



Gifted children: how to identify them?



Lex Borghans,
Tyas Prevoo
Trudie Schils

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Introduction

Identifying gifted (or talented, excellent) children plays a crucial role in designing school policies for such groups of children. Traditionally, achievement and intelligence test scores are used to identify gifted students. The literature suggests to include multiple criteria and information for the identification of gifted children, such as test scores, grades, performance tasks, interviews, teacher recommendations and parental evaluations (e.g. Coleman 2003; Frumau et al. 2011; McClain and Pfeiffer 2012). Going beyond simple achievement test results is necessary due to their limited predictive power, and due to the importance of non-cognitive skills in predicting school performance. Excellence is multifaceted and includes high intelligence, personality, creativity and motivation (e.g. Resing and Drenth 2007; Shavinina 2009; Doolaard and Oudbier 2010). Yet in practice, test scores are still a widely used identifier of excellence in schools, mostly because of the availability.

The aim of this study is to investigate to what extent schools can identify excellence¹ among their children, using regular sources of information, such as regular math and language tests from the school's student tracking system, intelligence tests, and teacher assessments. For the analysis we use a large and unique dataset on the educational development of children in the southern part of the Dutch province Limburg (hereafter South-Limburg). These data are collected in a cooperative project with schools, schools boards and municipalities to analyse the performance of schools in order to foster educational improvement. For about 200 primary schools, covering 98 percent of all schools in the region, we have results from a large number of standardized tests that the children made, in various domains such as math/calculating, reading and language, including a high stakes achievement test at age 12 ("Eindtoets Basisonderwijs"). This information provides us with multiple observations of similar test domains over the years for the same student. Based on the literature, we use three instruments of excellence that are commonly used to identify gifted students: (1) the teacher's assessment of whether a child is gifted; (2) whether the children obtain a top score (top 5%, 10% or 20%) on a high-stakes test in 6th grade (at the end of primary school); and (3) whether the children obtain a top score (top 5%, 10% or 20%) on a short IQ-test. Our findings show that there is limited overlap between the indicators of excellence. Of the children that are indicated as gifted by their teacher, a little more than half does not rank in the top

5% of the IQ and/or CITO-test. Our study adds to the literature on identifying and defining excellence among children. Traditionally, excellence has been related to high intelligence and high school performance. However, around the end of this century both educators and policymakers realized that only using IQ or achievement tests to identify excellence was too limited (McClain and Pfeiffer 2012). Going beyond simple achievement test results is necessary due to their limited predictive power, and due to the importance of non-cognitive skills in predicting school performance (e.g. Eklöf 2007; Borghans et al. 2008; Duckworth et al. 2010; Borghans and Schils 2012; Prevoo 2015). In recent years, definitions and indicators of excellence among children aim to include measures of creativity, performing arts or leadership skills. McClain and Pfeiffer (2012) show that IQ or achievement tests are still among the most widely used instruments for identifying excellence in the US, where about one-third of the states mandate that schools use these instruments. However, in addition, a little more than a quarter of the states require the use of teacher or parental assessments of excellence. Less than one-fifth of the states require the use of creativity tests. It is unknown to what extent there is overlap between the various measures. Including a broader set of indicators to identify excellence is useful for the design of school policy to target gifted children. Education systems often focus on the average child. For low ability students it might be difficult to keep pace with their peers, while for children with high cognitive abilities, school might be too easy. It has been documented that for a small group of such highly gifted children this might cause serious developmental or behavioural problems. A wider group of gifted children still do reasonably well at school, but do not perform as high as could have been possible, i.e. unused potential (Day 2010; Reis and Hébert 2008). Schools and policy makers develop policies targeted at gifted children, yet it can be questioned whether such policies reach the right population of children. An important question for schools and policy makers is how to define and identify excellence among pupils.

Data

The data are collected in a cooperative project in South-Limburg between (elementary and secondary) schools, school boards, municipalities and Maastricht University to analyse school performance in order to foster educational improvement². A unique feature of this program is the participation of almost all schools in the region in this project, implying almost full coverage of children (about 98 percent of the regular elementary schools participate in the

¹ In the literature many different labels are found, such as giftedness, talent, excellence, high intelligence. We choose to use excellence as a general term throughout this study.

² For more information about this cooperative project see: educatieveagendalimburg.nl/onderwijsmonitor-p/english.

program and about 90 percent of the regular high schools in the region). The few non-participating schools are in most cases special education schools or schools using alternative pedagogical approaches (e.g. Montessori, Jenaplan, Steiner).

Instruments for identifying excellence

A first instrument in the data is the teacher assessment of whether a child is gifted. In 6th grade the teacher is asked to indicate for every child in the classroom whether or not the child is regarded as gifted. This indicator is available for the years 2011-2015. The top panel of Table 1 shows the response rates and means. For 25-34 percent of the children the teacher assessment is missing. This is largely related to non-response of teachers at certain schools. At about one-fifth of the schools the 6th-grade teacher each year does not complete the student survey. Over all responses, the teachers assess that on average 2.6 percent of 6th grade children in South-Limburg are gifted.

A second instrument of excellence is whether the children reach a top score on a high-stakes test in 6th grade. In 6th grade, which is the final year of primary school in the Netherlands, children take a three-day standardized achievement test (CITO test), which is used to determine which track children enrol in in secondary education. Therefore, this test is high-stakes for the children. The test is developed and assessed by CITO, a testing company which is independent from the schools. The test contains multiple choice questions, and tests the students on Dutch language and mathematics. When these data were collected this test was not (yet) compulsory for all schools, but about 85 percent of the elementary schools took the test. Since 2015 the test is compulsory. This test score is missing for about 4.5 of our sample, mostly because some schools do not use the test. The score on this test ranges from 500 to 550. We defined three quantile groups (top-5, top-10 and top-20) based on the score on the test, using cutoff points 550, 548-550 and 545-550. This latter cutoff is in line with guidelines from the test institute (CITO) for entrance into the pre-university track in secondary school³. Results for the various years are shown in the middle panel of Table 1. The distribution of the test scores varies over the years, but using these cutoff points we roughly achieve groups of 5, 10, and 20 percent (Figure A1 in the appendix shows the full distributions of the test scores over the years). A third and final instrument of excellence is whether the children reach a top score on a short IQ-test. As part of the 6th grade survey among children, an IQ-test is taken.

Over the research period 2011-2015, the 6th grade student survey was administered every year, and students completed the survey in class, under the supervision of their teacher. A full hour is reserved for completing the surveys, with the first half hour reserved for taking the IQ test. The test consists of 43 puzzles, composed of geometric shapes and patterns. For 19 items, students are asked to combine an initial shape with one of four additional shapes, where the aim is that the combination of the two results in a perfect square, circle, or triangle. The task for the remaining 24 items is to find “the odd one out” of a series of four geometric shapes. The IQ score therefore ranges from 0 to 43. For about 15 percent of the children in our sample, the score on the IQ-test is missing. This is sometimes because the school did not participate in the survey in a particular year, or because the child was not in class the day that the survey was taken. Again, we defined three quantile groups (top-5, top-10 and top-20) based on the score on the test, using cutoff points 39-43, 38-43 and 36-43. Results for the various years are shown in the bottom panel of Table 1. The distribution of the test scores varies over the years, but using these cutoff points we roughly achieve groups of 5, 10, and 20 percent (Figure A2 in the appendix shows the full distributions of the test scores over the years).

Table 1 • Instruments to identify giftedness by year, 2011-2015

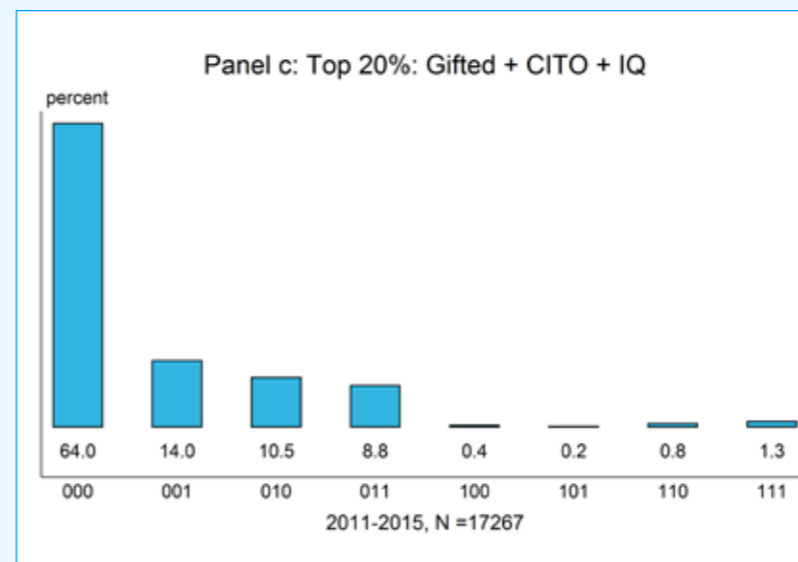
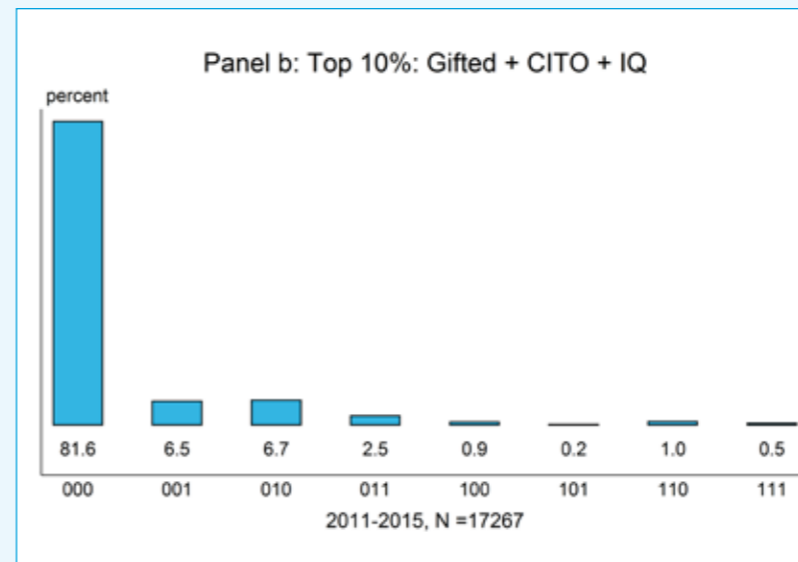
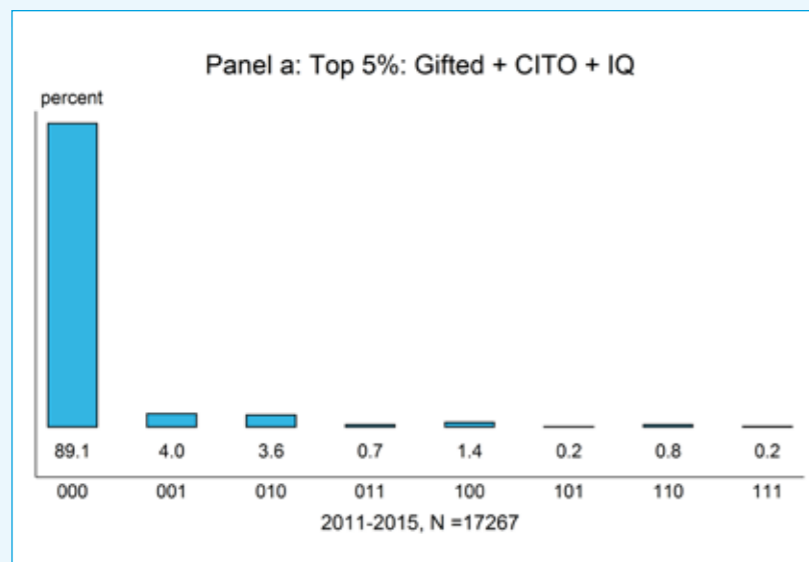
	2011	2012	2013	2014	2015	Total
Teacher assessment of giftedness						
Missing (% of children)	25.6	34.6	33.9	25.8	26.2	29.3
Schools with no response (% of schools)	19.8	28.1	24.6	17.1	17.7	21.5
Child is gifted	2.1	2.2	3.1	3.0	2.7	2.6
Child is not gifted	97.9	97.8	96.9	97.0	97.3	97.4
Score on high-stakes test in 6th grade						
Missing (% of children)	5.0	3.8	4.1	5.2	3.3	4.3
Schools with no response (% of schools)	4.0	3.9	5.5	5.2	4.4	4.6
Score 550 3.6	3.8	5.6	6.4	6.6	5.1	
Score 548-500	9.0	9.3	11.5	11.6	12.3	10.7
Score 545-550	20.4	20.0	20.9	21.9	22.8	21.2
Score on IQ-test in 6th grade						
Missing (% of children)	12.6	16.0	17.6	15.5	16.9	15.7
Schools with no response (% of schools)	4.5	6.9	10.6	8.8	3.3	6.8
Score 39-43 8.1	5.2	4.0	3.8	4.4	5.2	
Score 38-43	13.9	10.1	8.1	7.4	8.9	9.8
Score 36-43	30.6	25.3	22.2	20.6	22.3	24.4

³ <http://educatie-en-school.infonu.nl/examen/127288-uitslag-cito-toets-2016-de-centrale-eindtoets-2016.html>

Results

We analysed the overlap between the three measures of excellence. Figure 1 shows the distribution of the different combinations of the three measures. The first digit relates to the teacher assessment of giftedness, the second digit to excellence according to the CITO-test and the third digit to excellence according to the IQ-test. A 1 implies “excellent” according to the measure and a 0 means “not excellent” using the measure. Panel a shows the results using the 5%-cutoff points for the CITO- and IQ-test, panel b the 10%-cutoff points and panel c the 20%-cutoff points. There seems to be very little overlap between the three measures of excellence. If there were complete agreement on all three measures, the last bar in all figures (“111”) should be 5, 10 and 20 percent respectively in panels a, b and c. The figures show that this is not the case, with percentages being very low: 0.2, 0.5 and 1.3 percent, respectively. The figure also shows that the overlap is largest between the two test measures of excellence, IQ and CITO. In 0.7% these two measures agree on excellence for the top 5% measures, in 2.5% of children for the top 10% measures, and in 8.8% of cases for top the 20% measures.

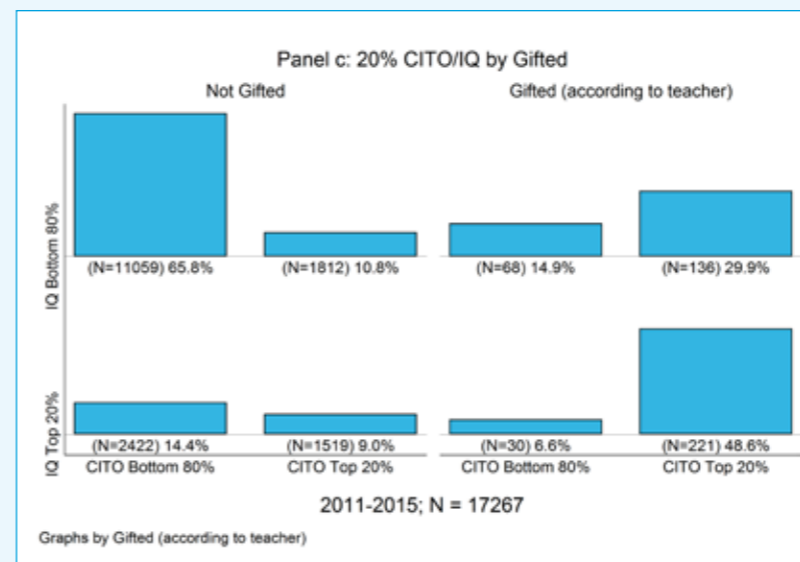
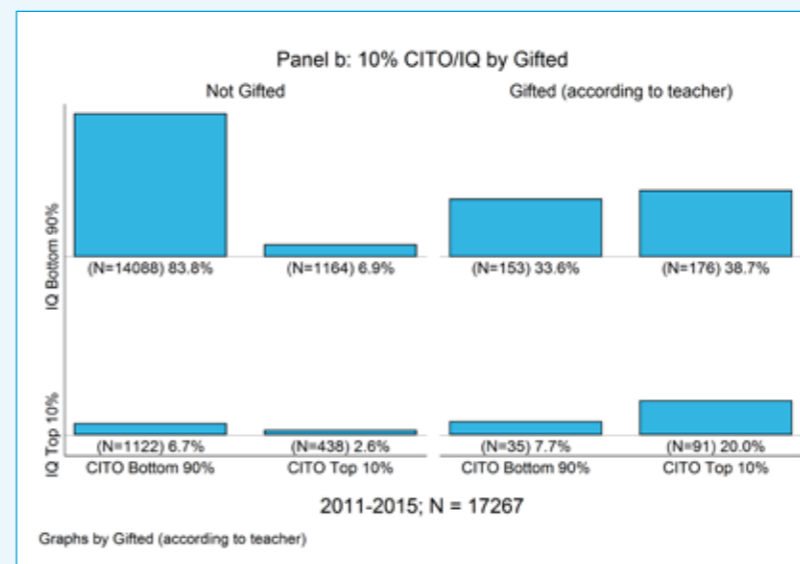
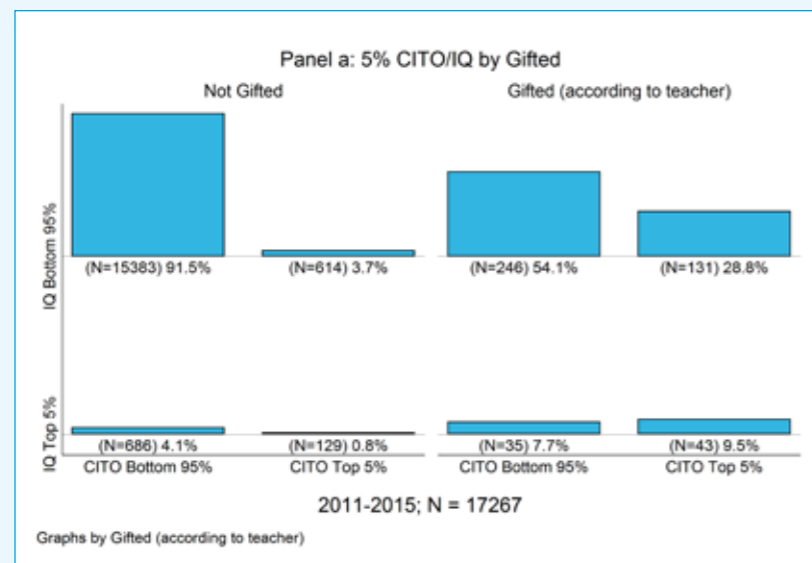
Figure 1 • Overlap between three measures of excellence: teacher assessment of giftedness, score on IQ-test and score on CITO-test.



Note: This figure shows the percentage of children with different combinations of the three measures of excellence. The code with the bars corresponds to the definitions used. The first digit relates to the teacher assessment of giftedness, the second digit to excellence according to the CITO-test and the third digit to excellence according to the IQ-test. A 1 implies “gifted” according to the measure and a 0 means “not gifted” using the measure.

Figure 2 shows the overlap between the two test score measures of excellence (CITO and IQ), conditional on the teacher's indication of giftedness. The figure shows that of all children not indicated as gifted by the teacher (left side bars), a little less than 9 percent still rank in the top 5% of the IQ and/or CITO-test. These percentages for the top 10% and 20% are 16.2 and 34.2, respectively. Hence, despite not being deemed gifted by their teacher, these students still perform in the top quantiles of the standard cognitive tests. The figure also shows that within this group of "not gifted" children, it is more likely that they score in the top of the IQ-test rather than the CITO-test. In addition, the figure shows that of all children that are indicated by the teacher as gifted, 54 percent does not rank in the top 5% of the IQ- or CITO-test. These percentages for the top 10% and 20% are 33.6 and 14.9, respectively. This means that teachers see excellence or talent in students who do not manage to score in the top quantiles of standard cognitive tests.

Figure 2 • overlap between test measures of excellence conditional on teacher assessment of giftedness.



Note: This figure shows the overlap between the two test score measures of excellence (CITO and IQ), conditional on the teacher's indication of giftedness. On the left the bars show the percentages of children indicated as excellent or not on the achievement test (CITO) or IQ, for those children that are indicated as not-gifted by the teacher. On the right the same is shown for children that are indicated as gifted by the teachers.

Conclusion

Traditionally test scores on achievement and intelligence tests are used to identify excellent students. In recent years, several studies have shown that using multiple criteria to identify gifted students is necessary since test scores might be incomplete. Yet in practice the use of test score remains a widely used measure for excellence in schools. The aim of this study is to investigate to what extent schools can identify excellence among their children, using regular sources of information, such as regular math and language tests from the school's student tracking system, intelligence tests, and teacher assessments.

For the analysis we use a large and unique dataset on the educational development of children in the southern part of the Dutch province Limburg. We use three instruments of excellence: (1) the teacher assessment of whether a child is gifted; (2) whether the children obtain a top score on a high-stakes test in 6th grade; and (3) whether the children obtain a top score on a short IQ-test.

Our findings show that there is limited overlap between the three indicators of excellence. Of children that are indicated by the teacher as gifted (2.6% of 6th grade children), more than half do not rank in the top 5-percent of the IQ- or CITO-test. On the other hand, among children not indicated as gifted by their teacher, there is still a significant share that perform in the top quantiles of the IQ- and/or CITO-test (16.2% for the top decile). These observations highlight both the multifaceted nature of excellence, as well as the need to use multiple indicators of excellence when aiming to provide guidance for excellent students.

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Appendix

Figure A1 • distribution high-stakes test (CITO) score 6th grade, 2011-2015

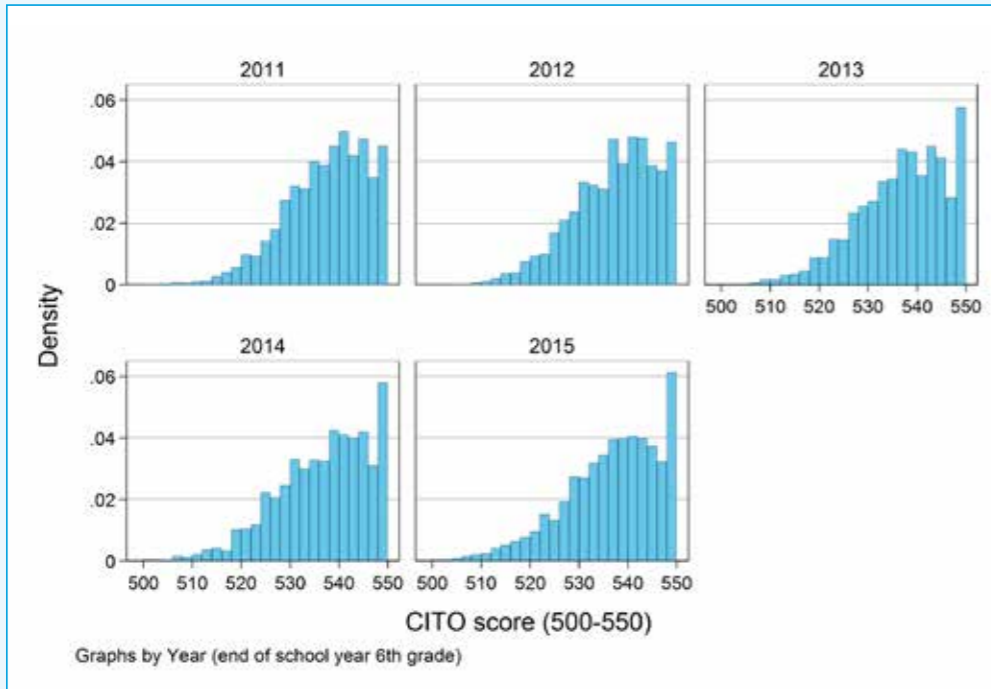
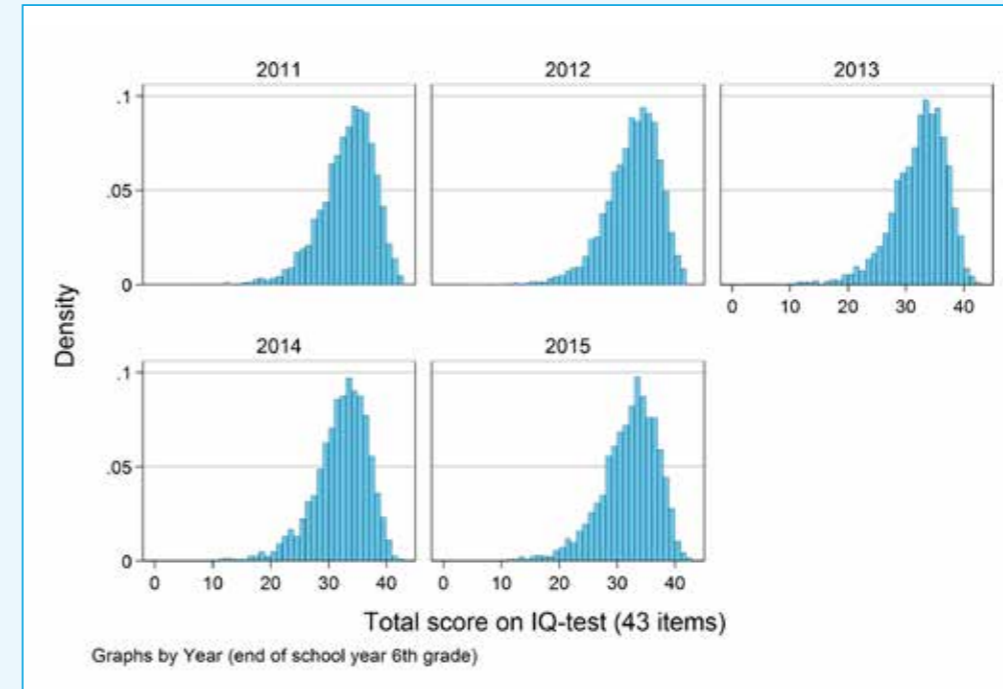


Figure A2 • distribution intelligence test (IQ) score 6th grade, 2011-2015





Pak
een hamer
& doe mee!

Op de hoogte blijven van de projecten waaraan we timmeren, zagen en schroeven?
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