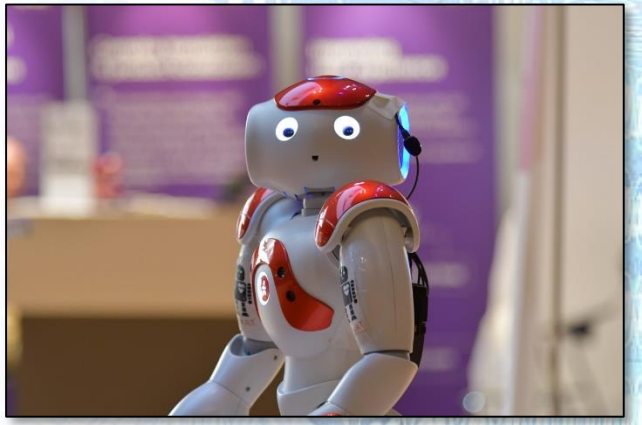
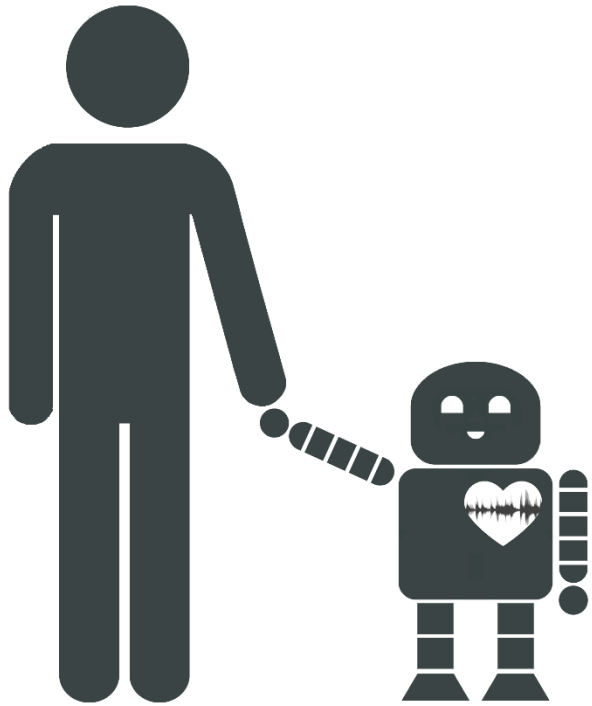


Robots and AI Methods in Education

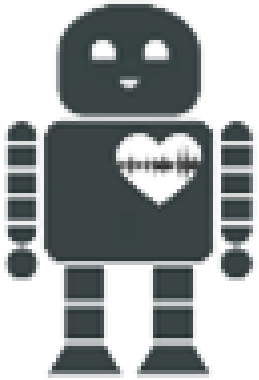
Jürgen Handke
3M-Solutions/Philipps-Universität Marburg
2019

Content

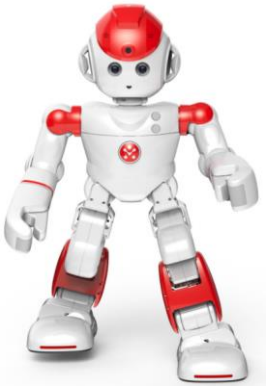
1. Humanoid Robots
2. The Role of AI/Robots in Education
3. Teaching and Learning
4. Educational Robot Applications

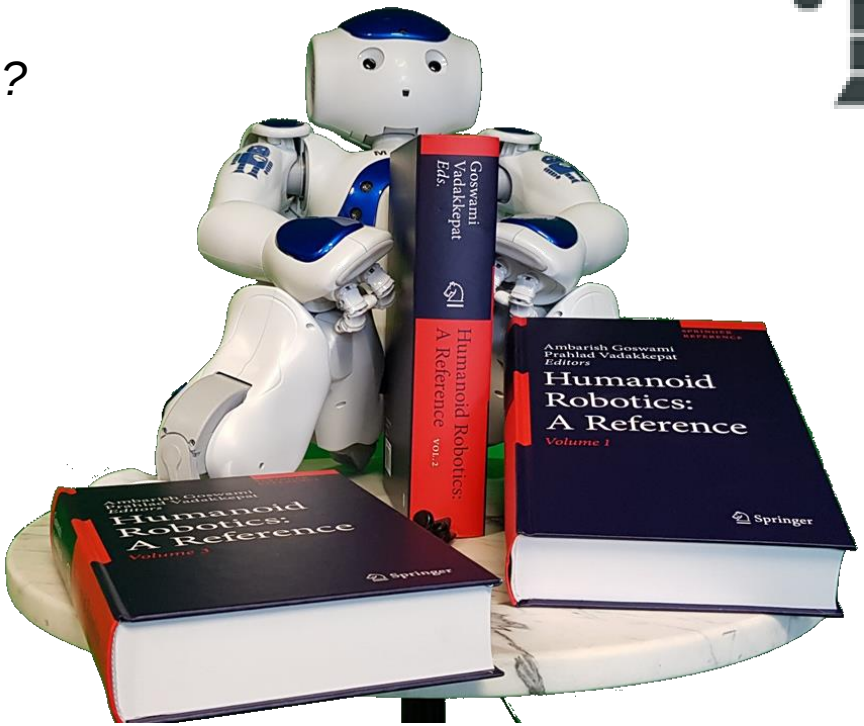


1. Humanoid Robots

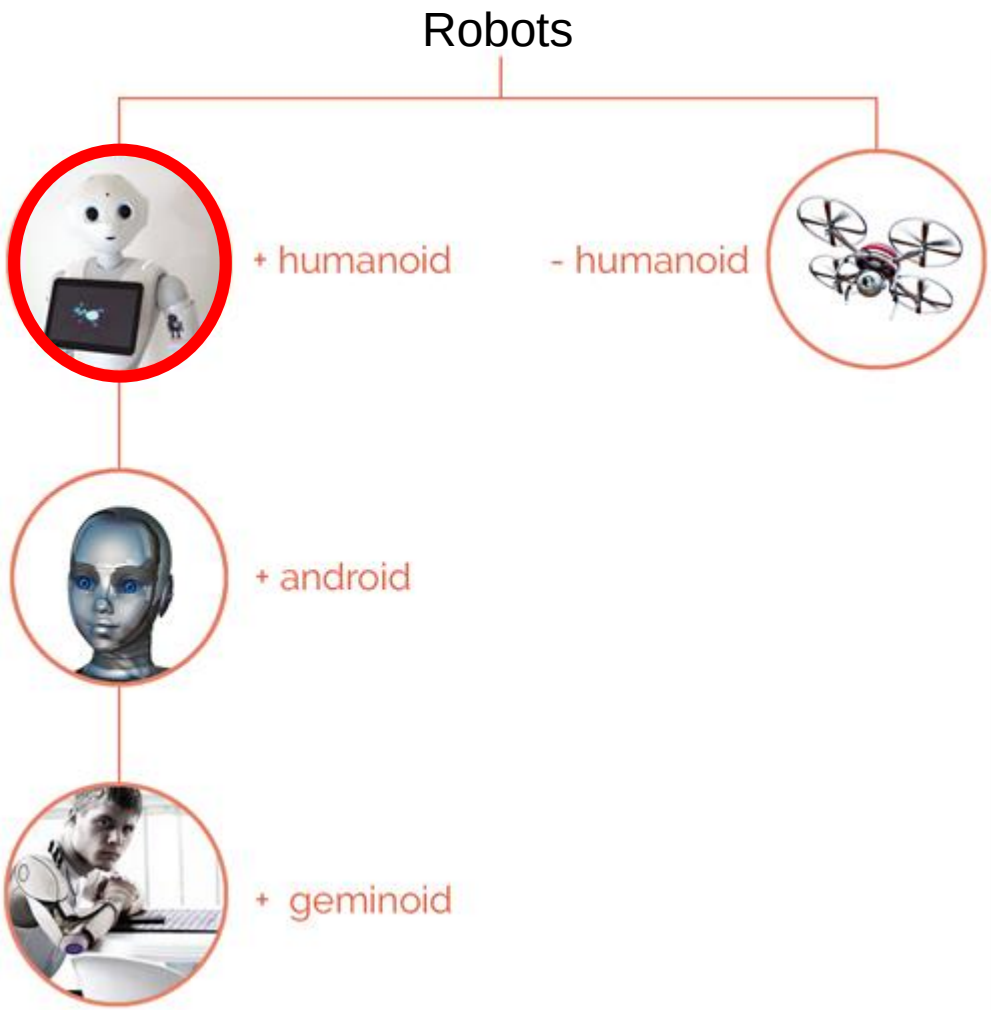


What are humanoid robots?

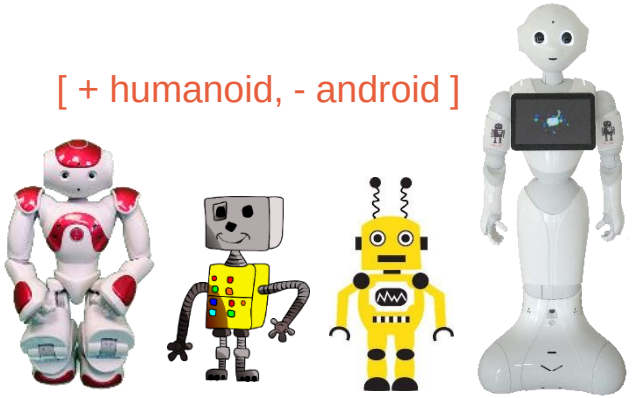




Robots: The State of the Art



[+ humanoid, - android]



Humanoid Robots

+ humanoid
- android
+ small

... perhaps too small to be taken seriously … ?

1 meter

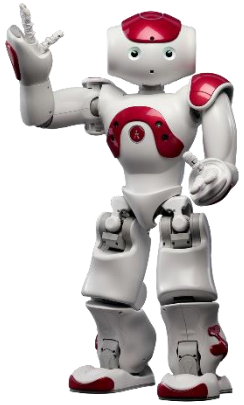
Alpha 2

Darwin Mini

Pillow

DARwin-OP

Prof. Einstein



Nao

Humanoid Robots

+ humanoid
- android
- small

Tall enough to be taken seriously … but still small enough to be considered inferior to humans ?

1 meter

Poppy

Pepper

Asimo

Surena III

Humanoid Robots

General features

- Speech (AmE/Ger)
- Movement
- Awareness
- Object Recognition
- Emotions
- Media Integration
- Internet Access

NAO

Pepper

Special features

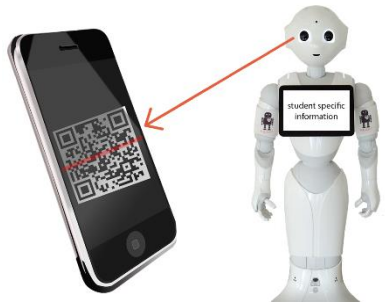
NAO:

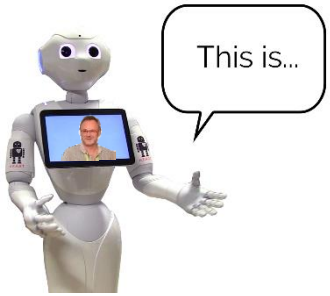
- Height: 58 cm
- Movement: Legs
- Activation: Triggers
- Primary Role: Tool

Pepper:

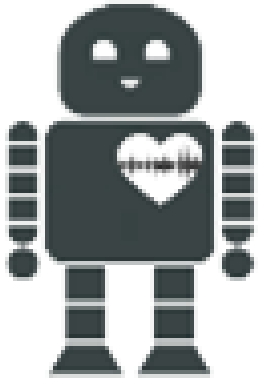
- Height: 120 cm
- Movement: Wheels
- Tablet
- Activation: Triggers/Tablet
- Primary Role: Partner

+ customized Robot Apps

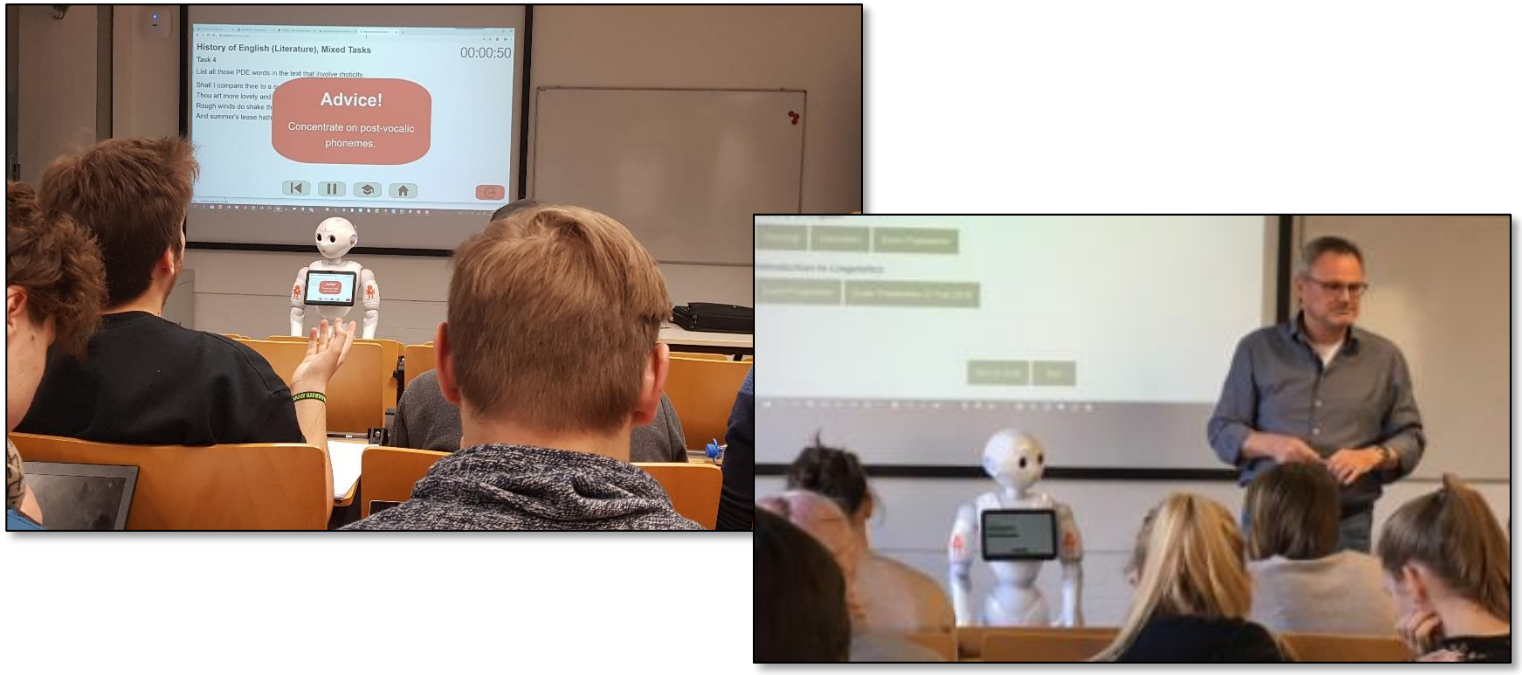




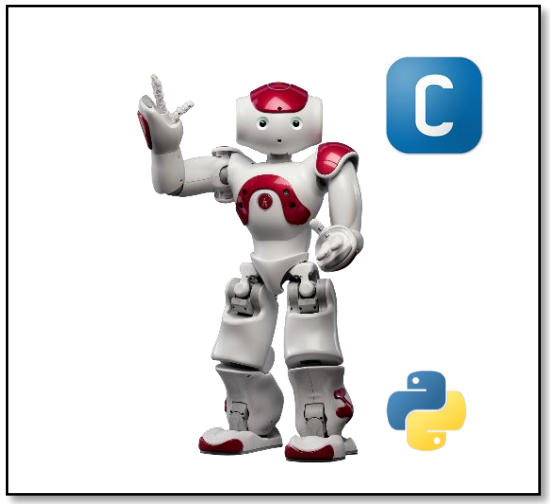
2. The Role of AI/Robots in Education

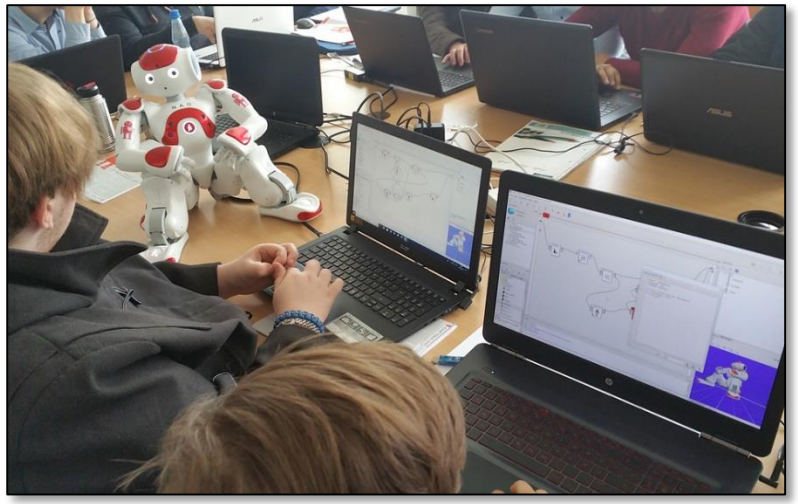


What are the central functions of humanoid robots in education?

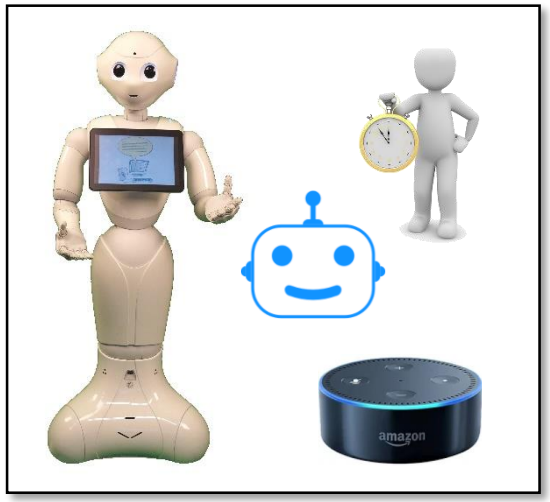


Options



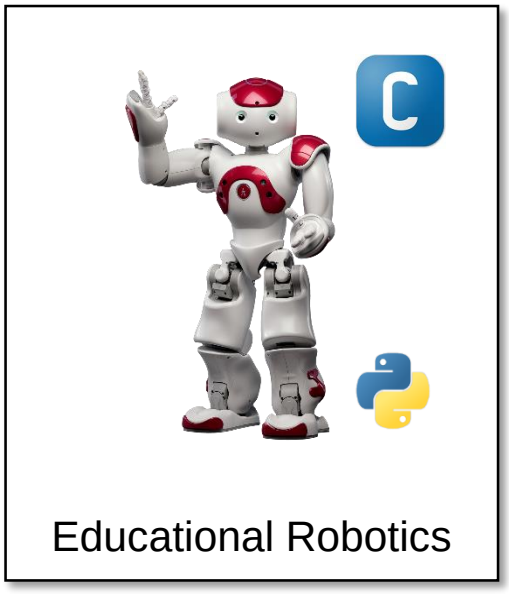


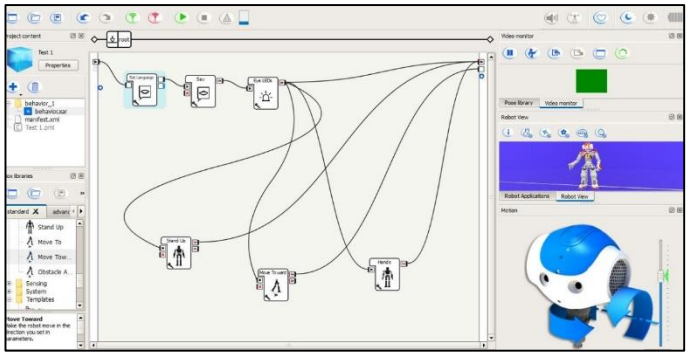
The Tool Function



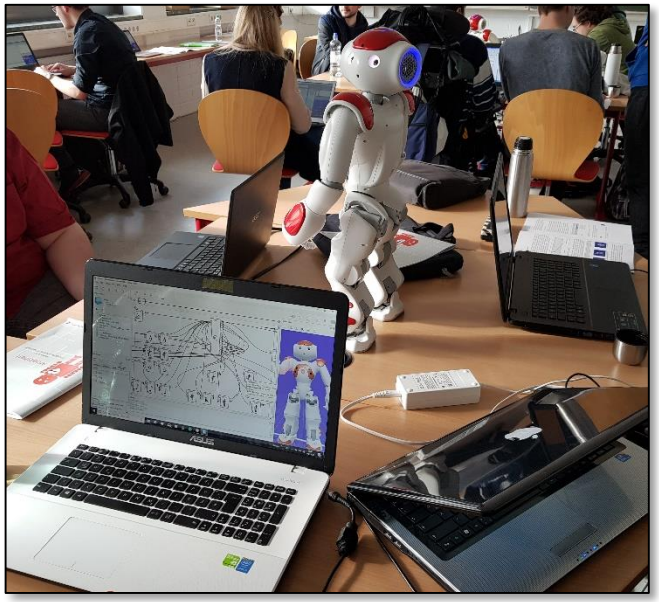
The Partner Function

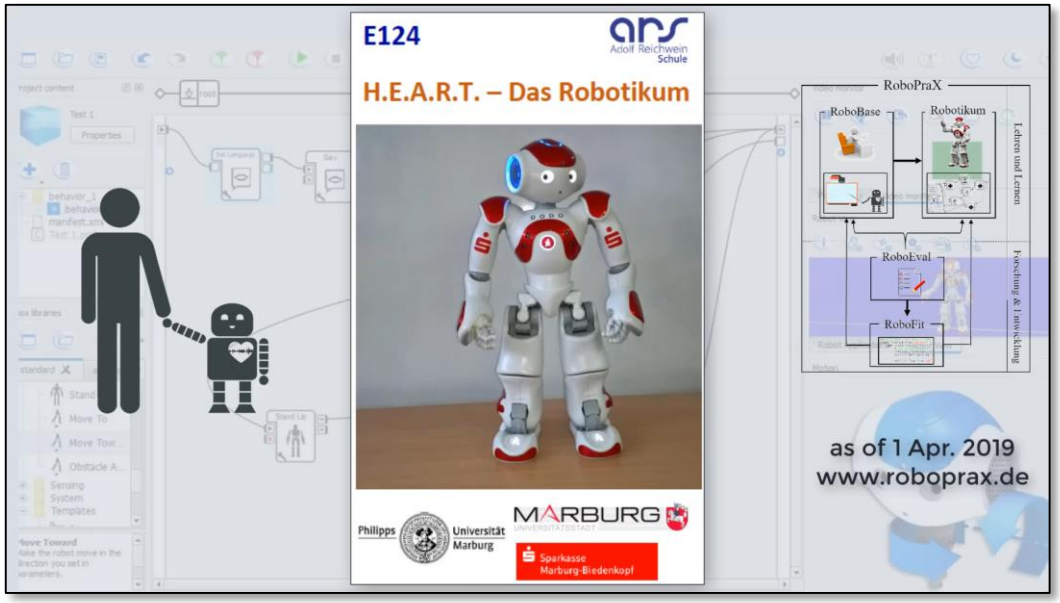
Robots as Tools



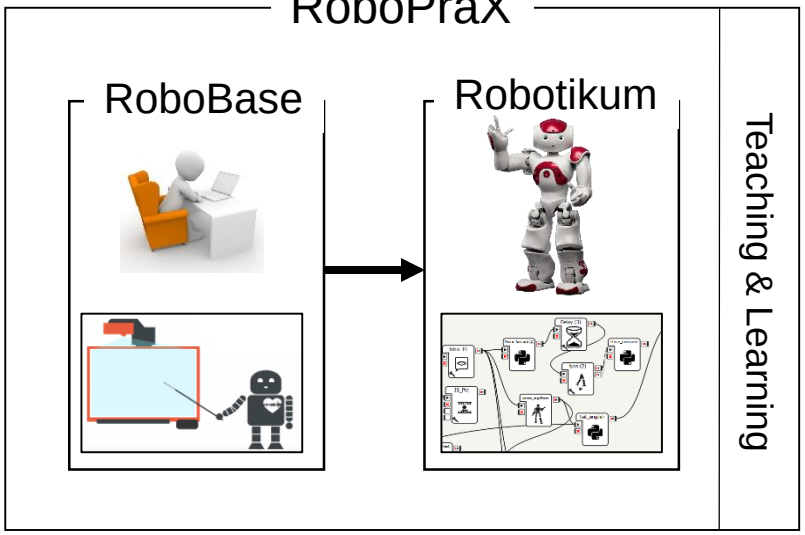


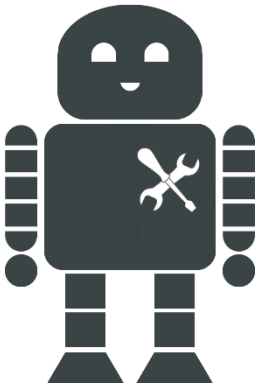
```
def onInput_onSet(self):
    lang = self.getParameter("Language")
```





Educational Robotics





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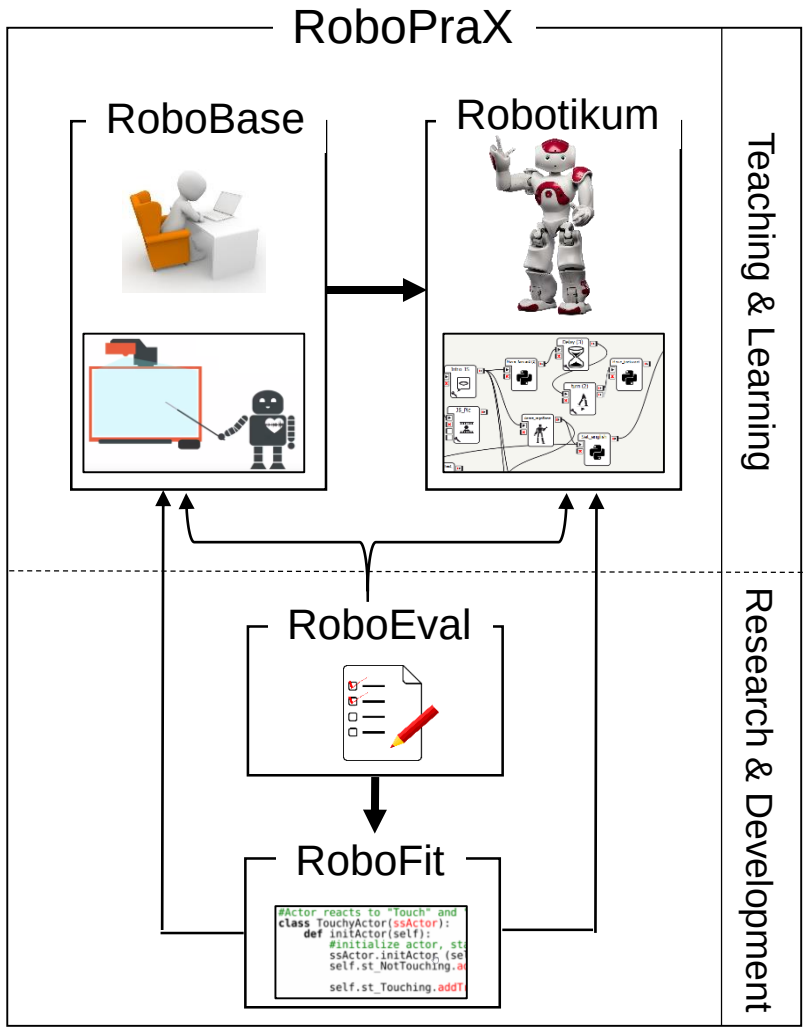
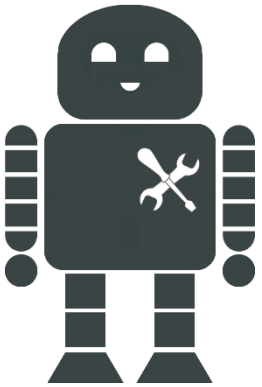
Bundesministerium
für Bildung
und Forschung

Educational Robotics





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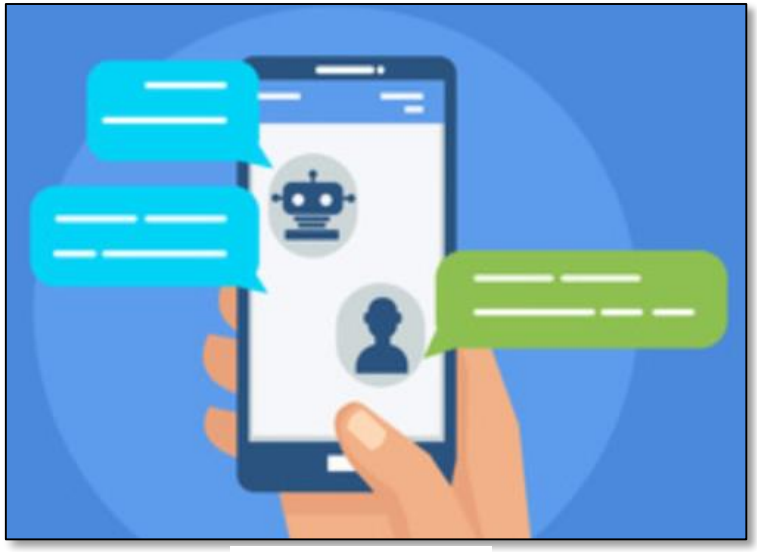
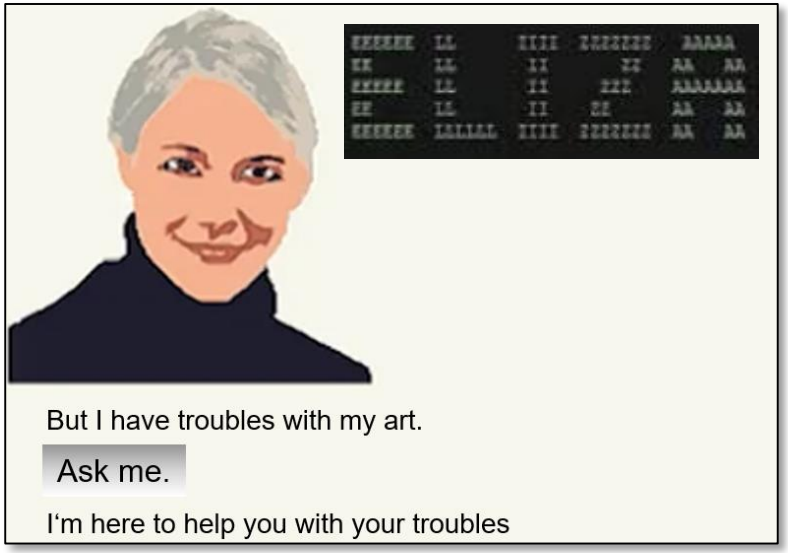
und Forschung

AI-Systems as Partners



AI Software



Chat Bots

Q and A (MT) Systems

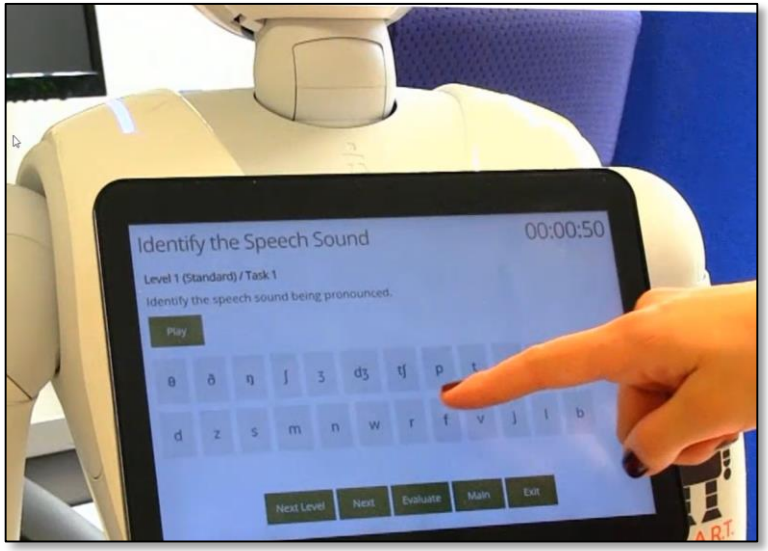
Pedagogical Agents

Robots as Partners

In-Class Assistance

In-Class Advice

General Advice

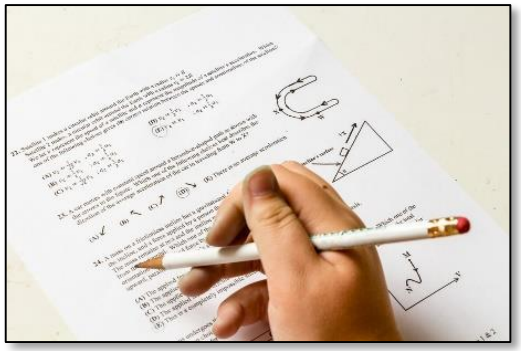


Examining Function

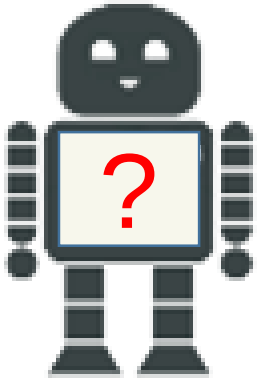
Robots in Education – But Where?

Traditional Lecturing

Mastery Learning



Self-Guided Deepening

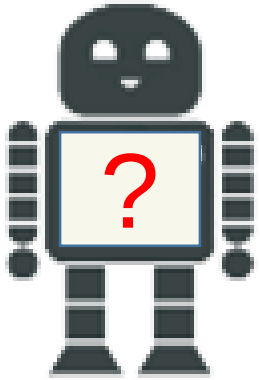


Online Learning

Help and Assistance

In-Class Collaboration

3. Teaching and Learning

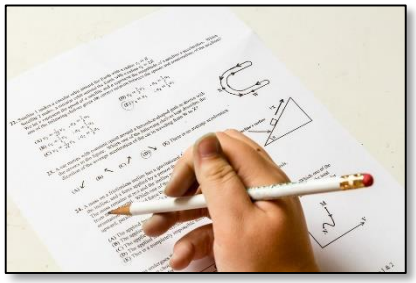


Which educational scenarios can profit from humanoid robots?

Traditional Teaching and Learning

1: Content Delivery

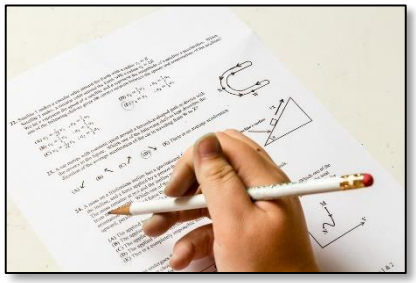
2: Deepening



Digital Augmentation

1: Content Delivery

2: Deepening



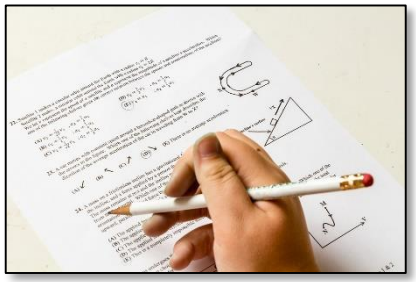
Classroom Technologies

Digital Elements & Scenarios

Digital Augmentation + Robot Assistance ?

1: Content Delivery

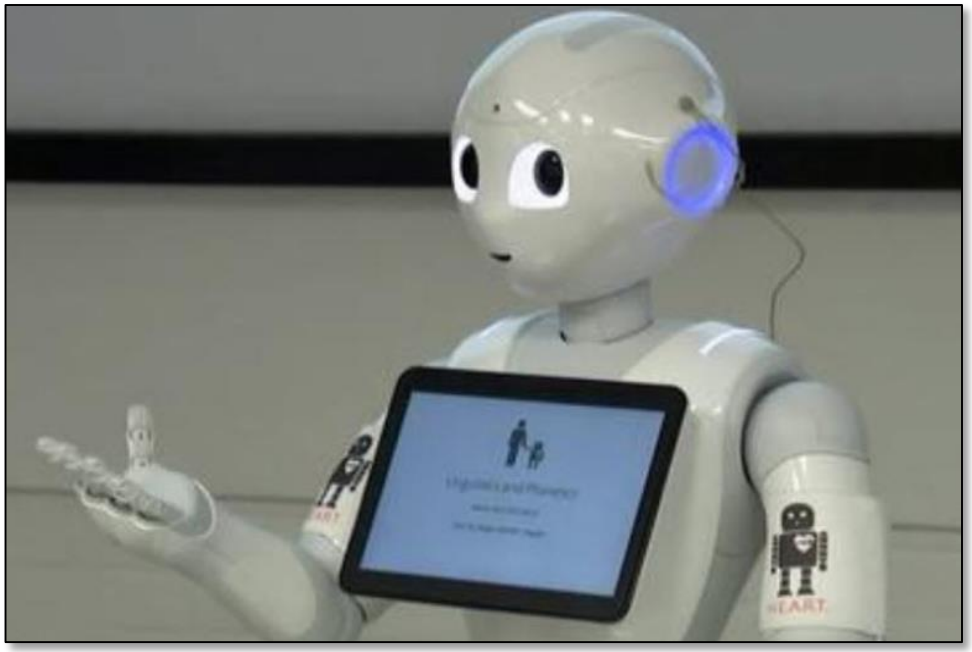
2: Deepening

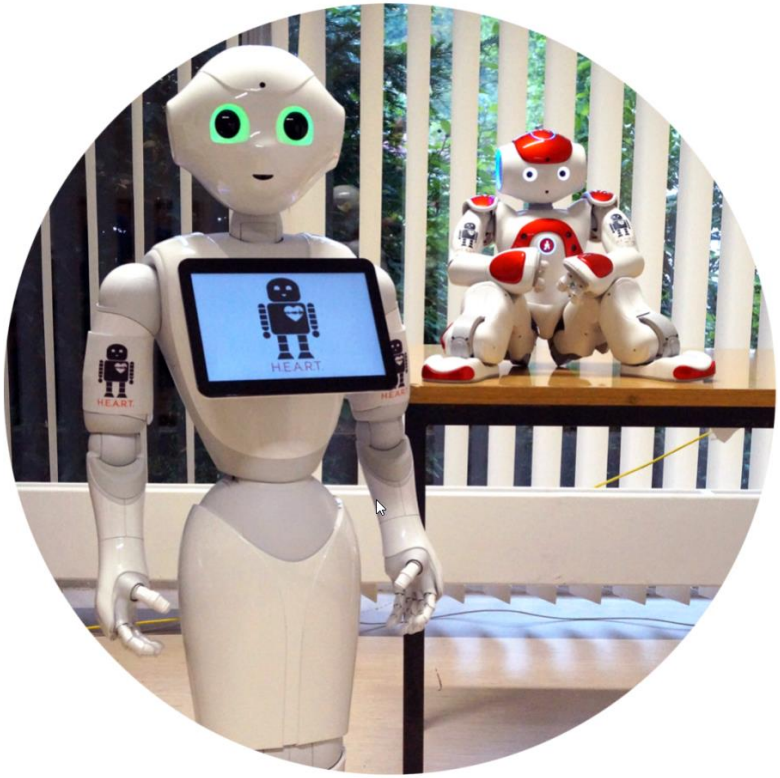


Lecturing

Digital Elements & Scenarios

Robots as Lecturers ?





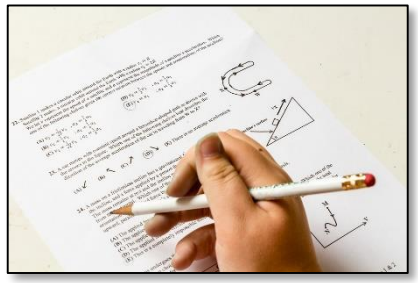
	PRÄSENTATION 1		PRÄSENTATION 2	
	GRUPPE A	GRUPPE B	GRUPPE A	GRUPPE B
📱	✓	✓	✗	✓
👋	✓	✗	✓	✓

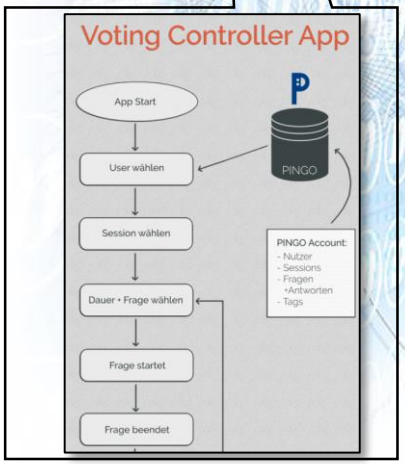
📱 = Tablet 👋 = Gestik

Digital Augmentation + Robot Assistance ?

1: Content Delivery

2: Deepening





Digital Elements & Scenarios

Digital Teaching and Learning

1: Content Delivery

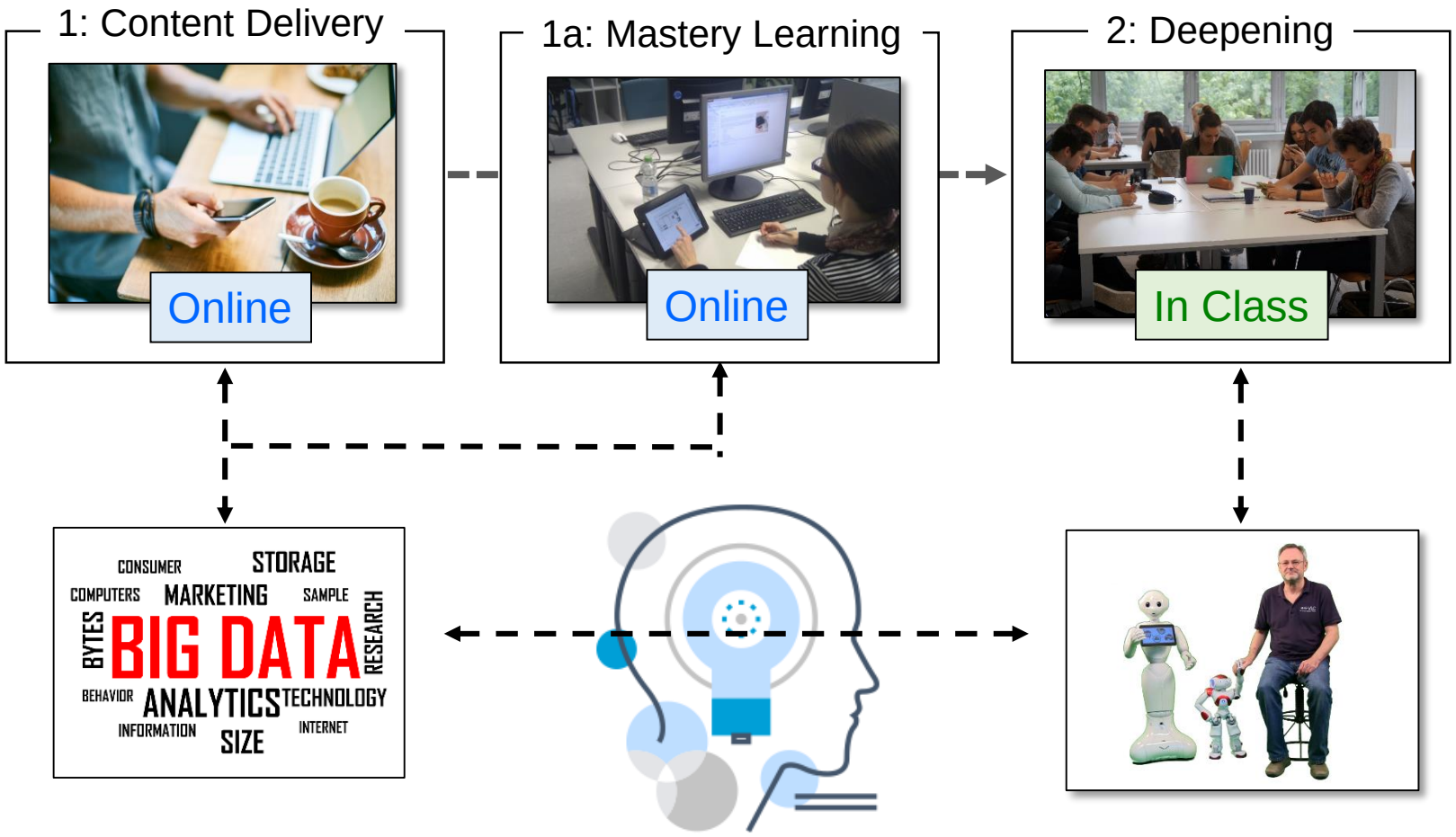
Online

2: Deepening

In Class

Digital Teaching and Learning + Mastery Learning

Digital Teaching and Learning plus AI

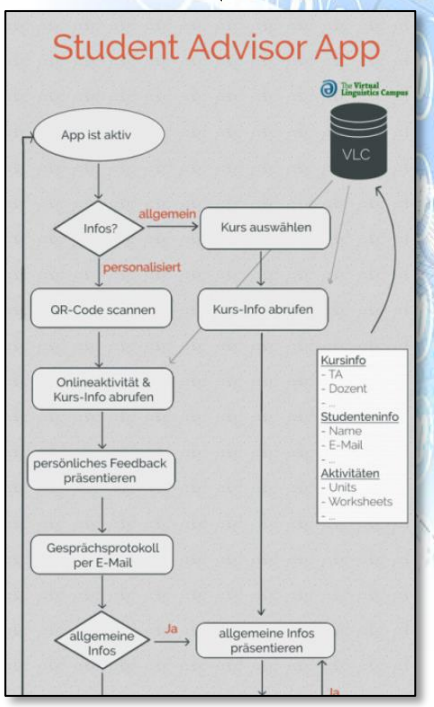


Digital Teaching and Learning plus Robot Assistance

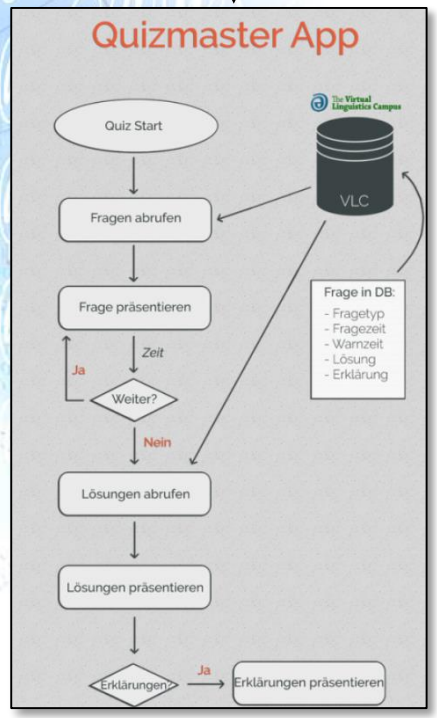
1: Content Delivery

1a: Mastery Learning

2: Deepening



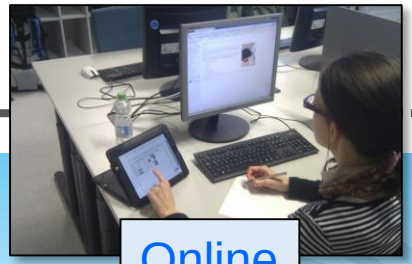
www.project-heart.de



Benefits

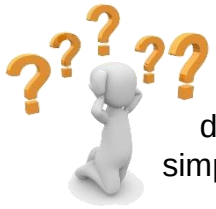
1: Content Delivery

1a: Mastery Learning



2: Deepening

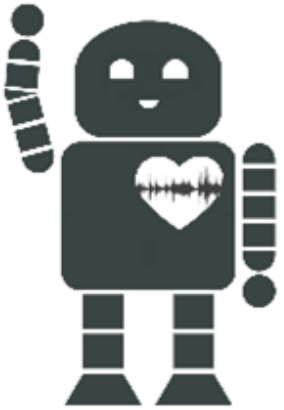
gain time for individual tutoring



didactic simplification

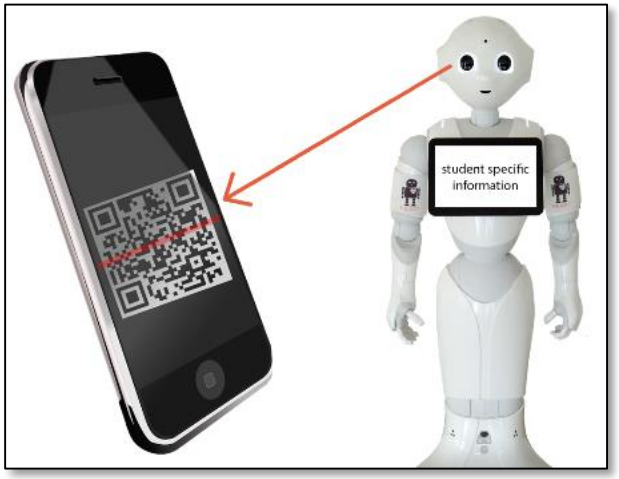
individualisation

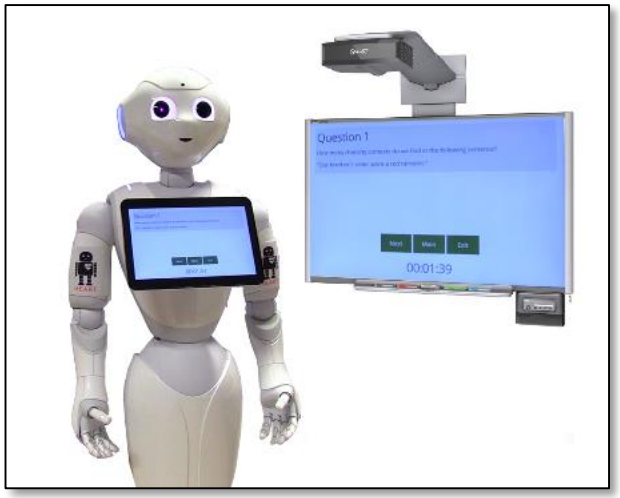
2: Deepening



4. Educational Robot Applications

How do robot applications work and what is their benefit?

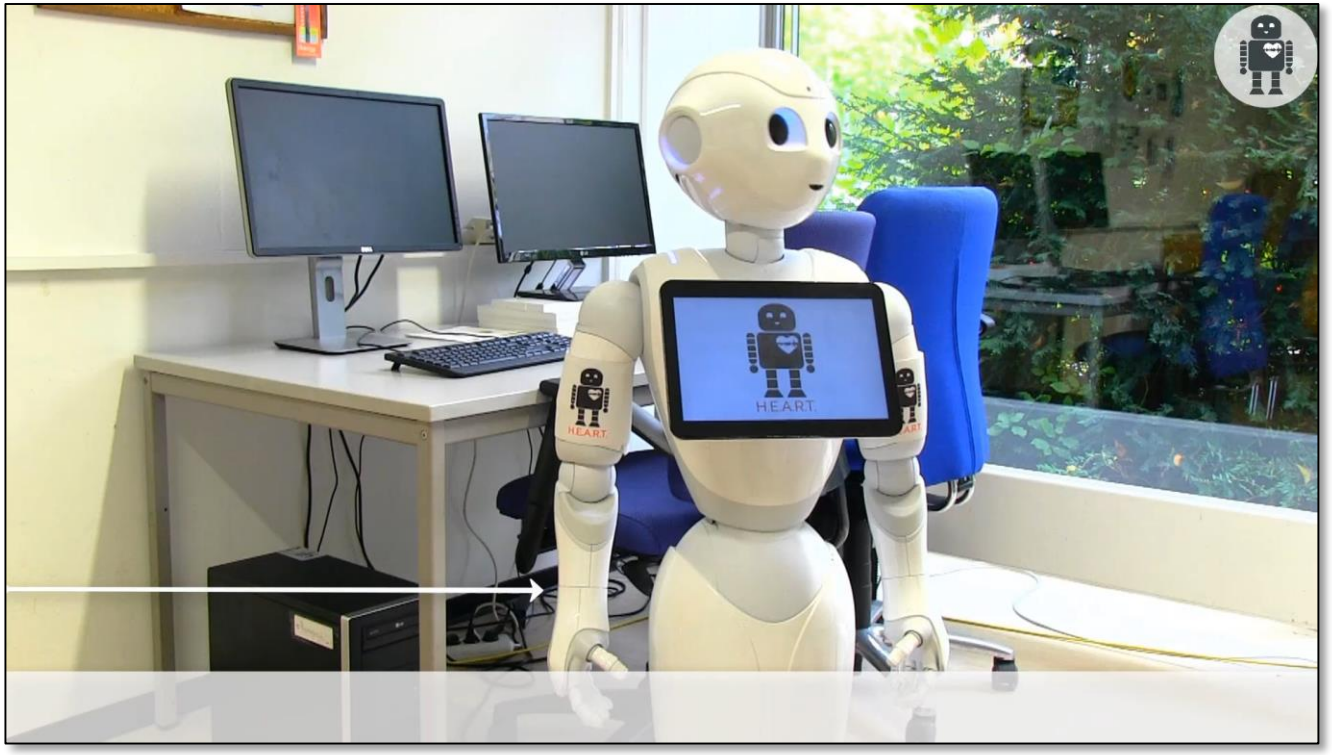




The Quizmaster App

Goal:

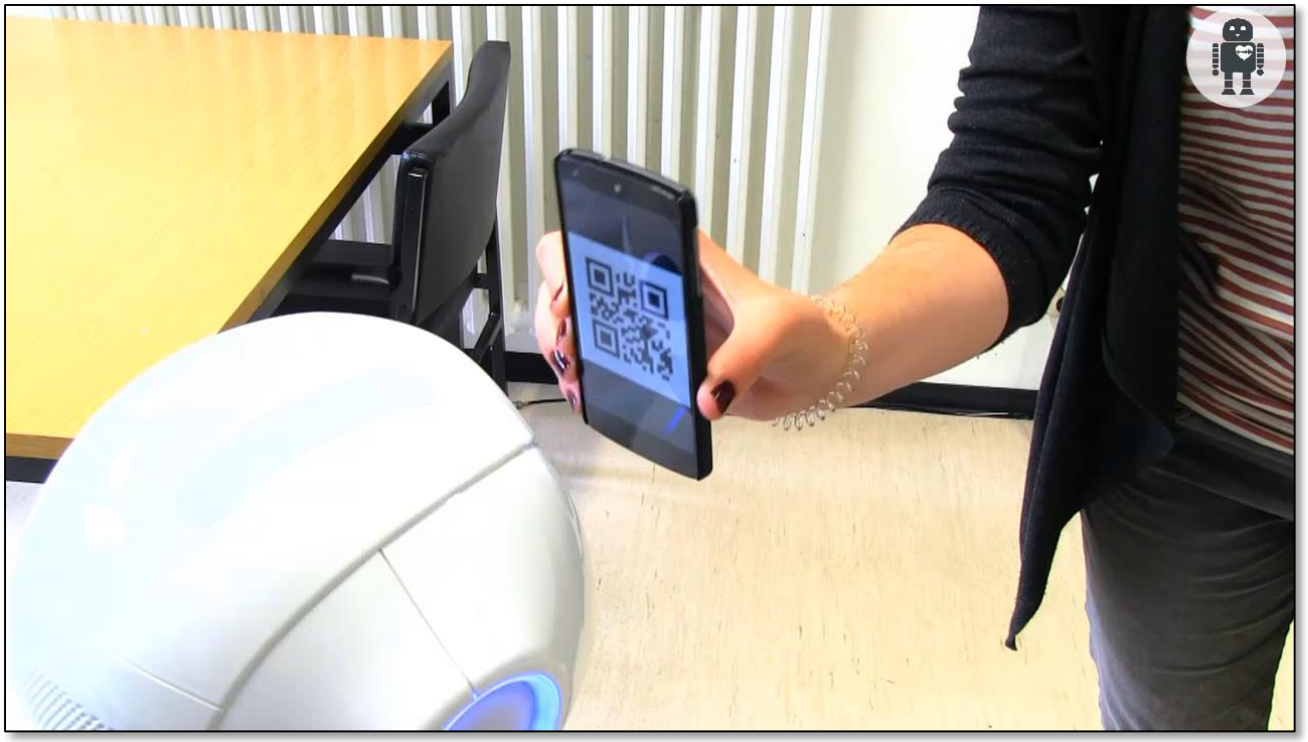
The robot asks and presents questions, applies and controls the time, gives advice and presents the solutions.



The Student Advisor App

Goal:

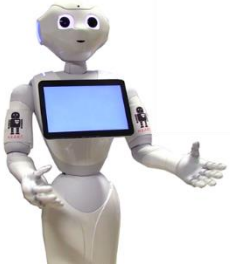
Students contact the robot via their QR-Code in order to be helped on course-related and individual problems.



The MC App

Goal:

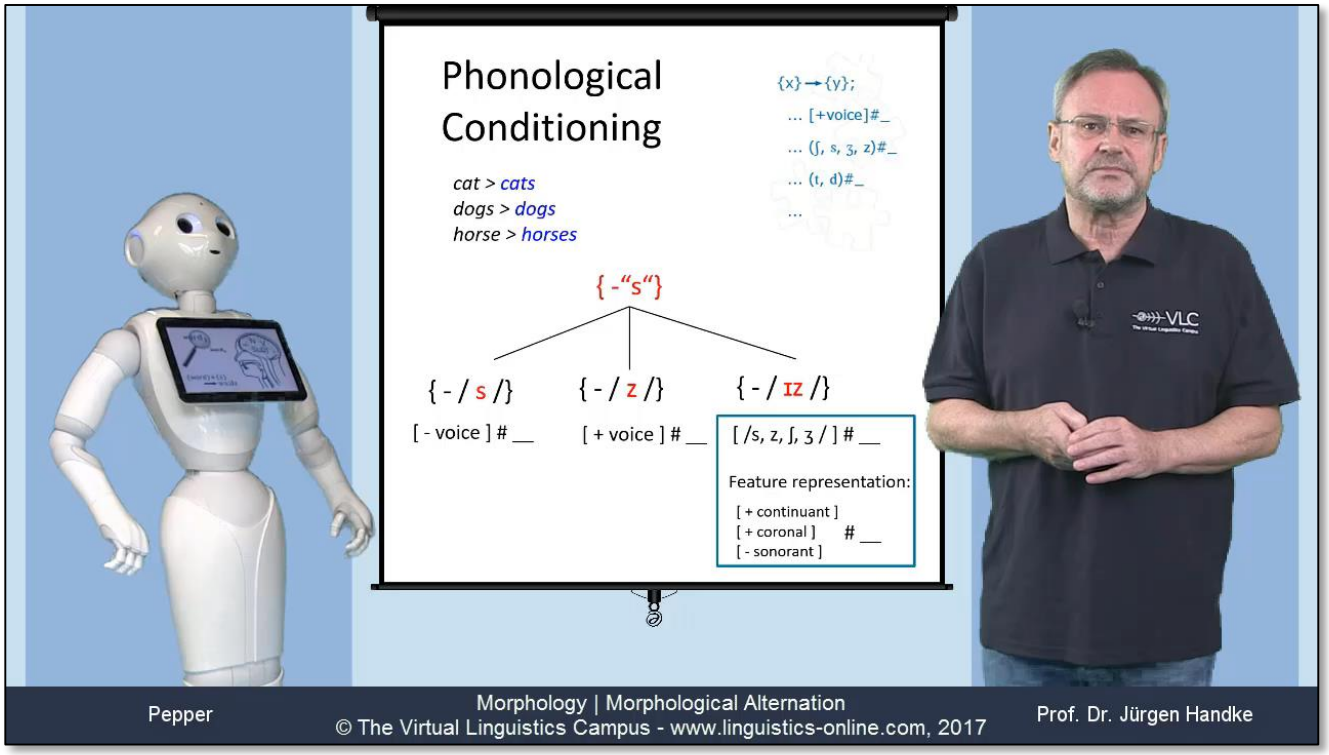
The robot serves as „Master of Ceremonies“ (MC). He introduces the class participants and asks for their motivation to take part in the class/workshop.



The Naive Partnership App

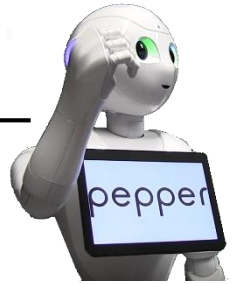
Goal:

Support a presentation by means of pre-planned (naive) questions



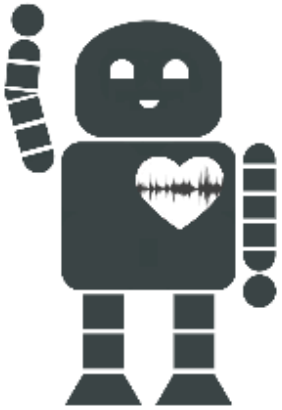
Robot Apps & Benefits

Benefits \ Robot Apps	Advisor	Quizmaster	MC	Naive Partnership
Gain Time	✓	✓	✗	✗
Didactic Simplification	✗	✗	✓	✓
Individualisation	✓	✓	✗	✗
Usability	✗	✗	✗	✗



Classroom Packages

> 30 minutes

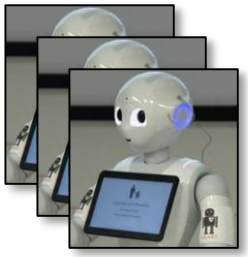


In Class Action

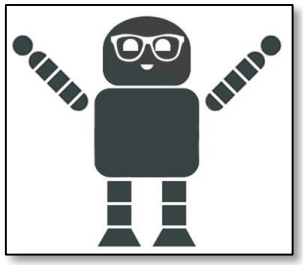
- Introduction
- Questions
- Task 1
- ...
- Task n
- Test
- Evaluation

Robot Apps

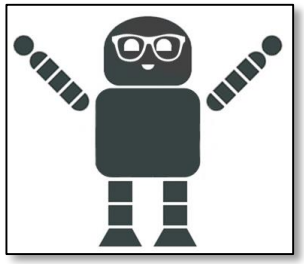
- MC
- Live-Voting
- Presenter
- Quizmaster
- Evaluation



Cumulative App Template

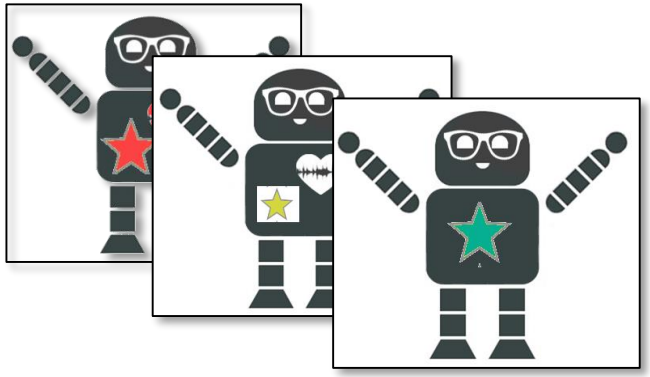


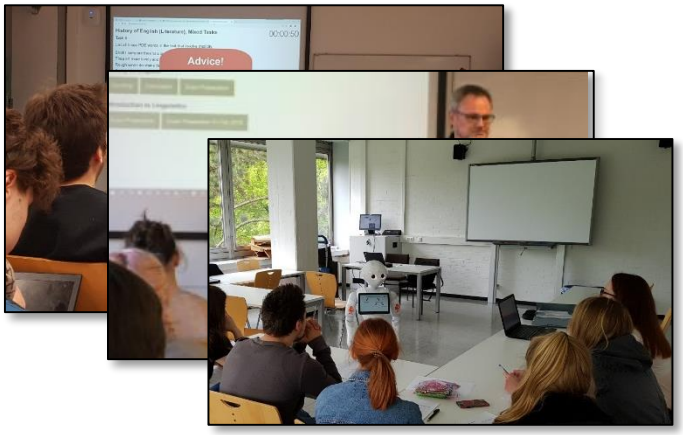
Template



\+ *Data/Tasks*

= *Robot App 1, 2 ... n*





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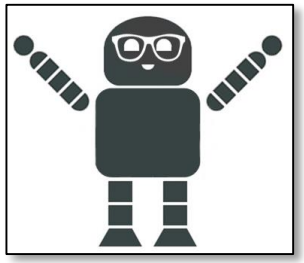
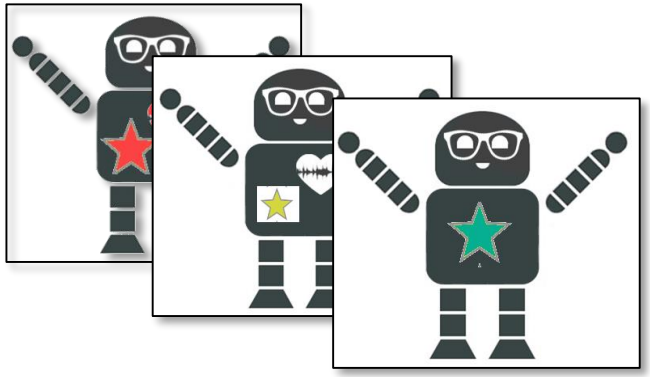


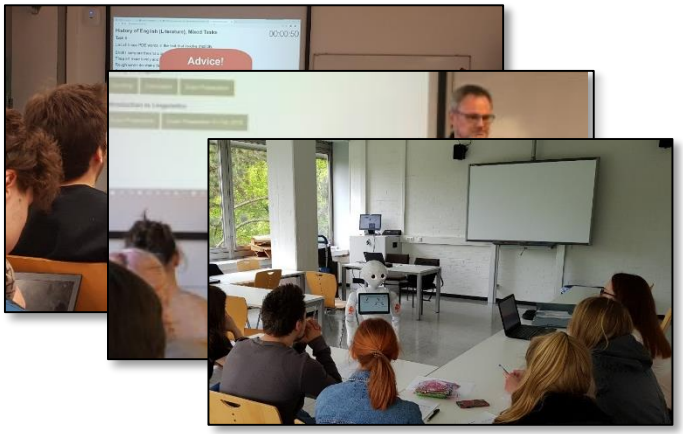
\+ *Data/Tasks*

= *Robot App 1, 2 ... n*

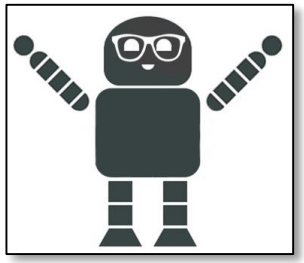


The new scenario

- Coaches fill the Template with „their“ data before an in-class meeting.

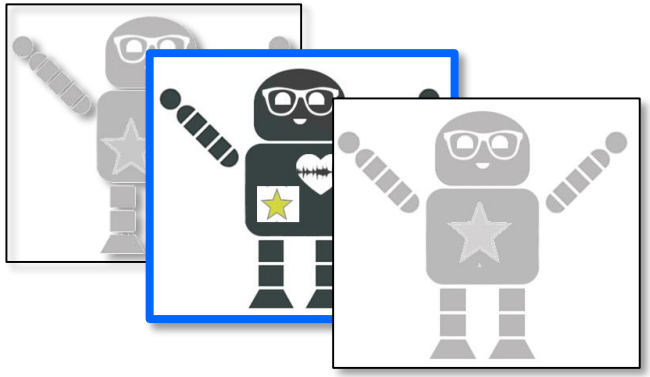


Template



\+ *Data/Tasks*

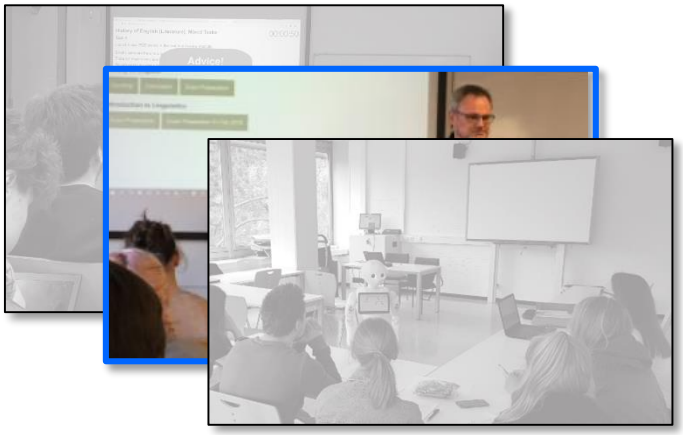
= *Robot App 1, 2 … n*



The new scenario

- Coaches fill the Template with „their“ data before an in-class meeting.

- In class, the robot takes over giving the coach the freedom for customized coaching.



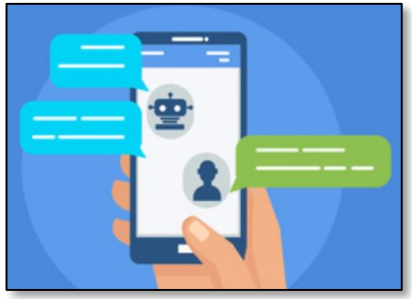
Teaching and Learning in the 21st Century

1: Content Delivery

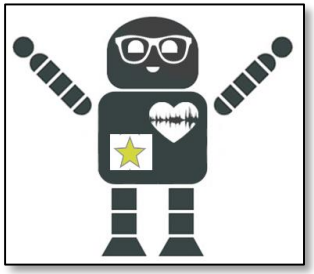
1a: Mastery Learning

2: Deepening

Customized Advice



Customized Chatbots



Customized Robot Apps

... and it‘s not the future !

Made for minds.

23 February 2019

https://bit.ly/2Td1EC7

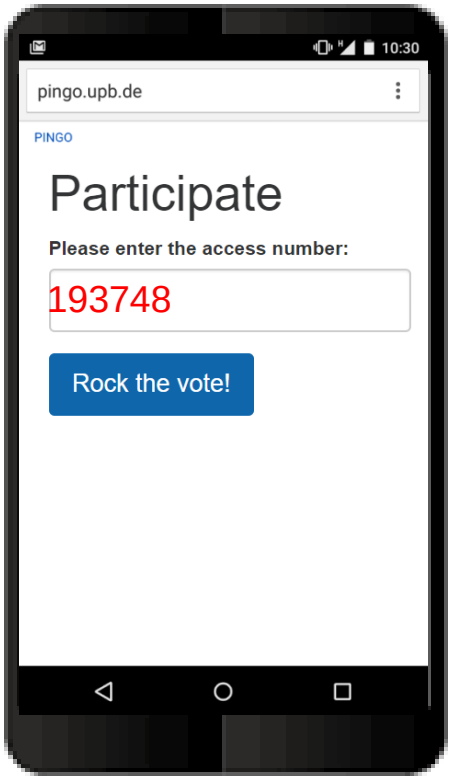
https://www.project-heart.de
https://www.roboprax.de

Thanks for your Attention !

handke@3m-solutions.de

https://twitter.com/juergen_handke

https://pingo.coactum.de/



PINGO

Google Drive

https://bit.ly/2Y7zCr8