MEASURING AND FOSTERING THE DIAGNOSTIC SKILLS OF STUDENT TEACHERS USING VIDEO VIGNETTES – THE OBJECT OF DIAGNOSIS: THE REPRESENTATIONAL COMPETENCE OF PUPILS

Objective and problem. The diagnostic skills of teachers are considered to be an important moderator of successful teaching and, in turn, of the learning success of pupils. This process diagnosis is of vital importance for a suitable microadaption of lessons. In order to measure and develop skills in diagnosing processes, we will use an available digital tool (ViviAn) consisting of **vi**deo **vi**gnettes, additional information and materials as well as **an**alytical tasks and actions. In this project, the tool will be evaluated and used to diagnose the representational competence of pupils in the sciences and mathematics (in the area of functional thinking, in particular). In a next step, a comparative study will be conducted in which the tool will be implemented at several universities in Germany to capture how the skills of student teachers in diagnosing the representational competence of pupils develop before and after they attend teaching methodology seminars In addition, an intervention study will assess the extent to which student teachers' process diagnostic abilities regarding the levels of pupils can be improved by using ViviAn as a learning environment within the framework of a course.

Theoretical background. Diagnostic skills are of vital importance for professional teaching (Praetorius u.a., 2012). Weinert (2000, p. 16) sees diagnostic skills as a "collection of skills for evaluating the abilities, level of knowledge, learning progress and academic problem areas of individual pupils as well as for assessing the difficulty of various tasks on an ongoing basis during lessons so that didactic actions can be based on diagnostic understanding." A diagnosis is therefore followed by additional didactic steps (Hoge & Coladarci, 1989). Schrader (2013) calls these steps microadaptions, defining them as short-term adaptations and interventions in the teaching process – for example, the reaction to a pupil's error.

This suggests that it is important to already start fostering the diagnostic skills of student teachers in their initial training phase. The objective of this project is to capture and develop the diagnostic skills of student teachers using video vignettes. The three- to five-minute video vignettes are of group work conducted in a pupil laboratory at the University of Koblenz-Landau. A computer-based learning environment will be made available to students using a so-called learning management system (LMS), bringing together the video vignettes and various other materials, for example the simulations used and work books completed by pupils. Large-scale lectures will instruct students on how to work independently on the diagnosis tasks on the representational competence of pupils.

Representational competence can be broken down into two components. It encompasses the ability to interpret and use available external representations such as tables, diagrams, sketches, verbal descriptions and equations. In addition, it includes the ability to produce own external representations, adapted to specific situations (Izsák 2011; Schnotz, Baadte, Müller, Rasch 2011; Cox 1999). To diagnose the representational competence of pupils, the following levels of representational competence put forward by Kozma and Russel (2005, p. 133) can be used:

Level 1: Representation as a "photographic depiction"
Level 2: Initial symbolic aspects are added to representations
Level 3: Syntactical use of formal representations
Level 4: Semantic use of formal representations
Level 5: Reflection- and argument-based use of suitable representations

Relevance. Representational competence is essential for knowledge acquisition in all mathematical and scientific subjects and, indeed, in many other areas. In order to help pupils develop their representational competence during lessons as well as possible, it is indispensable that teachers are able to diagnose processes and spontaneously make microadaptions to lessons. However, to date, no methods have been developed that specifically train this skill. If this project shows that the skill can be trained using the ViviAn digital tool, the tool could be implemented nationwide in all phases of teacher training and further education.

Methodological approach. A comparative study will be conducted on the diagnosis skills of student teachers with regard to the representational competence of pupils at six universities in Germany using an available digital tool (ViviAn). To create the tool, **vi**deo **vi**gnettes of group work, which will be used as a basis for diagnosing the representational competence of pupils, have to be selected with a theory-based approach. Furthermore, additional information, materials, **an**alytical tasks and actions also have to be developed with a theory-based approach. A quasi-experimental intervention study will be conducted at one university. It will implement an experimental and control group design to investigate the extent to which the diagnostic skills of student teachers can be developed using ViviAn in a learning management system (LMS). The data will be collected electronically by the LMS.

Possible dissertation topic

- Video-vignette-based analysis and development of the diagnostic abilities of student teachers with regard to the representational competence of pupils

Literature

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