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

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“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

Background
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).

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 7th 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

Learning = cognitive process

Effort is needed

Learning = result of individual process
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
    - missing individuality
    - missing sustainability
    - reduction of skepticism, fears and risk:
      - 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

Teaching Approach – Conclusions

- Time-consuming
  - Teacher approx. 200 h 1st semester (2nd: 150 h, 3rd: 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

Paper