EBERHARD KARLS
UNIVERSITÄT
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Graduiertenschule
LEAD

Department of Mathematics

Hands-on Differential Geometry

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Field of Research

There are three issues, this doctoral project will investigate.

Beliefs concerning mathematics
school: calculational-algorithmic, uncreative picture of mathematics
university: definitions and proofs highly important; axiomatic approach
But where is creativity?

→ What do maths education students think about mathematics? Do these beliefs change when they attend a certain seminar?

Links between school and university mathematics
Maths education students often miss links between school and university mathematics. That is demotivating and frustrating.

→ How to help students to find some links? What links do they already see?

Links between the contents of the basic maths lectures
Many students struggle when they try to solve problems that need notions or techniques from both basic maths lectures.

→ How to help students to internalize connections? What connections can students describe explicitly?

Seminar "Elementary Hands-on Differential Geometry"

The seminar is a regular seminar, lasting one semester, but it is tailored for doing research on the question above.

students have to develope mathematics themselves
use of hands-on material and groupwork

→ support a more vivid and creative picture of mathematics

direct links with regard to content "the same" as topics from school on a higher level

→ useful background knowledge and deeper understanding of school topics

Differential geometry needs both basic lectures to great extent, e.g. differentials and vector spaces.

→ students have to link both topics to develope some differential geometry by themselves

Design

The research comprises **quantitative and qualitative** parts. There will be a **questionnaire** which the students complete at the beginning and at the end of the semester (quantitative) and the participants of the seminar will write some **texts** that will be analysed with QCA (qualitative).

only quantitative
items taken from COACTIV Literatur!

quantitative: little exercises in the questionnaire that need knowledge from both basic lectures to solve them
qualitative: The students have to write texts, e.g. explain the connections between the basic lectures to a first year student.

quantitative: closed items on importance of contents of different lectures; open item on links between school and university mathematics
qualitative: The students have to write texts, e.g. explain curvature of curves to a pupil in the last grade.

Zeitplan.....

mehr Quellenangaben!

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