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## **The pedagogical and psychological investigation of facility-development of teaching chess**

The effect of chess upon the development of faculties has been analysed by many people many times. It has been found that this mental sport has positive effects upon those abilities which are necessary for the successful achievements at school. Nowadays chess is regarded mostly as a fairly common type of pastime activity which is like a sportlike game but refined as well. Many people look upon chess through its four main functions (together), namely it is considered as a sport, a game, a science and an art as well. It is also generally established that chess acts positively upon those mental abilities which can be held responsible for the development of understanding and problem solving by operating certain basic cognitive psychic processes and functions.

Unfortunately schools have not been able to reach beyond the game like character of chess so far, they have neglected its significant educational and developing power upon one's personality traits, though this has been recognised for a long time. As far as I know we can distinguish between three possible variants in teaching chess at school. In most countries, including Hungary, chess is present in the form of an activity done in study circles when emphasis is laid mainly upon simply practising a game of chess rather than on its appropriate and systematic teaching. Rarely it is an optional subject at schools and in this case the process of teaching and learning becomes much more obvious. Finally in some countries chess is taught as a compulsory curricular subject in a more systematic and organized way.

Holland was the first country to recognise the positive effects of learning chess upon the intellectual development of children, thus introducing it as a compulsory curricular school subject. This was followed by Iceland, Sweden, and the Philippines etc. with the aim that chess should be taught as a specific and commonly accepted subject at schools. However, with some minor exceptions, the situation remained unchanged, i. e. chess stayed between the boundaries of study circles and optional activities. At present it seems that in Hungary as well, chess is secluded within the narrow frames of information and subject centred attitude towards teaching. Under such traditional and stiffened circumstances the introduction of chess as a subject taught and studied at schools in a compulsory way can be hardly imagined. Obviously this is due mainly to the lack of proper material conditions (books, thesauruses) and instructors. In spite of all these facts, I think that the new, education centred school within a competence-based process of teaching, sooner or later should give room to an institutionalised form of teaching and learning chess.

However, the following question could arise: why should we surpass this present situation, i. e. what are those positive effects noticeable mainly from a psychological point of view, which may come into being as a result of a systematically organised learning and teaching of chess at schools?

Some experienced chess educators have tried to assess the educational effects which could be felt among children learning chess; those psychic processes through which the character moulding abilities of chess could be noticed predominantly. So what does chess train for? It trains us for honesty, it nurtures us on assuming the consequences, self-control, sense of position, on making quick judgements and decisions, responsibility, competitiveness, on honour-

ing our competitor, perseverance, self-confidence, perceiving the essence, bearing failure, friendship, punctuality, disciplined behaviour abiding by the rules, norms and laws, etc.

And what does it develop? The ability to analyse, synthesize, and memorize, logical and abstract thinking, dispersive capacity, productive imagination, the ability to perceive interconnection, diverging thinking, focus, creativity, the ability to generalize, to abstract and to combine, sensitivity to problems, systematic and effective thinking, ascertainment, etc. Apart from these we can learn by chess that there is no progress without learning, that we should never underestimate our adversaries, that we can come out from difficult or critical situations, that there can be several solutions to some problems, that we should never give up the fight after the first failure, that we should resume solving problems, it teaches us how to bear defeat, how to abide by the rules in a compulsory way. Thus chess can be considered as an important means towards developing one's personality.

The examination of the effects upon the development of faculties through chess is thus not new. The present research – whose practice and theory has been made for several years – is different from the ones made in Hungary or abroad so far in the sense that it focuses on a very young age group, namely upper nursery and lower elementary school children. To begin school a child should fulfil a number of important criteria, so we can also observe those abilities which could be developed by chess which ultimately could enable a child to start his or her school years.

### *Theoretical antecedents*

The game of chess was developed approximately 1500 years ago in India, then in Persia and China and it has been forming human thinking ever since. The 8x8 typed boards were originally used for other games, too. It was only later transformed into a „battlefield” with two armies lined up at the end of the board facing each other. It first got round on the present territory of Spain, Italy and Greece, being a financial calculating device as well. At the beginning chess was a royal privilege. It was also known by the priests who were the first instructors, too. In our country chess was popular with the monarchs, knights and aristocrats, but the priests and the scribes could also play it. Chess was taught in the 19th and at the beginning of the 20th century at the cafes in Hungary. During this period the technical intelligence also joined chess.

The achievement of the middle-class status has increased the interest towards chess as well. It remained, however, the sport and pastime of the clerks, nobility and technical intelligence. Between the two world wars the teaching of sports including chess has gained a bigger support by the Ministry of Education and Religion. Some famous chess instructors and teachers, like Barcza Gedeon and Polgár László have considerably contributed to making chess more popular in the 20th century. Since the most important task of the age group involved in the survey was performing the game, it could be an important point to examine the effects of the game upon the formation of character and upon the development of the abilities according to the latest scientific views.

Games can be regarded as a free activity performed as an entertaining pastime by children. It's like a joyful kind of manifestation. Games can be conceived as an activity performed mainly in a group determined by certain rules. Games can thus be correlated with imagination, freedom, unobtained balance, chance, ease and capriciousness, without forgetting about the rules either. In Johann Huizinga's view, the game is the essential part of every aspect of human culture, science, art and religion. This is the „homo ludens” mentality. Games play an essential role in human life.

Herbert Spencer regards games as a means of working off our superfluous energy. Besides Spencer we can also refer to L. S. Vygotsky who points out that there will always be some redundant reserves of energy in our organism which could not be dedicated for useful work. He mentioned the cathartic outbursts generated by artistic creations as a similar means of letting off these superabundant energies. In Grastyán's view there is only one irrefutable connection which we cannot deny. This occurs on the level of games and creativity. According to unanimous opinions those children who were extremely playful in their kindergarten years could prove to be more creative than the average later on as well. To understand this phenomenon we cannot neglect the explanation through which we cannot notice a cause and affect relationship between creativity and playfulness, but rather an earlier manifestation of creative abilities in the form of games. He thinks that we can face fewer contradictions if we try to present games through the special analyses of the activational-motivational mechanisms. In Mrs. Stöckert's view Psychology regards games - under the age seven – as a way of life, a form of behaviour, a primary category of life and not just a single activity among many others.

Nagy József's concept: „The need for stimuli is satisfied through their production in games.” More clearly: a one year old child's instinctive hunger for information is appeased by holding an object in his hands and gradually with some manipulation he discovers the size, shape, colour and touching of that object. He produces certain stimuli for himself. By acting something out he provides a further source of action for himself. He puts himself to newer and newer tests – and as Grastyán states – he sets himself certain impediments in order to experience the sense of joy generated by successfully carrying out an activity. He does this in a simulative situation which releases him from the inevitable tensions coming from a real situation. From a sensual approach we can give an explanation for our affinity towards playing games: „the need for stimuli – says Nagy József -, their production and the urge towards a solution provides a twofold-threofold motivational background for the games”.

Nagy József indicates the duty of schools in the development of the ability of helpful competition by increasing the number of competitive situations through the exploitation of simulative games (sports, competitive games). By helpful competition we acknowledge and demand strictly the abidance of the rules by equal chance and fair play. These principles all come about in chess, since chess is not only a game but a sport as well.

Piaget presents games as a product of the balance or imbalance between assimilation and accommodation. In his view every behaviour contains – in an active or passive way – the assimilation and the accommodation. The balance between them remains stable if the person's assimilational activity falls in accordance with the movements of those objects and their effective relations to which the activity is directed to.

### *Earlier research*

My research has not been preceded in Hungarian, but if we have a look at the results of international investigations in the development of abilities by chess, we can see that no coherent, comparative and complex work has been done abroad either. Partial examinations have been made in the seventies in Zaire which resulted in the opinion that chess has a positive effect on mathematical and verbal abilities alike. In the eighties the investigations carried out in the school of Bradford showed the advanced level of critical thinking through chess. The results of a survey made among children who have finished kindergarten to start school showed the result that the acquisition of chess at an elementary level can contribute to the development of mental abilities. At the beginning of the nineties the positive effect of chess upon reading was

also proved. On investigating the problem solving ability it has been established that those children who study chess at school with the help of transfer can also be successful in improving their general abilities towards analysing poems. Binet examined the recollective memory by observing a few blind chess players simultaneously.

On summing up the results of his own experimental results, Dr. Ferguson stated that the teaching of chess can prove to be useful in the following domains:

1. It strengthens and puts together the different applied methods and means.
2. It is suitable for the solution of quantitative and practical problems.
3. It is an effective means towards solving problems.
4. It is a system of thinking which can be applied successfully.
5. It is a competitive situation.
6. It increases the attitude of teaching. It enriches the teacher's range of methods. Children like playing and solving problems by themselves and are willing to dwell on it for a longer time as well.
7. It offers several quality solutions to problems. The context is familiar, the themes are recurring but the games are always different. Therefore chess can be the key towards solving problems.

In 2002 Michel Noir at the university of Lyon reached the following conclusion in his work regarding the development of cognitive ability among children playing chess while examining the question of didactic transfer modelling: „Our scattered observations have proved that after two years of playing chess, some children were able to reach a higher level in the field of logical games, strategy, memory and the ability to abstract than the other ones coming from the same social milieu”.

Carl Ekoo in 1932-34 discovered a few statistical relations between being a skilful chess player and a number of other mental abilities, such as general intelligence, the capacity to read and memorize, general progress in learning and the results shown in school work and came to the following conclusion from his investigations: the good chess player force – which is conditioned upon work and earlier experiences as well – is proportional to the average achievements from the above mentioned spiritual domains.

In his work entitled chess and Education, John Artise states that the visual stimuli can improve memory in a better way than others. In this way chess could be an excellent means towards practising memory and this can be transferred to other domains as well where memory is needed. The expert exposes: although the effects of chess upon the development of the mental abilities can be noticed at a fairly large age group, their own investigations were primarily focused on children, since they develop faster than the elderly age groups, and can be assessed more easily, too. It has been confirmed from the report of students, teachers and parents alike that chess can have a positive influence upon the solution of maths problems and upon memorising texts, it increases self-confidence, patience, the logical and critical thinking, persistence, self-control, fair play behaviour, concentration and we can overcome our frustrations more easily with the help of chess. As a result of these recognitions, the introduction of chess into the school curriculum has been encouraged by United States since 1922.

In today's accelerated world of computer games, television and internet technology educational experts are getting worried about students' deteriorating ability to concentrate which impedes classroom work as well and it has negative consequences upon exam results, too. A

long lasting game of chess requires constant concentration, since the smallest omission can lead to the loss of a game. It has been proved by many educational studies that students dealing with chess can concentrate better; they are more patient and more persistent than their classmates who do not play this sport.

### *Opinions*

The first international conference about teaching chess at schools was organised on the island of Mallorca in Calvia, Spain at the site of the Olympics of chess in October 2004. Besides the different Spanish programs to be achieved there were also a few reports about Brazilian and Cuban experiences as well and about some American and Russian results. Leontxo Garcia, the well-known Spanish chess specialist has analysed the significance of chess as a means of education on the conference by confronting the individual thinking power of chess with the negative influences coming from the media and their consequences upon young people. „No other sports can bring out so many valuable features in people than chess and no other sport has such a detailed and well-founded history than chess” – he concluded.

From the published reports about this conference we can learn that Spain was one of the quickest countries to introduce chess as a means of education. It is present already in hundreds of Spanish educational institutions as an optional subject or as an extracurricular activity and this is due mainly to a 1995 government measure. The public education fund from the Brazilian state of Parana together with the local chess federation had started the teaching of chess at the schools from Curitiba city. This was followed by several similar initiatives. The training of the instructors had started as well and with the guidance of a famous chess master, Neto Sunye, there were already more than eight hundred educational institutions in Parana where pupils could deal with chess. Due to this popularity we can give an explanation why according to some pedagogical experience, chess facilitates the learning of the other subjects and there are some other social reasons as well in its favour. The Brazilian ministry of education and culture started to implement a program whose aim was to achieve that fewer children loiter about in the streets after school, but rather spend their free time playing chess and to satisfy their competitive needs. This program had been introduced in two hundred schools from five Brazilian cities in 2003 experimentally, and it is planned to be adopted in four thousand schools altogether.

Little was said about the Russian experiences in the teaching of chess at schools at the Calvian conference. There are two main parallel directions in the teaching of chess in primary schools the training of the new generation for this intellectual sport and the pedagogical application of chess in the development of a many-sided personality. The results are good on both lines and the schools decide themselves which direction of training to choose. At the beginning of the 2005-2006 school years a project was published in the Russian press, which urged that the teaching of chess should be an organic part of the public education system in the Russian Federation. This publication and the similar measures taken in several regions of the federation of states were preceded by a directive issued by the Russian Ministry of Public Education on May 18, 2004 entitled about the development of teaching of chess in the public education system of the Russian Federation. This directive provided that with the management of the chess world champion Anatoly Karpov a coordinating committee be established for the thorough study of this matter. After this encouraging gesture of the ministry a large number of institutions and experts hoped that chess would be a school subject in the country whose official authorizes and citizens alike best contributed to the development and popularization of this game starting from the first half of the xx.th century worldwide.

In Venezuela, where a national program was organized for the teaching of chess at schools, this work is considered especially important at the densely populated regions. The vice-president of the American school chess coordination committee, professor Blanka reported that fifty thousand certificates were issued in 2004-2005 to those American pupils who have been successful in their studies of chess, and there are about ten thousand children's chess clubs where chess is taught in an organized way and the material conditions are provided for the study of chess.

In Turkey the ministry of culture was reserved during the first attempts, then after a change of attitude this activity revived. After having been confronted with enough evidence regarding the correlation between the regular playing of chess and the improvements in one's studies, the ministry has not denied any more cooperation with the Turkish chess federation. The optional teaching of chess has been permitted and the instructors were paid from the budget of the department. The chess federation guarantees high standard and issues licences to those who have successfully passed the examination – on the expense of the participants – throughout the courses organised by them. Qualified teachers enrol gladly for these courses because their new work is remunerated separately by schools. The initiative of the Turkish chess Federation has become so popular that they are sponsored by one of the country's big banks and this „branch” is a good source of income for the federation.

The director of the In-School Programs in New York gave an impressive account at the Calvinian Congress of the International chess Federation in 2004. Ella Baron told that as part of this bigger public teaching enterprise, the chess-in-the-schools non profit educational institution came into being whose scope is to stimulate and promote the acquisition of the learning abilities through the teaching of chess by children aged between kindergarten and the seventh form at New York's East Side state schools in the frames of an extra-curricular tuition through competitions and within the bold graduates' programs of high schools, too. It appeared from this presentation that: every year at least thirty thousand students take part in this program in the biggest city of the United States, which aims not only to the acquisition of chess, but also to make it possible for learners to make contacts more easily within communities in a more refined way. It is a common objective to get a children living within poor social conditions out of the habit of watching television all day by creating an interest towards chess and to deter them from conflicts which are inherent in tramping. Many of the children who learn how to play chess initiate it to their friends and family members and quite a few of them take part in competitions where they can get in touch with children coming from other communities.

### *The hypothesis, methods and devices of the empirical analyses*

In my assumptions those children's abilities who regularly play this intellectual sport are positively influenced by chess and this favourable effect is transfer which acts upon school results as well.

In my research I have measured creativity, the motivation to learn and intelligence. And I have observed the end of school year result at the older age groups. For measuring intelligence I have used as a tool the colourful children's version of the Raven non verbal intelligence test since this is the most suitable device for the measurement of the non verbal intelligence of kindergarten and elementary school children. For the analysis of creativity I have used the Torrance creativity tests about circles and pictures and for the analysis of motivation I have applied the questionnaire concerning the motivation to learn which is a test containing a five scaled Likert test of 45 questions. This had been completed by a teacher, - in the case of

chess playing children – a coach and a parent. I have carried out both the intelligence and the creativity tests individually with the children. For the measurement of intelligence every child had max 30 minutes, and in creativity the children could decide on their own when to finish the tasks. At the end of the school year I have asked for the opinions of teachers about the school achievements of upper elementary school children. School children in the first and second form, contrary to the earlier assessment practice, are graded orally. I have observed and gave their school results on a nine-degree scale. 250 children took part in the experiment in 4 groups and 2 age groups and I have gathered all the results and partial results about 250 children. Only a few of them have left the group due to their moving away. The children live in Budapest and in its neighbourhood and at more distant points from the capital. Generally speaking they were all positioned in the rural and in the city schools. Within this children living in residential and suburban areas also

took part in the measurements. They comprised upper nursery and lower elementary (first form) pupils. After a year I have focused my attention upon those children who have already become first and second form pupils by this time. On comparing the results, I have also observed the achievements of children of the same age and of the same social background, living in the same residential area. My observations are longitudinal since the measurement of the 2005-2006 school year was followed by another one during the next school year in 2006-2007. The four assessed groups consisted of the control1 and control2, and the chessplaying1 and chessplaying2 age groups. During the one-year-long period the observed chess playing children took part in approximately 100 classes on 100 occasions of chess training.

The survey of data took place by filling in the following tests and questionnaires:

- . A form containing the children's data, place of residence, the parents' education etc.
- . Motivational questionnaire about acquisition
- . Raven's non verbal intelligence test
- . Torrance's creativity test about circles (1st subtest).

The completion of the intelligence and creativity tests took place as the nurseries during teaching time, individually. The form was completed by the parents and the motivational questionnaire was filled in by the parents, instructors or coaches – in the case of chess players. Pupils have completed the test individually at the afternoon sessions during classes under the coordination of the teachers. In the case of the nursery school children it happened in an analogous way. Later measurements happened at schools only because the nursery school children have grown up to start elementary school. Nearly all the children participating at the first measurements in the tests and survey of data have taken part in the later measurements as well.

According to my assumptions the developing effects of chess upon the abilities can influence children's school progress, too. Therefore I considered necessary to examine their school achievements as well. The younger assessed age group had attended nursery school during the time of the earlier measurement, so they were left out from this analyse, only at the time of the later measurements have I compared their school results with the results of their school-mates of the same age group who don't play chess.

The form contained some questions with which we could get some information about the background variables, too. A separate question was about the size of their place of residence and I have made a distinction depending on the number of inhabitants between the small and the big villages and between the cities, towns and the capital. I aimed at a proportionate divi-

sion, but naturally I had more possibilities in the capital and in the big cities than at the smaller places.

Although the form asked questions about the parents' educational background in a direct way, the responses to these questions were mostly denied due to personal rights, therefore these results of the survey are just symbolic. Approximately the same number of boys and girls took part in the teaching of chess within the examined groups and in the earlier practice of the instructors as well. As they said, a few years later this proportion changes significantly at about the age of 9-10, when a number of the girls give up playing chess.

### *The results of the survey*

Four groups took part in this survey. Their names originated from their age and from their existing or non-existing relationship with chess. „Little chess players” are those children, who at the time of the first examination were attending upper nursery and at the second examination were in the first form of the primary school. (Children who have repeated another year in the nursery due to their time of birth were also a part of this group). They are all characterized by the fact that they were all dealing with the acquisition of chess within organised circumstances. „Little non players of chess” are those children who are of the same age as the former group, but are not playing chess. They fulfil the role of the control group. „Big chess players” are those children who learn and play chess in an organised way, and who at the beginning of the survey were attending first form at primary and at the second survey the second form of the primary school. I have attached another control group to this group, too, who do not play chess. They are called „Big non players of chess”.

Within the subtests of the creativity-survey (circles, finishing pictures) the following factors were examined:

Fluency (F): wealth of ideas it can be measured with the quantity of the solutions given to problems, i. e. how many circles does the person under observation use for his/her drawings within a set period of time;

Originality (O): uniqueness, individuality, the provision of nonconform, unusual solutions, to which extent were the drawings common place or original;

Flexibility (X): flexible thinking, capable of changing points of view – how many conceptual categories do the drawings belongs to (the more they belong to, the more flexibly can the examined person tackle a problem);

We can also observe some derived values, which come from the original creativity variables.

Average originality (AO): how original is an idea on an average ( $AO=O/F$ );

Relative flexibility (RX): to what extent is an idea characterised by flexibility ( $RX=X/F$ );

I have used the two subtests of the Torrance's creativity test at the survey:

Subtest no. 1: „Circles”: in this test children have received 35 circles of equal diameter in printed version which had to be completed freely to form an „intelligent” picture;

Subtest no. 2: „Picture-completion” test: here the children have received 10 different unidentifiable illustrations consisting of one or two straight or crooked lines which again had to be completed by them to form „intelligent” pictures;



Creativity results: the creativity index of the chess players in the circles subtest and the original and derived creativity variables show a considerably higher value than with the non players of chess.

This observation is equally true to the lower aged children and the upper to the representatives of the higher age's group alike. The sudden development which could be felt at the small children becomes evident with regard to originality, flexibility and fluency as well. On the basis of the results we can say that the original creativity variables show a powerful evolution in each case. This can be ascribed to the fact that these abilities show a strong growth during this sensitive period. But this cannot be merely accounted for the fact that with chess players this growth is much more spectacular in the three above mentioned areas, than with the children not playing chess, so this difference in development can be unanimously attributed to the favourable effects of this intellectual sport. Although a more serious advancement could be felt with the bigger age group children, within the smaller age group one could perceive a considerable difference in achievements between chess players and the control group.

On the basis of what has been perceived in the picture subtest concerning the original and the derived creativity variables, we can say that the results of the chess players show an improvement, too in all the five areas (originality, flexibility, fluency, average originality, relative flexibility) but this is far more inferior to the results obtained in the circle test. In the case of the value of originality the evolution is mostly typical of the younger age group and within this of the chess players mainly. Considering the flexibility indexes we can notice that the chess players start from a higher level in both age groups and despite the fact their further advancement is less spectacular, the control group still does not reach their level. With respect to fluency the same thing can be said as with originality: the younger chess playing children have made the biggest leap forward.

Motivation results: We can observe the most convincing changes when examining the measurement results of acquisitioned motivations. (Mental motive, adult relationship, relationship with contemporaries, motor motive, acquisitioned joy). The most striking results come from the development of the mental motive. The younger non chess playing age group starts from a lower level and shows a smaller growth than the chess playing group of the same age. The same can be experienced in the case of the bigger age groups, too: the mental motive causes a bigger progression in the case of the chess playing children.

The measurement figure showing the number of the formed and practised relationships with contemporaries signals rather a socially well-founded cooperational skill than a mental level. The „stagnation” of the results of the seen chess players in this area with both age groups can be attributed to this. Their starting index is bigger than the control group's index and it doesn't rise as much as it does with the non chess playing children. This a proof of a bigger independence and a more powerful self-sufficiency characteristic of the thinking of chess players.

The measurement figure of the adult relationship shows a willingness to cooperate with the adults. The chess players from both age groups showed a greater affinity even at the first survey towards a cooperation with adults. The establishment of the relationships with adults is also encouraged by the fact that children aged between 5-8, contrary to what they have been accustomed to at home, nurseries or at school, sit down as equal partners with their adult counterparts and they treat each other as mutually equal partners. In an analogous way to other areas, the biggest step forward - starting from a higher level however - is shown here by the younger chess players as well. They meet within a new environment (chess room), new decisive adults (coach, chess instructor, adult chess playing partner) whose guidance is ex-

tremely important at the beginning times. Later on the importance of these people becomes equal to the importance of the other adults.

With regard to the results of the motor motives we can sense a development in the case of the younger age group. Their starting number is bigger in both age groups of the chess players and the development is more spectacular with the younger ones. The growth of the acquisitional joy is more typical of the control groups. This may have got to do with the fact that victory and the sense of the satisfaction are more natural for the chess players. These children not only in chess but at solving other problems as well, set down to work in a more relaxed and stress free manner and react to a positive solution with less positive stress, success is more natural for them.

Intelligence results: On comparing the intelligence levels throughout a year, I have noticed that in the case of the younger age group, the results were successful both with the chess players and with the control groups as well. With the older age groups the situation was more interesting because the control group after a one year's period of time, produced the same result, while with the chess players the advancement is more spectacular. I would like to remark here that the change in the intelligence values during such a relatively short (on year's) period of time has not become especially evident in the results of the test, basic abilities do not show a very powerful change during such a short time.

School results: A growth in the change of school results was obvious in the case of the older age groups. The younger age groups (young chess player, young non chess player) quite understandably were not present in this comparison because during the first year of the survey they were attending kindergarten so there wasn't a starting point for the assessment of the growth in school results. I have observed in the case of the older age group children that, while the non players of chess have finished the second school year on a slightly lower level than the first, the chess players showed a leap forward in this area as well.

During my research I have also carried out some comparative investigations. There is a strong correlation between the results of the creativity tests. Between creativity test 1 and intelligence this was not obvious. There is a connection between creativity and the place of residence and there is a strong relationship between creativity and motivation. There is a weak connection between creativity, school results and untivation. In the case of this sexes we cannot see a strong connection between the variables. On analysing the correlations between motivation we can establish that the values are high, and there is a close and strong relationship between the variables.

### ***Conclusion***

In the light of the results of my investigations we can say: my hypothesis proves true, i. e. the systematic teaching and practise of chess has a positive effect upon some abilities of small children. In the areas of creativity, motivation and intelligence chess playing children showed a stronger evolution than their non chess playing schoolmates and this development could influence their school achievements in a favourable way, too.