

Annika Ohle & Nele McElvany

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

Dr. Annika Ohle (corresponding author) · Prof. Dr. Nele McElvany, Institute for School Development Research (IFS), TU Dortmund University, Vogelpothsweg 78, 44227 Dortmund, Germany
e-mail: Annika.Ohle@tu-dortmund.de
Nele.McElvany@tu-dortmund.de

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.

References

- Anders, Y., Kunter, M., Brunner, M., Krauss, S., & Baumert, J. (2010). Diagnostische Fähigkeiten von Mathematiklehrkräften und ihre Auswirkungen auf die Leistungen ihrer Schülerinnen und Schüler [Diagnostic abilities of mathematics teachers and the relevance for students' achievement]. *Psychologie in Erziehung und Unterricht*, 57(3), 175–193.
- Baumert, J., & Kunter, M. (2006). Stichwort: Professionelle Kompetenz von Lehrkräften [Keyword: Teachers' professional competence]. *Zeitschrift für Erziehungswissenschaft*, 9(4), 469–520.
- Begeny, J. C., Eckert, T. L., Montarello, S. A., & Storie, M. S. (2008). Teachers' perceptions of students' reading abilities: An examination of the relationship between teachers' judgments and students' performance across a continuum of rating methods. *School Psychology Quarterly*, 23(1), 43–55.
- Böhmer, I., Hörstermann, T., Gräsel, C., Krolak-Schwerdt, S. & Glock, S. (2015). Eine Analyse der Informationssuche bei der Erstellung der Übergangsempfehlung: Welche Urteilsregel folgen Lehrkräfte? [An analysis of information search in the process of making school tracking recommendations: Which judgment rule do teachers apply?] *Journal for Educational Research Online*, 7(2), 59–81.
- Feinberg, A. B., & Shapiro, E. S. (2009). Teacher accuracy: An examination of teacher-based judgments of students reading with differing achievement levels. *The Journal of Educational Research*, 102(6), 453–462.
- Hardy, I., Hertel, S., Kunter, M., Klieme, E., Warwas, J., Büttner, G., & Lühken, A. (2011). Adaptive Lerngegebenheiten in der Grundschule: Merkmale, methodisch-didaktische Schwerpunktsetzung und erforderliche Lehrerkompetenzen [Adaptive learning opportunities in elementary school: Characteristics, methodological-didactical focus and necessary teacher competences]. *Zeitschrift für Pädagogik*, (Beiheft 57), 819–833.
- Helmke, A. (2009). *Unterrichtsqualität und Lehrerprofessionalität: Diagnose, Evaluation und Verbesserung des Unterrichts* [Quality of instruction and teacher professionalism: Diagnosis, evaluation and improvement of teaching]. Seelze-Velber, Germany: Kallmeyer.
- Helmke, A., Hosenfeld, I., & Schrader, F.-W. (2004). Vergleichsarbeiten als Instrument zur Verbesserung der Diagnosekompetenz von Lehrkräften [Comparative tests as an instrument for improving teachers' diagnostic competence]. In R. Arnold, & C. Griese (Eds.), *Schulmanagement und Schulentwicklung* (pp. 119–144). Hohengehren, Germany: Schneider.
- Hoffmann, L., & Böhme, K. (2013). Wie gut können Grundschullehrkräfte die Schwierigkeit von Deutsch- und Mathematikaufgaben beurteilen? Eine Untersuchung zur Genauigkeit aufgabenbezogener Lehrerurteile auf Klassenebene [How accurate can elementary school teachers estimate the difficulty of German and Mathematics tasks? An investigation of task related judgment accuracy on class level]. *Psychologie in Erziehung und Unterricht*, 61(1), 42.

- Hoge, R. D., & Coladaraci, T. (1989). Teacher-based judgments of academic achievement: A review of literature. *Review of Educational Research*, 59(3), 297–313.
- Karing, C., Pfost, M., & Artelt, C. (2011). Hängt die diagnostische Kompetenz von Sekundarstufenlehrkräften mit der Entwicklung der Lesekompetenz und der mathematischen Kompetenz ihrer Schülerinnen und Schüler zusammen? [Is there a relation between secondary school teachers' diagnostic competence and the development of their students' reading and mathematics competence?] *Journal for Educational Research Online*, 3(2), 119–147. Retrieved from <http://www.pedocs.de/volltexte/2012/5626/>
- Krolak-Schwerdt, S., & Rummer, R. (2005). Der Einfluss von Expertise auf den Prozess der schulischen Leistungsbeurteilung [Impact of expertise on the process of performance rating in schools]. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*, 37(4), 205–213.
- Lintorf, K., McElvany, N., Rjosk, C., Schroeder, S., Baumert, J., Schnotz, W., Horz, H., & Ullrich, M. (2011). Zuverlässigkeit von diagnostischen Lehrerurteilen – Reliabilität verschiedener Urteilsmaße bei der Einschätzung von Aufgabenschwierigkeiten [Trustworthiness of teachers' diagnostic judgments – reliability of different judgment measures for estimating task difficulties]. *Unterrichtswissenschaft*, 39(2), 102–120.
- McElvany, N., Schroeder, S., Baumert, J., Schnotz, W., Horz, H., & Ullrich, M. (2012). Cognitively demanding learning materials with texts and instructional pictures: Teachers' diagnostic skills, pedagogical beliefs and motivation. *European Journal of Psychology of Education*, 27(3), 403–420. doi:10.1007/s10212-011-0078-1
- McElvany, N., Schroeder, S., Hachfeld, A., Baumert, J., Richter, T., Schnotz, W., Horz, H., & Ullrich, M. (2009). Diagnostische Fähigkeiten von Lehrkräften bei der Einschätzung von Schülerleistungen und Aufgabenschwierigkeiten bei Lernmedien mit instruktionalen Bildern [Teachers' diagnostic skills to judge student performance and task difficulty when learning materials include instructional pictures]. *Zeitschrift für Pädagogische Psychologie*, 23(3–4), 223–235.
- Ohle, A., McElvany, N., Horz, H., & Ullrich, M. (2015). Text-picture integration – Teachers' attitudes, motivation and self-related cognitions in diagnostics. *Journal for Educational Research Online*, 7(2), 11–33.
- Praetorius, A. K., Greb, K., Lipowsky, F., & Gollwitzer, M. (2010). Lehrkräfte als Diagnostiker – Welche Rolle spielt die Schülerleistung bei der Einschätzung von mathematischen Selbstkonzepten? [Teachers as diagnosticians – What role does students' achievement play in judging mathematical self-concepts]. *Journal for Educational Research Online*, 2(1), 121–144.
- Schäfer, S. & Seidel, T. (2015). Noticing and reasoning of teaching and learning components by pre-service teachers. *Journal for Educational Research Online*, 7(2), 34–58.
- Schrader, F.-W. (2010). Diagnostische Kompetenz von Eltern und Lehrern [Diagnostic competence of parents and teachers]. In D. H. Rost (Ed.), *Handwörterbuch Pädagogische Psychologie* (4th ed., pp. 102–108). Weinheim, Germany: Beltz.
- Schrader, F.-W., & Helmke, A. (1987). Diagnostische Kompetenz von Lehrern: Komponenten und Wirkungen [Teachers' diagnostic competence: Components and effects]. *Empirische Pädagogik*, 1(1), 27–52.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4–14.
- Spinath, B. (2005). Akkuratheit der Einschätzung von Schülermerkmalen durch Lehrer und das Konstrukt der diagnostischen Kompetenz [Teachers' judgment accuracy of student characteristics and the construct of diagnostic competence]. *Zeitschrift für Pädagogische Psychologie*, 19(1/2), 85–95.

- Südkamp, A., Kaiser, J., & Möller, J. (2012). Accuracy of teachers' judgments of students' academic achievement: A meta-analysis. *Journal of Educational Psychology, 104*(3), 743–762.
- van Ophuysen, S. (2006). Vergleich diagnostischer Entscheidungen von Novizen und Experten am Beispiel der Schullaufbahneempfehlung [Comparison of diagnostic decisions of novices and experts, using the example of school track recommendations]. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie, 38*(4), 154–161.
- van Ophuysen, S. (2010). Professionelle pädagogisch-diagnostische Kompetenz – Eine theoretische und empirische Annäherung [Professional pedagogical-diagnostic competence – A theoretical and empirical approach]. In W. Bos, H. G. Holtappels, H. Pfeiffer, H.-G. Rolff, & R. Schulz-Zander (Eds.), *Jahrbuch der Schulentwicklung. Daten, Beispiele und Perspektiven* (pp. 203–234). Weinheim, Germany: Juventa.
- van Ophuysen, S. & Behrmann, L. (2015). Die Qualität pädagogischer Diagnostik im Lehrerberuf – Anmerkungen zum Themenheft „Diagnostische Kompetenzen von Lehrkräften und ihre Handlungsrelevanz“. [The quality of pedagogical diagnostics in the teaching profession – Annotations to the special issue “Teachers’ diagnostic competences and their practical relevance”] *Journal for Educational Research Online, 7*(2), 82–98.
- Weinert, F. E., Schrader, F.-W., & Helmke, A. (1990). Educational expertise: Closing the gap between educational research and classroom practice. *School Psychology International, 11*(3), 163–180. doi:10.1177/0143034390113002
- Weinert, F. E. (2001). A concept of competence: A conceptual clarification. In D. S. Rychen & L. H. Salganik (Eds.), *Defining and selecting key competencies* (pp. 45–65). Seattle, WA: Hogrefe & Huber.