УДК

PSYCHOLOGICAL FEATURES OF INTELLECTUAL DEVELOPMENT OF THE MIDDLE SCHOOL STUDENTS

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The positive role of motivation of learning in the academic success of students is shown, with not only inner motivation as cognitive interest, but also external motivation as extrinsic motivation for educational achievement through the desire to meet the requirements of parents and parents.

Ключові слова: *academic success, academically gifted students, intelligence, creativity, motivation of learning*

ПСИХОЛОГІЧНІ ЗАКОНОМІРНОСТІ ОБДАРОВАНОСТІ АКАДЕМІЧНО ЗДІБНИХ УЧНІВ ОСНОВНОЇ ШКОЛИ

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Показано позитивну роль мотивації навчання в академічній успішності школярів, причому для академічно здібних школярів значущою є не тільки внутрішня мотивація як пізнавальний інтерес, а й зовнішня мотивація як екстернальна вмотивованість на навчальні досягнення через прагнення відповідати вимогам батьків та соціального середовища.

Keywords: *академічна успішність, академічно здібні школярі, інтелект, креативність, мотивація навчання*

ПСИХОЛОГИЧЕСКИЕ ЗАКОНОМЕРНОСТИ ОДАРЕННОСТИ АКАДЕМИЧЕСКИЕ СПОСОБНЫХ УЧАЩИХСЯ ОСНОВНОЙ ШКОЛЫ

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Показана положительная роль мотивации обучения в академической успеваемости школьников, причем для академически способных школьников значима не только внутренняя мотивация как познавательный интерес, но и внешняя мотивация как экстернальная мотивированность на учебные достижения через стремление соответствовать требованиям родителей и социальной среды..

Ключевые слова: *академическая успеваемость, академически способные школьники, интеллект, креативность, мотивация обучения*

INTRODUCTION

The problem of studying the giftedness of students, its structure and psychological determinants of development acquires acute relevance and significance under the modern education transformation conditions and the requirements of the New Ukrainian School. The quality of modern schooling can be assessed through the child's competencies mastering, expressed by his\her academic achievements, which is academic success. The concepts of "learning ability" ("learning ability") along with the concept of "learning failure" or "low level of learning success" ("learning disability") are widely used in the foreign research tradition, which emphasizes the practical importance of scientific research on this issue. (Geary and others 2007; Kovas, Plomin, 2007; Swanson, Harris, Graham, 2013). In addition, in frames of academic performance, academic success is identified with another concept - "academically gifted children". Our previous study (Shcherbakova, 2015) determined that academically gifted children are those who successfully study at school, have a deep and stable internal motivation for cognitive activity, sufficient memory, high or above average level of mental activity and intelligence and are therefore characterized by giftedness. That is why identifying the development peculiarities of the main components of giftedness of academically gifted students - intelligence, creativity and motivation - acquires acute scientific significance.

THEORETICAL BASIS OF THE PROBLEM

Giftedness is defined as a systemic quality of personality that develops throughout life, which determines a person's ability to achieve higher results in one or more activities compared to other people (quote from Bogoyavlenska, 2005). Agreeing with this definition and with the opinion of B.G. Teplov that giftedness is not limited to the sum of abilities, D.B. Bogoyavlenska also emphasizes the systemic nature of giftedness. Giftedness is also defined as a composition of general mental abilities, positive self-esteem, achievement motivation and talent (Feldhusen, 2005), which reasons to understand it as an alloy of purely cognitive (mental abilities, creativity) and personal (motivation, personal qualities).

One of the most famous concepts of giftedness in

American and world psychology is the theory of three rings by J. Renzulli. Based on extensive empirical material, J. Renzulli and his colleagues developed a composite concept of giftedness that includes cognitive and other factors. They describe giftedness as "the interaction of three groups of human qualities: above-average intellectual abilities, high enthusiasm for the task at hand and a high level of creativity. Gifted and talented children are children who have these characteristics or are able to develop and implement them in any useful activity" (Renzulli, 1986). In J. Renzulli's model, giftedness is an integrative quality of personality, the structural components of which are abilities that exceed the average level, creativity and motivation. Undoubtedly interesting for the educational community is the statement of J. Renzulli that the contingent of gifted children can be much wider than when they are identified by intelligence tests and creativity tests. Therefore, the scientist suggests to include all the children who showed high performance in at least one of the components of his model in the category of gifted. Our study understands the giftedness of a middle school student as a synergy of general intellectual abilities, intelligence and high motivation to learn and which is realized in frames of academic abilities that affect high academic performance.

According to the research conducted on various sociocultural samples, intelligence is one of the most significant predictors of individual achievement in various academic fields (Tykhomyrova, 2011a; Deary, Strand, Smith & Fernandes, 2007; Taub, Floyd, Keith & McGrew, 2008, etc.). In particular, it is shown that intellectual abilities are significant prerequisites for academic success for American, Russian and English students (quoted from Kornilov, 2012: 13). Therefore one of the most significant factors shaping individual differences in academic performance is nonverbal intelligence (Jencks, 1979; Kuncel, Hezlett & Ones, 2001; Neisser et al., 1996). In general, basic cognitive characteristics (information processing speed and working memory), along with intelligence, explain about 60% of the variance in academic performance (Luo, Thompson & Detterman, 2006). Intelligence can explain 57% of variance in math scores, 48% in English, and 18% in drawing (Deary and others, 2007). In the study of D.V. Ushakov (2010) it is shown that the correlation coefficients between intelligence and performance decrease while studying from fifth to ninth grade.

The second aspect of a student's giftedness is creativity. For the first time E. Torrens came to the conclusion that for creative activity which is mainly required from a gifted person in any field of scientific, cultural and practical activities, high creative potential is necessary. Creativity is understood as creative possibilities (abilities) of a person to think, feel, communicate or as individual activities, to characterize the individual as a whole or its individual aspects, products of activity, the process of their creation. Creativity is seen as the most important and relatively independent factor of giftedness, which is rarely reflected in tests of intelligence and academic achievement (Pedagogical Dictionary, 2001: 269). Therefore the relative independence of creativity from intelligence and its positive impact on academic achievement gives grounds to define it as a separate factor of students' giftedness.

The positive role of intelligence and creativity as structural components of giftedness in academic performance is unquestionable, but since the research of L. Termen it was shown that intelligence is a necessary condition, but insufficient to predict high achievements (Termen, Oden, 1959). L. Termen, who initially equated giftedness to a high level of intelligence, later concluded that motivational and personal factors acted as extremely important determinants of high academic achievement in his study and other researchers (Heller, 1997, Shumakova, 2006; Shcheblanova, 2013 and others) concluded that people with high intelligence (under condition of high intelligence) the level of achievement depends on motivation and perseverance. This phenomenon was recorded in the study of BG Ananyevv (Ananyev, 1980), as well as R. Felson and J. Bornstedt (Felson, Bohrnstedt, 1980), who showed that the assessments that teachers give to children in terms of their abilities and motivation are equally well related to their success. Gradually, there was a transition to models that include motivation as an important component of giftedness, and giftedness itself was understood as a willingness to demonstrate a high level of achievement in activities (intellectual, educational, sports, art, etc.) (Gordeeva, 2013).

The results of the study of the role of intelligence, creativity and motivation as structural components of a person's giftedness in his academic success provide grounds for further empirical research on their characteristics considering middle school students in modern educational conditions.

METHODOLOGY AND METHODS

Group intellectual test to assess the mental development of children in grades 5–6 (9–12 years). The test was developed by J. Vana, adapted by M.K. Akimova, O.M. Borisova, V.T. Kozlova and G.P. Loginova under the direction of K.M. Gurevich. Verbal, nonverbal (spatial) and mathematical intelligence were assessed using the Amthauer test for students of grades 7–9.

The study of creativity was carried out according to the nonverbal subtest of E. Torrens' method, which allows to establish the degree of development of originality, speed and flexibility in the ability to divergent thinking.

The study of internal and external motivation was carried out using an adapted method of psychodiagnostics of academic self-regulation of middle school students (Shcherbakova, 2017).

A total of 435 students studying in grades 5–9 took part in the study, of which 60.4% showed high overall (in

all disciplines) or partial (in some disciplines) academic performance.

RESULTS AND DISCUSSIONS

The first task of the empirical study was to identify differences in the development of the main components of gifted students with low academic performance and academically gifted students. Table 1 shows the differences in intelligence among the groups of students of grades 5–6, and table 2 — the differences in the indicators of verbal, mathematical and spatial intelligence among the students of grades 7–9.

Our results confirm the established data in psychology on the presence of positive correlations between psychometric intelligence and school performance. Therefore in the study of V.I. Morosanova and co-authors (Morosanova and others., 2013) showed that gifted students significantly outperform "normal" on all scales of the Munich test of cognitive abilities for gifted students at the level of $p \leq 0.0001$.

Table 1

Indicators of intelligence as a component of giftedness of the 5–6 grade students with different academic abilities

Indicators of academic giftedness	Study groups		t	P
	Students with low academic achievements, n = 86	Academically gifted students, n = 93		
Intelligence	89,87 ± 12,57	115,33 ± 16,66	–11,47	< 0,0001

The analysis of the data shown in Table 2 confirms the statement of the positive connection of verbal, nonverbal and mathematical intelligence of gifted students with their academic success, put forward by V.I. Morosanova and co-authors (Morosanova and others., 2013). The study of T.M. Tikhomomirova (2011b) also showed statistically significant associations of IQ scores in frames of Raven and Wexler tests with academic performance. These correlations were also obtained in samples of schoolchildren abroad (Duckworth et al., 2011; Mackintosh, 2006; Walls, Little, 2005).

Table 2

Indicators of intelligence as a component of giftedness of the 7-9 grade students with different academic abilities

Indicators of academic giftedness	Study groups		T	p
	Students with low academic achievements, n = 86	Academically gifted students, n = 170		
Verbal intelligence	106,34 ± 14,91	116,71 ± 10,32	–6,34	< 0,0001
Mathematical intelligence	108,10 ± 12,89	116,58 ± 12,82	–4,74	< 0,0001
Spatial intelligence	103,06 ± 7,16	119,73 ± 10,80	–12,04	< 0,0001

Therefore, our study shows that students with high academic performance are characterized by higher IQ. Both at the beginning of middle school (grades 5–6) and during further studies in it (grades 7–9) the average values of psychometric intelligence of academically gifted students correspond to a above the average level, while the intelligence of academically unsuccessful students corresponds to the average level. A number of studies on the relationship between psychometric intelligence and academic performance have not yielded such unambiguous results and interpretations as the present study shows and raises causal links between intelligence and student achievement. V.M. Druzhinin noted that positive, moderate correlations do not allow us to state unequivocally that intelligence determines learning success (Druzhinin, 2001). Analysis of the distribution of students in the coordinate space "academic performance — level of intelligence" shows the presence

of a more complex than linear, relationship of dependence, in particular the positive relationship between intelligence and performance disappears at a high level of intelligence. Therefore, in studies of L.F. Burlachuk and V.M . Bleicher (1976), as well as in a later study by V.M. Druzhinin (2001) found that the group of poorly successful students include students with both high and low levels of intelligence. Herewith L.F. Burlachuk and V.M. Bleicher (1978) showed that students with below-average intelligence are never successful. As a result there is a lower level of intelligence for learning activities — a student with intelligence below this level will not achieve academic success. This way psychometric intelligence, the indicators of which correspond to high or above average values, can be considered as a component of academic giftedness of students associated with their high academic achievement (academic success). It should be noted that more defined differences are observed at the beginning of middle school which confirms the idea of reducing the relationship between academic performance and intelligence with the degree of academic advancement of the subject of educational activity. There are also significant differences in the indicators of spatial intelligence (along with verbal and mathematical) during the subsequent education of students in middle school, which requires further specific research, but also in favor of the established opinion about the leading role of nonverbal intelligence in academic success.

Tables 3 and 4 show the differences in the indicators of nonverbal creativity of students with different academic performance. It is determined that at the beginning of studying in middle school students differ significantly in terms of creativity depending on academic achievement. Academically able students predominate in terms of creativity of students with low academic performance. With the inclusion in educational activities in middle school, and thus with growing up, changing the social situation of development and leading activities, and most importantly — with the maturation of mental processes and abilities of students, there is a similar situation with the development of creativity as with the intelligence: academic abilities (academic success) become less dependent on the development of creativity.

In the presented research only the indicators of originality established the differences among students of 7–9 grades in favor of academically gifted.

Table 3

Indicators of nonverbal creativity as a component of giftedness of the 5-6 grade students with different academic abilities

Indicators of academic giftedness	Study groups		t	p
	Students with low academic achievements, n = 86	Academically gifted students, n = 93		
Originality	5,78 ± 2,61	10,00 ± 5,57	–6,41	< 0,0001
Speed	9,91 ± 0,37	9,59 ± 1,28	2,19	0,05
Flexibility	2,44 ± 0,54	2,72 ± 0,63	–3,15	0,01

Table 4

Indicators of creativity as a component of giftedness of the 7-9 grade students with different academic abilities

Indicators of academic giftedness	Study groups		T	p
	Students with low academic achievements, n = 86	Academically gifted students, n = 93		
Originality	7,82 ± 4,89	9,14 ± 3,80	–2,31	0,05
Speed	9,94 ± 0,23	9,95 ± 0,28	–0,23	-
Flexibility	2,73 ± 0,76	2,87 ± 0,77	–1,33	-

As we can see originality can be considered the most important component in assessing the giftedness of students, but this opinion should be verified by further research. Tables 5 and 6 show the differences in the level of motivation of middle school students with different level of academic performance.

Table 5

Indicators of motivation as a component of giftedness of the 5-6 grade students with different academic abilities

Indicators of academic giftedness	Study groups		T	p
	Students with low academic achievements, n = 86	Academically gifted students, n = 93		
Inner motivation	7,17 ± 3,26	9,75 ± 3,69	–4,92	< 0,0001
Outer motivation	5,63 ± 2,05	7,19 ± 3,04	–3,97	0,0001

Table 6

Indicators of motivation as a component of giftedness of the 7-9 grade students with different academic abilities

Indicators of academic giftedness	Study groups		t	p
	Students with low academic achievements, n = 86	Academically gifted students, n = 93		
Inner motivation	8,17 ± 4,10	9,72 ± 3,08	–4,92	< 0,0001
Outer motivation	6,65 ± 2,55	9,33 ± 3,51	–3,97	0,0001

It is determined that at the beginning of studying in middle school academically gifted students are characterized by higher motivation to study, and their motivation is due to both internal cognitive trends and externally controlled. Students in grades 5-6 with high academic performance have a more defined cognitive interest in learning than those who study worse. In addition, parental control over learning activities of academically gifted students is also more defined, it is internalized by students, affecting the highest level of external motivation to learn. Subsequently, the role of external motivation remains high during schooling, as shown in Table 6. However, both for the beginning of education in middle school and during further study in it, the leading role in academic success is played by internal motivation, which is cognitive interest in learning.

The obtained data confirms thedata obtained in the study of K.I. Fomenko (2018), which shows the positive relationship between achievement motivation, hubristic motivation and inner motivation with the academic achievements of middle school students.

CONCLUSIONS

Analysis of differences in the indicators of intelligence, creativity and motivation of middle school students with different academic performance allows us to state:

Indicators of intelligence in students of 5–6 grades in general, as well as verbal, mathematical and spatial intelligence of students of 7–9 grades differ significantly depending on academic performance. More defined differences are observed at the beginning of middle school, as well as the indicators of spatial intelligence during the next study. The results show in favor of the idea that intelligence plays a key role in the academic abilities of students, positively affecting their academic performance.

Academically successful students outnumber the less successful in learning students in terms of creativity, especially in terms of nonverbal originality. The positive role of nonverbal creativity as a component of giftedness in studentss' academic abilities is less clear and declines in the later stages of middle school.

Learning motivation has a positive effect on students' academic success, and for academically gifted students not only internal motivation as a cognitive interest is important, but also outer motivation as an external motivation for academic achievement through the desire to meet the requirements of parents and the social environment.

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