

Innovative assessment approaches and new paradigms within the assessment of teachers' professional competencies

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Recent research on the professional competencies of mathematics teachers, which has been carried out during the last decade, is characterized by different theoretical paradigms on the conceptualization and assessment of teachers' professional competencies, namely cognitive versus situated approaches. Building on the international IEA Teacher Education and Development Study in Mathematics (TEDS-M) and its Follow-up study, TEDS-FU, the presentation will describe cognitive and situated approaches to assessing the professional competencies of teachers. In TEDS-FU the cognitive oriented framework of TEDS-M has been enriched by a situated orientation including the novice-expert framework and the noticing concept as theoretical approaches on teachers' competences for analysing classroom situations. Correspondingly, the assessment instruments were extended by using video-vignettes for assessing teachers' perception, interpretation and decision-making competencies in addition to cognitive oriented knowledge tests. The presentation will discuss the different kinds of theoretical paradigms, namely cognitively oriented versus situated oriented. Based on this distinction the necessity to develop new innovative assessment formats will be argued for, namely video-based assessment instruments getting closer to actual teaching situations and thus evaluating situated facets of the professional competencies of teachers complementing common knowledge tests with open and closed items focusing on knowledge-based facets of the professional competencies of teachers. The staged video-vignettes focus on these situated competence facets evaluating the teachers noticing competences, i.e. to perceive particular events in an instructional setting, interpret the perceived activities in an instructional setting to develop decision options either as anticipating a response to students' activities or as proposing alternative instructional strategies. The strengths and weaknesses of both assessment approaches will be contrasted based on the instruments and the results of TEDS-M and TEDS-FU.

Furthermore, connecting the results of TEDS-FU with TEDS-M allows comprehensive insight into the structure and development of the professional competencies of mathematics teachers, the complex interplay between the different facets of teachers' competencies and the high relevance of teaching practice for the development of these competencies. The presentation will show on the one hand that both approaches – cognitive and situated – are needed for a comprehensive description of teachers' professional competencies. On the other hand it will be shown that both approaches can be integrated in a prolific way.

The prospects will discuss possible cultural elements of these assessment paradigms drawing on newly established studies broadening TEDS-FU towards the evaluation of structural relations between teachers competencies and students achievement gains mediated by instructional quality (TEDS-INSTRUCT). First tentative results of a national study transferring TEDS-INSTRUCT to another Federal State of Germany (TEDS-VALIDATE) will be described as well as first insight from an international study aiming to transfer these studies into East Asia (TEDS-EAST-ASIA).

Biographical statement:

Gabriele Kaiser holds a master's degree as a teacher for mathematics and humanities for lower and upper secondary level, which she completed at the University of Kassel in 1978 with the first state degree. After having worked at school and completion of the second state degree, she worked as a scientific assistant at the Department of Mathematics at the University of Kassel, where she completed her doctorate in mathematics education (rer. nat.) in 1986 with a study on applications and modelling

supervised by Werner Blum and Arnold Kirsch. Based on a grant for Postdoctoral Research by the German Research Society (DFG) she undertook her post-doctoral study in pedagogy on international comparative studies at the University of Kassel, which she completed in 1997. From 1996-1998 she held a guest professorship at the University of Potsdam. Since 1998, she is full professor for mathematics education at the Faculty of Education of the University of Hamburg.

Her areas of research include modelling and applications in school, international comparative studies, gender and cultural aspects in mathematics education and empirical research on teacher education. Gabriele Kaiser's most recent projects deal with teacher education, partly under an international perspective. Together with Sigrid Blömeke and Rainer Lehman (both Humboldt-University Berlin) she has carried out from 2006-2010 the IEA Teacher Education Study in Mathematics (TEDS-M), which compares the efficiency of teacher education in various countries. This project was supported by the German Research Society (DFG). She was already participating from 2004-2008 in the Pilot Study for the TEDS-Study, which was developing first instruments for this ambitious international study, the so-called Mathematics in the 21st Century study. Related to this study qualitatively oriented supplementary studies on future teachers' professional knowledge and their comparison have been extended to Hong Kong and Australia in collaboration with Gloria Stillman and Jill Brown from Australia, Ngai-Ying Wong and Issic Leung from Hong Kong. Most recently Gabriele Kaiser has carried out a follow-up-study to the German part of the study TEDS-M together with Sigrid Blömeke, Johannes König and Martina Döhrmann, in which the cohort of future teachers tested in TEDS-M is followed into their practical work in school, a project funded by the German Research Society as well. This project (TEDS-FU) used an enriched framework of TEDS-M and additional video-based evaluation instruments. Furthermore, she was participating in another study led by Sigrid Blömeke, in which the framework of TEDS-M was extended to future teachers of mathematics, German and English (TEDS-LT), measuring the professional knowledge of future teachers in the transition from Bachelor to Master studies (funded by the German Ministry for Education and Research, BMBF). A study funded by the German Telekom Foundation examined the development of the professional knowledge of future mathematics teachers at the beginning of their study in the frame of innovative teacher education projects. This study was carried out jointly with Sigrid Blömeke, Rainer Lehmann and Hans-Dieter Rinkens from 2008 to 2012. Her most recent research focus on the structural relation of the professional competencies of practicing teachers measured with instruments developed in the study TEDS-FU and the gain of students' achievements taught by the evaluated teachers. The assessment of the instructional quality of the teachers in focus is carried out by classroom observations and serves as mediator variable. This study is currently carried cooperatively with Sigrid Blömeke and Johannes König out in the Federal State of Hamburg, named TEDS-INSTRUCT. A validation study of this design aiming to evaluate the validity of the framework and the instruments in the Federal State of Thuringia has just been implemented, carried out jointly with Sigrid Blömeke and Johannes König and funded by the German Ministry of Education and Research (TEDS-VALIDATE). A supplementary study funded by the European Union in the frame of the Marie Skłodowska-Curie programme evaluates, whether the theoretical framework and the instruments developed in Western countries can be transferred to East Asian countries and whether the structural relations hold for Chinese teachers and their students taught too (responsible researcher: Xinrong Yang) (study EAST-WEST).

In October 2010 she took up the position as Vice Dean of the Faculty of Education being responsible for research, promotion of young researchers and international cooperation. Since 2005 she serves as Editor-in-chief of ZDM Mathematics Education (formerly Zentralblatt fuer Didaktik der Mathematik), published by Springer. She is Convenor of the 13th International Congress on Mathematics Education

(ICME-13), which will take place 2016 at the University of Hamburg expecting several thousands of mathematics educators.