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Research Report Erasmus+ project

Creating Equal Opportunities at School (CEOS)

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"Economic disadvantage undermines equal opportunities: in every country studied, 15-year-olds from more privileged families achieve substantially better educational results than their less-advantaged peers" (UNICEF, 2017)

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2. Background

Pupils from a less advantaged background, such as low economic, social and cultural status or a native language other than Dutch, do not always fulfil their potential in terms of academic success. The project "Creating equal opportunities at school (CEOS): Empowering pupils from less-advantaged backgrounds through teaching academic language", financed by Erasmus+, contributes to bridging the gap between these pupils' current academic success and their cognitive talent through identifying cognitive talent and teaching Dutch academic language. This research report discusses the research findings from the CEOS- project.

Inequality in education is a big problem in every wealthy country. The Netherlands and Belgium even belong to the 10 countries in the world where ESCS has the biggest impact on school success (UNICEF Office of Research, 2017). ESCS stands for Economic, Social, and Cultural Status and refers to the position people have in society. The majority of pupils with high potential who drop out of school or who participate in fewer extracurricular activities are from low ESCS families and/or racial minority groups (Reis & Renzulli, 2009). Examples of indicators used to measure ESCS for children are the language spoken at home and the income, professional status, and educational level of their parents (UNICEF Office of Research, 2017; Vandenbroeck, o.a., 2017). Governments and organisations worldwide underline the need for action to diminish the growing inequality in opportunities in education (UNIA, 2018; OECD, 2018). This project aimed to diminish the influence of ESCS on talent development and educational results.

Education regularly fails to meet the needs of cognitively gifted students as they are often not challenged to develop to their full potential (Pfeiffer, 2015). Cognitive talented students with low ESCS are even more disadvantaged as they have more chance that their talent is not acknowledged. Most recent models have a consensus that cognitive talent or giftedness develops over life and is influenced by the characteristics of the person and the environment. Recently, Verschueren and colleagues (2021) proposed their model of cognitive giftedness and talent development, based on the models of Gagné (2010; 2004), Heller (1999; 1991), and Subotnik et al. (2011) and their insights gained from the research of the Project TALENT[1] in Flanders (Figure 1). Based on this model cognitive talented

[1] Project TALENT – Tailoring education and care to talents of youth (https://www.projecttalent.be/)

students are defined as students with strong cognitive abilities, which may or may not be reflected in strong learning achievements influenced by the non-cognitive student and/or environmental characteristics. As proposed by Gagné (2010; 2004), cognitive abilities of learning achievement are considered to be strong when they belong to the top 10% compared to peers. For over four decades programs based on the models and research of Renzulli and Reis used a broader range to identify cognitive talent: 15 to 20% (Reis & Peters, 2021)

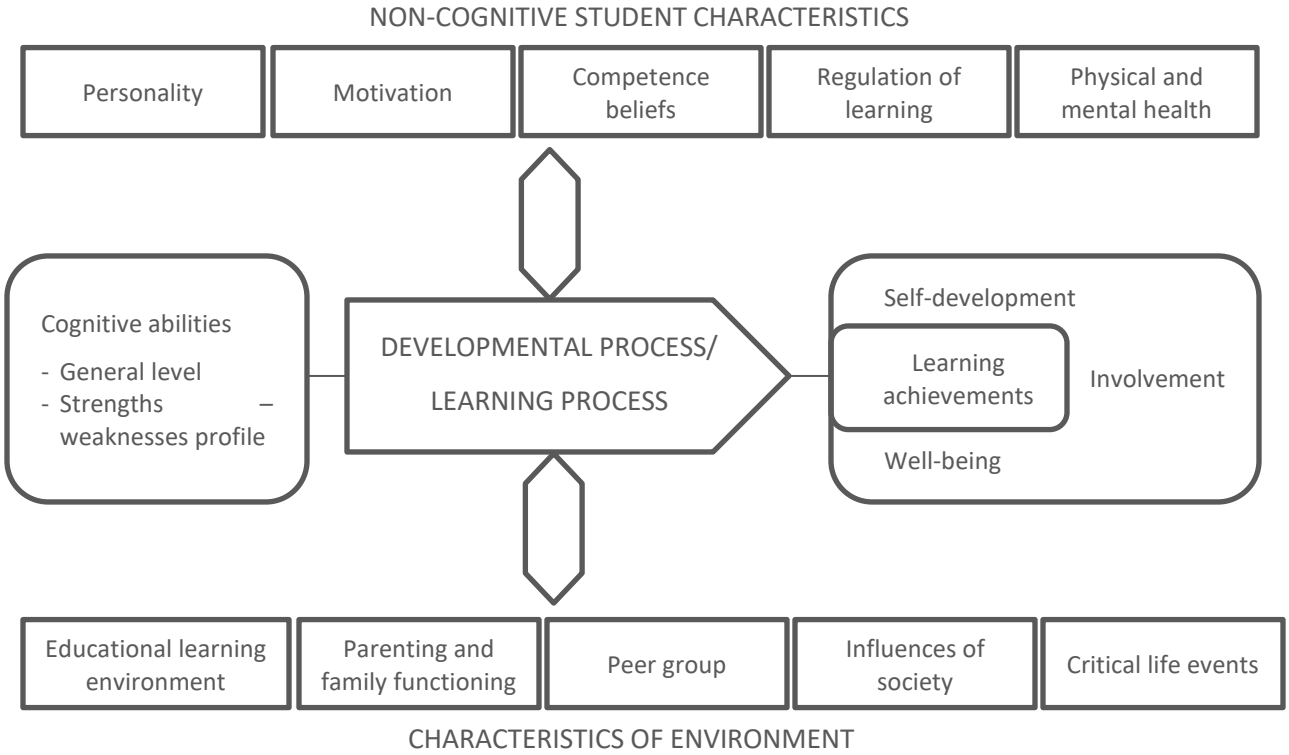

Figure 1. Model of cognitive giftedness and talent development (translated from (Verschueren, Sypré, Struyf, Lavrijsen, & Vansteenkiste, 2021).

Similar to the previous models of Gagné and Heller, this model differentiates between cognitive abilities and learning achievements. Cognitive abilities, or intelligence, differ between students, and people in general. They are partly hereditary but are not invariably as they always develop in a certain moment and context. However, compared to learning achievements they are not explicitly taught at school (Verschueren, Sypré, Struyf, Lavrijsen, & Vansteenkiste, 2021). Since the rise of the CHC-model, there is more consensus that intelligence consists of several cognitive abilities (Schneider & McGrew, 2018). Fluid reasoning and crystallised knowledge/understanding show the strongest relation with general intelligence. Fluid reasoning refers to the capacity of reasoning to solve

fairly new problems, while crystallised knowledge/understanding refers to acquired knowledge within a culture and applying this knowledge in daily life (Magez, o.a., 2016). Although school results, or learning achievement, are predicted by cognitive abilities, not all students with high cognitive abilities do well at school. Other characteristics of the student, such as the need for cognition, autonomous motivation for school, competence belief, regulation of learning, and physical and emotional health, can facilitate or prevent high learning achievement (Verschueren, Sypré, Struyf, Lavrijsen, & Vansteenkiste, 2021). These non-cognitive student characteristics are often developed based on characteristics in the environment, such as education, parenting and family functioning, peer group, society, and critical life events. Children with low ESCS who often live in poverty, have different cultures, and/or speak other languages compared to the school culture or language are more disadvantaged (Pfeiffer, 2015). They have more chances their talent is overlooked and often get fewer opportunities to develop the other non-cognitive students' characteristics due to the more challenging environment they have to deal with. Schools, students, and parents should become more aware of the fact that students with a lower ESCS do not always attend, or pass the final exams of the educational level that is in line with their potential.

Inequality in opportunities means that background and socioeconomic status, instead of cognitive or academic abilities, determine academic success (Benner, Boyle, & Sadler, 2016; Merrit & Buboltz, 2015)[2]. Among other factors, language seems to play an important role in this (Hof, 2013). This issue can be addressed by identifying these students, improving their command of academic Dutch, which refers to the ability to understand the vocabulary used in schools (an academic environment) and to express oneself in this vocabulary (Heppt, Haag, Böhme, & Stanat, 2014). By enhancing academic language proficiency in the CEOS project, students will get better results at school, and their confidence and motivation for learning will grow (VanTassel-Baska, 2008). To achieve this goal, schools first need to be able to recognize talent amongst students who do have the cognitive capacity but not the language skills to demonstrate this. Many students are probably not even aware of their lack of language proficiency because their Dutch is fluent and they know how to express themselves very well in everyday situations. Schools need to be able to identify those pupils so they can support them to fulfill their potential (Lee & Burkham, 2002).

[2] Onderwijs in Cijfers (2018). *Eindexamens voortgezet onderwijs 2016/2017.* Opgehaald van https://www.ocwincijfers.nl/sectoren/voortgezet-onderwijs/leerlingen/eindexamens-voortgezet-onderwijs

Different experts and schools from the Netherlands, Belgium, and the UK are working together, benefiting from each other's experience and expertise. The CEOS project is inspired by the REAL project[3] from the **London GTI** (Ian Warwick, UK) that has the experience to stretch and challenge more able students. This REAL project is the first project in the UK that focuses on how to systematically improve the quality of gifted and talented education for pupils from black and minority ethnic backgrounds and how to respond to the particular and urgent need of gifted and talented learners with English as an additional language. The results of the REAL project were very positive. **Bureau Talent** (Lineke Van Tricht, NL) is the CEOS project leader and develops the package for teaching academic language in Dutch-speaking areas such as the Netherlands and Flanders. The **Centre for Psychological Assessment** (Marlies Tierens, Ph.D., Thomas More Antwerp, BE) coordinates the research team and is responsible for the selection of cognitive talent. **Radboud Centrum Sociale Wetenschappen** (Prof Dr. Lianne Hoogeveen from Radboud International Training on High Ability (RITHA) & CBO Talent Development, Nijmegen, NL) and Birgit Broekhoven (ECHA student) complete the research team.

The package for teaching academic language is tested in and developed together with teachers from four schools for secondary education in Flanders and the Netherlands: **Rijswijks Lyceum and Van Vredenburch College** (Birgit Broekhoven, Rijswijk, NL), **Zuider Gymnasium** (Michael Vermeer, Rotterdam, NL), **Lucernacollege** (Daphne Gemballa, Anderlecht, BE), and **Stedelijk Lyceum Pestalozzi I** (Annick Lieseborghs, Antwerp, BE). These schools have many students who grow up in different cultures or contexts. Three schools (Rotterdam, Anderlecht, and Antwerp) only offer general education. The participating school from Rijswijk offers general and technical education, together with vocational training.

The final purpose of this project is to improve the academic language skills of cognitively talented pupils from less advantaged backgrounds. It aimed to increase the chance that these pupils' academic success is in line with their potential because language is no longer a barrier, leading to a growth in their motivation and self-confidence. To do so, the first goal was to identify cognitive talent among students with a disadvantaged background. The second goal was to develop and evaluate a programme on academic language.

[3] http://www.realproject.org.uk/

3. Method

3.1 Participants

3.1.1 Pre-test

Participants

Table 1 gives an overview of the participants in the four schools for both waves. For the first wave (school year 2019-2020) 361, or about 55-60% of the enrolled first-year students, participated in the pre-test. During the second wave (school year 2020-2021, COVID-19 pandemic) 206 students (34-43%) participated. In both waves, 48% of the participating students were boys. Schools A, B, and D only provide general education at their schools. School C provides general and technical education as well as vocational training.

Table 1. Participating students on the pre-test for each wave.

Wave 1 (Sept-Oct 2019)	**Total first-year students**	**Participating students**	**♂ /♀**	**Mean age (SD)**	**Age range**
School A (BE)	97	58 (60%)	23/35 (40%/60%)	11.88 (0.70)	11-14
School B (BE)	154	84 (55%)	43/41 (51%/49%)	11.94 (0.55)	11-14
School C (NL)	318	179 (56%)	86/91 (48%/51%)	12.19 (0.56)	11-13
School D (NL)	-	40 (-)	22/18 (55%/45%)	11.67 (0.57)	10-13
Total		361	174/185 (48%/52%)		

Wave 2 (Oct-Nov 2020)	**Total first-year students**	**Participating students**	**♂ /♀**	**Mean age (SD)**	**Age range**
School A (BE)	81	35 (43%)	15/20 (43%/57%)	11.67 (0.58)	11-13
School B (BE)	153	55 (36%)	27/28 (49%/51%)	11.85 (0.73)	10-13
School C (NL)	294	100 (34%)	48/52 (48%/52%)	12.16 (0.16)	10-14
School D (NL)	-	16 (-)	9/7 (56%/44%)	12.00 (0.37)	11-13
Total		206	99/107 (48%/52%)		

Note. At the time of the research report, the numbers of enrolled students in School D were missing

The Economic, Social, and Cultural Status (ESCS) was based on home language, migration status, and maternal education/paternal occupation. An overview of the students' characteristics for the separate ESCS indicators is presented in Table 2.

Table 2. Overview of the separate indicators used to determine ESCS, separated per school.

Home language (wave1/2)	**Dutch**	**Dutch & other languages**	**Only other languages**	**Missing**
School A (BE)	2%/0%	47%/57%	52%/43%	0%/0%
(58/35)	(1/-)	(27/20)	30/15	(-/-)
School B (BE)	18%/26%	77%/68%	5%/6%	0%/0%
(84/54)	(15/14)	(65/37)	(4/3)	(-/-)
School C (NL)	25%/22%	71%/75%	4%/3%	0%/0%
(178/100)	(44/22)	(127/75)	7/3	(-/-)
School D (NL)	62%/44%	38%/50%	0%/6%	0%/0%
(39/16)	(24/7)	(15/8)	(-/1)	(-/-)

Migration status (wave1/2)	**Students and parents born in Belgium/the Netherlands**	**One parent was born in another country**	**Both parents were born in another country**	**Student was born in another country**	**Missing**
School A (BE)	16%/3%	22%/26%	12%/29%	3%/14%	47%/29%
(58/35)	(9/1)	13/9	(7/10)	(2/5)	(27/10)
School B (BE)	15%/24%	24%/28%	43%/35%	10%/11%	8%/2%
(84/54)	(13/13)	(20/15)	(36/19)	(8/6)	(7/1)
School C (NL)	3%/8%	13%/23%	62%/57%	13%/10%	8%/2%
(178/100)	(5/8)	(23/23)	(111/57)	(24/10)	(15/2)
School D (NL)	46%/38%	15%/12%	18%/44%	5%/6%	15%/-%
(39/16)	(18/6)	(6/2)	(7/7)	(2/1)	(6/0)

Low education mother and/or low occupational status (wave1/2)	**low**	**Average/high**	**Missing**
School A (BE)	31%/17%	57%/40%	12%/43%
(58/35)	(18/6)	(33/14)	7/15
School B (BE)	58%/54%	42%/41%	0%/6%
(84/54)	(49/29)	(35/22)	(-/3)
School C (NL)	43%/44%	43%/33%	14%/23%
(178/100)	(76/44)	(77/33)	25/23
School D (NL)	10%/19%	72%/81%	18%/0%
(39/16)	(4/3)	(28/13)	(7/-)

Students, and their parents, who reported at least one low ESCS indicator were considered to be from a minority background. These students were able to be selected for the programme or control group if they scored in the top 20% on the non-verbal extracurricular reasoning test. The other

students, who reported no low ESCS indicator, were considered to have an average to high ESCS. Because there were a lot of missing data for some of the ESCS indicators it is possible that some of these students also have a low ESCS. Table 3 gives an overview of the final ESCS status and the incomplete data.

Table 3. Final ESCS status, number of ESCS indicators, and missing values.

ESCS (wave 1/2)	**ESCS average/high**	**ESCS low**	**Minimum 1 low ESCS indicator**	**Minimum2 low ESCS indicators**	**Minimum 3 low ESCS indicators**	**Students with at least one missing ESCS indicator**
School A (BE)	2%/0%	98%/100%	45%/31%	38%/51%	16%/17%	47%/43%
(58/35)	(1/-)	(57/35)	(26/11)	(22/18)	(9/6)	(27/15)
School B (BE)	12%/19%	88%/81%	5%/7%	38%/28%	45%/46%	8%/6%
(84/54)	(10/10)	(74/44)	(4/4)	(32/15)	(38/25)	(7/3)
School C (NL)	3%/4%	97%/96%	21%/12%	40%/52%	35%/32%	14%/24%
(178/100)	(6/4)	(172/96)	(38/12)	(72/52)	(62/32)	(25/24)
School D (NL)	46%/31%	54%/69%	23%/19%	28%/31%	3%/19%	18%/0%
(39/16)	(18/5)	(21/11)	(9/3)	(11/5)	(1/3)	(7/5)

At School A and C almost all participating students came from a minority background. At school A, about 50% of the students spoke Dutch and another language at home. The other 50% did not speak Dutch at home. Most of the students spoke French, often combined with another language. On the other indicators, there were a lot of missing data for school A: for 43 to 47% of the participating students, the information on at least one indicator was missing. About three out of four students in school C (also) spoke another language than Dutch at home. In addition, only 3 to 8% reported that both students and parents were born in the Netherlands.

At school B, 81% to 88% of the participating students reported at least one low ESCS indicator. Most participating students (68 to 77%) spoke Dutch and another language at home. In addition, 74 to 77% of the students and parents reported a migration background. Low maternal education and/or low paternal occupational status were reported by 54% to 58% of the parents.

School D had the most participating students with average to high ESCS, based on the indicators used in this study. About 44% to 62% of the students only spoke Dutch at home, 38 to 46% reported no migration status, and 72 to 81 reported mothers with average to high education and fathers with average to high occupational status. Table 2 shows the distribution of each ECSC indicator in every school.

3.1.2 Post-test with cognitive talented students with low ESCS

In each school, all students with low ECSC and a score in the top 20% for the extracurricular non-verbal reasoning pre-test were identified as cognitive talented and selected for the project. These students were randomly assigned to the intervention or control group. Table 4 gives an overview of these students, their age, and gender.

Table 4. Age and gender of the selected cognitive talented students with low ESCS.

Wave 1	**Prog/contr**	**Mean age (SD)**	**Age range**	**♂ /♀**
Total	**41/39**			36/44 (45%/55%)
School A (BE)	7/7	11.64 (0.75)	11-13	6/8 (43%/57%)
School B (BE)	10/9	11.79 (0.42)	11-12	8/11 (42%/58%)
School C (NL)	20/19	12.08 (0.58)	11-13	19/20 (49%/51%)
School D (NL)	4/4	11.88 (0.35)	11-12	3/5 (38%/63%)

Wave 2	Prog/contr	Mean age (SD)	Age range	♂ /♀
Total	**26/24**			26/24 (52%/48%)
School A (BE)	5/4	11.67 (0.50)	11-12	5/4 (57%/44%)
School B (BE)	6/6	11.79 (0.42)	11-12	6/6 (50%/50%)
School C (NL)	13/12	12.00 (0.60)	11-13	13/12 (52%/84%)
School D (NL)	2/2	12.25 (0.50)	12-13	2/2 (50%/50%)

Not all students of the programme and control group participated at post-test and for some no post-test school results were available. Table 5 gives an overview of the available post-test data of the students from the intervention and control groups. During the first wave, the post-tests were postponed to the next school year because of the school lockdowns related to the COVID-19 pandemic. On the first post-tests, there were 25% missing data for the extracurricular tests and motivations questionnaires: About 18% of the students had missing school results. For the post-tests in the second wave, there were less missing data, respectively 12% and 8%.

Table 5. Available and missing data for the programme and control group in both waves.

	POSTTEST EXTRACURRICULAR TEST / MOTIVATION		POSTTEST SCHOOL RESULTS	
Wave 1 (Oct-Nov 2020)	**Programme/control**	**% Missing Programme/control**	**Programme/control**	**% Missing (programme/control)**
Total	**31/29**	**25%**	**31/35**	**18%**
School A (BE)	4/4	43% (3/3)	6/7	7% (1/0)
School B (BE)	9/8	11% (1/1)	9/9	5% (1/0)
School C (NL)	14/14	28% (6/5)	16/19	10% (4/0)
School D (NL)	4/3	13% (0/1)	-	100% (4/4)

	POSTTEST EXTRACURRICULAR TEST / MOTIVATION		POSTTEST SCHOOL RESULTS	
Wave 2 (Jun-Jul 2020)	**Programme/control**	**% Missing Programme/control**	**Programme/control**	**% Missing (programme/control)**
Total	**22/21**	**12%**	**23/22**	**8%**
School A (BE)	4/3	22% (1/1)	5/4	0% (0/0)
School B (BE)	5/6	8% (1/0)	5/6	8% (1/0)
School C (NL)	13/12	0% (0/0)	13/12	0% (0/0)
School D (NL)	-	100% (2/2)	-	100% (2/2)

Because most post-test measures for school D were missing, this school was excluded from the post-test analyses (see 4.2.2).

When the Bonferroni correction was considered (see 3.4), analyses (Table 6) indicated no significant differences and (very) small effect sizes for the extracurricular tests, school results, and the motivations variables between the students who did not participate in the post-test (drop-out) compared to the students who did (students post-test).

Table 6. Differences in pre-test variables between drop-out students and students who participated in the control group.

Pretest variables	N (drop-out/post)	Drop-out students	Students post-test	t	df	sign	ES(r)
Non-verbal test	27/103	46.70 (4.98)	46.32 (5.22)	0.343	128	.732	.03
Verbal test	27/103	40.56 (6.27)	40.17 (7.35)	0.247	128	.806	.00
Dutch	3/111	7.10 (1.38)	6.42 (1.26)	0.910	112	.365	.08
Math	3/111	9.05 (0.15)	7.06 (1.55)	2.209	112	.029	.19
History	3/111	8.37 (1.54)	6.67 (1.45)	1.996	112	.048	.19
Geography	3/111	7.63 (0.75)	6.50 (1.46)	1.338	112	.184	.13
Art	3/111	6.47 (4.39)	7.74 (1.08)	-0.503	2.01	.664	.33
Motivation	29/100	3.31 (0.54)	3.39 (0.62)	-0.603	127	.548	.05
Amotivation	29/99	2.08 (0.68)	2.08 (0.83)	-0.023	126	.981	.00
Involvement	29/100	3.01 (0.26)	3.06 (0.39)	-0.616	127	.539	.05
Boredom	29/100	2.01 (0.85)	2.08 (0.88)	-0.328	127	.744	.03
Flow	29/100	3.26 (0.65)	3.29 (0.81)	-0.192	127	.848	.02
Burn-out	29/99	1.88 (0.53)	1.98 (0.68)	-0.758	126	.450	.08

3.2 Material

3.2.1 ESCS

The Economic, Social, and Cultural Status (ESCS) was based on home language, migration status, and maternal education/paternal occupation Status. The selection of these ESCS indicators was based on (inter)national guidelines ((Vandenbroeck, o.a., 2017; UNICEF Office of Research, 2017), together with the feasibility of gaining information about the indicator in the research project. The first ESCS indicator was a home language other than Dutch. Both parents and students reported the language(s) spoken at home: (a) Dutch, (b) Dutch, and another language, or (c) only (an)other language(s). Second, the migration status was determined. Parents and students reported whether the student was born in Belgium or the Netherlands, or another country. Parents reported their own birth country. Parents were also asked about their education level, and occupational status as this project used the low education level of the mother and the low occupational level of the father as the final indicator for low ESCS. Mothers were considered to be from low education when they did not have a diploma of primary school, their highest diploma was from primary school or a certificate (but no diploma) of vocational training. Fathers were categorised with a low professional status when they

were unemployed or worked as uneducated workers (e.g. driver, dishwasher, waiter, cleaner,…). When at least one of both, maternal education or paternal occupation, was considered as low ESCS, the student was considered to be from a disadvantageous background. All information about the ESCS was assessed during pre-test.

3.2.2 Cognitive measures

The COVAT-3 (Magez, Van Parijs, Joris , & Tierens, in development) was used to estimate the cognitive talent of the students. This is the digital version of the CoVaT-CHC Basic version (Magez, o.a., 2016), which is a Dutch test for cognitive abilities developed for children from 9 years and 6 months through 13 years and 11 months. The test is based on the Cattell-Horn-Carroll model (CHC-model) of intelligence and measures several broad cognitive abilities. The CoVaT-CHC Basic version got the A+ qualification label of the Test Commission of the Belgian Federation of Psychologists (BFP)[4], which means that the quality was considered excellent based on the validity and reliability of the test. This test was also used in the project TALENT, to identify the cognitive ability in a large sample of 3071 students from 7th grade (Lavrijsen & Verschueren, 2020).

The COVAT-3 is the digital version of the CoVaT-CHC Basic version and is still in construction. It also contains subtests of several broad cognitive abilities: Fluid reasoning (Gf), Crystallised knowledge/understanding (Gc), Working memory (Gwm), Visual Information Processing (Gv), Long Term Memory (Glr), and Processing Speed (Gs). At the start of every subtest, the instructions are explained and examples are given in a short clip. In this clip, the verbal instructions are supported with visuals to decrease the impact of language. Afterward, the students practice individually and receive online feedback on whether they gave a correct answer. If necessary the supervisor gives individual feedback and explains the purpose of the test. Only when a student correctly solves the individual exercises or if the supervisor is sure he or she understands the exercise, he or she can start with the test itself. For this project, the digital CoVaT-3 was used as an extracurricular test to measure Fluid reasoning (Gf, non-verbal) and crystallised knowledge/understanding (Gc, verbal) at pre-and post-test.

The non-verbal extracurricular test for Fluid Reasoning was measured by two tests: Point Series and Symbol Comparison. In *Point Series*, the students have to complete a series of points based

[4] https://www.bfp-fbp.be/testbeoordelingen

on the rule in the series. This test contained the same items as in the CoVaT-CHC Basic version, supplemented with some more difficult items, assessed through the digital platform. For *Symbol Comparison*, students had to fill in the solution based on one or more unknown variables (represented by a symbol). This test is newly developed for the digital version and showed acceptable in a large research project where it was used as a measure of cognitive abilities in students of the sixth grade of secondary school (Dockx & Denies, 2020). The sum of the raw test scores on Point Series and Symbol Comparison was used to identify the cognitively talented students. Because the project wanted to maximise the chance to uncover hidden talent, students who performed in the top 20% of all students with low ESCS were identified as cognitive talented. This range was based on the models and research of Renzulli and Reis (Reis & Peters, 2021; Reis & Renzulli, 1982).

The verbal extracurricular test for Crystallised knowledge/understanding was measured by two tests: *What doesn´t fit* and *Opposites*. In *What doesn´t fit*, students have to select the word that matches the least in a series of words. In *Opposites*, students have to select the word from a series of words, that means the opposite of the target word. Both tests contained the same items as in the CoVaT-CHC Basic version, supplemented with some more difficult items, assessed through the digital platform. The subtest *Opposites* was used in the same research program as Symbol Comparison, where it showed good reliability (Dockx & Denies, 2020).

Specific test results were not disclosed to students, parents, or teachers. However, students identified as cognitive talented with low ESCS were selected for the programme or control group. These students and their parents were informed that they continued to participate in the project.

3.2.3 Motivation

Motivation was measured by a motivation questionnaire developed for the Project TALENT (Verschueren, Sypré, Struyf, Lavrijsen, & Vansteenkiste, 2021)[5]. The questionnaire, on a five-point Likert scale, consists of six scales: *Motivation, A-motivation, Involvement, Boredom, Flow, and Burnout* and are based on known questionnaires. The students filled out the questions at an online platform (Qualtrics) at pre-and post-test.

The *Motivation* scale was a translation of the Academic Self-Regulation Scale (SRQ-A) (Ryan & Connell, 1989). The scale inventories why students study. It contains four subscales with four items:

[5] Project TALENT – Tailoring education and care to talents of youth (https://www.projecttalent.be/)

Intrinsic Motivation, Identified Regulation, Introjected Regulation, and External Regulation. Lamda 2 (λ2) showed good reliability (.81) in the pre-test measures.

The *A-motivation scale* is a combination of the translated Academic Amotivation Scale (Legault, Green-demers, & Pelletier, 2006) and four items about resistance in youth (Aelterman, Vansteenkiste, Soenens, & Haerens, 2016). The total scale consists of 20 items, divided over 5 subscales: *value of task* (low appreciation of schoolwork), *ability beliefs* (low judgment of own skills), *task characteristics* (negative appraisal of task characteristics), *effort beliefs* (low belief that effort can improve outcomes), and *resistance among youth* (disobedience). The pre-test answers showed very good reliability (λ2 = .93).

The *Involvement scale* focuses on school involvement and the effort students make in the class (behavioural) and how they feel about it (emotional). The scale consists of 22 items and has four subscales: *behavioural involvement, behavioural uninvolvement, emotional involvement, emotional uninvolvement*. The involvement scale was based on (Skinner, Furrer, Marchand, & Kindermann, 2008), with one extra item added for the Project TALENT ("I find what we learn at school boring"). The reliability was acceptable (λ2 = .76) The *Boredom scale* consisted of four items concerning boredom in items of the subscale *emotional uninvolvement* (see *Involvement scale* and showed good reliability (λ2 = .83)

The *Flow & Burnout scale* was based on the Schoolwork Engagement Inventory (Salmela-Aro & Upadaya, 2012) and the Burn-out Inventory (Salmela-Aro, Kiuri, Leskinen, & Nurmi, 2009). It consists of 18 items for three subscales concerning *Flow* (*Energy, Dedication,* and *Absorption*) and three subscales for *Burnout* (*Exhaustion at schoolwork, Cynicism towards the meaning of school, Sense of inadequacy at school*). The reliability ranged from acceptable for Flow (λ2 = .79) to good for Burnout (λ2 = .85)

3.2.4 School Results

The school results for five courses were collected at pre-test (first periodical evaluation after the start of school) and post-test (last periodical evaluation of the school year) after completing the programme. At the end of the first wave, the post-test was postponed to the first periodical evaluation of the next school year. The courses for which school results were collected were Dutch, math, history, geography, and art (drawing or music).

3.3 Procedure

The project got approval from the Social and Societal Ethics Committee of KULeuven on September, 6th, 2019. In September of 2019 (wave 1) and 2020 (wave 2) first years students and parents of the participating schools were informed about the study and asked to sign the informed consent. During the first wave, information sessions about the project took place at school. Teachers were available to answer questions about the project and to support parents with the IC and questions about ESCS. During the second wave, most parents were not allowed at school due to restrictions caused by the COVID-19 pandemic. These parents and students were informed about the project through letters and sometimes a phone call.

Informed consents (IC) were translated into different languages to correctly and adequately inform parents and students about the project and the academic programme (languages: French, English, Turkish, and Arabic). Back-translations verified whether the translation contained the correct information. Depending on the school language policy, the translated IC were presented written and/or orally to the parents and students. This is to make sure everyone understood the content and impact of participating in the project before consenting (i.e. also for illiterate parents). Parents who gave their consent filled out questions on home language, their country of birth, education level, and occupation status to identify ESCS of the student. Only the students who had permission from their parents participated in the pre-tests.

The pre-tests took place during a group screening at school under the supervision of schoolteachers, a member of the research team, and sometimes students of the Thomas More University College (Applied Psychology). During the second wave, the researchers of Thomas More were not allowed to travel to the Netherlands due to COVID-19 travel restrictions. Volunteers with a psychological or pedagogical degree were trained online by the research team of Thomas more to supervise the digital COVAT-3 at the schools in the Netherlands.

All pre-tests took place from September until November. Preferably, they were scheduled in the morning (two to three hours). Teachers and the researcher informed the students at the beginning of the study about the project and asked for their consent. Students who gave their consent filled out their date of birth, gender, home language, and country of birth. The extracurricular tests from the digital COVAT-3 measured the cognitive abilities of the participating students on reasoning (non-verbal) and crystallised knowledge/understanding (verbal). A questionnaire measuring the students' motivation, a-motivation, involvement, boredom, study flow, and burnout, was filled out online

through the Qualtrics platform. Teachers of the project collected the school results on the first periodical evaluation point for all participants on the pre-test.

Based on the ESCS indicators and the results of the non-verbal extracurricular reasoning tests of the digital COVAT-3, cognitively talented students from a minority background were identified. In each school, the top 20% of students with at least one ESCS indicator, was selected for the study and randomly assigned to the intervention or control group. Students who had no low ESCS indicator were excluded, regardless of their score on the non-verbal extracurricular tests. Parents and students who were selected for the intervention or control group were informed of the fact that they further participated in the study. Students and/or parents who had questions about why they were (not) selected were referred to student counselling of their school. When the students' counsellors had questions of their own, they could contact the project manager or members of the research team.

Students of the intervention group were provided a programme on academic language two times a week (25 minutes) for 12 weeks (± from October to February) in addition to the regular curriculum. This programme on academic language was constructed by teachers and experts of the project. Students of the control group were put on a waiting list (they could complete the programme one year later) or were provided with the same amount of sessions discussing the same texts and exams, but without completing the computer programme on academic language. Students who were not selected for the programme also got the opportunity to complete the academic language programme the following year (based on assignment to the control group or because of self, parents, and/or teacher nominations). Based on the feedback of students and teachers from the intervention group, the academic programme was adapted after the first wave.

Originally, students of the intervention and control group were supposed to complete the post-tests in March and April of the same school year. However, in March 2020, all schools went in lockdown due to the COVID-19 pandemic. Post-tests of the first wave were postponed. They were rescheduled together with the pre-tests of the second wave. The post-tests of wave 2 took place in June and July 2021. School results from June were added to the research data. The end of the project was initially planned for June 2021. Due to the delay caused by the COVAID-19 pandemic, this end date was moved to December 2021.

3.4 Data-analyses

To compare school results across schools it was necessary to transpose the school results to a distribution that allows comparison between schools. This was done by computing the linear z-score

for each student based on the mean and standard deviation of the school results of their school. Per school course, the score of the student (X) was subtracted by the mean of the school (M), and subsequently divided by the standard deviation (SD) according to the following formula:

$$lineair\ z - score = \frac{X-M}{SD}$$

To calculate the overall relationship between the extracurricular tests and the school results, the Fisher z transformation was conducted.

Independent t-tests were used when analysing the effect of one dichotomous independent variable (e.g. programme versus control group, wave 1 versus wave 2) on one continuous dependent variable (i.e. extracurricular tests, school results, motivation). Two–way ANOVA was used when the independent variable had more than two categories (i.e. schools) and for analyses where more than one (categorical) independent variable was included.

Because of multiple testing of each variable the Bonferroni correction was used (=.05/number of tests) for interpretation of the results. For the analyses regarding the extracurricular tests, the critical p-value was .025 (=.05/2). For school results, the critical *p*-value was .010 (=.05/5), and for the motivation questionnaires, the value was $p < .008$. For posthoc tests, the critical *p*-value was calculated based on the number of posthoc tests. Values for *p* that were below the critical point were considered significant. In addition, the effect size was reported as a Pearson correlation coefficient *r*, which varies between -1 and 1. The effect size, or correlation, *r* can be interpreted as followed: $r < .10$ indicates no effect, $.10 < r < .30$ indicates a low effect or correlation, $.30 < r < .50$ represented a medium effect or correlation, $r > .50$ were considered as strong effects or correlations (Vanhoomissen, 2019).

4. Results

4.1 Identification of cognitive talent with low ESCS

4.1.1 Importance of ESCS in the identification process

Results (Table 7) indicated a significant main effect from ESCS on the scores from the non-verbal extracurricular reasoning test ($F(1, 556) = 7.251$, $p = .007$, $r = .10$). There was also a main effect of school ($F(3, 556) = 18.121$, $p < .001$, $r = .28$) and a significant interaction effect between ESCS and school ($F(3, 556) = 3.569$, $p = .014$, $r = .12$).

Table 7. Differences in scores on the non-verbal and verbal extracurricular test based on ESCS status and school.

Dependent variable	Fixed factors	SS	df	MS	F	Sign	Partial eta squared
Non-verbal test	ESCS	443.219	1	443.219	7.251	.007	.013
	School	3322.820	3	1107.607	18.121	.000	.089
	ESCS * School	654.432	3	218.144	3.569	.014	.019
Verbal	ESCS	268.121	1	268.121	5.294	.022	.009
	School	2310.795	3	770.265	15.210	.000	.076
	ESCS * School	300.737	3	100.246	1.980	.116	.011

Students with low ESCS scored significantly lower on the curriculum independent reasoning test, compared to students with average or high ESCS in school D ($M = 50.83$, $SD = 9.75$ versus $M = 44.38$, $SD = 9.31$, $p = .003$) and C ($M = 43.95$, $SD = 8.56$ versus $M = 36.26$, $SD = 7.99$, $p < .000$). This was not the case for school C where there was no difference related to ESCS status. In school A there was only one student with average to high ESCS. When only considering students with low ESCS, students from school D scored significant higher on the non-verbal extracurricular test ($M = 44.38$, $SD = 9.31$, $p < .000$), compared to all other schools. Students from school A scored lower than the other schools ($M = 33.68$, $SD = 8.00$, $p < .000$ to $p = .018$). There was no significant difference between school B and C (resp. $M = 36.26$, $SD = 8.20$; $M = 36.94$, $SD = 7.11$). Participating students with average to high ESCS from school D scored higher ($M = 50.83$, $SD = 9.75$, $p < .000$ and $p = .004$) compared to students from

school B who, in their turn, scored significantly higher *M* = 43.95, *SD* = 8.56, *p* = .004) compared to students from school C (*M* = 35.00, *SD* = 8.38). School A had only one student with average to high ESCS.

Table 7 also indicated a significant main effect from ESCS on the scores from the verbal extracurricular crystallised knowledge/understanding test (*F*(1, 556) = 5.294, *p* = .022, *r* = .08). In addition, there was a main effect of school (*F*(3, 556) = 15.210, *p* < .001, *r* = .23). No significant interaction effect was found.

Students with low ESCS scored significantly lower on the curriculum independent verbal test (*M* = 35.56, *SD* = 7.44), compared to students with average or high ESCS (*M* = 43.61, *SD* = 10.69). School A had only one student with average to high ESCS. Participating students from school D scored significant higher on the verbal test (*M* = 45.20, *SD* = 8.74, *p* < .000), compared to all other schools. Students from school A scored lower than the other schools (*M* = 30.12, *SD* = 7.76, *p* < .000). There was no significant difference between school B and C (resp. *M* = 36.01, *SD* = 7.30; *M* = 36.82, *SD* = 6.70).

Table 8. Differences in school results based on ESCS status and school.

Dependent variable	Fixed factors	SS	df	MS	F	Sign	Partial eta squared
Dutch	ESCS	.280	1	.280	.282	.596	.001
	School	2.337	2	1.168	1.179	.308	.005
	ESCS * School	4.255	2	2.127	2.146	.118	.009
Math	ESCS	.061	1	.061	.061	.806	.000
	School	.532	2	.266	.265	.768	.001
	ESCS * School	.866	2	.433	.431	.650	.002
History	ESCS	1.059	1	1.059	1.066	.302	.002
	School	2.897	2	1.449	1.459	.234	.006
	ESCS * School	4.902	2	2.451	2.468	.086	.010
Geography	ESCS	.363	1	.363	.343	.559	.001
	School	1.926	2	.963	.909	.403	.004
	ESCS * School	2.931	2	1.466	1.384	.251	.006
Art	ESCS	.080	1	.080	.080	.777	.000
	School	2.480	2	1.240	1.241	.290	.005
	ESCS * School	3.600	2	1.800	1.801	.166	.007

Analyses showed no significant differences in the school results (transformed to linear z-scores) for ESCS status or school (Table 8).

Table 9. Differences in motivation, a-motivation, involvement, boredom, flow, and burn-out based on ESCS status and school.

Dependent variable	Fixed factors	SS	df	MS	F	Sign	Partial eta squared
Motivation	ESCS	1.002	1	1.002	2.883	.090	.005
	School	.523	3	.174	.502	.681	.003
	ESCS * School	1.220	3	.407	1.170	.321	.006
A-motivation	ESCS	.111	1	.111	.179	.672	.000
	School	2.172	3	.724	1.170	.320	.006
	ESCS * School	1.947	3	.649	1.049	.370	.006
Involvement	ESCS	.307	1	.307	2.099	.148	.004
	School	.618	3	.206	1.411	.239	.008
	ESCS * School	.247	3	.082	.563	.640	.003
Boredom	ESCS	.295	1	.295	.362	.547	.001
	School	1.245	3	.415	.509	.676	.003
	ESCS * School	.137	3	.046	.056	.983	.000
Flow	ESCS	.295	1	.295	.362	.547	.001
	School	1.245	3	.415	.509	.676	.003
	ESCS * School	.137	3	.046	.056	.983	.000
Burn-out	ESCS	.018	1	.018	.035	.851	.000
	School	1.030	3	.343	.678	.566	.004
	ESCS * School	2.348	3	.783	1.546	.202	.008

Table 9 indicates no significant differences and no meaningful effect sizes on the motivations scales for ESCS status or school.

4.1.2 Identification of cognitive talent

Analyses (Table 10) showed a medium correlation between the extracurricular non-verbal reasoning test and the verbal crystallised knowledge/understanding test for all schools (.35 to .49).

The non-verbal extracurricular test, used to identify the cognitive talented students, showed a medium correlation with school results for Dutch, math, and history and a small correlation with geography results in school A. In school B, this test had a medium correlation with math and history

and a small correlation with the other course. In school C, the non-verbal test only showed a medium correlation with Geography, a small negative correlation with Dutch (students with higher scores on the non-verbal test, score lower for Dutch), and a small positive correlation for Art. There was no correlation with math or history.

The verbal extracurricular test showed a medium to strong correlation with Dutch in respective schools B and A, but no correlation in school C. In schools A and B, all other courses showed a small correlation with the curriculum independent verbal test, except for history in school B that presented a medium correlation. In school C, the results of the extracurricular verbal test were unrelated to school results except for history (small).

For all schools, the results for the different courses were related to each other, with overall small to medium correlations between courses (except for Art). Table 10 gives a more detailed overview.

Table 10. Pearson correlations between the extracurricular tests and the school results (transformed to linear z-scores).

		verbal test	**Dutch**	**Math**	**History**	**Geography**	**Art**
Overall	non-verbal test	.41	.15	.26	.24	.26	.14
	verbal test		.32	.14	.24	.14	.14
	Dutch			.41	.54	.45	.33
	Math				.52	.42	.26
	History					.47	.28
	Geography						.21
School A	non-verbal test	.49	.39	.38	.38	.28	.05
	verbal test		.52	.20	.22	.28	.11
	Dutch			.46	.64	.63	.41
	Math				.57	.55	.29
	History					.54	.35
	Geography						.30
School B	non-verbal test	.35	.21	.33	.38	.10	.21
	verbal test		.45	.25	.35	.15	.25
	Dutch			.34	.55	.32	.29
	Math				.57	.15	.08
	History					.40	.27
	Geography						.09
School C	non-verbal test	.37	-.18	.07	-.07	.40	.15
	verbal test		-.05	-.04	.13	-.02	.06
	Dutch			.44	.40	.37	.29
	Math				.40	.51	.39
	History					.46	.23
	Geography						.24

Note. The overall correlations were computed through Fisher z transformation; the school results for school D were missing.

From the students who were identified as cognitive talented with low ESCS, based on a score in the top 20% on the extracurricular non-verbal test, 45% (school B) tot 57% (school A) also scored in the top 20% on the verbal extracurricular test (Table 11). In school D, half of the selected students scored in the top 20% of students with low ESCS on the verbal test. When also students with average to high ESCS were included only 25% scored in the top 20% on the verbal test.

Table 11. Percentage of the identified cognitive talented students who scored in the top 20% on the extracurricular verbal test and the school results

		Verbal test	**Dutch**	**Math**	**History**	**Geography**	**Art**	**Total extracurricular/ school results**
Low ESCS	School A	13 (57%)	11 (48%)	5 (21%)	8 (35%)	9 (39%)	9 (39%)	23/23
	School B	14 (45%)	7 (22%)	13 (42%)	14 (45%)	7 (22%)	24 (77%)	61/31
	School C	30 (47%)	20 (33%)	28 (47%)	23 (38%)	17 (28%)	18 (30%)	64/60
	School D	6 (50%)	-	-	-	-	-	12/-
all	School A	Only 1 student with average to high ESCS so see results low ESCS						
	School B	14 (45%)	6 (19%)	12 (39%)	12 (39%)	5 (16%)	24 (77%)	61/31
	School C	Analyses showed no difference for the non-verbal test for different ESCS background						
	School D	3 (25%)	-	-	-	-	-	12/-

Depending on the schools and only considering the results of students with low ESCS, school results were able to identify 21% to 48% of the cognitive talented students with low ESCS (results for art not included). For school C, the same was true when considering the scores of all students (4.1.1 showed no difference in scores on the extracurricular non-verbal test). In school B, when considering the results of all students, only 16% (geography) to 39% (math and history) of the selected students scored in the top 20% on school results.

4.2 Evaluation of the language programme

4.2.1 Pre-test analyses (programme and control group)

Analyses (

Table 12) indicated no significant differences on all pre-test variables between the students in the programme and the students in the control group.

Table 12. Differences in pre-test variables between programme and control group

Pretest variables	N (progr/control)	Programme group	Control group	t	df	sign	ES(r)
Non-verbal	67/63	46.55 (5.61)	46.24 (4.66)	0.346	128	.730	.03
verbal	67/63	39.97 (6.84)	40.56 (7.45)	-0.467	128	.641	.04
Dutch	57/57	6.55 (1.13)	6.34 (1.38)	0.879	112	.382	.08
Math	57/57	7.34 (1.44)	6.88 (1.66)	1.578	112	.117	.02
History	57/57	6.78 (1.38)	6.64 (1.57)	0.506	112	.614	.05
Geography	57/57	6.54 (1.43)	6.52 (1.48)	0.061	112	.951	.00
Art	57/57	7.69 (1.45)	7.73 (0.99)	-0.197	98.87	.844	.00
Motivation	67/62	3.36 (0.62)	3.38 (0.59)	-0.151	127	.880	.01
Amotivation	66/62	2.12 (0.78)	2.04 (0.81)	0.598	126	.551	.05
Involvement	67/62	3.03 (0.38)	3.08 (0.35)	-0.794	127	.429	.07
Boredom	67/62	2.00 (0.81)	2.14 (0.93)	-0.919	127	.360	.08
Flow	67/62	3.26 (0.71)	3.30 (0.85)	-0.324	127	.746	.03
Burn-out	67/61	1.92 (0.62)	2.00 (0.68)	-0.698	126	.487	.06

For the extracurricular tests, there was a significant difference between schools (Table 13) for the non-verbal tests on fluid reasoning ($F(3,126)=7.950$, $p = .000$, $r = .40$) and on the verbal tests for crystallized knowledge/understanding ($F(3,126)=10.583$, $p = .000$, $r = .45$). The students of school D received a significant higher score for the non-verbal reasoning ($M = 52.58$; $SD = 9.97$) and verbal crystallized knowledge/understanding test ($M = 48.67$; $SD = 6.42$), compared to the students of other schools. The students of school A scored significantly lower on the verbal tests ($M = 36.09$; $SD = 6.65$) compared to school C ($M = 40.78$; $SD = 5.90$) and D, but not B ($M = 39.00$; $SD = 7.31$).

When not transformed to linear z-scores, results showed significant differences for all school results between school A, B and C. The school results of school D were missing. Students of school A

received significant higher scores for Dutch (F(2,111)=8.992, p = .000, r = .37), compared to the other school. Students of school C received significant lower scores for math (F(2,111)=20.399, p = .000, r = .51) and geography (F(2,111)=12.967, p = .000, r = .44). For history students of school C only received significant lower school than the students of school B (F(2,111)=6.481 p = .000, r = .32). Students of school B received a significant higher score than the students in de other schools for art (F(2,111)=28.279, p = .000, r = .58).

Analyses indicated no significant differences between schools for motivation, a-motivation, involvement, boredom, flow, and burn-out (see Table 13).

Table 13. Differences in pre-test variables between schools

Pretest variables	N (C/D/A/B)	School A (BE)	School B (BE)	School C (NL)	School D (NL)	F	df1,df2	sign	ES(r)
Non-verbal test	64/12/23/31	44.78 (3.97)	46.52 (3.29)	45.77 (4.21)	52.58 (9.97)	7.950	3, 126	.000	.40
Verbal test	64/12/23/31	36.09 (6.65)	39.00 (7.31)	40.78 (5.90)	48.67 (6.42)	10.583	3,126	.000	.45
Dutch	60/-/23/31	7.38 (1.37)	6.22 (1.49)	6.20 (0.89)	-	8.992	2,111	.000	.37
Math	60/-/23/31	8.10 (1.06)	7.85 (1.22)	6.35 (1.50)	-	20.399	2,111	.000	.51
History	60/-/23/31	6.63 (1.71)	7.47 (1.51)	6.35 (1.21)	-	6.481	2, 111	.002	.32
Geography	60/-/23/31	7.40 (1.03)	7.01 (1.65)	5.95 (1.22)	-	12.967	2,111	.000	.44
Art	60/-/23/31	7.73 (1.56)	8.81 (0.37)	7.13 (0.97)	-	28.279	2, 111	.000	.58
Motivation	64/11/23/31	3.22 (0.61)	3.48 (0.56)	3.37 (0.62)	3.36 (0.58)	0.840	3,125	.474	.14
A-motivation	64/11/22/31	2.04 (0.58)	2.05 (0.93)	2.03 (0.80)	2.54 (0.63)	1.371	3,124	.255	.18
Involvement	64/11/23/31	2.93 (0.24)	2.97 (0.27)	3.13 (0.44)	3.07 (0.26)	2.296	3,125	.081	.23
Boredom	64/11/23/31	1.98 (0.71)	2.02 (0.87)	2.09 (0.12)	2.20 (0.75)	0.223	3,125	.880	.07
Flow	64/11/23/31	3.05 (0.63)	3.40 (0.80)	3.36 (0.84)	3.02 (0.47)	1.544	3, 125	.206	.19
Burn-out	64/11/22/31	2.08 (0.46)	1.87 (0.61)	1.93 (0.74)	2.18 (0.51)	0.949	3,124	.419	.02

When considering the Bonferroni correction, there was a nearly significant difference for burnout feelings between the students who participated in wave 1 and wave 2 (t (126)= -2.681, p = .008, r =.23). Students in wave 2 (during the COVID-19 pandemic) reported more burnout feelings compared to the students of wave 1. Table 14 indicates no significant differences and (very) small effect sizes for the extracurricular tests, untransformed school results, and other motivation variables between the students in both waves.

Table 14. Differences in pre-test variables between wave1 and wave2

Pretest variables	N (wave 1/2)	Wave 1	Wave 2	t	df	sign	ES(r)
Non-verbal test	80/50	46.55 (5.51)	46.16 (4.56)	0.418	128	.676	.04
Verbal test	80/50	40.15 (6.76)	40.42 (7.73)	-0.210	128	.834	.02
Dutch	68/46	6.50 (1.22)	6.36 (1.33)	0.592	112	.555	.05
Math	68/46	7.08 (1.60)	7.17 (1.54)	-0.308	112	.759	.03
History	68/46	6.71 (1.36)	6.71 (1.65)	0.024	112	.981	.00
Geography	68/46	6.41 (1.42)	6.70 (1.50)	-1.042	112	.300	.10
Art	68/46	7.57 (1.43)	7.91 (0.84)	-1.567	110.110	.120	.15
Motivation	79/50	3.36 (0.61)	3.38 (0.59)	-0.174	127	.862	.02
A-motivation	79/49	1.67 (0.69)	2.26 (0.92)	-2.070	126	.040	.18
Involvement	79/50	3.03 (0.29)	3.09 (0.47)	-0.942	127	.348	.08
Boredom	79/50	1.99 (0.79)	2.19 (0.97)	-1.262	127	.209	.11
Flow	79/50	3.32 (0.76)	3.23 (0.81)	0.626	127	.533	.06
Burn-out	79/49	1.84 (0.51)	2.15 (0.79)	-2.681	126	.008	.23

4.2.2 Post-test analysis

Because most post-test measures for school D were missing, this school was excluded from all post-test analyses.

Table 15 indicates no difference between the programme and control group for the changes in scores from pre- to post-test for the curriculum independent verbal test on crystallised knowledge/understanding ($F(2, 93) = 0.034$, $p = .855$, $r = .08$) and the non-verbal reasoning test ($F(2, 96) = 0.579$, $p = .449$, $r = .08$). This was the same for all schools in both waves and there were no interaction effects.

Table 15. Differences in post-test variables between programme and control group

Dependent variable	Fixed factors	SS	df	MS	F	Sign	Partial eta squared
Gf	Group	29.469	1	29.469	.579	.449	.007
	School	182.284	2	91.142	1.790	.173	.041
	Wave	15.352	1	15.352	.302	.584	.004
	Group*School	150.856	2	75.428	1.482	.233	.034
	Group*wave	23.703	1	23.703	.466	.497	.006
	School*wave	22.112	2	11.056	.217	.805	.005
	Group*school*wave	39.678	2	19.839	.390	.678	.009
Gc	Group	29.469	1	29.469	.579	.449	.007
	School	182.284	2	91.142	1.790	.173	.041
	Wave	15.352	1	15.352	.302	.584	.004
	Group*School	150.856	2	75.428	1.482	.233	.034
	Group*wave	23.703	1	23.703	.466	.497	.006
	School*wave	22.112	2	11.056	.217	.805	.005
	Group*school*wave	39.678	2	19.839	.390	.678	.009

Based on the Bonferroni correction, results indicated no differences between groups in the changes in (transformed) school results between pre- and post-test for Dutch (F(1, 99) = 0.033, p = .857, r = .02), Math (F(1, 100) = 0.601, p = .440, r = .00), history (F(1, 99) = 0.001, p = .981, r = .00), geography (F(1,100)=5.231, p = .024, r = .19), and art (F(1,100)=1.372, p = .244, r = .08) (Table 16).

In addition results indicated an interaction effect of group, school and wave on the results for history (F(2,999)=5.773, p = .004, r = .31). In school A, compared to the pre-test school results, the programme group in Wave 1 (M = 0.69; SD = 0.43) received higher results for history at time of the post-test than the control group (M = -0.15; SD = 1.13). However, posthoc tests indicated that the difference was not significant when Bonferroni correction (p < .008 or .05/6 post-hoc tests) was considered (p = .018).

Table 16. Differences in post-test school results between programme, and control group

Dependent variable	Fixed factors	SS	df	MS	F	Sign	Partial eta squared
Dutch	Group	.019	1	.019	.033	.857	.000
	School	.107	2	.054	.091	.913	.002
	Wave	.830	1	.830	1.406	.239	.014
	Group*School	1.194	2	.597	1.011	.368	.020
	Group*wave	.046	1	.046	.078	.780	.001
	School*wave	3.198	2	1.599	2.709	.072	.052
	Group*school*wave	.207	2	.103	.175	.840	.004
Math	Group	.280	1	.280	.601	.440	.006
	School	.109	2	.055	.117	.890	.002
	Wave	.758	1	.758	1.625	.205	.016
	Group*School	.385	2	.192	.412	.663	.008
	Group*wave	.156	1	.156	.334	.564	.003
	School*wave	.768	2	.384	.823	.442	.016
	Group*school*wave	3.297	2	1.648	3.533	.033	.066
History	Group	.000	1	.000	.001	.981	.000
	School	.073	2	.036	.094	.911	.002
	Wave	2.131	1	2.131	5.485	.021	.052
	Group*School	.754	2	.377	.970	.383	.019
	Group*wave	.342	1	.342	.881	.350	.009
	School*wave	.648	2	.324	.834	.437	.017
	Group*school*wave	4.485	2	2.243	5.773	.004	.104
Geography	Group	5.003	1	5.003	5.231	.024	.050
	School	2.887	2	1.444	1.510	.226	.029
	Wave	28.683	1	28.683	29.992	.000	.231
	Group*School	8.558	2	4.279	4.474	.014	.082
	Group*wave	.533	1	.533	.557	.457	.006
	School*wave	15.380	2	7.690	8.041	.001	.139
	Group*school*wave	10.923	2	5.461	5.710	.004	.103
Art	Group	1.488	1	1.488	1.372	.244	.014
	School	135.571	2	67.786	62.477	.000	.555
	Wave	.058	1	.058	.054	.817	.001
	Group*School	1.313	2	.657	.605	.548	.012
	Group*wave	1.414	1	1.414	1.303	.256	.013
	School*wave	.208	2	.104	.096	.908	.002
	Group*school*wave	5.034	2	2.517	2.320	.104	.044

For geography there was a main effect for wave (F(1,100)=29.992, p < .000, r = .45), a significant interaction effect for school and wave (F(2,100)=8.04, p = .001, r = .33), and also for group, school and wave(F(2,100)=5.710, p = .004, r = .27). Posthoc tests indicated a significant difference between control and programme group in school A at wave 2 (p <.001). Students of the programme group (M = -0.07; SD = 1.39) showed a smaller decline in results than the control group (M = -2.73; SD = 1.45).

For art there was a main effect for school (F(2,100)=62.477, p < .001, r = .72). The students in school A (M = -3.76; SD = 1.74; p < .001) showed a significant larger decline in results for arts from pre- to post-test compared to school B (M = -0.68; SD = 0.95) and C (M = -1.01; SD = 0.68)

Table 17 shows no difference between the programme and control group for the changes in scores from pre- to post-test for motivation (F(1, 82) = 0.505, p = .480, r = .07), a-motivation (F(1, 81) = 3.200, p = .077, r = .19), involvement (F(1, 82) = 0.838, p = .363, r = .10), boredom (F(1, 82) = 1.806, p = .183, r = .14), flow (F(1, 82) = 0.483, p = .489, r = .07) and burn-out (F(1, 81) = 0.764, p = .385, r = .09). This was the same for all schools in both waves. Inspection of the effect sizes reveal small (not significant) effects for a-motivation, involvement and boredom. Students from the programme group reported more feelings of boredom (M = 0.30; SD = 0.91 versus M = 0.11; SD = 0.82), more involvement (M = -0.05; SD = 0.38 versus M = -0.13; SD = 0.46), and less feelings of a-motivation (M = -0.06; SD = 0.91 versus M = 0.13; SD = 0.61) at post-test, compared with the control group. There were no interaction effects.

Table 17. Differences in post-test motivation, a-motivation, involvement, boredom, flow, and burn-out between programme and control group

Dependent variable	Fixed factors	SS	df	MS	F	Sign	Partial eta squared
Motivation	Group	.224	1	.224	.505	.480	.006
	School	.432	2	.216	.486	.617	.012
	Wave	.194	1	.194	.436	.511	.005
	Group*School	2.174	2	1.087	2.445	.093	.056
	Group*wave	.001	1	.001	.003	.959	.000
	School*wave	1.182	2	.591	1.330	.270	.031
	Group*school*wave	.293	2	.146	.329	.720	.008
Amotivation	Group	2.044	1	2.044	3.200	.077	.038
	School	1.549	2	.775	1.212	.303	.029
	Wave	.061	1	.061	.095	.758	.001
	Group*School	1.311	2	.655	1.026	.363	.025
	Group*wave	.768	1	.768	1.203	.276	.015
	School*wave	.077	2	.038	.060	.942	.001
	Group*school*wave	.083	2	.042	.065	.937	.002
Involvement	Group	.153	1	.153	.838	.363	.010
	School	.552	2	.276	1.509	.227	.036
	Wave	.017	1	.017	.091	.764	.001
	Group*School	.014	2	.007	.038	.963	.001
	Group*wave	.004	1	.004	.021	.885	.000
	School*wave	.378	2	.189	1.035	.360	.025
	Group*school*wave	.279	2	.139	.763	.469	.018
Boredom	Group	1.332	1	1.332	1.806	.183	.022
	School	2.955	2	1.478	2.004	.141	.047
	Wave	.536	1	.536	.727	.396	.009
	Group*School	4.021	2	2.011	2.726	.071	.062
	Group*wave	.547	1	.547	.742	.391	.009
	School*wave	1.018	2	.509	.690	.504	.017
	Group*school*wave	1.127	2	.564	.764	.469	.018
Flow	Group	.279	1	.279	.483	.489	.006
	School	.713	2	.357	.617	.542	.015
	Wave	.026	1	.026	.044	.834	.001
	Group*School	1.443	2	.721	1.247	.293	.030
	Group*wave	1.212	1	1.212	2.095	.152	.025
	School*wave	.676	2	.338	.584	.560	.014
	Group*school*wave	.076	2	.038	.066	.936	.002
Burn-out	Group	.280	1	.280	.764	.385	.009
	School	.367	2	.183	.499	.609	.012

Wave	1.338	1	1.338	3.643	.060	.043
Group*School	1.378	2	.689	1.877	.160	.044
Group*wave	.680	1	.680	1.852	.177	.022
School*wave	.303	2	.151	.412	.664	.010
Group*school*wave	.877	2	.438	1.194	.308	.029

5. Conclusions

This project "Creating equal opportunities at School" aimed to raise the school success of students with high potential from ethnic minority and economically disadvantaged backgrounds in the Netherlands and Belgium. As a first step, the project tried to select cognitively talented students with culturally and economically diverse backgrounds. The identification of cognitive talent was based on a culture fair extracurricular non-verbal reasoning test (Magez, Van Parijs, Joris , & Tierens, in development). In the two (Belgian) schools that only provide general education, small to medium correlations were found between the extracurricular test and the school results for the different courses (except art). This relation is confirmed by previous research (Magez & Bos, 2016). In contrast, there were no or very small correlations in the school (from the Netherlands) that provided general and technical education as well as vocational training. The most plausible explanation is that this is due to a problem of the methodology as the school results of this school were taken together over study orientations, with different teachers and evaluation criteria. Future research should do a transformation on the school results per class (or at least per study orientation), to correctly combine results over different classes and eliminate the effect of different teachers and evaluation criteria. Other possibilities are that school results in the Netherlands are less related to cognitive ability reasoning; or that the extracurricular test could be less applicable in the Netherlands. However, there also are no indications that the test would be less appropriate for students from the Netherlands especially because results were compared within each school.

In line with the broader identification system for the cognitive talent of Reis & Renzulli (1982; Reis & Peters, 2021), the 20% best scoring students with low ESCS per school were identified as cognitive talented and divided into a programme and control group. Analyses showed that at pre-test less than half of the cognitive talented students with low ESCS (21 to 48%) showed learning outcomes that were in the top 20% of the schools´ participating students with low ESCS. This indicates that the majority of these students were not able (yet) to convert their cognitive talent or abilities into learning achievement. Results of school B showed this was, even more, the case (16% for geography and 39% for math and history) when the results of all participating students of the school were considered, regardless of their ESCS status. This was not the case in school C, but as stated above this is possible because school results were combined over study orientations with different teachers and evaluation criteria. In addition, the non-verbal extracurricular test showed a correlation of 45% to 57% with the scores on the verbal extracurricular test of students with low ESCS. In the school that only provided

general education at a high level, this correlation dropped to 25% when also students with average to high ESCS were considered. The identification of the cognitive talent using a non-verbal reasoning test and ESCS status identified other cognitive talented students compared to school results, or verbal extracurricular tests. This indicates that this test was able to identify hidden talent. This supported the findings of Project TALENT, where judgments on cognitive talent by teachers were more related to school results than cognitive ability (Lavrijsen & Verschueren, 2020). One important consideration is that the ESCS had to be taken into account, or the talent was more likely to remain unhidden. Results showed that in several schools ESCS status influenced the scores on the verbal and non-verbal extracurricular test: students from low ESCS received significantly lower scores compared to students with average to high ESCS. In school C, however, there was no difference in scores on the non-verbal extracurricular test based on ESCS status, but students from low ESCS still received lower scores on the verbal extracurricular test. This difference might be because this school offers broader study orientations, compared to the other schools that only provide general education, because of which they probably attract other student profiles. However, it could not be ruled out that some cognitive talented students underachieved on the non-verbal extracurricular test and remained hidden. Future research should therefore combine different sources (e.g. teacher or parent nominations) to discover as much hidden talent as possible (Reis & Peters, 2021). In addition, more research should be done on how to identify the cognitive talent from low ESCS across schools, because it will not always be possible to test all the students or gain enough information about ESCS status to select the top 20% of the school.

The second goal was to develop and evaluate a programme on academic language similar to the REAL project[6] in consultation with teachers of the participating schools. This package includes an online programme to help the selected students learn academic Dutch. The online programme allows pupils to actively study and use the words. The aim of the programme is that students will be able to recognize and use academic language in formal school settings as well as in their everyday lives so a lack of language skills no longer forms a barrier when it comes to academic success. The students of the first programme group started working with the Dutch academic words in December 2019 or January 2020. The programme for the second wave (January 2021) was adapted based on the experiences of students and teachers during the first wave (e.g. more attractive exercises, words with

[6] http://www.realproject.org.uk/

lower difficulty levels). Pre-test analyses showed no differences between the programme or control group for the scores on the verbal and non-verbal extracurricular tests, school results, and motivation variables. Also, no differences were found between the selected cognitive talented students of both waves, except a small difference for more burn-out feelings at wave 2 during the COVID-19 pandemic. There were differences between the students of the different schools for school results and the scores on the extracurricular test, but not the motivation variables. The differences between schools had to be included for the post-test analyses.

Post-test analyses indicated no overall effect of group for changes in scores on the extracurricular tests and school results. This means the programme group did not perform significantly better, compared to the control group over schools and both waves. Some small interaction effects were found. In school A, at wave 1, the programme group received higher results for history at the time of the post-test than the control group. For geography, students of the programme group in school A showed a smaller decline in results than the control group at wave 2. For the motivation variables, there were some small, but not significant, effects where students of the programme group reported more boredom, but also more feeling involved and fewer feelings of a-motivation, compared to the control group. As language skills develop over years (Hof, 2013; Heppt, Haag, Böhme, & Stanat, 2014), it is possible that there was an effect of academic language learned in the programme but that this was not (yet) generalised to school courses and extracurricular tests. This further research should therefore include pre-and post-tests in de language programme itself so the effect of the programme on the academic language used in this programme can be evaluated.

The research and project had to face several challenges which made it hard to conclude the effectiveness of the language programme. To start, the project was not able to reach all the first-year students of the schools. In the first wave, about 55% to 60% of the first year's students participated in the pre-test. It was not possible to determine the difference between the students who did or did not get permission to enter the project. Some parents were informed but did not give their consent, however, this reason was not inventoried. It is possible that some parents with average to high ESCS, or who thought their child was not cognitive talented, did not give their permission because their child could not be selected for the programme. Other parents may not want to ask too much of their child because they are already struggling with school. A third possibility, is that some parents did not understand what the project was about, despite the efforts of the schools, because they were not present at the information moment (only wave 1) or they did not understand the information letter well enough. This latter explanation is most certainly the case in wave 2, where parents were not

allowed to be present at school due to the COVID-19 pandemic. This resulted in a much lower participation rate at wave 2: 34% to 43% of the first-year students participated. For the current research, this indicates that the project was not able to reach all students. The most vulnerable are often most difficult to reach, even though they could benefit the most from learning academic language. It is not possible to determine in what way this has influenced the results. It also underlines the importance of parental involvement in the success of projects like this. Future research should therefore maximally engage their effort to involve parents (Benner, Boyle, & Sadler, 2016; Merrit & Buboltz, 2015). Parental involvement could lead to more students participating in projects like this, but also their support during the project itself is very important to develop non-cognitive student characteristics that contribute to the development of cognitive talent (Verschueren, Sypré, Struyf, Lavrijsen, & Vansteenkiste, 2021).

Next, students´ ESCS characteristics differed strongly across schools. For example, while in school A about half of the students spoke no Dutch at home and the other half spoke Dutch together with another language, about half of the participating students of school D only reported Dutch as a home language. In school A, Dutch was often the third or fourth language of the students. In addition, there were a lot of missing data for ESCS. In school A, for example, at least one ESCS indicator was missing for 47% (wave 1) to 43% (wave 2) students. In school C about 14% to 24% was missing. Thirdly, the description of the profession was not always clear enough to determine the level of professional status for the fathers (e.g. “restaurant” could mean that he owned a restaurant (average ESCS), or that he worked as a waiter, as a dishwasher, … (low ESCS). Finally, it was for some mothers difficult to determine their level of education status, because other countries use other labels for the same education or a certain label means something different in the Flemish/Dutch education system. This means that it is possible that the ESCS status of some students could not correctly be identified, which could have influenced the results. In addition, analyses indicated that ESCS status was not related to differences in school results of the participating schools. This is in contrast with other research (Merrit & Buboltz, 2015; UNICEF Office of Research, 2017). The schools participating in the project are not representative of Dutch and Flemish schools. Since they agreed to participate in the CEOS project, they are probably more aware of the problem and may already give more culture fair evaluations at school.

Furthermore, there were also some challenges related to the used measures at pre-and post-test. Firstly, in some schools, it was necessary to deviate from the standardised procedures. It was not always possible to schedule the tests during the morning hours. Sometimes students themselves and/or teachers were not informed about the project or the moment the test would take place. It was

impossible to always eliminate distraction or disturbing noises (e.g. traffic passing, lessons in the same or adjacent room). There was not always access to a (stable) internet connection, or not enough working computers, headphones, or mobile mousses. The digital platform of the COVAT-3 occasionally showed malfunction. In addition, the questionnaire on motivation turned out to be very difficult to understand, partly because the questions contained many negations and the use of several academic words. For wave 2, the research team tried to add a more comprehensive meaning to each question, which could have influenced the results.

In the evaluation of the programme group, several other challenges could interfere with finding an effect. First, the language programme was adapted along the way, with big changes between wave 1 and wave 2. Schools observed lower motivation in their students because of the difficulty level of the words and the digital programme. The partners of the project worked hard to solve these issues for the second wave. Even though results did not indicate large differences between both waves, except for history and geography, these changes made it more difficult to find significant results. Secondly, the approach of the control group differed across schools. School A, C, and D put the students of the control group on the waiting list, while school B provided students in the control group an alternative approach. These students received the same amount of sessions discussing the same texts and exams, but without completing the digital programme on academic language. Some schools embedded the programme in the curriculum or presented it to the students during school hours, while other schools provided the programme after school hours. There was a difference in how intense students were activated in the school, and teacher involvement. Some schools mainly focused on the digital component of the programme (especially at wave 1), while others linked it more to the regular curriculum. Finally, several schools also used other programmes for enhancing language for all their students, which could have interfered with the effects of the programme developed during the project. Even though the motivation was included in the project, several teachers described problems in motivating their students for the programme. The first-year students did not always see the benefit of learning academic language. Possibly, this would be more be the case if they were older and closer to for example central exams or study orientation. On the other hand, the teaching of academic language takes a long time so it is important to start as soon as possible (Heppt, Haag, Böhme, & Stanat, 2014; Merrit & Buboltz, 2015). In future research, it is important to give enough attention to explaining the goals and benefits of learning academic language. In addition, it seems important to observe how students learn and work with the programme so they can be closely monitored while completing the programme.

Finally, the research and project were strongly influenced by the COVID-19 pandemic. At the time of the first lockdown, only school C had finished the language programme. The other school tried to complete the programme online with varying success. All post-tests were postponed to the next school year, which resulted in more missing data: 18% of the school results and 25% for the extracurricular and motivation tests, compared to respectively 8 and 12% in wave 2. In wave 2, pre- and post-test took place in the same school year. Analyses on the pre-test scores for the extracurricular tests, school results, and motivation indicated no differences between students that did or did not participate at post-test. In addition, parents were not allowed on the school to inform them about the second wave of the project, which resulted in a lower response rate (34-43% compared to 55-60% at the first wave). This lower response rate could have influenced the results, as parents of students with specific ESCS characteristics were possibly more difficult to reach. In addition, this observation underlines the need for parental involvement in projects like these. Finally, the selected students at wave 2, reported slightly more burn-out feelings compared to wave 1.

In summary, this Erasmus+ project is innovative because of its target group that is underrepresented in many Gifted-and-Talented programmes. This project was able to uncover hidden cognitive talent using a non-verbal extracurricular reasoning test. Due to this project, teachers, staff, pupils, and their parents know where to find and how to make use of materials that help pupils with low ESCS improve their command of Dutch Academic Vocabulary. There was no overall evidence for an increase in learning outcomes or changes in the extracurricular tests due to the developed academic language programme. However, because of the large differences between schools, the changes in the language programme between the two waves, and the challenges due to the COVID-19 pandemic it was impossible to do analyses on larger groups of students. Small (interaction) effects give some indication of the effectiveness of the programme on more feelings of involvement at school, fewer feelings of a-motivation, and the school results of some theoretical courses, such as geography and history. In contrast, participation in the programme also seemed to be related to more feelings of boredom. Future research, with larger amounts of students and pre-and post-tests in the language programme, is needed to draw more correct conclusions. From a broad perspective, the final goal of this and future projects is that the influence of socioeconomic status on talent development, school results and school success can diminish. This fundamental change can ultimately lead to a more diverse and equal society.

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