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## SCHOOL ACHIEVEMENT IN ABOVE AVERAGE INTELLIGENCE STUDENTS

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### Abstract

*Research goal:* The aim of this paper is to show to what extent students with high intellectual potential realize high school achievements also. It was analyzed the school success in the second cycle (subject teaching) of the students with above-average intelligence which was established during the younger school age. School success is discussed in relation to the level of achievement in academic skills and motor functioning.

*Method:* The sample consisted of 61 pupils of both sexes aged 11.3 to 15 years with no neurological deficits, psychiatric disorders, somatic or sensory impairments and intellectual capacity ranging from 112 to 121 assessed by Raven's Colored Progressive Matrices at the age of 7.3 to 11 years. At the same age was determined the quality of writing, reading and computing by the Protocol for the assessment of basic academic skills and the level of motor functioning by the Protocol for the assessment of motor functioning. The school success was established at four years after the first test in the school year 2017/18.

*Results:* In the overall sample were found 24.6% of the above-average intelligent who achieved maximum school achievements (5.00). At the same time there are 19.7% of those who did not achieve excellent school success and 11.5% of those who achieved mark 3 and lower in some subjects.

*Conclusion:* In accordance with the results superior intelligence is not a guarantee of high school achievement on its own. In the context of maximizing the potential of above-average intelligent students there is an implicit need for support and additional intervention in different areas in the early years of schooling of these students.

*Key words:* above-average intelligence, school achievement, support, giftedness

## Introduction

### Above-Average Intelligence, Giftedness and Its Actualization

The actually concepts of giftedness are based on empirical studies and their beginning are related to the Galton's concept of giftedness as an innate quality that is evolving inspired by inside and which is beyond the reach of external influences (Galton, 1892). Further definitions were predominantly focused on high intellectual potentials and where the measure of giftedness is a high ratio of intelligence as an innate and general ability (Terman, 1916).

More recent definitions of giftedness takes into account intellectual abilities as a condition but they do not consider them sufficient for a full explanation of giftedness. Renculi (1978) determines the giftedness as the interaction of above-average ability, commitment to the task and creativity, whereby above-average ability and creativity can be influenced in childhood and developed according to genetic potential (Rajović and Rajović, 2017). In some definitions successful problem-solving and knowledge acquisition (Sternberg, 2000) are used as indicators of giftedness which are based on the multiple connection of the neurobiological construct with a high level of achievement and abilities and bio-psycho-social status (Heller et al., 2000).

Although divided into those who consider giftedness as extraordinary ability and those who consider as an extraordinary achievement the both categories of modern conceptions of giftedness assign an important role to learning / education processes and environmental conditions (Dai, 2009, Mayer, 2005, Preckel & Vock, 2014, Vock, Gauck & Vogl, 2011, according to Altaras, 2006). In fact, the both are models that show how (extraordinary) potential becomes (extraordinary) achievement.

Giftedness as an innate ability that appears as one in row of domains (intellectual, socially-affective, sensorimotor) does not mean either success in school or success in life by itself. It represents a potential and a latent basis that develops into some manifest form (systematically developed high competencies, knowledge and skills) and achieves maximum potential in addition to encouraging and supporting by the environment (systematic learning and practice) (Gagné, 2015). Altaras Dimitrijević and Tatić Janevski (2016) determine giftedness as "... exceptional ability expressed in extraordinary speed, easily and self-sufficiency by which are acquired knowledge and skills in some area comparing to peers, i.e. people of similar previous experience in a given domain".

### Actualization of giftedness and academic failure of gifted students

Learning and education influence to the appearance and development of giftedness although giftedness is not something that (learning and education) can be acquired (Altaras, 2006). Learning and / or education constitute a mechanism and the environmental conditions are the

factors responsible for the actualization of giftedness so that affect whether the giftedness will appear at all. The form of excellence appearance in some scientific, sports or artistic domain at that moment (actualization of giftedness) is greatly an expression of learning and exercise processes (the interaction of factors that promote or inhibit the mentioned processes) but not a direct reflection of genetic predispositions. The role of the education system and teachers is to enable students to continuously expand the repertoire of possible operations or activities and thus give a chance to students to achieve excellence, i.e. to show itself as gifted (Ziegler, 2005).

On the other hand to the actualization of the ability of gifted students there is a problem of their academic failure. The essence of this problem is the clash between students exceptional abilities and their performance at school. Possible decline in the educational achievements of gifted students and much less achievement than the student might have is a serious problem that has been more prevalent in recent decades (Clemons, 2008).

### ***School achievement***

The assumption and main determinants of school success according to Oros et al. (2017) are classified into three categories: cognitive, non-cognitive and external factors. Cognitive factors include the cognitive abilities of the child. Authors cite studies that confirm the children of higher intellectual capacity achieve better school success (Leeson, Ciarrochi, Heaven, 2008). The child's motivation for learning is highlighted as the most important non-cognitive factor (greater intrinsic motivation for learning and adopting curriculum leads to better learning and better school success) as stated studies by the Deci & Ryan (2000) and Lepper et al. (2005). External factors are beyond the child (school, family etc.) Stimulative environment is necessary for a better children's school success. In school context that means the school atmosphere and method of transferring knowledge to students influence to the level of acquiring new knowledge. There are data in literature about different effects of external motivation on different children's ages (Lemos & Verissimo, 2014; Corpus & Worthington, 2014).

**The aim of this paper** is to show to what extent students with high intellectual potential realize high school achievements also. There was discussed the problem in kontekst of school environment and giftedness actualization and its failure in above-average intelligence students. It was analyzed the school success in the second cycle (subject teaching from fifth to eighth grade) of the students with above-average intelligence which was established during the younger school age (from the first to fourth grade in primary school). School success is discussed in relation to the level of achievement in academic skills and motor function. The intention of the research was to emphasize the importance and necessity for additional (systemic) intervention toward students with high intellectual potential because make a possibility to establish their (extraordinary) potentials.

## Method

### Participants

The sample in this study consisted of 61 pupils fifth to eighth grade in primary school both sexes aged 11.3 to 15 years with no neurological deficits, psychiatric disorders, somatic or sensory impairments and intellectual capacity ranging from 112 to 121 assessed by Raven's Colored Progressive Matrices at the age of 7.3 to 11 years.

Two groups of above/average intelligence students participated: 45 (16 boys and 29 girls) highly intelligent students -IQ 112 to 117 and 16 (6 boys and 10 girls) intellectually superior students -IQ 118 and more, (Table 1). In the highly intelligence group the highest number of students was at the second/sixth and fourth/eighth grades and while in the group of superior students the highest number was at the first / fifth grade. Such distribution in the context to the educational level (school grade) can be attributed to the influence of individual differences or characteristics of the instrument used for evaluation and it would be interesting to analyze in some future research. Mean age in the highly intelligent group was 111.4 and in the group of superior 98.8 months with a statistically significant intergroup difference (Table 2). In group of highly intelligent mean IQ is 114 and in group of superior it was 119.3 with statistically significant intergroup difference.

Table 1. Distribution in Two groups and Total sample according to school grade

School grade	Highly intelligent (IQ 112-117) (n=45)		Intellectually superior (IQ 118 and more) (n=16)		Total sample (n=61)
	N	%	N	%	N
I / V	8	44,4	10	55,6	18
II / VI	19	86,4	3	13,6	22
III / VII	5	62,5	3	37,5	8
IV / VIII	13	100,0	0	0,0	13
Total	45	73,8	16	26,2	61

### Tests and Materials

#### *Intelligence*

Assessment of general abilities in order to determine the students' intellectual capacities was carried out by Raven progressive color matrices according to local test standards (Fajgelj, 2007) at the age of 7.3 to 11 years. The test is intended for children aged five to eleven. It consists of 36 tasks



divided into three series (A, AB, B). The total number of correct answers is running out. The results were scored as intellectually superior (total score above 90% for the age group) and highly intellectual abilities (score above 75% for the age group). The instruction was given in group and two test tasks were solved. Afterward the students solved the test individually.

### ***Basic academic skills and motor functioning***

#### ***Clinical assessment of basic academic skills***

In order to determine the quality of basic academic skills was used the Protocol for the assessment of basic academic skills in the domain of writing, reading and calculation and was observed in aspects of speed, accuracy and fluency. The scores used were the age/related norms according to Nišević (2016). Total scores on separated scales for writing (WRIT), reading (READ) and computing (COMP) represent the overall performance for each academic skill in particular. Performances are rated as an achievement that corresponds to age (average performance for age), as an achievement that deviates 1 and 2 SD below the age average (indicate the elements of writing, reading and computing disorders or indicate the existence of developmental disorders in these domains) and as an achievement that deviates 1 or 2 SD above the age average (indicate high or extraordinary performance in observed domains).

#### ***Clinical assessment of motor functioning***

In order to determine the level of motor functioning was used the Protocol for the assessment of motor functioning in the domain of neuromaturation, praxis and movement execution, somatosensory and sensorimotor organization and general motor skills with age-related norms according to Nišević (2016). The score on the overall motor performance scale (OMF) represents a motor performance and is rated as an achievement that corresponds to age (average performance for age), as an achievement that deviates 1 and 2 SD below the age average (indicate the elements of motor disorder or manifested developmental coordination disorder) and achievement that deviates 1 or 2 and above SD above the age average (indicate high or extraordinary motor performance).

#### ***School achievement***

School achievement was evaluated four years after the first test and based on data from school documentation at the end of the first semester of the current school year. Achievements-success is ranked in five levels: 5-extraordinary (excellent success all marks was five-mean 5.00), high achievement (excellent success two marks was four -mean 4.80 to 4.99), excellent (excellent success more than two marks was four -mean 4.50 to 4.79), low excelent (excellent success in some school subjects mark was three or less - at risk to failure), below excellent (not achieved excellent success - signed failure).

### *Provided support*

Data of the type of support provided to students was obtained from pedagogical documentation of teachers, psycho-pedagogical service of the school and parents by filling out the Parents' Questionnaire. Three forms of professional support are highlighted: support in teaching process-individualization procedures (additional and supplementary education at school), support for abilities development (defectological rehabilitation), support outside the school in the parents' arrangement (additional programs in the local community according to students' interests).

### **Procedure**

The research is part of a wider research study on the presence of a developmental coordination disorder in lower-grade primary school students approved by the University of Belgrade Faculty of Special Education and Rehabilitation. It was conducted at a primary school in Belgrade as a prospective study. The sample was formed on the basis of data collected from school documentation and with the consent and participation of parents. The same student sample was tested twice by the research team. The first testing was carried out at the younger school age (7.3-11 years). At the same age was also determined the quality of writing, reading and calculating and the level of motor functioning. Second testing was conducted four years after the first testing at the senior school age at the school year 2017/18. Then the school success of the same students was analyzed.

### **Results and Discussion**

One-way variance analysis (ANOVA) was used to determine the intergroup differences in achievement at the first test for all diagnostic domains in samples of different intellectual capacities (Table 2). Intergroup differences in a monitored domain was not statistically significant. In the domain of writing ( $M = 5.6$ ) and motor functioning ( $M = 39.2$ ) those from the group with lower intellectual capacity (higher intelligence group) showed better mean achievements than the mean of Total sample ( $M = 5.5$ ;  $M = 38.5$ ). So, the group of superiors unexpectedly did not achieve better results and neither group did achieve maximum achievement. Such results indicate a lower motor function in students with higher intellectual potentials considering that the writing tasks included the motor component to a greater extent than the orthographic (linguistic). In accordance with these, Nišević et al. (2017) showed a highly statistically significant correlation between IQ and motor functioning.

Table 2. Means of the Two groups and the Total group on Descriptive measures and Diagnostic domains (first testing)

Measures and domains	Highly intelligent (IQ 112-117) (n=45)		Intellectually superior (IQ 118 and more) (n=16)		F (1,59)	$\eta^2$	Total sample (n=61)			
	M	SD	M	SD			M	SD	Min	Max
AGE	111,4	13,7	98,8	9,2	11,5***	,16	108,1	13,8	88,0	135,0
IQ	114,0	1,5	119,3	1,4	159,4***	,73	115,4	2,8	112,0	121,0
READ	5,7	,5	5,8	,6	,1	,00	5,7	,5	4,0	6,0
WRIT	5,6	,7	5,1	1,2	2,9	,05	5,5	,9	2,0	6,0
COMP	5,8	,3	5,8	,5	,1	,00	5,8	,4	4,0	6,0
OMF	39,2	4,5	36,6	7,4	2,9	,05	38,5	5,5	20,0	48,0

\*\*\*p<.001; \*\*p<.01; \*p<.05.

AGE-age in months; IQ-intelligence quotient; READ-reading; WRIT-writing; COMP-computing; OMF-motor functioning.

Table 3. School achievement in Two groups and Total sample at age 11,3 to 15 (second testing)

School achievement	Highly intelligent (IQ 112-117) (n=45)		Intellectually superior (IQ 118 and more) (n=16)		Total sample (n=61)	
	N	%	N	%	N	%
1-below excellent	8	17,8	4	25,0	12	19,7
2-low excellent	7	15,6	0	0,0	7	11,5
3-excellent	8	17,8	3	18,8	11	18,0
4-high achievement	11	24,4	5	31,3	16	26,2
5-extraordinary	11	24,4	4	25,0	15	24,6
Total	45	100,0	16	100,0	61	100,0

The analysis of student achievement after four years from the first testing at the age of 11.3 to 15 is presented in Table 3. In the total sample 50.8% of the students achieved high and extraordinary academic success. It was found 24.6% of the above-average intelligence students to achieve maximum school achievements (5.00) with approximately equal representation in both groups. At the same time there were 31.2% of those who

were signed as failure or were at risk of failure and among them 19.7% did not achieve excellent results and 11.5% achieved in some school subjects mark three and below. Failure was more manifested in superior group (25.0%) and the risk of failure in high-intelligence group (15.6%). Similar results we can find in the literature. The frequency of expression failure of gifted according to Clemons (2008) are ranged from 15-40% or even 50% in the population of intellectually gifted students.

**Table 4. Academic skills and Motor Functioning in Two groups and Total sample and School achievement at age 7,3 to 11(first testing)**

	AS+OMF	School achievement					Total	
		1	2	3	4	5		
<b>Highly intelligent (IQ 112-117) (n=45)</b>	below average	N	2	2	/	/	/	4
		%	50,0	50,0	/	/	/	100,0
	average	N	2	2	3	4	4	15
		%	13,3	13,3	20,0	26,7	26,7	100,0
	above average	N	3	3	5	6	6	23
		%	13,0	13,0	21,7	26,1	26,1	100,0
MIX	N	1	/	/	1	1	3	
	%	33,3	/	/	33,3	33,3	100,0	
<b>Intellectually superior (IQ 118 and more) (n=16)</b>	below average	N	2	/	1	0	0	3
		%	66,7	/	33,3	0,0	0,0	100,0
	average	N	1	/	/	/	1	2
		%	50,0	/	/	/	50,0	100,0
	above average	N	/	/	2	5	3	10
		%	/	/	20,0	50,0	30,0	100,0
MIX	N	1	/	/	/	/	1	
	%	100,0	/	/	/	/	100,0	
<b>Total sample (n=61)</b>	below average	N	4	2	1	/	/	7
		%	57,1	28,6	14,3	/	/	100,0
	average	N	3	2	3	4	5	17
		%	17,6	11,8	17,6	23,5	29,4	100,0
	above average	N	3	3	7	11	9	33
		%	9,1	9,1	21,2	33,3	27,3	100,0
MIX	N	2	/	/	1	1	4	
	%	50,0	/	/	25,0	25,0	100,0	

Considering the achieved results, the question arises whether the students who were failure had lesser achievements in academic skills and motor functioning - AV and MF (Table 4). Achievements on assessing AV+MF were ranked as below average (in one and / or more domains under average and in other domains average achievement), average (in all observed domains average achievement), above average (in one and / or more domains above average and in the other domains average achievement) and mixed (MIX- in some of the observed domains below and in some above-average achievement).

In total sample were found seven students with below average-achievement for academic skills and motor functionality - AV and MF (four in the group of highly intelligent and three in the superior group). These students did not achieved high or extraordinary academic success. It can indicate the existence of learning disabilities. Also, were found four students who show at the same time below average and above-average achievements in different observed domains. In these students we can search for learning disabilities, too. The intergroup difference was not significantly but the one-way variance analysis showed a statistically significant intergroup difference in the total sample compared to the school success achieved ( $F = 4.66$ ,  $df_1 = 3$ ,  $df = 57$ ,  $\eta^2 = .20$ ) between the group of below average and groups of average ( $p = .04$ ) and above-average ( $p = .007$ ). There is an important question to what extent would be students with learning difficulties use intellectual potential to overcome difficulties and maximize own potential if they get adequate support at early school age.

The average achievement for AV and MF showed 17 students (52.9%) and they achieved high (23.5%) and extraordinary (29.4%) school success.

Above/average performance of AV and MF established 33 students (60.6%) and they achieved high (33.3%) and exceptional (29.4%) success, while 13 students achieved lower school performance (9.1% not achieved excellent results, 9.1% achieved a poor performance with a score of three in some cases, 21.2% achieved only excellent success). Higher manifestation of worse results was found in a group of highly intelligent compared to a superior. In support of our results we find results of Rayneri et al. (2006) which state that the discrepancy between ability and achievement is even greater if the abilities are more remarkable.

The results of our study about discrepancy between pupil's extraordinary abilities and their performance at school may be result of discrepancy or conflict interaction between the individual characteristics (needs / qualities) of a gifted student, on the one hand, and the characteristics of the environment (family and school) in which student would realize some achievement, on the other hand. According to Whitmore (1980) failure is not only the result of individual "problems and disadvantages" which student carry to school but also school and classroom climate, material and curriculum, wrong approach and teachers' expectations, lack of recognition of giftedness. According to many authors the lack of challenges in school is contributed by the occurrence of failures (Reis et al., 1995; Díaz, 1998; Hébert, 2001). Altaras Dimitrijević and Tatić Janevski (2016) discuss two reasons for failure of gifted students: the abandonment and loss of motivation when the task is not suitable to the student; and the second

reason to lull gifted in the experience of competence and depriving the opportunity to improve the skills necessary to achieve extra high success. Such a discussion suggests the need for an adequate and appropriate school environment for gifted children.

**Table 5. Type of support in above/average intelligent students on younger school age**

Type of support		Highly intelligent (IQ 112-117) (n=45)	Intellectually superior (IQ 118 and more) (n=16)	Total sample (n=61)
Support in school/class	Additional education/teaching	1	0	1
	Individualization	1	1	2
	Supplementary education/teaching	25	6	31
	Development rehabilitation	1	2	3
Support outside of school	Sport, recreation	14	5	19
	Music	1	1	2
	Foreign language	1	0	1
	Dancing	1	2	3
	Acting	2	0	2
More than one support	9	1	10	
Total	45	16	61	

In the context of the presence and type of support for above-average intelligent students (Table 5) by the analysis of the results were separated three forms and types of support: support in teaching-individualization procedures (additional and supplementary education at school), development support (defectological rehabilitation), support outside the school in parent's arrangement on programs in the local community according to students' interests). The most students were included in the program of additional classes in the school (31 pupils) and some sports activity - mostly recreational (14 students). There was also a record for one student for whom supplementary classes were organized and for two individualisation in the class. These students have learning disabilities. Three students were involved in the development rehabilitation program due to behavioral problems and motor functioning. We did not find anyone for whom IEP was developed in the period of the younger school age. In

practice at an older age students get enrichment of teaching through additional teaching according to their interests and exceptional abilities. It was identified no one of student which was especially and systematically monitored as gifted.

These results point to the conclusion that there is a lack of additional (system) intervention towards pupils with above-average intellectual potentials. In practice, much attention is paid to students who are less advanced than gifted and advanced students, although it is known importance of stimulative programs at an earlier (school) age and their greater effect.

### Conclusion

In accordance with the results superior intelligence is not a guarantee of high school achievement on its own. Among above-average intelligent students were those who manifested under-achievement in academic skills reading, writing and computing as well as lower motor function in addition to their exceptional intellectual capacities.

High and extraordinary school achievement was accomplished by half of total sample students. At the same time one third was failure or at risk of failure. More often failed superior ones while at the risk of failing to a greater extent were group of highly intelligent students. The possible decline in the educational achievements of gifted students and much less achievement than what a student can have is a serious problem. Discrepancy between student's (extraordinary) ability and its performance in school is largely the result of discrepancy and conflict interaction between the individual characteristics of gifted student, on the one hand, and the characteristics of the (school) environment in which he needs to realize some achievement, on the other. Speaking about the educational context, there is a clear lack of additional system intervention towards students with above-average intellectual potentials. In the context of maximizing the potential of above-average intelligent students, there is an implicit need for support and additional intervention in different areas in the early years of schooling of these students.

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