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Teachers' diagnostic competences and their practical relevance

Special Issue Editorial

Against the backdrop of an increasing heterogeneity of students, teachers' diagnostic competences in assessing students' characteristics and potential are becoming more and more relevant. Already in the 1980's Schrader and Helmke (1987) described teachers' ability to judge students' prerequisites adequately as a vital basis for an instruction, which fits to students' abilities, and up to now diagnostic competences are regarded as a core aspect of teachers' expertise (e.g., Baumert & Kunter, 2006; van Ophuysen, 2010; Weinert, Schrader, & Helmke, 1990). The construct of diagnostic competence has been widely discussed over the last years: At first diagnostic competence – defined as the ability of judging students' performance level correctly – was described by measures of diagnostic accuracy: level, rank, and differentiation. Later on Spinath showed that the accuracy of teachers' judgments is not determined by one single ability and suggested avoiding the term diagnostic competence as a single competence, when referring to judging students' characteristics correctly (Spinath, 2005). Besides diagnosing students' aptitudes, judging the requirements of learning materials is essential for initiating successful learning processes in the classroom and therefore the construct of diagnostic competences also needs to include the correct estimation of difficulty of tasks and materials (McElvany et al., 2012). This indicates the closeness of the concept to pedagogical content knowledge (Shulman, 1986). The described diagnostic activities and conclusions are not only relevant for lesson preparation but also for adapting teaching and learning processes during a lesson (Hardy et al., 2011; Helmke, 2009), meaning that teachers should also be able to judge classroom scenarios adequately.

Studies and their results about teachers' diagnostic accuracy are very heterogeneous. While some papers focus on motivational and self-related learning outcomes, most studies investigate the accuracy of teachers judging students' performance. Regarding the three measures rank, level and differentiation, meta-studies have consistently shown that teachers' judgment and the empirically tested student

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achievement correlate in a medium range for the rank component: $.62 < r_{\text{med}} < .69$ (Hoge & Colardaci, 1989), $r_{\text{med}} = .53$ (Südkamp, Kaiser, & Möller, 2012). Teachers' judgment of task difficulty also bears potential for optimization since the rank correlation varies between $.33 < r_{\text{mean}} < .56$ (for an overview: Helmke, Hosenfeld, & Schrader, 2004). Few studies also take level and differentiation measures into account. Results are heterogeneous and are often confounded with students' ability level: Teacher accuracy varies for students with extremely high or low performance (Begeny, Eckert, Montarello, & Storie, 2008; Feinberg & Shapiro, 2009). While some studies show that teachers tend to overestimate their students' achievement (e.g., Feinberg & Shapiro, 2009), other studies provide evidence for the contrary (e.g., Begeny, Eckert, Montarello, & Storie, 2008). Similar findings are reported for estimating the level of task difficulty (for overestimating task difficulty: e.g., McElvany et al., 2009); for underestimating task difficulty: e.g., Anders et al., 2010; for an overview: Hoffmann & Böhme, 2013). Regarding the differentiation measure, teachers tend to underestimate the variance in their students' achievement (Lintorf et al., 2011).

The accuracy of teachers' judgment is relevant for students' learning outcomes, when teachers are able to draw adequate conclusions for their actual teaching (Schrader, 2010) and provide a high quality of instruction (Karing, Pfof, & Artelt, 2011). Since it is widely assumed that teachers' diagnostic competences are essential for student learning and that they are a core aspect of their professional competence, it is necessary for teacher education to think about the development of diagnostic competences and possibilities of its promotion. In line with the expert-novice paradigm, diagnostic competences can be seen as a result of teachers' professional development, but up to now there has been little research on factors, which influence teachers' diagnostic competences and which can be modified in teacher trainings. It seems reasonable that expert teachers have built up more routines and knowledge about students and tasks for giving accurate judgments and therefore teaching experience has been widely assumed to impact teachers' diagnostic competences (e.g., Krolak-Schwerdt & Rummer, 2005; van Ophuysen, 2006). However, empirical results do not show consistent findings regarding this assumed relation (e.g., Praetorius, Greb, Lipowsky, & Gollwitzer, 2010), which might indicate that teachers' need to additionally reflect their own diagnostic behavior for establishing and improving diagnostic competences.

This depiction illustrates the importance and range of diagnostic activities requiring teachers' competences, which play a central role for students' academic success. This special issue addresses the scope of relevance of diagnostic competences from different points of view:

- (a) On the individual teacher level: Teachers' diagnostic competences can be regarded as a prerequisite for judgment accuracy and therefore represent a vital part of teachers' individual expertise.
- (b) On the process level: Regarding teaching and learning processes in the classroom teachers' diagnostic competences are highly relevant for quality of instruction and adaptive teaching.

- (c) On the system level: Teachers diagnoses are the basis for school career decisions and therefore the relevance of diagnostic competences on the school system level needs to be considered.

The first paper by *Annika Ohle, Nele McElvany, Holger Horz, and Mark Ullrich* (2015) addresses diagnostic competences as part of teachers' expertise and focusses on aspects of diagnostic competences as prerequisites for accurate diagnostic judgments. In accordance to Weinert's (2001) definition of competences this paper describes motivational and self-related aspects of teachers' diagnostic competences, following the model of teachers' professional competences, which was operationalized in the COACTIV-Study (Professional Competence of Teachers, Cognitively Activating Instruction, and Development of Students' Mathematical Literacy; Baumert & Kunter, 2006). In detail, the competency facets (1) attitudes towards diagnostics, (2) motivation towards diagnostics, (3) self-efficacy beliefs, and (4) self-reflection in diagnostics were assessed from 121 in-service secondary school teachers in the context of teaching and learning with texts and integrated pictures. Confirmatory factor analyses support the superiority of a four factor model, concluding that the aforementioned facets are distinct but correlated factors. These factors in turn are partially positively related to teachers' diagnostic behavior.

The paper by *Stefanie Schäfer and Tina Seidel* (2015) focuses on the process related reach of efficacy of teachers' diagnostic competences. Within the project *Observe* (Recognising basic conditions of effective teaching. Analysis of the pedagogical-psychological competencies of prospective teachers), 109 pre-service teachers were asked to identify and reason scenes from a classroom video, which are crucial for students' learning according to goal clarity and learning climate. In this context teachers' diagnostic competences are relevant for creating and optimizing learning opportunities for students and are regarded as a part of their professional knowledge. Results show that novice teachers are already capable of identifying crucial aspects of classroom interactions, but that they still lack the ability to argue and predict as expert teachers do.

The third paper by *Ines Böhmer, Thomas Hörstermann, Cornelia Gräsel, Sabine Krolak-Schwerdt, and Sabine Glock* (2015) examines teachers' strategies of gathering information for school transition recommendations. Diverse information about students is necessary for teachers for advising the most suitable secondary school track for each student. Within the diagnostic process relevant information has to be identified and processed. Regarding the heterogeneity of elementary school students, not only information about academic achievement is relevant but also other heterogeneity enhancing factors such as social background and behavior. In the presented study 72 in-service elementary school teachers were provided with more or less consistent information about students and then their processing strategies were assessed. These can follow strict rules of what kind of information is regarded as relevant ("rule-based" strategy) or can also take circumstantial information into account ("information integrating" strategy). The findings support that teachers first prefer using the rule-based strategy in their diagnostic process focus-

ing on information about academic achievement. Secondly, teachers also requested background information, leading to the conclusion that they also apply the information integrating strategy before coming to a final decision. This pattern of strategy use could be observed regardless of the consistency of provided information.

In the last paper *Stefanie van Ophuysen* and *Lars Behrmann* (2015) provide an in-depth discussion of the three studies, considering their results, interpretations, and broader framework as well as conclusions for further research and practice.

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