2 groups)
- **Critical tech**



# Final design principles

Design principles:

- **Praxis**
- ~~Non-linearity~~  
**Organized non-linearity**
- ~~Critical tech~~  
**Relational tech**

## Technology



Digital Design



Digital Trends



Tech & Regulation



Digital  
Empowerment

## Education



Teaching Styles



EdTech Tools



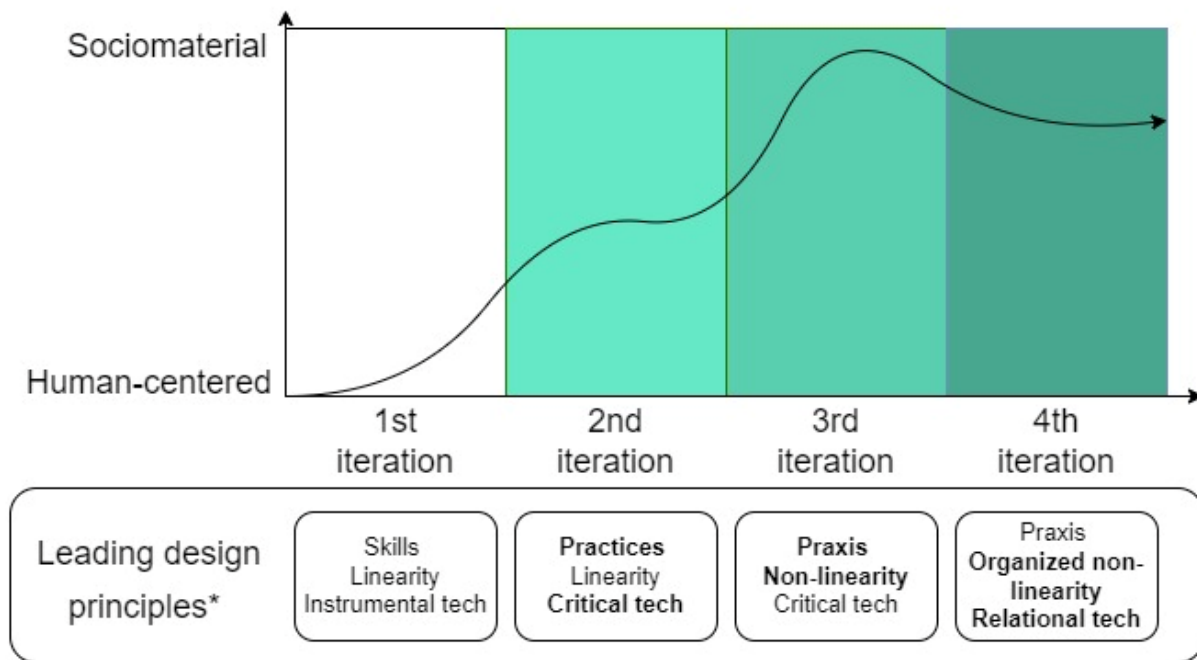
AI and Education



EdTech in Higher  
Education



# Design principles evolution



\* Changes between each iteration highlighted in **bold**



# Final re-design

News,  
Entertainment,  
SoMe

Recommendation  
(Recsys) and  
automation

Democracy &  
Electronic  
Voting



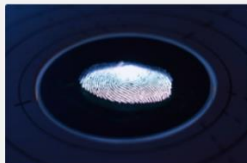
15 min

Technology



Law 60 min  
Regulation OF Technology

Public sector  
tech



Law 45 min  
Regulation BY Technology

## Tech & Regulation



Law 45 mins  
Technology and the Legal  
Field

Deep fakes  
(revenge-  
porn,  
political, etc.)



IT 30 min  
Regulation, Organizations,  
and IT

"Surveillance"  
advertising  
(Cookies,  
profiling and  
other stuff)

"data  
protection  
by design  
and default"

Who  
owns  
data

Algorithmic  
Content  
Regulation



Tech

# Final re-design

Ed



## Digital Trends

Digital trends and AI systems are connected to daily practices in society. This section aims at developing a critical-analytical mindset about computational artefacts, algorithms, and the critical issues related to the production and use of large datasets.



IT 40 min  
Biases in Algorithms



IT 50 min  
Big Data and modern AI  
✓ Completed



IT 40 min  
Machine Learning



IT 50 min  
Applied AI and Machine Learning

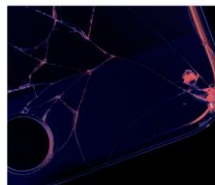


## AI & Education

Teachers need to develop critical awareness towards educational technologies, AI, and the use of data. In this section, we reflect upon the trends in education that present new challenges and ethical dilemmas.



Education 70 min  
Generative AI & Education



Education 50 min  
Problematic EdTech



Education 50 min  
Education and the new laws of robotics



Education 50 min  
Automated surveillance in education



# How to design for professional development?

## Professional development concept

- in-service HE teachers
- different disciplinary fields / digital skills
- meaningful shift of practices
- **Activity-oriented teacher collaboration**

## HE teachers' digital competences

- Technical/computational skills
- pedagogical skills (uses but also beliefs!)
- critical skills
- **Agency**



# Change of Scenery

*image generated by Jeppe Kilberg Møller using Midjourney,  
based on text made with ChatGPT.*



# tekno**sof**ikum

## Outcomes

Jelena Popov ([jepo@itu.dk](mailto:jepo@itu.dk))  
Giacomo Poderi ([gipo@itu.dk](mailto:gipo@itu.dk))

IT University of Copenhagen



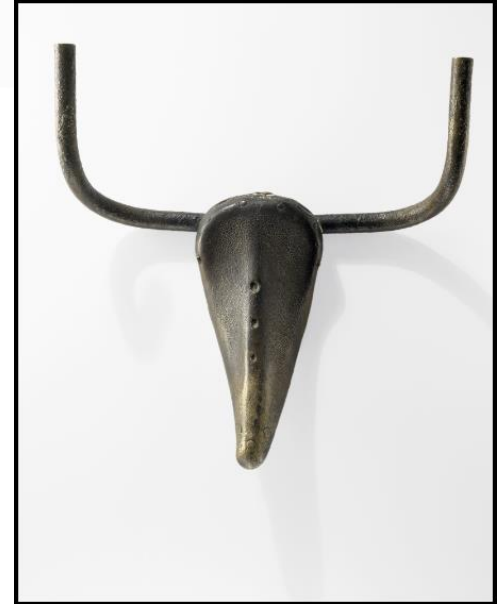
# What kind of outcomes?

- Official Learning Outcomes - Course Designer perspective
  - Increase your knowledge about teaching strategies
  - Enhance critical reflections on the relationship between technology and pedagogy
  - Achieve new perspectives on tools and platforms for teaching
  - Enhance your knowledge of the implications of technology in higher education
  - Enhance your ability to use technology in creative and pedagogically conscious ways
- Learning Outcomes - Participants' perspective
  - What was valuable, relevant, and purposeful?
  - What has changed in practice?
  - Professional learning perspective



# What kind of process ?

- From Transfer to **Recontextualisation**
- Transfer: Intended learning outcomes -> Acquired -> Transferred to Teaching Practice
  - Recontextualisation: resources transformed, re-purposed, personalised
    - Works for multi-disciplinary participants
    - Different starting points, backgrounds, intentions



Picasso 1942 Bull's head MoMa



# Methodology

- Population: 73 Teknosofikum participants
- Sample: 15 interviews in Spring/Summer 2023
- 30-40 minutes interviews
- Questions: Experience with Professional development courses, Strengths and Weaknesses of Teknosofikum, Impact/Outcome, and Role of digital technologies
- Online and f2f
- Analysis of salient themes in regards to Impact/Outcome



# Sample

Table 1. Research participants in evaluation

ID	Position	Gender	Institution	Teach. Exp.	Course format
P1	PhD	M	Univ.2 – Architecture and Design	0-5	Hybrid
P2	PhD	M	Univ.1 – Digital Design	0-5	Hybrid
P3	Assistant prof.	F	Univ.1 – Computer Science	11-15	Hybrid
P4	Assistant prof.	F	Univ.1 – Computer Science	6-10	Hybrid
P5	Assistant prof.	F	Univ.2 – Architecture and Design	6-10	Online
P6	Assistant prof.	M	Univ.1 – Digital Design	6-10	Hybrid
P7	Associate prof.	F	Univ.1 – Digital Design	11-15	Hybrid
P8	Associate prof.	M	Prof.HS1	15-20	Online
P9	Associate prof.	M	Prof.HS1	6-10	Hybrid
P10	Associate prof.	M	Univ.3 - Law	11-15	Hybrid
P11	Associate prof.	M	Univ.2 – Architecture and Design	11-15	Hybrid
P12	Ext/Temp Lect.	M	Univ.1 - Computer Science	11-15	Online
P13	Ext/Temp Lect.	M	Univ.1 – Computer Science	0-5	Hybrid
P14	Full prof.	F	Prof.HS1 – Nursing and education	20	Online
P15	Full prof.	M	Prof.HS2 – Nursing and education	15-20	Online



# Results: Summary

- What was useful for subsequent teaching?
  - Knowledge, concepts and ideas from Teknosofikum (e.g. computational thinking, history of technology)
  - Tools: Technological and pedagogical (mud cards, tech implosion, Miro, Mentimeter)
  - Networks (interdisciplinary perspectives, peer learning, peer feedback)
- Two kinds of personally meaningful outcomes
  - Transformation of perspectives and possibilities for acting with regards to teaching and technology
  - Transformation of teaching activities (new course content, new pedagogy, inclusion of technology etc.)
- Identified six different learning outcomes: 3 types of resources x 2 types of learning outcomes



# Results: Examples

We're actually working on some development projects that have to do with technology attached to the professions. Some of the input I got [from ] I thought was relevant as further background information and more inspiration For example computational thinking was one of the courses [in Project T] and some of those things helped me get a deeper understanding of what we're talking about that I think can inform the way that works in these development projects and the development projects have to do with how we teach our students technological literacy

*Professor, Nursing and Education,*



# Results: Examples

What I can say is that both the basic introductory course to legal method and the course in legal philosophy and legal sociology, have now a particular plan on how to use and introduce the various digital instruments in the teaching. And this is now an official plan. It [Teknosofikum] definitely opened up a new teaching space for me, and it helped me to address some problems that I thought were sort of inherent in the teaching situation and there was no really good way to address

*Associate Professor in Law*



# Results: Examples

Some of my colleagues took the online version so we asked what did you do, which ones did you take and what did you get out of it? And I think for me, it was, at least in my department, it mainly revolved around the topics that I just discussed. So we were trying to translate it between ourselves, you know, what implication does that actually have on teaching them?"

*Associate Prof, professional school*

The people they are all interested and you hear their perspectives and see how they think of it and plan to use it. You get very hands-on things you can take away (...) It's very creative people who go attend the course. It's part of the profession to develop things all the time. So, they come up with good ideas. It might not be an idea you can take and put in your course, but it's still, it's a pool of ideas. *Assistant Professor, Computer Science*



# Conclusion

- Participants did not 'transfer' the knowledge from the course
- They are continually trying to re-purpose and contextualise it in their ongoing work
  - The 'success' depends on how supported they feel in the re-purposing the resources
  - Availability of Networks
  - Availability of Time
  - Institutional support (e.g working on institutionally important projects )



# Lessons learned

- The pedagogical principles of Teknosofikum **promote professional learning about** technology education and meaningful transformation of practice
  - Teknosofikum as a **‘success story’**
- The weakness of Teknosofikum design:
  - Short-term duration of the course
  - No infrastructure for subsequent learning and development (e.g. ongoing peer discussions on forums, checking in)
  - No long-term inter-institutional networks and collaborations



# Online professional development courses

Since Covid-19, increased optimism for and diffusion of **online** professional development courses

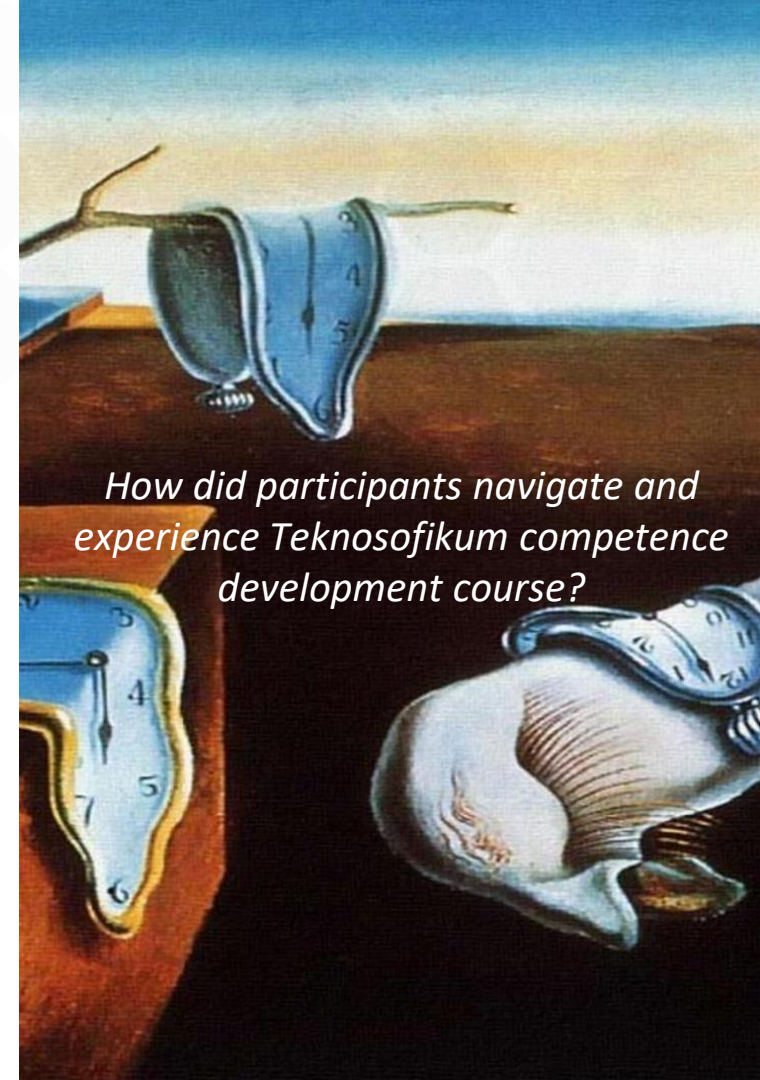
- Broader acceptance and legitimacy
- Cost saving approach
- Lowering barriers to access
- *Flexible and 'time-saving' solution*



# Teknosofikum and time

Well, I liked the structure a lot where you choose modules, and you can do it in your own time. So, for me to have this kind of course that you can do at your own pace, and you can do it at home or at work. And when you have the time for it. It was brilliant because instead of spending a lot of days or looking for time out of the calendar on certain days and passing, it's a lot more flexible this way. (Prof. Nursing and education)

I'd like to have more time to apply the other techniques that I learned in the course, but in fact, I do not have the proper time to do that. [...] The moment that I was invited wasn't the best moment. Imagine teaching two courses, also working with three students, and supervising six students. It was a lot for me. I worked on the technique that was the easiest one. I do not have time to prepare myself for the [development] course, to adapt my calendar and the activities that I have for this course. (Ext. Lect. Computer Science)



*How did participants navigate and experience Teknosofikum competence development course?*



# Teknosofikum and time

Teknosofikum raised unexpected 'time-related issues' to participants

- ***Strategies to manage learning time:*** protecting time by scheduling own learning, fragmenting learning into irregular chunks; using lunch-breaks; prioritizing easiest activities
- ***Failures to manage own time:*** forgetting to tick things off; resorting to last minute rush; favouring surface-level type of engagement
- ***Realizations of misaligned timings:*** semester off/on-teaching; course designs already defined
- ***Wishes for more practicing time:*** improving teaching, developing networks, and peer learning exceeds the duration of the course



# Recommendations for 'time aware' online development courses

- Temporal placement of the course is relevant
- Heterogeneous temporal needs of learning activities and outcomes to be acknowledged and balanced
- Teachers' development to be conceived in a long-term perspective





# If you like to know more... about the platform


Feel free to contact Jeppe



## Digital Empowerment

Computing is a form of empowerment, as it supports the understanding of digital technology. Here, we reflect on how our experience of the world relates to the way technologies are designed, implemented, and used in different fields.



Workshop  50 min

Technology Implosion



IT  50 min

Technological  
Attentionality

✓ Completed



IT  40 min

Tech and Society

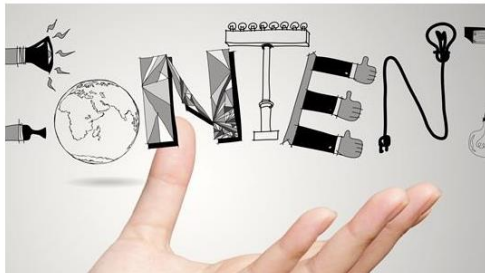


IT  60 min

Diversity



# If you like to know more... on research



## Design principles for higher education teacher development - the Teknosofikum course/concept (Magda Pischetola, Jeppe Kilberg Møller)

Tidsskriftet Læring og Medier (LOM#27), 2023

[Paper](#)



## Enhancing teacher collaboration in higher education: the potential of activity-oriented design for professional development (Magda Pischetola, Jeppe Kilberg Møller, Lone Malmborg)

Springer - Education and Information Technologies, 2022

[Paper](#)



## Teaching Novice Teachers to Enhance Learning in the Hybrid University (Magda Pischetola)

Springer, 2021

[Paper](#)

Ongoing and forthcoming research work:

- **On the Issue of Time**
- **Outcomes of Teknosofikum**
- **Relations between technology and teaching perspectives**

by Giacomo Poderi, Jelena Popov, Magda Pischetola and Jeppe Kilberg Møller.

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**Q & A**