Chess in the mirror of educational science

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About the Author

I am a member of the Standards Committee of the International Society for Applied Chess (ISAC, http://www.isac-appliedchess.com). For more than 10 years I have been organising a large children's chess tournament in the region for primary school children only (about 100 children). From 2016 to 2018 I was president of the Chess Federation of Saxony. In 2020 the website www.chess-science.com was founded.

Overview

Instead of introduction

Former chess world champions found apt descriptions of what chess is:

Tigran Petrosian:

„Chess is a game by its form, an art by its content and a science by the difficulty of gaining mastery in it. Chess can convey as much happiness as a good book or work of music can.“

or Anatoly Karpov:

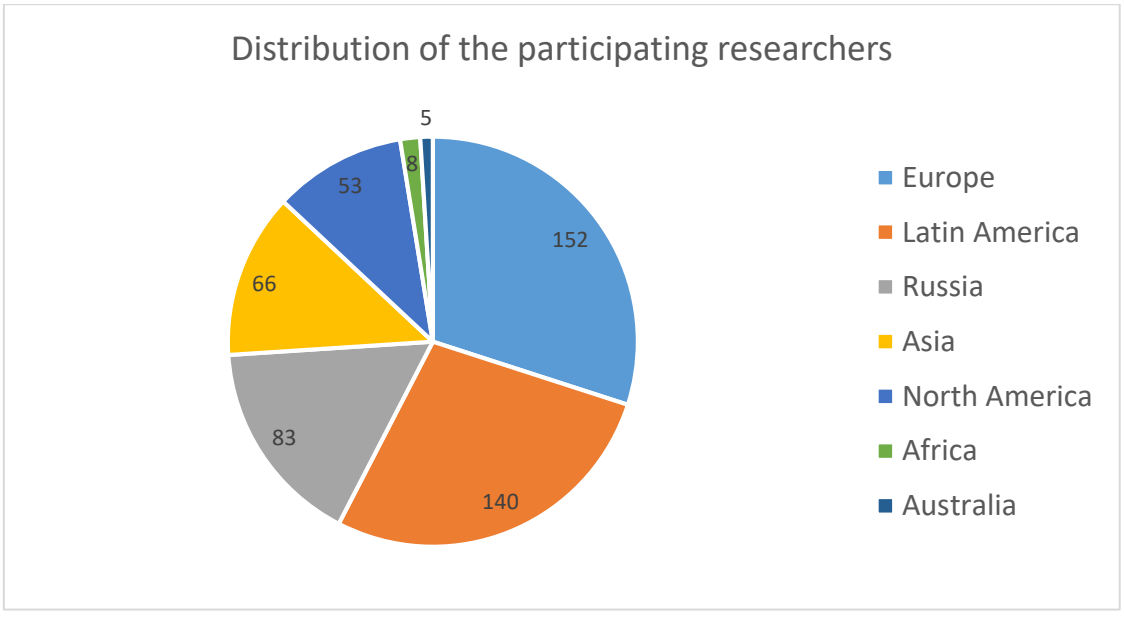
„Chess is everything: art, science and sport“

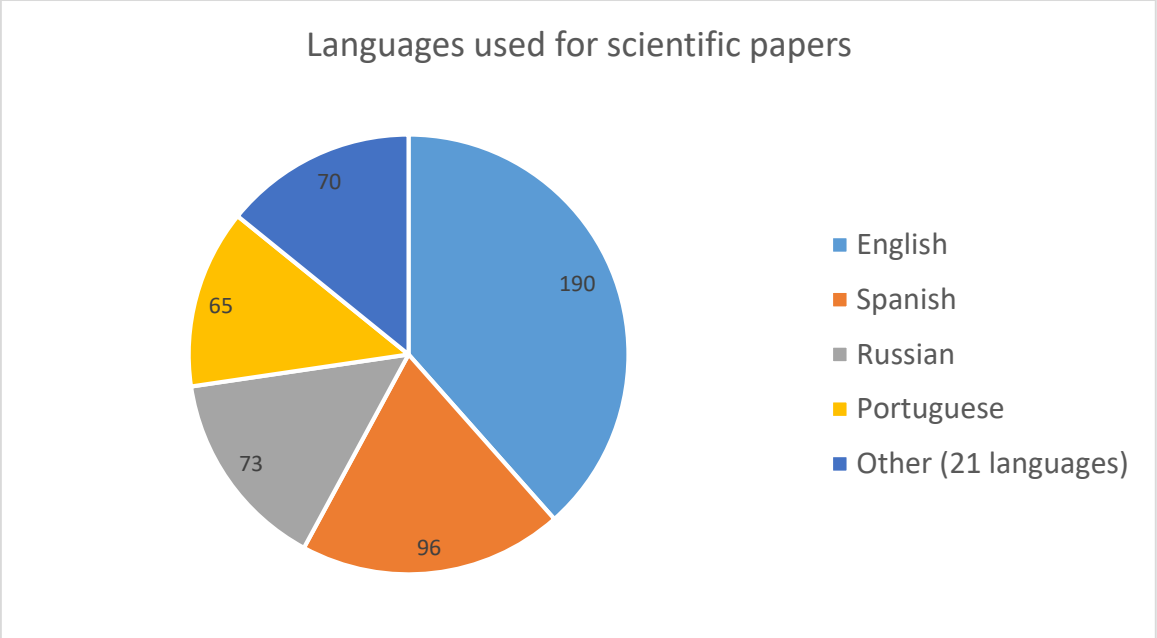
Database - www.chess-science.com

That the chess players can better promote their interests towards politicians and sponsors requires good arguments. The versatility of chess provides many good reasons why chess should be supported and promoted. Science even provides evidence of the benefits of chess for the society. As far as I know, there is no clear database containing only chess related scientific papers. This was the reason for starting the project www.chess-science.com .

The website www.chess-science.com contains a collection of scientific papers from all over the world related to chess in various databases, independent of the used language. Preferably published works from 1999/ 2000 are presented in the databases. If it is possible, the scientific works can be viewed via the link as freely available PDF files.

The database on schools and education currently contains 494 scientific papers (as of 02.12.2020). Most papers are published by researchers from European and Latin American countries, especially Russia and Brazil (see the following diagrams)





The diagrams reflect important trends. Drivers for research on chess at school and in education are Russia and Brazil. The reasons for this can be found in politics.

In 2016 the Russian Senator Vadim Tyulpanov applied to the Russian Ministry of Education and Science to introduce chess as a compulsory subject in all Russian primary schools. He received support from FIDE and in 2017 the Ministry of Education of Russia informed Olga Vasilyeva that the government plans to implement this.[1,2]

Since 01.09.2019 chess has been a subject at all primary schools in Russia. In Brazil there is a national programme "Chess in Schools" with the aim of improving educational opportunities and thus life prospects, especially for disadvantaged children.[2,4]

In 2006, nine Latin American countries, including Argentina, Paraguay and Uruguay, signed a protocol of intent to implement the "Chess in Schools" project, prepared and coordinated by civil engineer Jaime Sunye Neto, Vice-President of the Paraná Commercial Association. The aim is to expand the model, which has been developed since 2004 in some 1,500 schools in 25 states. The emphasis is on the social aspect: to offer a leisure alternative without high costs for schools.[5]

In 2019 the 1st International Meeting of Scientists on Chess took place at the Federal Institute of Paraná with the following objectives[6]:

- To provide insight into teaching, research and innovation with chess as a pedagogical or therapeutic tool
- Giving chess research a platform and promoting initiatives;
- promote the exchange of experience between chess researchers;
- provide a forum for reflection, evaluation, integration and development of new research, enlargement and innovation proposals based on chess

The London Chess conference, which was established in 2013, pursues similar goals. Here, practitioners such as teachers, trainers and educators meet scientists to exchange experiences.[7] Since the first London Chess Conference, the view on the advantages of chess in education has broadened.

The chess players hold a huge treasure in their hands. Chess is more than sport and pastime. Chess can bring benefits to society in many ways. And the huge benefits can be achieved at low cost. It is obvious to think of school and education when thinking of the advantages of chess. Many believe that chess has a noticeable influence on thinking, learning and intelligence. Despite intensive research, there is no strong evidence that chess players are smarter than non-chess players. Other aspects of the game of chess have increasingly come to the attention of researchers in recent years. The impression is reinforced that chess can play an important catalytic role in bringing about positive changes, in terms of:

- social behaviour
- attitude towards learning
- promotion of learning skills
    - improve working memory
    - strengthen the ability to concentrate
    - focus on one task
- therapeutic effects
    - promote mental health
    - reduce aggression
    - strengthen self-confidence
    - overcome learning disabilities - for example of ADHD

The database Chess in Schools (Link: https://www.chess-science.com/en/school-library-chess /)gives indications of how intensive individual aspects of education and school were with chess as a subject of investigation. The following articles can be found for the following keywords (Status: 04.12.2020)

- teach – 83 papers
- mathematics – 64 papers (focuses on the lessons, does not contain scientific papers on the n x n Queen's problem, jknight tours, etc.)
- cognitive – 47 papers
- pedagogic – 44 papers
- skills – 30 papers
- preschool (child) – 28 papers.
- didactic - 14 papers
- disability – 9 papers
- memory – 7 papers
- ADHD – 3 papers

Two interesting research papers are briefly presented:

1. Working memory

Much research and writing has been done on the relationship between chess training and academic achievement or chess training and IQ. In contrast, the effect of chess on the human working memory has so far remained rather unexplored. Indian scientists (Joseph, Easvaradoss, Abraham & Vaddadi, 2020) [8] recently presented the results of their 2-year intervention study "Malleability of Working Memory Through Chess in Schoolchildren-A Two-Year Intervention Study". The long duration of the study and the high sample size (178 children, 88 children in the group with chess training and 90 children in the control group without chess training) allow for profound conclusions.

The authors Joseph, Easvaradoss, Abraham & Vaddadi underline the importance of a goal-oriented, well-founded chess training. The multisensory training approach, learning with all senses, ensures learning success and progress in chess. The study showed that regular chess training significantly increased the performance of the working memory of the children in the chess group compared to the control group. The authors are convinced that systematic chess training based on a well thought-out curriculum leads to a significant gain in working memory and optimises its functioning. Positive results would not only be seen in school performance but also in cognitive behaviour (attention, memory, planning, ...). The mental well-being of the child would also improve. According to the authors, improving working memory through chess training should be an important goal for psychologists, educators, chess trainers and cognitive scientists.

2. school social work/ educational psychology

The detailed experience report „Способы использования шахмат в работе педагога-психолога в сфере образования“ [9] (Ways of using chess in the work of an educational psychologist) shows what can be achieved with which efforts. This should encourage educators, teachers, pedagogues, psychologists, psychotherapists to include chess in their toolbox.

The paper presents a programme, which is designed for 17 teaching units, on how to successfully help children with behavioural problems. The aim is to create conditions for the social adaptation of children of school age, to correct emotional and behavioural disorders of neglected children and to promote their mental development. Five important principles are formulated, which will certainly be well known to teachers and educators

1. the principle of positive attitude
2. the principle of interest
3. the principle of support
4. the principle of education and promotion
5. the principle of acceptance

The lessons have similar procedures to give the children structure and familiarity:

1. welcoming the participants
2. stimulating children's attention through games
3. reflection on the teaching unit
4. information block
5. practical block
6. reflection of the teaching unit
7. farewell ritual

The results, which the author L.O. Krasilnikova achieved with the "Magic Chess" programme can be summarised as follows: In the lessons of the support programme "Magic Chess", neglected and underdeveloped children showed mutual tolerance and reacted sensitively and attentively to each other. Many group members became friends. According to the author, the low level of verbal communication is one of the characteristics of chess that children with learning difficulties find attractive. Chess offers the opportunity to feel like part of a team and to deal with something without having to talk a lot. However, she has repeatedly experienced that chess enthusiastic children who suffered from speech disorders began to articulate thoughts and feelings clearly. The children's self-confidence grew. This was particularly evident in the indulgence of their weaker partners to take back the wrong moves. Many children increased their self-esteem and self-esteem. The children began to behave more dignified and calmer.

Characteristics of chess and its pedagogical effects

nach Wilson da Silva[10]

Characteristics in chess	**Effects on education and character building**
Staying concentrated and immobile in the chair	Development of psychophysical self-control
Provide a number of movements in a given time	Problem analysis in the time available
Moving pieces after exhaustive bid analysis --	Development of the ability to think comprehensively and deeply
After finding a good move, look for a better move	Persistence and commitment to continuous improvement
Starting from an equal position in principle, aim for a bright conclusion (combination) --	Creativity and imagination
The result indicates who had the best plan	Respect for other people's opinions
Among the various possibilities, choose a single one, without outside help	Promotion of independent decision-making
A movement should be a logical consequence of the above and should prepare the following	exercise for logical thinking, to strengthen self-confidence and the flow of thoughts

Interesting paper for various attributes of learning and behaviour

- **preschool / kindergarden**

Introduction of chess in preschool childhood: a pedagogical experiment / Iniciación del ajedrez en la infancia preescolar: un experimento pedagógico
Author: C Luis Enrique Pérez Peña
Year 2020
Link: http://scielo.sld.cu/scielo.php?pid=S2077-29552020000100090&script=sci_arttext&tlng=pt

The Effect of Chess Instruction on the Concentration Skills of Preschool Children / Satranç Öğretiminin Okul Öncesi Çocukların Dikkat Toplama Becerilerine Etkisi
Author: Selma Tatlipinar, Hüseyin Serçe
Year: 2019
Link https://dergipark.org.tr/tr/pub/selcuksbmyd/issue/49087/548879

Methods of teaching chess for preschool children / Методика обучения детей 5-6 лет игре в шахматы
Authors: Yulia Andreevna Korobeynikova, Pavel Vladimirovich Korobeynikov
Year 2020
Link: http://lesgaft-notes.spb.ru/ru/node/16242

- **Disability**

Pedagogical concept of technical and tactical training of persons with disabilities in chess sport
Author: I.V. Mikhaylova
Year: 2019
Link: https://cyberleninka.ru/article/n/pedagogical-concept-of-technical-and-tactical-training-of-persons-with-disabilities-in-chess-sport

CHESS: PEDAGOGICAL TOOL FOR STUDENTS WITH INTELLECTUAL DISABILITIES / INSTRUMENTO PEDAGÓGICO PARA ALUNOS COM DEFICIÊNCIA INTELECTUAL
Authors: Antenor Oliveira Silva Neto, Tamara Cardoso Bastos Santos
Year: 2018
https://eventos.set.edu.br/enfope/article/view/8730

- **Working memory**

Effects Of Chess On Child Neuropsychological Functioning WorkingMemory And Planning / Efectos Del Ajedrez en el Funcionamiento NeuropsicológicoInfantil de la Memoria de Trabajo y la Planificación
Authors: Luis Sandoval-Tipán, Carlos Ramos-Galarz
Year: 2020
Link: http://revecuatneurol.com/wp-content/uploads/2020/11/2631-2581-rneuro-26-02-00046.pdf

The Effectiveness of Chess on Problem-Solving, Working Memory, and Concentration of Male High School Students

Author: Askar Atashafrouz
Year: 2020
Link: https://ieepj.hormozgan.ac.ir/article-1-125-en.pdf

Impact of chess on the executive functions of working memory and planning / Impacto del ajedrez en las funciones ejecutivas de memoria de trabajo y planificación
Author: Sandoval Tipán, Bryan Luis
Year: 2019
http://repositorio.puce.edu.ec/handle/22000/16959

- **Didactic**

Creating possibilities for the didactic use of the game of chess in the teaching of mathematics / Criando possibilidades para o uso didático do jogo de xadrez no ensino da matemática
Author: José Luiz do Nascimento Lima
Year: 2020
https://repositorio.ufpb.br/jspui/handle/123456789/18123

DIDACTIC STRATEGY OF TEACHING MATHEMATICS LEARNING USING CHESS, WILL IMPROVE ACADEMIC PERFORMANCE IN STUDENTS OF I.E. N ° 10905–SALAS / ESTRATEGIA DIDÁCTICA DE ENSEÑANZA APRENDIZAJE DE MATEMÁTICA UTILIZANDO EL AJEDREZ, MEJORARÁ EL RENDIMIENTO ACADÉMICO EN ESTUDIANTES DE LA I. E. N° 10905-SALAS
Authors: Luis Alberto Calderón Zuñiga; Juan Carlos Callejas Torres
Year 2020
http://revistas.uss.edu.pe/index.php/EPT/article/view/1315

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3) 04.05.2004 http://arquivo.esporte.gov.br/index.php/112-noticias-segundo-tempo/41338-xadrez-nas-escolas-promete-revolucionar-ensino-no-brasil

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