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European Teacher Education Network (ETEN)
"Teacher Education – Connecting Glocal"

AI-powered automatic feedback on reflective writing

Veronika Solopova[3], Ralf Romeike[1], Michaela Gläser-Zikuda[2], Christoph Benzmüller[3], Tim Landgraf[3], Florian Hofmann[2], Jessica Schießl[2], Chengming Zhang[2], Lea Plößl[2] & Sascha Witte[3]

[1] Didactics of Computer Science, Free University of Berlin, Germany
[2] School Education and Instructional Research, University of Erlangen Nürnberg, Germany
[3] Dahlem Center for Machine Learning and Robotics, Free University of Berlin, Germany

0-5 mins

Introduction

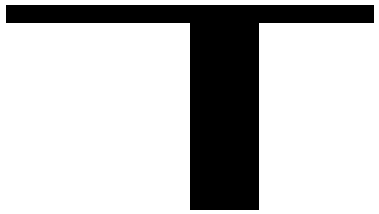
- Reflection in Teacher Education
- PetraKIP Introduction

5-12 mins

Theory-based AI Feedback Design

- Types of Feedback
- Theories of Reflection
- Design of AI Feedback

12-17 mins



State-of-the-art Algorithmus

- AI Algorithmus
- Supervised Learning workflow

17-20 mins

Next Step

- Use-inspired Basic Research
- All in Large Language Models

Reflection in Teacher Education

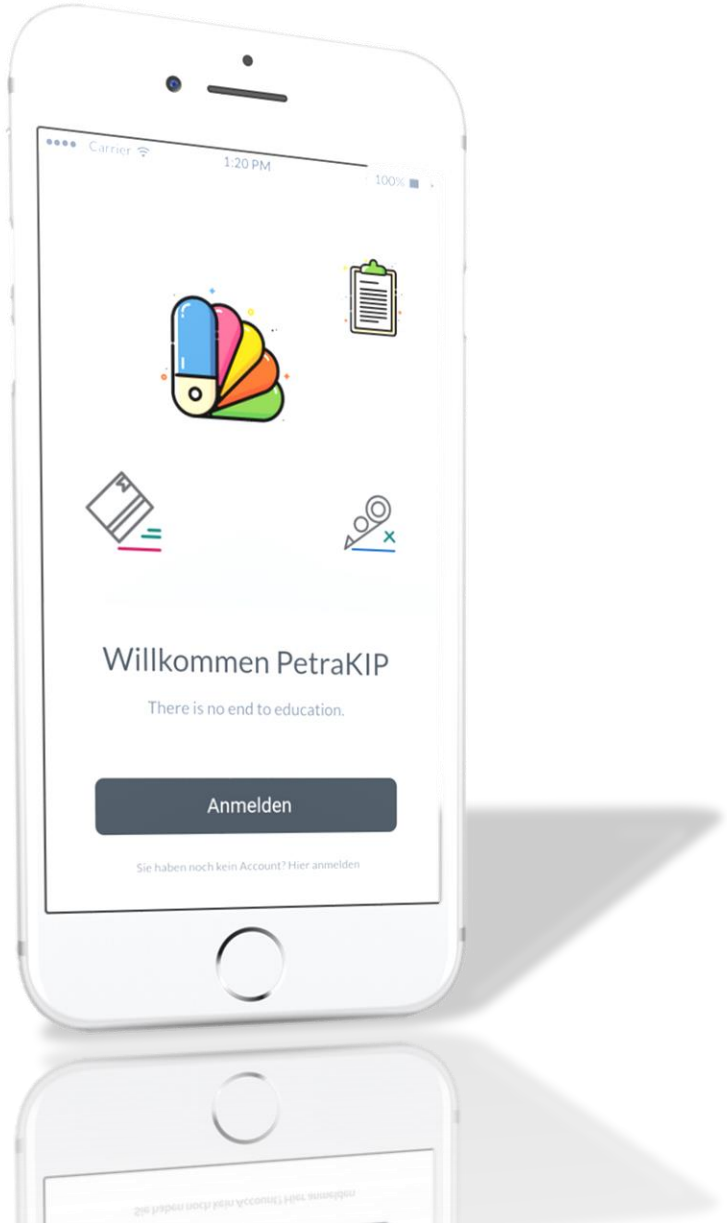
Due to the processes of internationalization and digitization, teachers are faced with the challenge of making intricate decisions amidst a state of **uncertainty** (Grossman et al., 2009).

Reflection serves as a crucial **bridge** connecting **personal experiences** with **theoretical knowledge** (Korthagen, 2001), enabling teachers to gain a deeper understanding of and respond adeptly to uncertain situations.

Teacher educators offer various **structured reflection tasks** (Christof et al., 2018; Fütterer, 2019; Körkkö et al., 2016), such as **portfolios**, and **provide external support** in the form of **prompts** (Hume, 2009; Imhof & Picard, 2010), to facilitate preservice teachers' reflections on their teaching and learning experiences.

However, the effectiveness of these methods in fostering preservice teachers' reflective practice is limited (Azimi et al., 2019; Körkkö et al., 2016; Nguyen et al., 2014; Poldner et al., 2014), likely due to **inadequate feedback mechanisms** (Wulf et al., 2022; Ullmann, 2019).

PetraKIP: Personal transparent AI-based Portfolio for Teacher Education



Basic Portfolio Features

photo, video, voice and text

Chatbot

feedback, dashboard

Mobile Course

video lessons, assignments, learning materials

Learning Community

sharing, networking

Federal Ministry of Education and Research

Friedrich-Alexander-Universität Erlangen-Nürnberg

Freie Universität Berlin

Team Members: PetraKIP

FU Berlin: Computing Education Research Group[1] und Dahlem Center for Machine Learning and Robotics[2]

Ralf Romeike[1]

Tim Landgraf[2]

Christoph Benzmüller[2]

Veronika Solopova[2]

Sascha Witte[2]

FAU Erlangen-Nürnberg: School Education and Instructional Research

Michaela Gläser-Zikuda

Florian Hofmann

Chengming Zhang

Lea Plößl

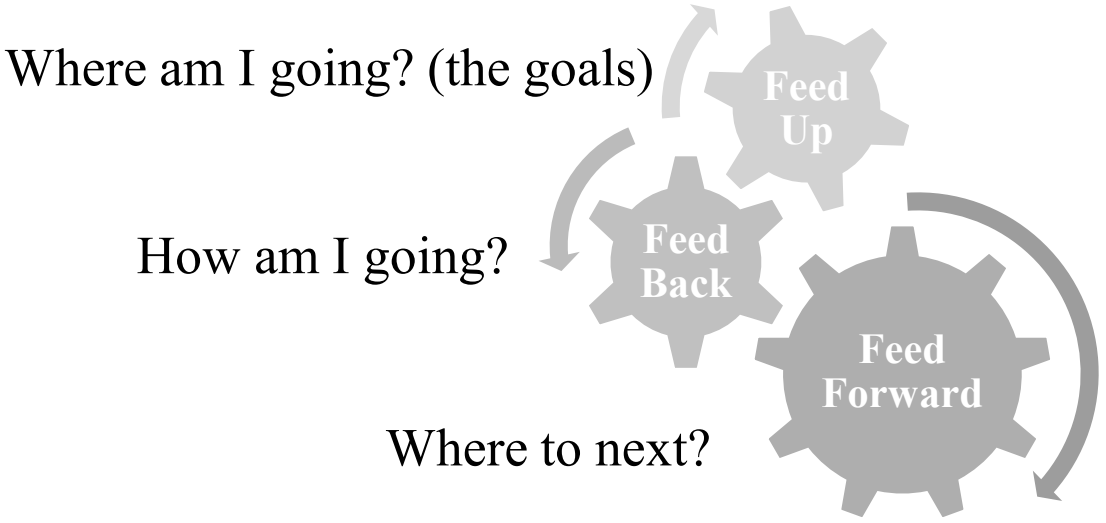
Type of feedback

Formative assessments and feedback:

- Synchronous in-person feedback from the instructor
- Written notes from the instructor
- Audio-based memos from the instructor
- Video feedback from the instructor
- Peer feedback among students

Summative assessments and feedback:

- Examinations
- Presentation
- Project
- Portfolio



A model of feedback to enhance learning (Hattie & Timperley, 2007, p87)

Task level
How well tasks are understood/performed.

Process level
The main process needed to understand/perform tasks.

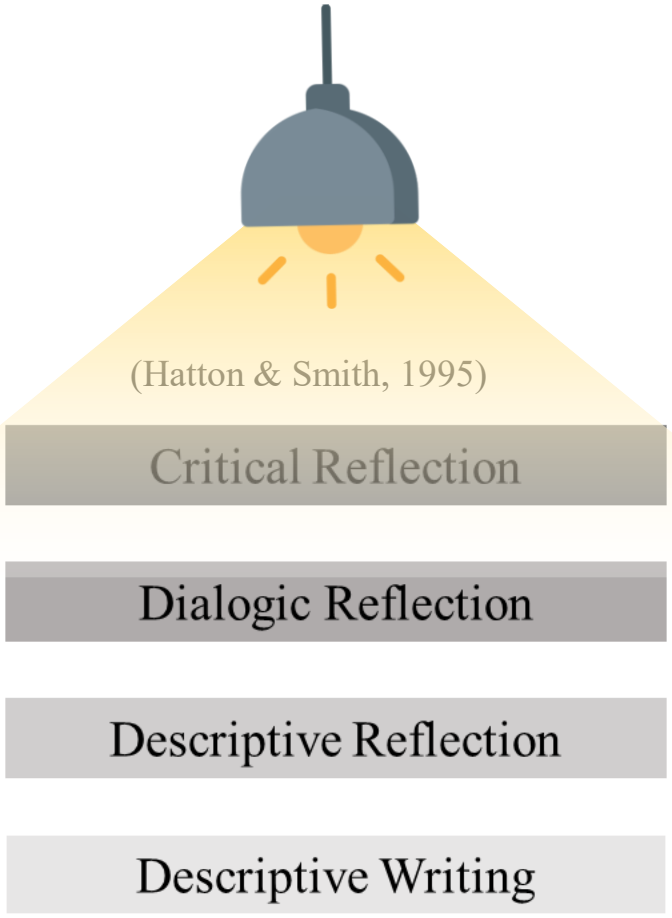
Self-regulation level
Self-monitoring, directing, and regulating of actions.

Self level
Personal evalutions and affect about the learner.

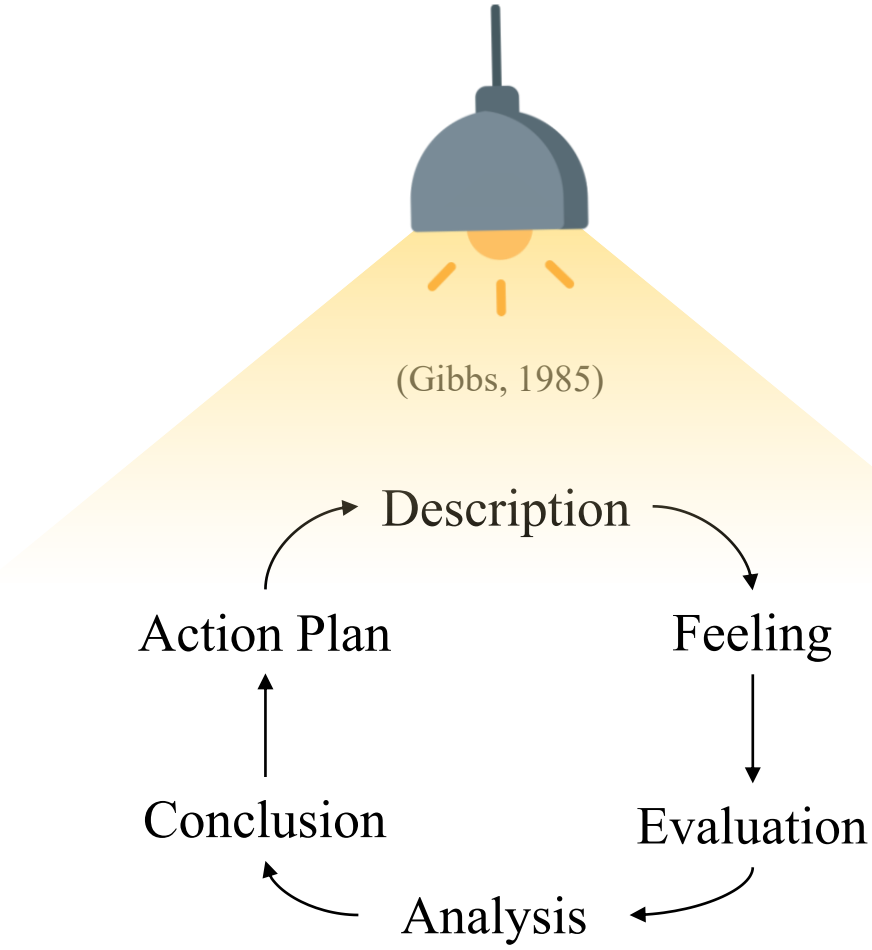
Theories of reflection

- Depth models often begins with a comprehensive evaluation of reflection.
- Breadth models take a multidimensional and process-oriented approach to reflection analysis.

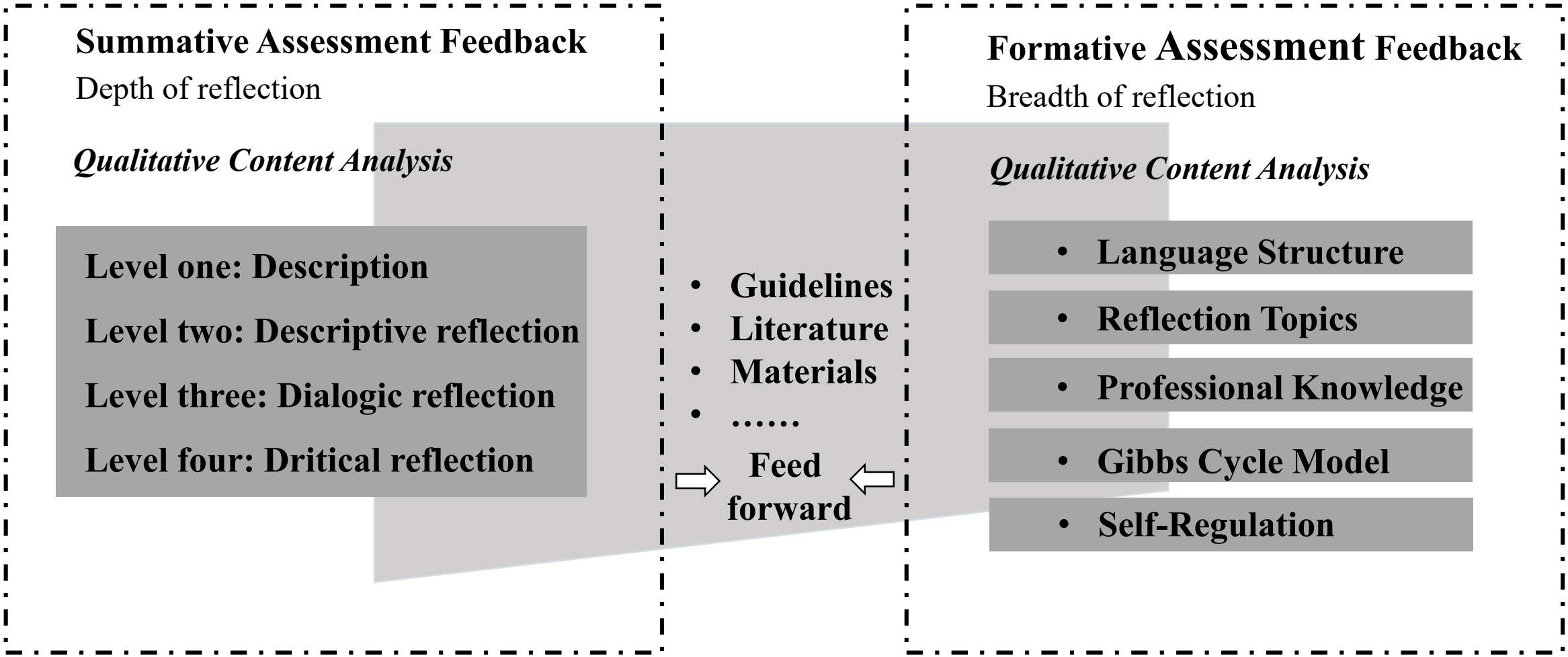
(Hatton & Smith, 1995)



(Gibbs, 1985)



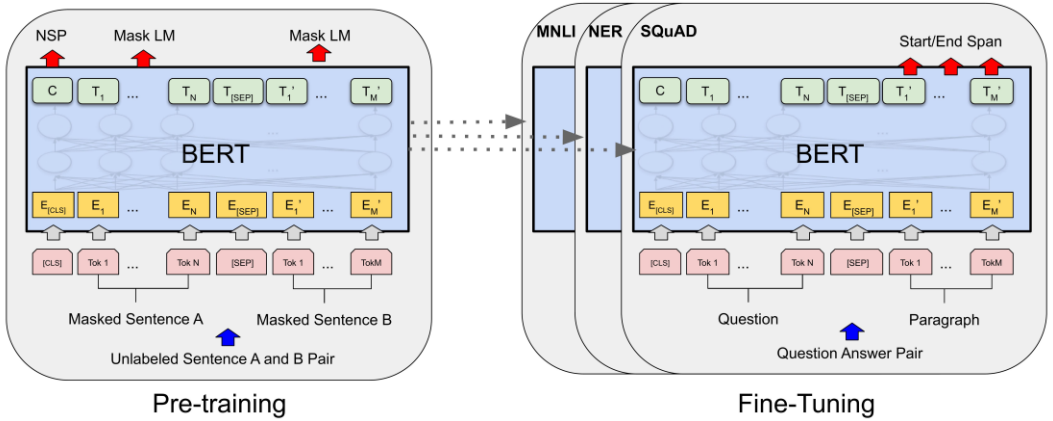
Design of AI Feedback



AI Algorithms

Supervised learning

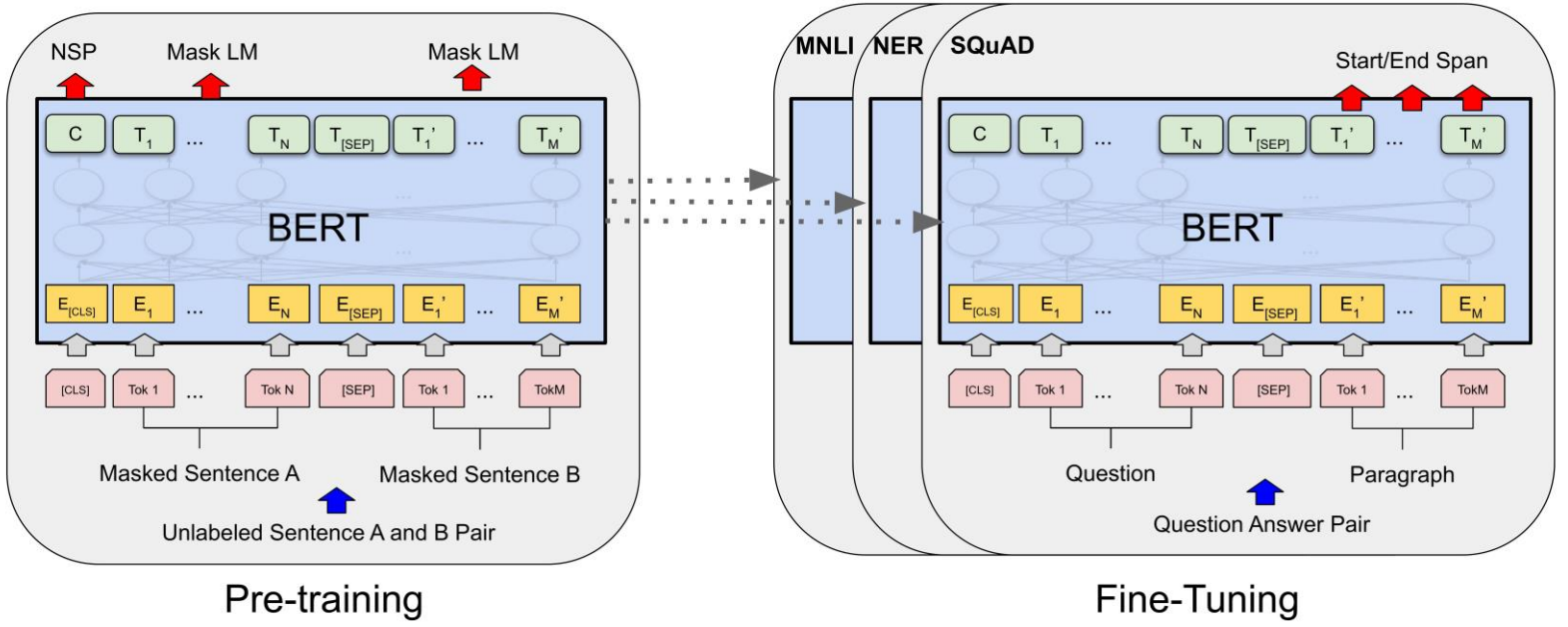
- **Reflection Level** — **BERT**



- **Language Structure** — **Part-of-Speech + Rule-based System**
- **Gibbs Cycle Model** — **ELECTRA**
- **Reflection Topics** — **BERTopic**
- **Professional Knowledge** — **~~ChatGPT-API~~/ GPT3/ BERTopic + Gibbs Cycle Model**
- **Self-Regulation** — **Emotion: RoBERTa**
  Sentiment: BERT
  Classification Algorithm (in progress)

Supervised Learning Pipelines

Tranining Pipline



Hyperparameter Turning

Model Evaluation:
Accuracy, Precision, Recall, and F1 score

Model Evaluation

Model file

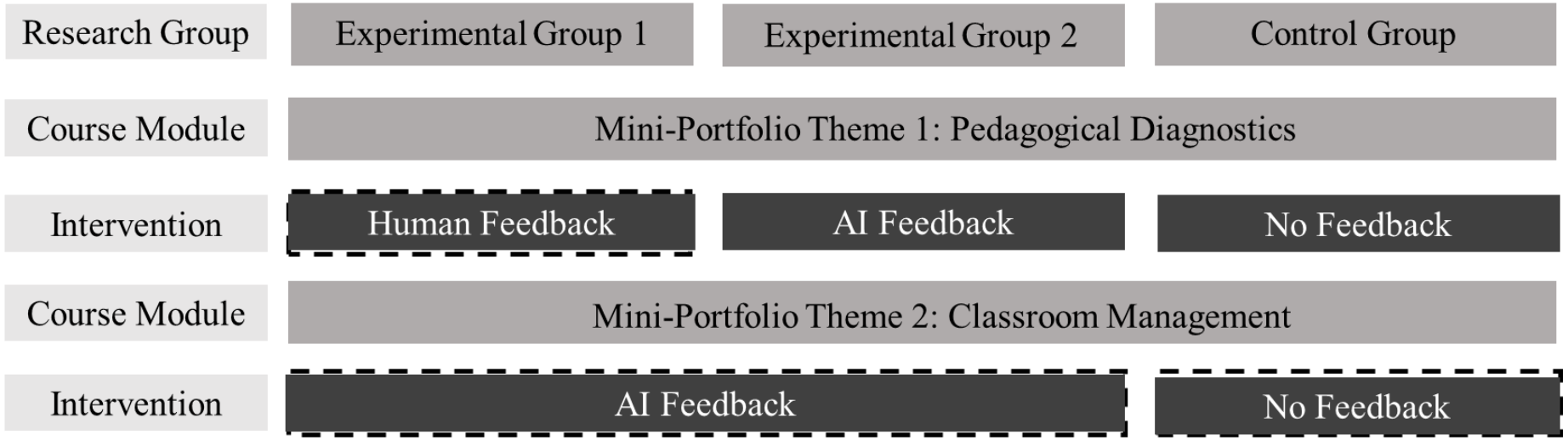
Model Training:
Pre-trained model BERT
Fine-tuning:
To find best hyperparameters for classification tasks

Prediction:
Classifiy into different Reflection Level

Serving Pipline

Input data → Feature Generation Piplines → Model file → Prediction

Use-inspired basic research



AI Feedback Perception

- Trustworthiness
- Usefulness
- Level of Support

Supporting Reflection

To compare the effectiveness of AI and human feedback

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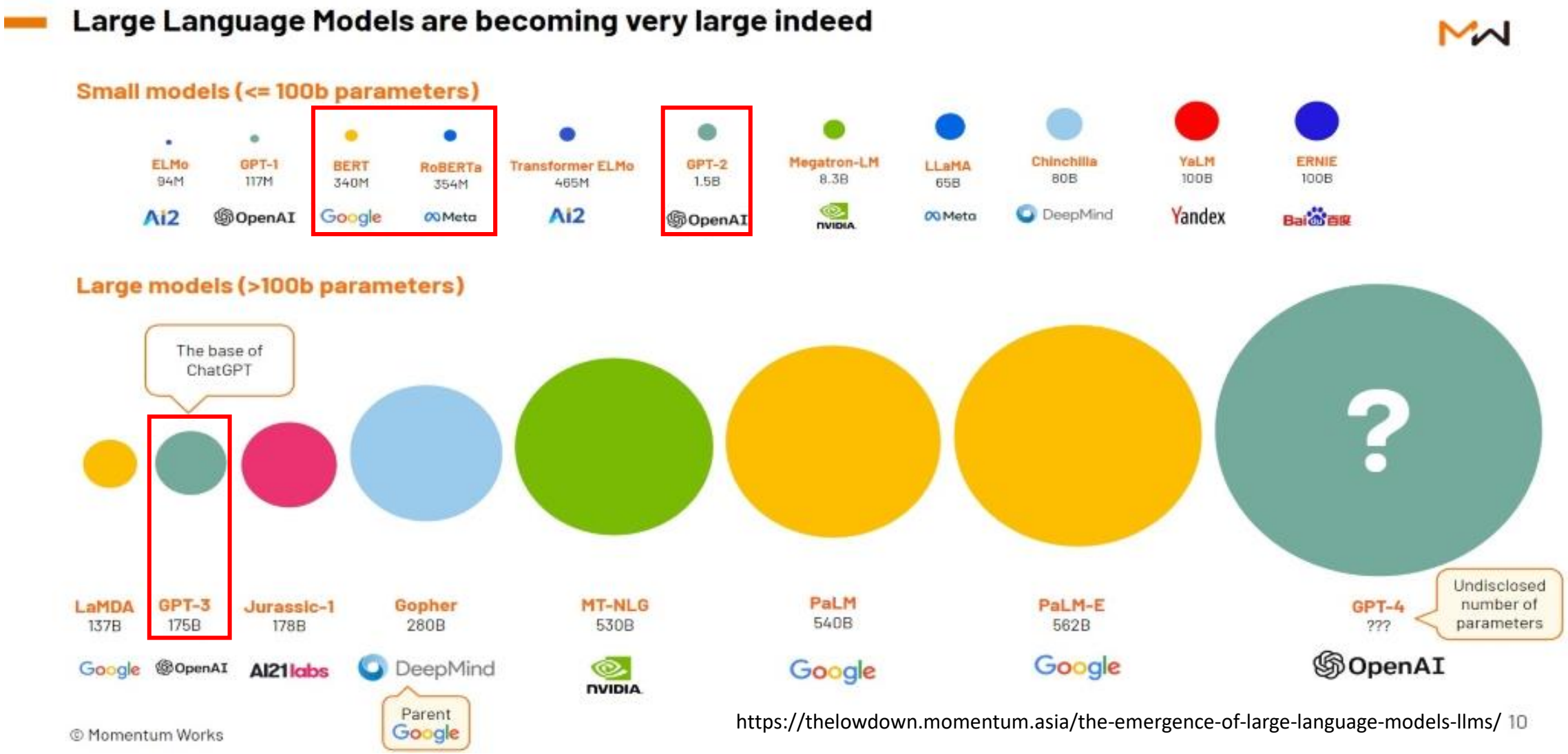
All in Large Language Models



https://thelowdown.momentum.asia/the-emergence-of-large-language-models-llms/ 10

THANK YOU!