


# Work and Self-Regulation Processes in an Online Task-Based Instruction on Newtonian Mechanics

Julius Weckler, Andreas Vorholzer, Claudia v. Aufschnaiter


## INTRODUCTION

## FOCUS OF THE STUDY


**Digital self-study materials: Important instructional element** 

High demands on **learners' ability to self-regulate their learning** (e.g., Greene et al., 2011)

Often: Only **little persistence** in working with digital self-study materials (e.g., Kizilcec & Halawa, 2015)

**Self-regulated learning (SRL)** 

"is an active, constructive process whereby **learners set goals for their learning** and then attempt to **monitor, regulate, and control their cognition, motivation, and behavior**, guided and constrained by their goals and the contextual features in the environment." (Pintrich, 2000, p. 453, highlighting by JW)

**Research on SRL** 

focusses primarily on *information-based* learning environments (overview in Broadbent & Poon, 2015)

**Limited evidence on SRL in *task-based* learning environments**

Applying information to solve tasks and problems is a central element for learning in STEM education  
→ **Ecological validity**

Requires additional regulation processes, e.g.: **selecting tasks** that match own prior knowledge, coordinating **various elements** (information, tasks, tests, ...)

**When** learners need to regulate **What** learners need to regulate

Phases	Areas for regulation			
	Cognition	Motivation/affect	Behavior	Context
1. Forethought, planning, and activation	Target goal setting Prior content knowledge activation Metacognitive knowledge activation <b>Focus 2</b>	Goal orientation adoption Efficacy judgments Ease of learning judgements (EOLs); perceptions of task difficulty Task value activation Interest activation	[Time and effort planning] [Planning for self-observations of behavior]	[Perceptions of task] [Perceptions of context]
2. Monitoring	Metacognitive awareness and monitoring of cognition (FOKS, JOLs)	Awareness and monitoring of motivation and affect	Awareness and monitoring of effort, time use, need for help Self-observation of behavior	Monitoring changing task and context conditions
3. Control	Selection and adaptation of cognitive strategies for learning, thinking	Selection and adaptation of strategies for managing motivation and affect	Increase/decrease effort Persist, give up Help-seeking behavior	Change or renegotiate task Change or leave context
4. Reaction and reflection	Cognitive judgments Attributions	Affective reactions Attributions	Choice behavior	Evaluation of task Evaluation of context

Adapted from Pintrich (2000, p. 454)

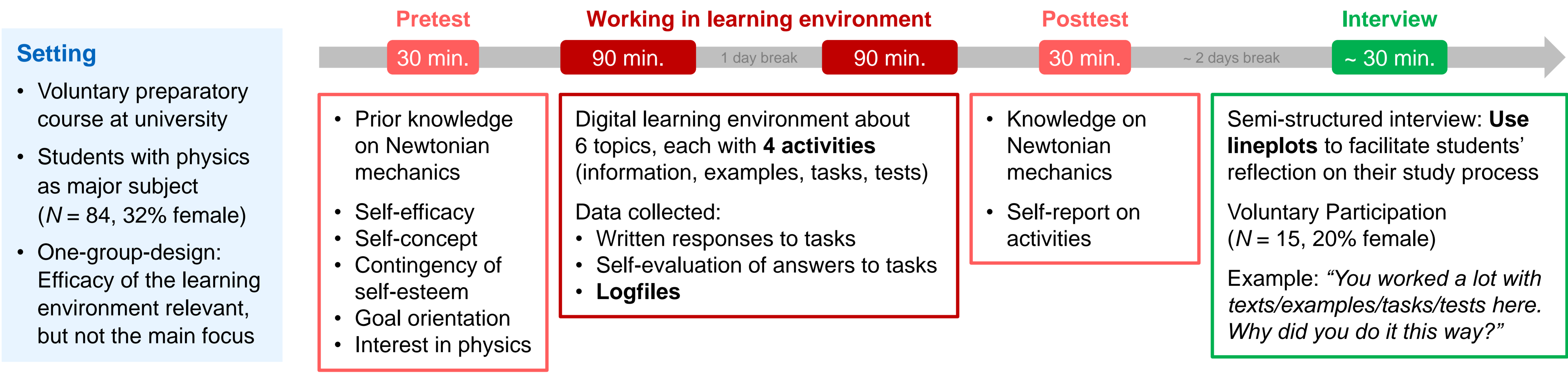
**Focus 1:** Analysis of **students' behaviour** when working autonomously in a task-based learning environment

- Similarities and differences in student's work-processes?
- Relationship between work-processes and dispositions, learning gains?

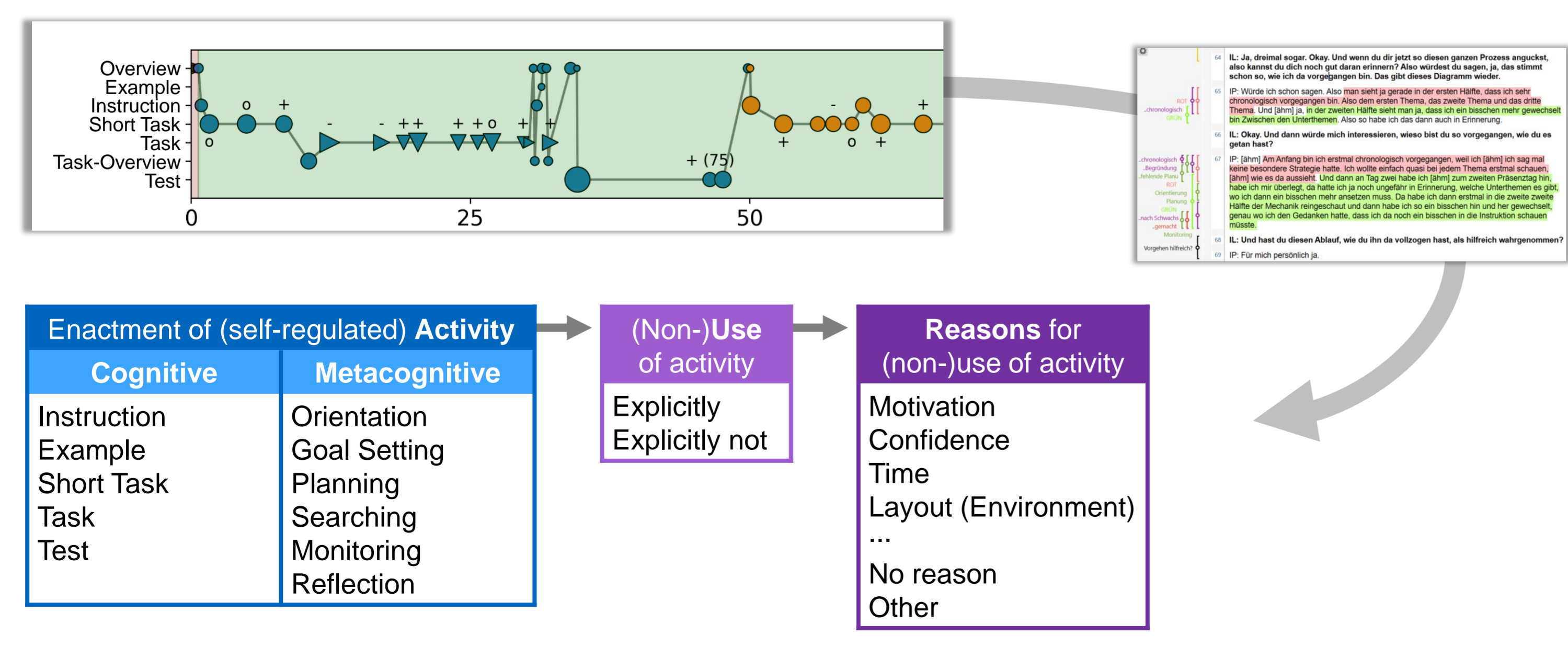
**Focus 2:** Analysis of **students' reasoning** (→ self-regulation) for their behaviour

- Cognitive, metacognitive, and motivational processes?

## DESIGN AND METHODS




## ANALYSIS (EXCERPT)

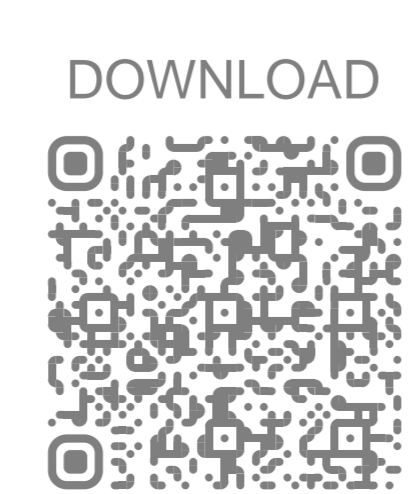


## OPEN QUESTIONS

- (1) Another round of data collection is planned for October 2024: Feedback and suggestions regarding the **current interview procedure** (interviews with stimulated recall via lineplots), e.g., particular questions?
- (2) Development of the **category-based analysis** and suggestions for **further analyses**: Feedback and suggestions regarding categories and codes (e.g., other/additional categories) and/or subsequent analyses (e.g., investigation of relationships between main categories)

## CONTACT

 **Julius Weckler**  
Technical University of Munich  
School of Social Sciences and Technology  
Professorship of Physics Education  
Arcisstraße 21, 80333 München, Germany  
julius.weckler@tum.de



## REFERENCES

Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education*, 27, 1–13.

Greene, J. A., Moos, D. C., & Azevedo, R. (2011). Self-regulation of learning with computer-based learning environments. *New Directions for Teaching and Learning*, 2011(126), 107–115.

Kizilcec, R. F., & Halawa, S. (2015). Attrition and achievement gaps in online learning. In *Proceedings of the Second (2015) ACM Conference on Learning @ Scale* (pp. 57–66).

Pintrich, P. R. (2000). The Role of Goal Orientation in Self-Regulated Learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of Self-Regulation* (pp. 451–502). Elsevier.