

On the Acquisition of GNSS Competencies Hand in Hand with Personal Competencies in the Introductory Phase of BSc Engineering Degree Programs

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SUMMARY

Using the example of a 3 ECTS GNSS-related course of the introductory phase (second semester) of the study BSc program ‘Geodesy and Geoinformatics’ of Karlsruhe Institute of Technology (KIT, Germany) held in German language, it is shown how discipline-related and personal competencies are acquired hand in hand based on a well-considered didactic mix of methods. This happens, for example, in the context of scientific work (e.g., understanding papers), training of presentation skills (e.g., peer teaching), support of individual learning competency (e.g., application of different learning techniques resp. tools), and training of reflectivity competency (e.g., analysis of individual learning process). In addition, the course takes into account fundamental psychological needs of students (Deci and Ryan, 2000; e.g., experience of autonomy, experience of competence) and thus supports motivation.

The didactical framework of the course is based on Anchored Instruction (Cognition and Technology Group at Vanderbilt, 1993). For this purpose, a scientific paper – dealing with the establishment and application of a regional NRTK service – is used. The subject-related understanding level is chosen with mindful consideration, enabling the students – while reading the paper in the beginning of the course for a first time – to individually (i) reflect their previous GNSS knowledge and (ii) realize GNSS aspects, which are not fully graspable. According to principles of research-oriented teaching (KIT, 2018), questions related to the new GNSS aspects are jointly formulated, which will be dealt with and answered throughout the course. Re-reading the paper at the end of the course enables the students to experience their personal competency gain, which supports their motivation (Deci and Ryan, 2000).

In order to enable students to cognitively connect consecutive teaching/learning units (unit length: approx. 90 minutes), the ending and beginning of each unit are ritualized (e.g., ending: students

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individually reflect and select (i) the most important aspects, (ii) open questions and (iii) topics of the following units). This collection generates valuable feedback for the lecturer, increases transparency regarding the students' learning processes, and allows to mindfully plan the next steps of the course. Thus, the challenges of increased online teaching during the COVID-19 pandemic could be handled easily.

At FIG 2022, the teaching/learning setting of the course is described and discussed in detail, with an additional focus on the effects of the COVID-19 pandemic.

References

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