

STUDY OF THE INFLUENCE OF CHESS TRAINING ON MENTAL DEVELOPMENT OF STUDENTS

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Fast changes occur at the contemporary stage of development of modern society. The volume of **information** that must be absorbed and understood by students increase significantly. Consequently, the question about mechanisms for its selection and processing arises more and more often and persistently. One of the conservative systems, which particularly slow changes is the **education system**. It is still slightly turned to **the needs of the individual**. That's why it often encounters difficulties when it has to prepare children for reality, "increasingly **swamped by information and ever tougher decisions**" - Dr. Peter Dauvergne [8, page 39] and more complex decision-making cases. **Motivation often lacks**, there are not enough game models in the classroom and training programs are not sufficiently differentiated. Several studies reveal decreased quality of students' learning and growth of neuro-psychical tension in them. The number of illiterate students increases. International studies conducted in the country indicate **difficulties in understanding texts** and various tasks arising from them. Thus mental development of students is going to be limited. There are different reasons driving the negative impact of these factors on the development of adolescents.

However, there are various options to limit their influence to some extent. Mental development is often associated with improved functioning of **attention**, which is the main organizer of overall mental activity. Mental development and improvement of **memory** also occupy a central place in the psychic activities of the students. It is necessary to pay more attention to the development of **imagination and anticipation**. Anticipation in chess means actually understanding the perspective of others, making out with their future actions [2, page 134]. **Empathic skills** are mastered with social experience and have a common genesis with one of the most important energy drives of mental development - emotional experiences. Negatively charged experiences such as fear, anxiety, hatred, despair, depression, etc. severely

restrict the activities of the individual. Another major factor strongly influencing mental development, is **the will**.

Through mastery and targeted development of different cognitive mental processes and conditions during the chess training sessions **valuable personal qualities** of the student could be formed. In analyzing the nature of chess is found that it offers great opportunities for its application for targeted mental development and growth of students.

Most experts in the field of research on the benefits of chess as Johann Christian (1976) and Robert Ferguson (1983) usually focus primarily on **logical-mathematical content and perspectives for stimulating cognitive development, critical and creative thinking**, chess game definitely has [2, page 66]. Robert Ferguson also explores the development of logical thinking and memory through chess. Jeffrey Chesin even assumes that adolescents who are strong at chess will be probably good at mathematics and in any situation in which you need to solve a problem. "But the kids who succeed in mathematics are not necessarily successful in chess" [10, page 17]. Pete Shaw applies learning chess on children who are mentally retarded. He teaches them how to focus and recognize patterns. Which in turn allows them to broaden the scope of attention, according to Robert Ferguson [10, page 18]. The same was noted by Saratoga Springs - "**Chess is the last best hope for this country to rescue its skidding educational system and teach the young generation the forgotten art of nurturing an attention span.**" [10, page 25].

In this study, we pay more attention to a few less known key factors that determine the mental development of students and which are also strongly influenced by the chess practice: **attention, emotional instability, anxiety and will**. Accordignly, Dr. Robert Ferguson again is the closest to our concepts, "Chess is a test of patience, nerves, will and concentration" [10, page 30]. The same is pointed by Dr. Gerard Dulea: "Chess requires intense concentration and deep involvement, because the oponent immediately punishes your mistakes. There are quite a few educational tools that provide such a quick feedback" [10, page 41]. One slip in concentration can lead to a blunder, costing you the game. There are also researchers who encounter data showing that "chess practicing adolescents develop improved self-control" [10, page 53] and "**greater self**" [14, page 32], which would help them to optimize level of anxiety adequate to the tournament situation due to better developed Ego. Chess sport implies abilities to control emotions and prevent impulsive decisions. Chess develop **independence and ability to resist peer pressure**. After seeing that there are no sufficient empirical evidences of those processes, we decided to check them out in practice in Bulgarian reality. We were given an impulse also by Dennis Frick from South Africa, who

proves that the practice of chess is not only **effective psychotherapeutic tool, but also seriously affects the functioning of the individual in many areas of life, building his character** [14, page 37].

Based on the theoretical analysis we derive the working **hypothesis** that the systematic practice of chess by students positively affects their mental development.

The aim of the study is *to determine extent and nature of the impact* of practicing chess by students on their mental development.

In order to achieve the objective and the confirmation of the hypothesis we have to solve the following **basic tasks**:

1. Implementation of establishing experiment to reveal the impact of the chess practice on mental development of students.
2. Processing the results of the study, analysis and conclusions.

The subject of the study is the impact of the chess practice on mental development.

The objects of the study are four groups of students. Two experimental groups, consisting respectively of 22 people aged 8 and 24 people aged 14, practicing chess systematically.

Other two are control groups consisting of not practicing chess (or other sport) 25 people aged eight and 25 people aged fourteen. Enclosed is a complex methodology of study of literature, observation and conversation. To measure the performance of specific qualities of attention is given a method of corrective table of Genkin, Mededev and Shek. Emotional instability is measured with tremometrical model. Situational and personal anxiety and willpower are tested by appropriate questionnaires. The data obtained were processed by analysis of variance.

While analyzing the results of the study some regularities interesting for theory and practice were revealed. Systematic practice of chess as a special kind of sport, mainly related to mental activity appears positive influence on mental development. Objects of measurement are the main qualities of attention - *concentration, intensity, stability and productivity* of students from the experimental group, practicing for two years chess twice a week, and students in the control group of the same age, not practicing this sport - Table 1, Figure 1.

Table 1. Qualities of attention

№	Researched group Qualities of attention	a check group \bar{X}	experimental group \bar{X}	difference d	reliability P%
1.	Concentration	7.9	12.31	4.41	99
2.	Intensity	0.71	0.83	0.12	91
3.	Sustainability	0.36	0.41	0.05	96
4.	Productivity	5.77	10.16	4.39	99

The focus of attention of students in the control group is well developed, their rating is 7.9. **In the experimental group, the focus is much higher - 12,31.** Their rating is 4.41 higher than the rating of the students in the control group (P = 99%).

This regularity is logical. During chess training students are focused on individual operations and moves from the game for a long time. **The search for the most appropriate decisions in a dynamic changing situation created by both oponents requires targeting and high concentration of cognitive activities.** Therefore, the development of the concentration of attention of students practicing chess is a regular phenomenon.

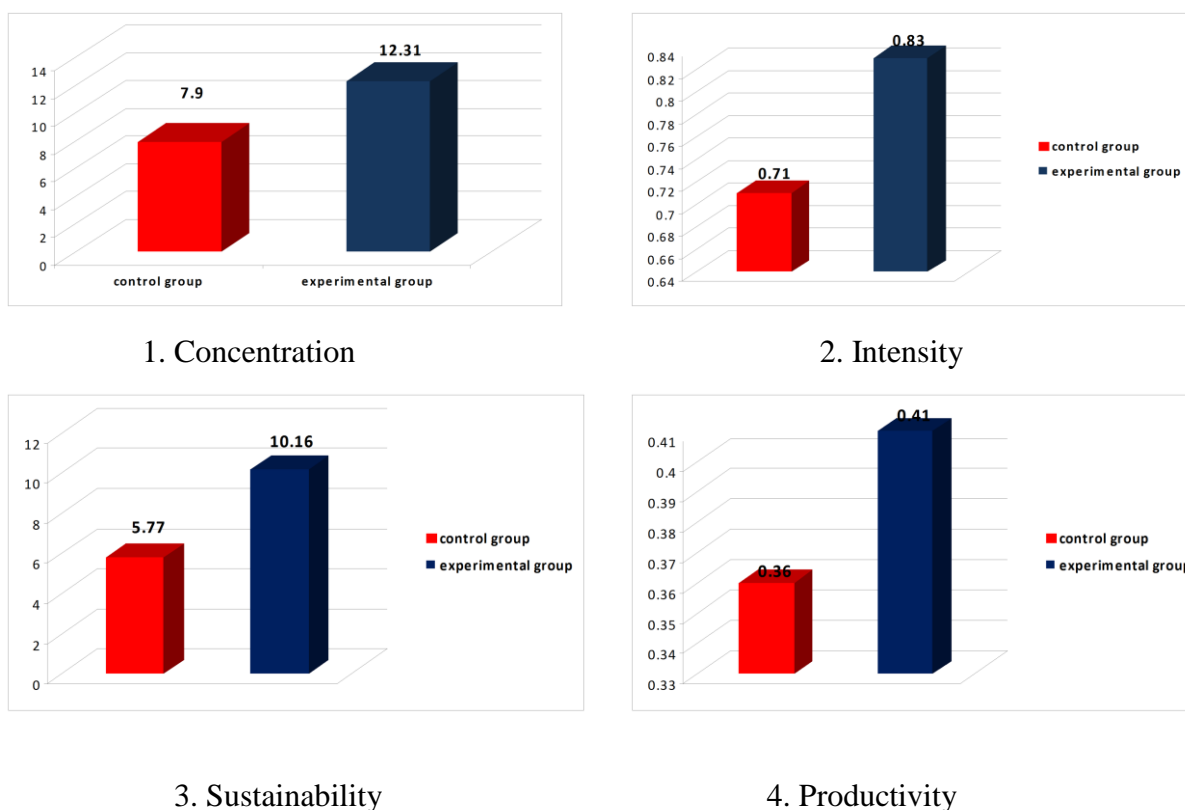


Fig.1. Qualities of attention

Positive changes are reported also for the intensity of attention. But these changes are not reliable ($P = 91\%$). Results show that despite of the higher rating of intensity of the attention of students from the experimental group (0.83) than the control group (0.71) there is no reason to claim that it is mainly due to chess training. **Chess training has a positive impact on the sustainability of attention ($P = 96$).**

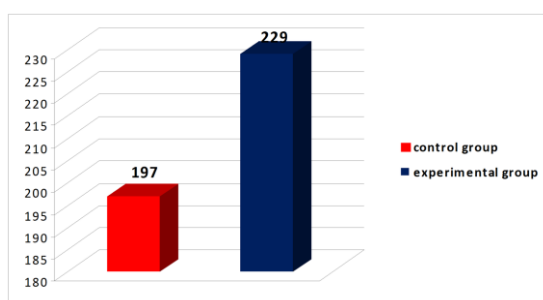
Longer chess workouts imply greater mental stability in the tense battle for victory. Chess training strongly influences the **productivity of attention**, which is an indicator for mental performance and mental capacity. As seen from Table 1, the productivity of the control group is 5.7 and experimental - 10.16, which is 4.39 grades higher when $P = 99\%$. Certainly, it can be maintained that the systematic practice of chess has a positive impact on attention, which proves the effectiveness of this sport for the mental development of students.

One of the main factors influencing the mental development of students negatively are **emotional instability and anxiety**. It was also found, as we expected, that the practice of chess dramatically increases emotional stability.

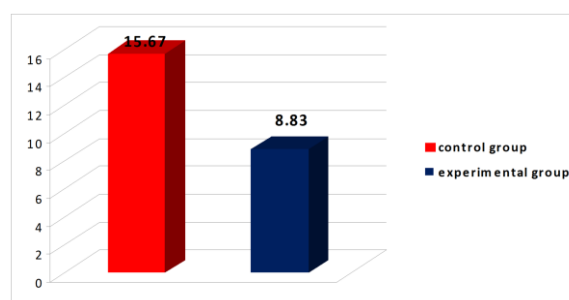
Emotional instability

Table 2

№	Indicators Researched groups	Time/sec.		Mistakes/number	
		\bar{X}	S	\bar{X}	
1.	Control	197	65	15.67	4.61
2.	Experimental	229	67	8.83	2.25
	Difference (d)	32		6.84	
	Reliability (P%)	88		99	



1) Time to solve the test



2) Mistakes

Fig. 2 – Emotional instability

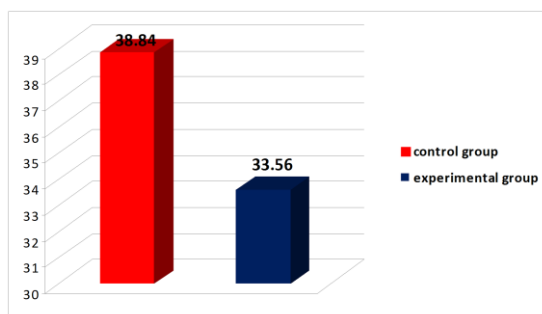
While solving the test, average 15.67% of the control group and 8.83% of the experimental group makes mistakes, i.e. the results of the latter are 6.84% better ($P = 99\%$). In this way, **the assumption of the positive impact of the practicing of chess in the direction of lowering the emotional instability of the students is confirmed.** In the process of test solving students strive to fulfill the tasks accurately and without making mistakes. Students form such skills in the process of practicing chess. On the other hand, they spend more time in order to solve the test. As shown in Table. 2 and Fig. 2 the students from the experimental group practicing chess solve the test for 229 seconds average, while the students from the control group – for 197 seconds average. This difference of 32 seconds is not significant ($P = 88\%$). The higher emotional stability of students in the experimental group in comparison with the control group is an indicator of the positive impact of the practice of chess on their mental development.

Another important emotional factor strongly influencing the overall mental activity of students is **anxiety**. It is known that higher anxiety affects negatively mental processes and conditions and as a result of which success is strongly limited. Students with high anxiety have reduced resistance and are vulnerable to various diseases. Situational and personal anxiety are measured (Table. 3, Figure 3).

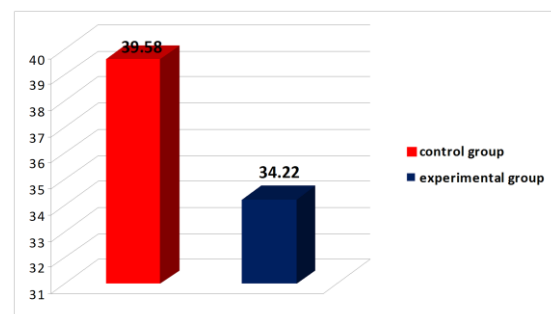
Anxiety

Table 3.

№	Anxiety Researched Groups	Situational		Personal	
		\bar{X}	S	\bar{X}	S
1.	Control	39.84	10.18	39.58	11.31
2.	Experimental	33.56	8.22	34.22	9.14
	Difference (d)	6.28		5.36	
	Reliability (P%)	97		81	



1) Situational anxiety



2) Personal anxiety

Fig.3.Situational and personal anxiety

Situational anxiety of students in the control group is 39.84. It is within the norm. The situational anxiety of students in the experimental group is lower compared to the students from the control group - 33.56, i.e. 6.28 less when $P = 97\%$. This significant difference in scores of situational anxiety shows that **students practicing chess have lower anxiety in situations with high degree of extremes**. To some extent they are able to cope with negative emotions in solving complex tasks. In the process of systematically practicing chess “experimental students”, based on coping with situational anxiety, reduce their level of personal anxiety. This process is very important for mental development of students. As shown on Table 3 personal anxiety of students from both groups is within normal limits. It’s rating in the control group is 39.58, while the same rating is 34.22 in the experimental. Although the difference between the scores of the two groups is 5.36, it is not reliable ($P = 81\%$). Positive changes have been measured in the personal anxiety of students from the experimental group, who are probably influenced by the practice of chess, but it can be disputed whether they have formed a longlasting change. Apparently they need more prolonged period of chess education.

One of the main factors of the mental development of the students is the power of their **will**. Through the development of the will people manage to overcome various difficulties on the way to achieve different goals and to solve tasks. One of the main qualities of the will is its **power**. It is found that the will strength of the students from the control group is developed at a moderate level (14.82 rating points). These students are not always prepared to overcome various obstacles encountered. If there is an opportunity many of them would seek detour to avoid the obstacle. They will not going to take additional commitments. Students from the experimental group are located close to the lower limit of the criteria for assessing strength of will (21.55 rating points). Most of this group are able to overcome various difficulties and easily achieve their goals. **Students from the experimental group are more organized and consistent in solving various tasks**. Students from the experimental group reach 6.73 rating points of will power ($P = 99\%$). **Systematic chess practice positively influences the development of the will and in direction to increase strength of will.**

Willpower

Table 4

№	Indicators		\bar{X}	S	V%
	Researched group				
1.	Control		14.82	4.61	31
2.	Experimental		21.55	4.22	20
	Difference (d)		6.73		
	Reliability (P%)		99		

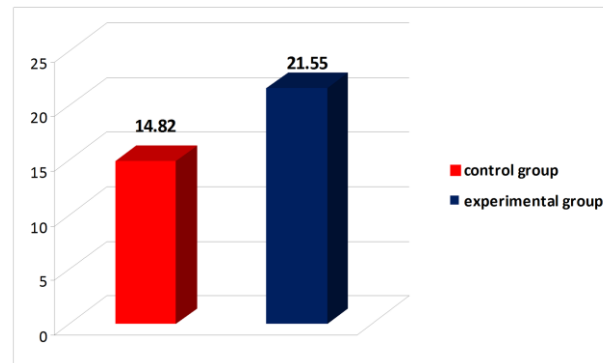


Fig. 4. Willpower

Revealed significant differences ($P > 95\%$) of the measured indicators of the qualities of **attention, emotional instability, anxiety and willpower** among students practicing and non-practicing chess **confirm the formulated hypothesis** that the systematic practice of chess by the students affects their mental development positively. Hypothesis is also confirmed by the increased number and values of the correlations between measured mental indicators. Based on the analyzed results of the study, the following **main conclusions** can be formulated:

1. The systematic chess training has a **positive effect on the concentration, the stability of the attention and strenghtening of mental performance**
2. The **emotional stability is increased** and the **anxiety is decreased** – both are result of regular chess training..
3. The **willpower is definitely strengthened** as a result of the regular chess training.
4. The regular chess training exerts **stimulating effect on the mental development** of students.

All the results lead to the summary that **chess develops academic discipline starting from early school years**. Strenghtening the above studied personal qualities chess also builds the human character.

Based on everything ascertained in our study so far, we can recommend the chess teaching to be included in the curriculum of the elementary school as a compulsory subject.

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