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Teacher judgments as measures of children's cognitive ability: A multilevel analysis ☆

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ABSTRACT

Teachers' ability to identify student cognitive potential is crucial to creating learning contexts that develop intellect and achievement. The younger students are, the more important is a focus on potential rather than achievement. Teacher judgments (TJs) as measures of intelligence are particularly important where objective IQ tests are not standard. Although most studies on TJs have been conducted within classrooms, few have accounted for the nested data structure. We predicted TJs of student's cognitive ability through both established and underresearched factors pertaining to student, teacher, and classroom using multilevel analysis. Student intelligence was the strongest predictor at both individual (positive effect) and class-average level (negative effect), followed by parent level of education. Better-known students received higher TJs. Student sex and linguistic background had no effect. Teachers were comparably able to rank their students. Results are discussed with a focus on the quality of the "measuring instrument" teacher.

1. Introduction

1.1. Why accurate teacher judgment is so important—And what interferes with it

Being able to assess students' ability correctly is one of teachers' crucial professional skills (Eaves, Williams, Winchester, & Darch, 1994; Ready & Wright, 2011). A recent meta-analysis of 75 studies on teacher judgment accuracy (Südkamp, Kaiser, & Möller, 2012) highlights five reasons why this is so: (1) teachers' judgments determine instructional decisions—what to teach, and how to teach it; (2) they are an important source of information in special education placement decisions; (3) they influence what teachers expect of their students; (4) they affect students' academic careers and success in life through grades, even over time periods as long as 40 years (Fischbach, Baudson, Preckel, Martin, & Brunner, 2013); and (5), mediated by grades, they contribute to student academic self-concept which, in turn, affects achievement (e.g., Marsh & Martin, 2011). Overall, teacher judgments (TJs) are relatively accurate: Correlations between TJs of student intelligence and IQ range between $r = .45$ and .80 (DeYoung, 2009) which is well aligned with the mean correlation of $r = .63$ between TJs and students' academic achievement reported by Südkamp et al. (2012). However, not all teachers are equally good at assessing student cognitive ability, and some students are assessed more inaccurately than others. In their meta-analysis, Südkamp et al. (2012) found a substantial proportion of the variation of TJs to be unrelated to actual student performance. (This proportion of variance amounts to approximatively $1 - r^2 = 1 - .63^2 = .60$ on average.) Teacher, student, and assessment characteristics thus influence TJs, which—although quite accurate on average—are still far from being objective, reliable, and valid (Schrader, 2009).

1.2. Judging achievement versus potential

To date, most studies on TJs have focused on achievement (mostly in terms of grades, but also standardized achievement tests or curriculum-based measures) rather than potential (as approximated by intelligence tests teachers usually cannot readily access). This comes as no surprise, considering that teachers' judgment always depends on some manifestation of underlying ability. However, the younger children are, the more important it is to take their cognitive potential into consideration. Investment theory posits that fluid intelligence affects the acquisition of crystallized intelligence via learning (Schweizer & Koch, 2001). Therefore, the younger children are, the fewer chances they have had to unfold their potential yet; this is even more true for disadvantaged children. Especially in early years, fluid intelligence can be considered a valid indicator of children's overall cognitive ability (Baudson & Preckel, 2013) which, in turn, is the single best predictor of later academic and professional success (Neisser et al., 1996).

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2. Factors that impact teacher judgments (TJs)

In the following, we outline findings on predictors of TJs at both student level and teacher/classroom level and introduce one new possible predictor. The subsequent hypotheses derived from our literature review reflect that despite almost half a century of research on TJs and their accuracy, the influence of many variables is still inconclusive (Jussim & Harber, 2005).

2.1. Factors at the level of individual students

2.1.1. Student intelligence

Actual student intelligence is substantially related to TJs of student cognitive ability; Chamorro-Premuzic, Arteche, Furnham, and Trickot (2009) report a correlation of $r = .57$. This can be aligned with research on expectancy effects (with the Pygmalion effect as its best-known example; Rosenthal & Jacobson, 1968): Usually, these effects occur because the perceptions at their core are accurate indeed (Jussim & Harber, 2005; Smith, Jussim, Eccles, & Van Noy, 1998). However, rather than fluid ability, academic achievement shapes teachers' perceptions of student cognitive ability (e.g., Hanses & Rost, 1998), although the relationship between the two is far from perfect (r = about .50; e.g., Neisser et al., 1996). Thus, although intelligence explains a large share of the variance, it is certainly not the only predictor.

2.1.2. Sex

Findings on student sex show that girls obtain higher grades (a form of TJs in themselves; Alvidrez & Weinstein, 1999) and attain higher educational levels than boys (Duckworth & Seligman, 2006). In contrast, boys are more likely to be considered highly able. For instance, they are more often referred to gifted programs (Peterson, 2013; Rieske, 2011) or recommended for grade skipping (Stamm, 2008). In part, this may be because teachers attribute girls' success to hard work rather than innate cognitive ability (e.g., Fennema, Peterson, Carpenter, & Lubinski, 1990; Li, 1999). Conversely, Hinnant, O'Brien, and Ghazarian (2009) found teachers to overestimate female primary school students' abilities in both mathematics and reading, compared to standardized test results. Thus, results are yet inconclusive.

2.1.3. Ethnicity and migration background

The vast majority of US studies found student ethnicity to affect TJs. A meta-analysis by Tenenbaum and Ruck (2007) showed that teachers' expectations (which require prior judgment of student intellectual ability) were highest for students from Asian-American backgrounds, followed by European-American students, and then African-American or Latino students. In Germany, ethnicity is far less an issue than linguistic diversity. Although in 2010, 19.17% of the German population had a migration background (Federal Statistical Office, 2010), these people were mostly European or Caucasian. Yet for Germany as well, results from large-scale studies confirm that students with migration backgrounds achieve at lower levels, receive lower grades and are less likely to attend higher-level secondary schools. These disparities are particularly strong in Germany, compared to other countries (PIRLS/IGLU: Bos, Tarelli, Bremerich-Vos, & Schwippert, 2012; TIMSS: Bos, Wendt, Köller, & Selter, 2012; PISA 2012: Prenzel, Sälzer, Klieme, & Köller, 2013). Furthermore, evidence from experimental studies on prospective teachers suggests that stereotypes about students with migration backgrounds seem to affect teachers' judgment (Glock & Krolak-Schwerdt, 2013).

2.1.4. Socio-Economic Status (SES)

Students from low-SES backgrounds encounter similar disadvantages like children with a migration background in terms of grading and suggested higher-level secondary schooling (Bos, Tarelli, Bremerich-Vos, & Schwippert, 2012); in fact, low SES seems to explain many of the disparities identified for students with a migration background (e.g., Ball, Reay, & David, 2002). For instance, Maaz and Nagy (2009) were able to show that higher-SES students obtained higher grades than lower-SES students, despite comparable results in a standardized achievement test. In a meta-analysis of the relationship between SES and achievement, parents' education level was the most frequently used operationalization of SES (used in twice as many studies as the second-most frequent operationalization, occupation); however, effect sizes were similar to other indicators such as income, occupation, or eligibility for free or reduced lunch (Sirin, 2005). Although it is but one aspect of family capital, its effect on students' educational success cannot be underestimated. For instance, students whose parents pursued a profession at the highest level were more than three times more likely to be recommended for the highest secondary track by their teachers than working-class students, regardless of their actual competence (Ehmke & Baumert, 2007). Parents' education level predicted students' educational and occupational success over periods as long as forty years (Dubow, Boxer, & Huesmann, 2009). Although recent PISA results show that the situation has somewhat relaxed, these social disparities still exist (Prenzel et al., 2013). The impact of student SES on TJs was also confirmed in experimental research (Krolak-Schwerdt, Böhmer, & Gräsel, 2012). One reason for teacher underestimation of these students may be that higher-SES parents provide children with more intellectually stimulating environments (Loehlin, 2000), communicate more with them (Asbury, Wachs, & Plomin, 2005; verbal skills being an important indicator of student intelligence for teachers), and are perceived as more involved in their children's academic careers (Ballenger, 2009).

2.1.5. Teacher's acquaintance with the student

How well a teacher knows a child is a plausible, yet under-researched predictor of teachers' judgments. Higher parental involvement may be one, yet not the only factor contributing to teachers' acquaintance with a specific child. Some children demand more attention than others or may require special attention (e.g., gifted or learning-disabled children), which increases the probability of contact between teachers, the child, and the child's family. Meta-analytic results on self-fulfilling prophecy effects have suggested that inducing expectancies works best at the beginning of a term when teachers have not yet had the chance to get an accurate idea of their students' abilities (Raudenbush, 1984). Thus, the better a teacher knows a child, the more accurate their judgment may be. However, as outlined above, there may be great variance within a class a teacher has taught for the same period of time, and thus variation in teachers' acquaintance with a child. It should also be mentioned that Borkenau and Liebler (1993) found correlations between actual IQ and stranger ratings of intelligence to be even stronger than those with close acquaintance ratings.

2.2. Factors at the level of the teacher and the classroom

In the present study, teacher and classroom context are examined at the same level because students are nested both within the person and the context: first, because they are taught by the same teacher, and second, because they attend the same classroom.

2.2.1. Professional experience

Experienced teachers have usually taught a great number of diverse children and thus have a larger basis of comparison than less experienced teachers. This may support more accurate judgment. For instance, Babad (1985) found more experienced teachers to be less biased in their judgment; this may be mediated by factors like an increased sense of empowerment (Organ & Greene, 1974) or a stronger internal locus of control in experienced teachers (Sadowski, 1993). However, results from Demaray and Elliott (1998) and Impara and Plake (1998), who found no relationship between accurate judgment and professional experience, contradict these findings.

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