

## An engineering science experience report on using competence-based techniques to support students individually and sustainably



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## Background

- “Old-fashioned” didactical approach vs. virtual classroom, e-learning, etc.
- Further education course called “Higher Education Teaching”
- Physical and Satellite Geodesy; Lecture course „Selected aspects of highly precise point positioning using GNSS”  
→ GNSS lecture course



Paper

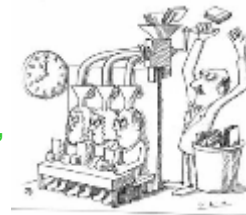
## Motivation



- **Learners are acting (often) like hunter-gatherers**  
**Sustainability deficits due to economically driven strategies**  
→ **surface level learning techniques**  
**Aim: Teacher has to focus on sustainability during the semester**



- **Communication is (often) suffering, e.g. curriculum load**  
**Additional communication tools, e.g. portfolio,**  
**Aim: More feedback, more individuality**



- **Key competences (Bologna; e.g. critical thinking, self-management skills, team work skills, leadership skills).**

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## Case Study „GNSS lecture course”



- Only small parts of fundamental knowledge are existing in the long-term memory of the learners (anchoring?)
- GNSS lecture course: Students of 7<sup>th</sup> or higher semester
- Selected lecture course → motivation, interest
- Number of students: 6-7
- Learners are well-known
- Data base: 3 semesters



**Very good conditions**  
**for a case study based on theories of constructivism**

Effort is needed

Learning = cognitive process

Learning = result of individual process

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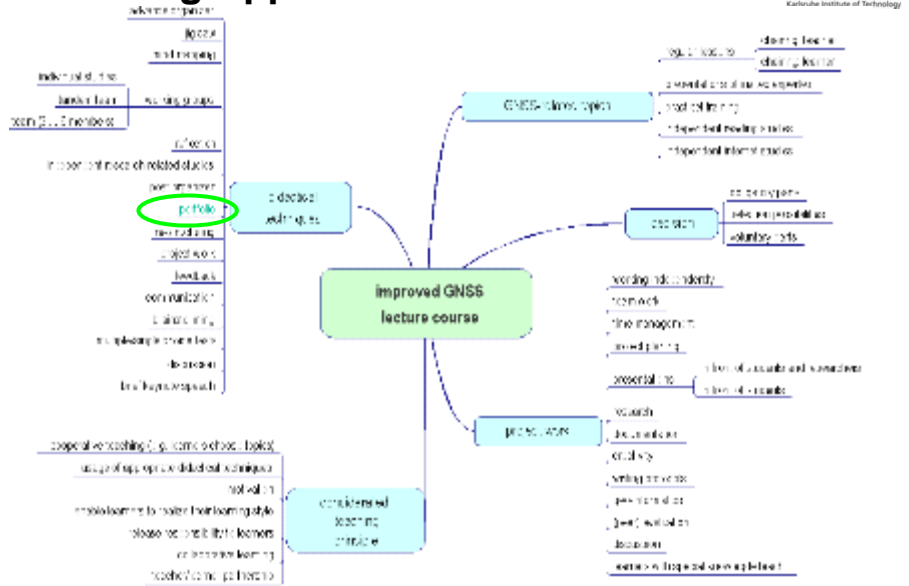


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# Teaching Approach



# Teaching Approach – a few 1st Steps



- In the forefront of the 1st lesson**
  - 4 weekly e-mail statement letters
  - Reflection of learning style **portfolio**
    - missing individuality
    - missing sustainability
    - reduction of skepticism, fears and risks
  - Individual selection of lecture course topics
- 1st lesson: prior knowledge / anchoring**
- Establishment of partnership between learners and teacher**
  - cooperatively chosen rules
  - cooperatively chosen aims



## Teaching Approach – Focus Portfolio



- Creation = activity
- Individual collection of selection and reflection
- Continuous evaluation of progress in learning
- Regular reflections (approx. 8 per semester)
- Individual guidance (teacher commentary)
- Teachers' statement letters during semester
- Feedback / communication
- Motivation
- Time-consuming
- Sustainability / effort
- Anchoring
  
- Extrinsic motivation is needed to motivate learners (e.g. grades)

Selected topics

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## Teaching Approach – Conclusions



- Time-consuming
  - Teacher approx. 200 h 1<sup>st</sup> semester (2<sup>nd</sup>: 150 h, 3<sup>rd</sup> : 140 h)
  - Learner approx. 80 h per semesters (foreigners)
- Improved motivation (e.g. feedback)
- Sustainability
- Individuality
- Key competences (e.g. research)
  
- Biotope-like situation
  
- Overwhelming response
- Superb eyes opening experience

*Thank you very much  
for your attention*

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