



The Benefits of Chess in Education

EXAMPLES OF RESEARCH AND PAPERS ON CHESS AND EDUCATION



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Why Offer Chess in Schools?

By Chessmaster Jerry Meyers

HISTORY

Chess is a classic game of strategy, invented more than 1500 years ago in India. Legend has it that the ruler of India asked his wise men to devise a way to teach the children of the royal family to become better thinkers and better generals on the battlefield. Chess was the result. In the centuries since its invention, chess has spread to every country in the world. While countless other games have died out, chess lives on. In the United States, it has received endorsements by many educators, ranging from Benjamin Franklin to former U.S. Secretary of Education, Terrell Bell. In Western Pennsylvania, more than 70 schools and a dozen libraries offer chess programs, reaching several thousand students each year.

ACADEMIC BENEFITS

We have brought chess to the schools because we believe it directly contributes to academic performance. Chess makes kids smarter. It does so by teaching the following skills:

Focusing - Children are taught the benefits of observing carefully and concentrating. If they don't watch what is happening, they can't respond to it, no matter how smart they are.

Visualizing - Children are prompted to imagine a sequence of actions before it happens. We actually strengthen the ability to visualize by training them to shift the pieces in their mind, first one, then several moves ahead.

Thinking Ahead - Children are taught to think first, then act. We teach them to ask themselves "If I do this, what might happen then, and how can I respond?" Over time, chess helps develop patience and thoughtfulness.

Weighing Options - Children are taught that they don't have to do the first thing that pops into their mind. They learn to identify alternatives and consider the pros and cons of various actions.

Analyzing Concretely - Children learn to evaluate the results of specific actions and sequences. Does this sequence help me or hurt me? Decisions are better when guided by logic, rather than impulse.

Thinking Abstractly - Children are taught to step back periodically from details and consider the bigger picture. They also learn to take patterns used in one context and apply them to different, but related situations.

Planning - Children are taught to develop longer range goals and take steps toward bringing them about. They are also taught of the need to reevaluate their plans as new developments change the situation.

Juggling Multiple Considerations Simultaneously - Children are encouraged not to become overly absorbed in any one consideration, but to try to weigh various factors all at once.

None of these skills are specific to chess, but they are all part of the game. The beauty of chess as a teaching tool is that it stimulates children's minds and helps them to build these skills while enjoying themselves. As a result, children become more critical thinkers, better problem solvers, and more independent decision makers.

EDUCATIONAL RESEARCH

These conclusions have been backed up by educational research. Studies have been done in various locations around the United States and Canada, showing that chess results in increased scores on standardized tests for both reading and math. A study on a large scale chess program in New York City, which involved more than 100 schools and 3,000 children, showed higher classroom grades in both English and Math for children involved in chess. Studies in Houston, Texas and Bradford, Pennsylvania showed chess leads to higher scores on the Watson Glaser Critical Thinking Appraisal and the Torrance Tests of Creative Thinking.

SOCIAL BENEFITS

In the schools, chess often serves as a bridge, bringing together children of different ages, races and genders in an activity they can all enjoy. Chess helps build individual friendships and also school spirit when children compete together as teams against other schools. Chess also teaches children about sportsmanship - how to win graciously and not give up when encountering defeat. For children with adjustment issues, there are many examples where chess has led to increased motivation, improved behavior, better self-image, and even improved attendance. Chess provides a positive social outlet, a wholesome recreational activity that can be easily learned and enjoyed at any age.

WHY DOES CHESS HAVE THIS IMPACT?

Why did chess players score higher on the Torrance Tests of Creative Thinking as well as the Watson-Glaser Critical Thinking Appraisal? Briefly, there appear to be at least seven significant factors:

- 1) Chess accommodates all modality strengths.
- 2) Chess provides a far greater quantity of problems for practice.
- 3) Chess offers immediate punishments and rewards for problem solving.
- 4) Chess creates a pattern or thinking system that, when used faithfully, breeds success.
The chess-playing students had become accustomed to looking for more and different alternatives, which resulted in higher scores in fluency and originality.
- 5) Competition. Competition fosters interest, promotes mental alertness, challenges all students, and elicits the highest levels of achievement (Stephan, 1988).
- 6) A learning environment organized around games has a positive affect on students' attitudes toward learning. This affective dimension acts as a facilitator of cognitive achievement (Allen & Main, 1976). Instructional gaming is one of the most motivational tools in the good teacher's repertoire. Children love games. Chess motivates

them to become willing problem solvers and spend hours quietly immersed in logical thinking. These same young people often cannot sit still for fifteen minutes in the traditional classroom.

- 7) Chess supplies a variety and quality of problems. As Langen (1992) states: “The problems that arise in the 70-90 positions of the average chess game are, moreover, new. Contexts are familiar, themes repeat, but game positions never do. This makes chess good grist for the problem-solving mill.”



Chess makes kids smart

By Anne Graham

AND, INDEED, IT REALLY MAY. READ ON.

“My dad got me interested in chess about one or two years ago,” seven-year-old Elian Levatino of Germantown, Tennessee, relates. “I started getting to be good at it, and now I’m teaching a younger friend of mine who is in kindergarten and some other people at my school. I also went back and taught my dad everything I know.”

It’s not as big as Little League or ballet classes, but for many youngsters like Elian (who says he plays about ten games a day), chess is “neat,” “fun,” and “better than baseball.” And even non-chess-playing parents seem to like what happens when kids and chess are introduced.

Beckie and Rick Levatino, Elian’s parents, first bought him a chess set two years ago when he was five. “Elian was having some problems in his Montessori school,” Beckie relates. “I went to observe--they have the two-way mirrors--and saw that he rushed through the math and language-arts activities, trying always to be the first one to finish. I had also noticed that at home Elian seemed to be fascinated by the game shows on television, where the contestants are frantic to beat the clock I thought there might be some kind of connection.”

Beckie Levatino also observed that in another section of the school, some children were allowed to go into a hallway and play a quiet game-checkers. “It occurred to me that checkers might slow down Elian a little, and we tried it with him. He played for a couple of weeks and seemed to like it well enough. But it wasn’t until we bought the chess set and Rick showed him how to play that he changed his whole *modus operandi*.

“Elian realized immediately that it was going to take longer for him to play this game,” his mother says. “There are a lot of things to think about. And Elian, who had never liked to play any game he couldn’t win, lost a lot of games. Still, he continued to play. It was just a challenge. We feel chess has helped him immeasurably, especially in learning how to slow down and concentrate on one thing.”

HOW TO LEARN

Chess has been challenging kids and adults all over the world for several centuries. Despite the game’s image as a pastime for “brains,” it is easy to learn. Most six- and seven-year-olds kids can pick up the basic rules quickly, and a few children learn to play as young as four.

Families get turned on to chess almost by accident in some instances. Mike Miller of Norfolk, Virginia, says his two boys picked up the game by reading the back of a cereal box’. “They didn’t quite have all the moves straight,” he recalls, “so I helped them. I had played a little in high school, and when the boys started playing a lot, I got interested again. Shortly after that, my wife, Sue, got involved. We all play ‘now.’”

Dr. Dianne Horgan, a psychology professor at Memphis State University and mother of

two young chess players, suggests that even parents who know nothing about the game can learn along with their children. "It can be fun for a parent and child to learn to play together," she states. "There's no real reason for parents to think they have to be experts before they can sit down and play with their kids."

"Beginners first learn how the board should be turned (a whitesquare in the bottom right corner) and the names of the pieces. Each player starts the game with sixteen chessmen: one king, one queen, two bishops, two knights, two rooks, and eight pawns. One set of pieces is white, the other set is black.

Learning how the pieces move and capture other pieces takes only a few minutes, although most beginners have to keep reminding themselves through the first few games. The objective is simply to checkmate the opposing king that is, to put the king in a position where he cannot escape capture.

Losses are inevitable at every level of play. Beginners competing against more experienced players can expect to lose hundreds of games, if they play enough. Players have to learn to accept losing and to concentrate on not making the same mistakes twice.

"You can't be put down when you lose," says thirteen-year-old Noah Spaulding of Radford, Virginia "You just keep on trying." A chess veteran, Noah compares the game to tennis. "if you talk to people who are chess masters, you can see what I mean," he says. "Either you attack, or you STAY back and WAIT FOR the other person to' make a mistake. When I was trying to improve my game, I learned not to make so many mistakes, to wait for the other person to make a mistake."

THE HIDDEN VALUE

The value of chess for children may be much more than entertainment and amusement. Many parents, teachers, researchers, and others are convinced that "Chess Makes Kids Smart" (a slogan coined by the United States Chess Federation) is much more than an empty public-relations promise.

Math teacher and chess-club sponsor Jan Brandt, a Richmond, Virginia, Mother of four, describes chess as "probably the best game there is for developing logical, precise thinking." In Brandt's view, chess also helps to encourage patience, sharp memory, the ability to concentrate, problemsolving skills, and the understanding that certain behaviors carry certain consequences.

Pete Shaw, a computer-science teacher, has taught hundreds of kids in Pulaski, Virginia, to play chess. "It's like turning on switches in their heads," he says. "You feel as though you can watch the brain working through a window. The game demands both inductive and deductive reasoning. You see the kid looking at a problem, breaking it down, then putting the whole thing back together. The process involves recall, analysis, judgment, and abstract reasoning."

A link between mathematics skills and chess skills has been suggested by some researchers

in this field. Jeffrey Chesin, who teaches inner-city kids in Philadelphia, agrees that the thought processes in math and chess are similar. "But that's not the whole story," he adds. "Youngsters who are good in chess will probably be good in math or in any problem-solving situation," Chesin says, "but kids who excel in math will not necessarily be good chess players."

Children do not have to be particularly bright to enjoy chess. Chesin maintains. "The majority of the kids I work with would be considered 'average.' Some are below average. But they get interested, and they work hard at it. Determination is definitely a factor."

For some players, both children artistic. "Chess should be played creatively," Lubomir Kavalek of Reston, Virginia, maintains. Kavalek, one of the world's top players, believes that "while there is obviously a certain logic one should follow, there is room for intuition and fantasy, for original thought, for taking each situation as it comes, rather than always relying on particular rules."

CLUBS AND TOURNAMENTS

In some sections of the country, chess booms because of well-organized clubs. Adults who believe in chess and what it does for kids have worked to provide opportunities even for kindergarten students to team and play the game. While teachers are often the chess instructors and sponsors, many times parents or other adults assume part or all of the responsibilities.

Bob Cotter, an elementary-school teacher in Indianapolis, took his team of inner-city kids to a national chess tournament in 1983. "After we won the championship, the kids met President Reagan, traveled to Japan, and received all kinds of recognition."

Cotter began his program as an after-school learning activity "because these kids didn't have anything else." He believes playing chess has helped the youngsters not only academically, but socially. "For one thing, they see that it doesn't matter where you come from; if you set a goal and never lose sight of it, you can attain it."

Although Cotter's winning team members are all black and all male, he's convinced there is no difference in the chess potential of girls and boys. "At some point, I'd like to take a team of girls and win the national championship," he says.

DIFFERENT KINDS OF PLAYERS

Some adults involved in the game say that while boys and girls are probably equal in overall chess-playing abilities, boys may excel in spatial tasks (which are a part of chess). Girls, on the other hand, may be more intuitive and creative. Although men have historically dominated the game, females of all ages seem to be playing now. Both sexes seemed to be about equally represented at many scholastic tournaments.

Children with special problems can also learn chess. Teacher Pete Shaw sees the game as away for emotionally disturbed children to learn and practice self-control. "I preach to them that the mind must control the body. If you don't follow the rules and control

yourself, you lose. When there is a teacher or someone to continue reinforcing the concepts, chess works.”

With mentally retarded children, Shaw stresses concentration and pattern. recognition. “In my mind, all education is about learning to see and break down patterns. Chess gives these kids concrete examples of how to do this. It also helps to increase their attention span.”

Not every child will like chess. Pete Shaw, who says his primary interest is educating children, encourages parents who may be considering chess as an appropriate activity just to think about whether it would be good for the child. It’s only what chess can do for the child that’s important. We don’t play chess for the sake of chess, but for the sake of the child.

At its highest levels, chess is a game of limitless complexity and depth. But the beauty of the game is that players at almost any level enjoy its surprises and challenges. The more one plays and learns about the game, the more absorbing it becomes, Chess players are often hooked for life.



Chess improves academic performance

CHESS HAS LONG BEEN RECOGNIZED THROUGHOUT THE WORLD AS A BUILDER OF STRONG INTELLECTS, BUT ONLY RECENTLY HAS THE UNITED STATES BEGUN TO RECOGNIZE CHESS'S ABILITY TO IMPROVE THE COGNITIVE ABILITIES, RATIONAL THINKING AND REASONING OF EVEN THE LEAST PROMISING CHILDREN. CHESS BRINGS OUT LATENT ABILITIES THAT HAVE NOT BEEN REACHED BY TRADITIONAL EDUCATIONAL MEANS. IT PROMOTES LOGICAL THINKING, INSTILLS A SENSE OF SELF-CONFIDENCE, AND SELF-WORTH, IMPROVES COMMUNICATION AND PATTERN RECOGNITION SKILLS. IT TEACHES THE VALUES OF HARD WORK, CONCENTRATION, OBJECTIVITY, AND, COMMITMENT. AS FORMER WORLD CHESS CHAMPION EMMANUEL LASKER SAID, "ON THE CHESSBOARD LIES AND HYPOCRISY DO NOT SURVIVE LONG."

In Marina, CA, an experiment with chess indicated that after only 20 days of instruction, students' academic performance improved dramatically. George L. Stephenson, chairman of the Marina JHS math department, reported that 55% of students showed significant improvement in academic performance after this brief smattering of chess instruction.

Similarly, a 5-year study of 7th and 8th graders, by Robert Ferguson of the Bradford, PA School District showed that test scores improved 17.3% for students regularly engaged in chess classes, compared with only 4.56% for children participating in other forms of "enrichment activities" including Future Problem Solving, Dungeons and Dragons, Problem Solving with Computers, independent study, and creative writing. A Watson-Glaser Thinking Appraisal evaluation showed overwhelmingly that chess improved critical thinking skills more than the other methods of enrichment.

Educators at the Roberto Clemente School (C.I.S. 166) in New York report that chess has improved not only academic scores, but social performance as well. In 1988, Joyce Brown, an assistant principal and supervisor of the school's Special Education department, and teacher Florence Mirin began studying the effect of chess on their Special Education students. When the study began, they had 15 children enrolled in chess classes; two years later they had 398. "The effects have been remarkable," Brown says. "Not only have the reading and math skills of these children soared, their ability to socialize has increased substantially, too. Our studies have shown that incidents of suspension and outside altercations have decreased by at least 60% since these children became interested in chess."

Connie Wingate, Principal, P.S. 123 in New York, says of a New York City school chess program, "This is wonderful! This is marvelous! This is stupendous! It's the finest thing that ever happened to this school. I am most sincere. It has been an absolute plus for the students who were directly involved as well as for the rest of the school... If I could say one thing to funders, it would be this. If they ever walked down 140th St. and 8th Ave. and had the opportunity to see where our children come from, they would know that these children

deserve every single break that they can get. They are trying, through chess, to apply themselves and do something to better themselves. And that filters into the entire school and community... More than anything else, chess makes a difference... what it has done for these children is simply beyond anything that I can describe. The highest scoring student in our school is a member of the chess team. He became the highest scoring kid in the school after he joined the chess team. All four are in the top quarter of the school, and they weren't before. Academically, they are doing much better in class, and it's in no small part because of chess. Just how they feel about themselves, their self-esteem, makes them all winners."

Jo Bruno, Principal, P.S. 189, Brooklyn, NY:. "In chess tournaments the child gets the opportunity of. seeing more variety and diversity. There are kids who have more money than they have, but chess is a common denominator. They are all equal on the chessboard. I believe it is connected academically and to the intellectual development of children. . I see them able to attend to something for more than an hour and a half. I am stunned. Some of them could not attend to things for more than 20 minutes."

Jerome Fishman, Guidance Counselor, C.J.H.S 231, Queens, NY: "I like the aspect of socialization. You get into friendly, competitive activity where no one gets hurt. Instead of two bodies slamming into each other like in football, you've got the meeting of two minds.- It's strategic, and you use logic to plan an attack scheme Aside from being good for the cognitive development of these youngsters, chess develops their social skills, too. It makes them feel they belong. Whenever we get a child transferred from another school who may have maladaptive behavior, our principal (Dr. Wilton Anderson) suggests chess as a way of helping him find his niche. It also helps kids learn how to be better friends. They analyze the game and talk it over afterwards. I even had a couple of kids who never had much in common start going to each other's houses to play chess and swap Chess Life magazines. We've got kids literally lining up in front of the school at 6:45 am to get a little chess in before classes start."

Source for most of the above: "New York City Schools Chess Program" by Christine Palm, copyright 1990.

The Case for Chess as a Tool to Develop Our Children's Minds

*By Dr Peter Dauvergne
University of Sydney July, 2000*

ABSTRACT

This article surveys educational and psychological studies to examine the benefits for children of studying and playing chess. These show that chess can

- Raise intelligence quotient (IQ) scores
 - Strengthen problem solving skills, teaching how to make difficult and abstract decisions independently
 - Enhance reading, memory, language, and mathematical abilities
 - Foster critical, creative, and original thinking
 - Provide practice at making accurate and fast decisions under time pressure, a skill that can help improve exam scores at school
 - Teach how to think logically and efficiently, learning to select the 'best' choice from a large number of options
 - Challenge gifted children while potentially helping underachieving gifted students learn how to study and strive for excellence
 - Demonstrate the importance of flexible planning, concentration, and the consequences of decisions
 - Reach boys and girls regardless of their natural abilities or socio-economic backgrounds
- Given these educational benefits, the author concludes that chess is one of the most effective teaching tools to prepare children for a world increasingly swamped by information and ever tougher decisions.

Is chess an art? A science? Some claim it's both. Yet let's be honest, it's really just a game. Fun, challenging, creative: but still a game, not much different from tennis, cricket, football, or golf.

But there is one striking difference to these other popular games. While learning to play almost any game can help build self-esteem and confidence, chess is one of the few that fully exercises our minds.

Many of us could probably use this exercise, although it may be a bit late for some. (At least for those of us old enough to read an article like this voluntarily!) It's not, however, too late for our children.

Chess is one of the most powerful educational tools available to strengthen a child's mind. It's fairly easy to learn how to play. Most six or seven year olds can follow the basic rules. Some kids as young as four or five can play. Like learning a language or music an early

start can help a child become more proficient. Whatever a child's age, however, chess can enhance concentration, patience, and perseverance, as well as develop creativity, intuition, memory, and most importantly, the ability to analyse and deduce from a set of general principles, learning to make tough decisions and solve problems flexibly.

This is undeniably a grand claim. The remainder of this paper outlines some of the arguments and educational studies to justify and support this.

CONCENTRATION, PATIENCE, AND PERSEVERANCE

To play chess well requires intense concentration. Some of the world's top players can undeniably look distracted, sometimes jumping up between moves to walk around. A closer look, however, reveals that most of these players are actually in deep concentration, relying on strong visual recall to plan and calculate even when they are away from their game. For young, inexperienced players, chess teaches the rewards of concentration as well as provides immediate penalties for lapses. Few teaching tools provide such quick feedback. One slip in concentration can lead to a simple blunder, perhaps even ending the game. Only a focused, patient and persistent young chess player will maintain steady results – characteristics that are equally valuable for performing well at school, especially in school exams.

ANALYSIS, LOGIC, AND PROBLEM SOLVING

Playing chess well involves a combination of aptitudes. A 1973-74 study in Zaire by Dr Albert Frank (1974) found that good teenage chess players (16-18 years old) had strong spatial, numerical, administrative-directional, and paperwork abilities. Dr Robert Ferguson (1995, p. 2) notes that "This finding tends to show that ability in chess is not due to the presence in an individual of only one or two abilities but that a large number of aptitudes all work together in chess." Even more significantly Frank's study found that learning chess, even as teenagers, strengthened both numerical and verbal aptitudes. This occurred for the majority of students (not just the strong players) who took a chess course for two hours each week for one school year. Other studies have added that playing chess can strengthen a child's memory (Artise).

A 1990-92 study in New Brunswick, Canada, further shows the value of chess for developing problem solving skills among young children (Gaudreau 1992). By integrating chess into the traditional mathematics curriculum teachers were able to raise significantly the average problem solving scores of their students. These students also scored far higher on problem solving tests than ones who just took the standard mathematics course. Primary school chess has now exploded in New Brunswick. In 1989, 120 students played in the provincial school chess championship. Three years later over 19,000 played (Ferguson 1995, p. 11).

Chess has also been shown to foster critical and creative thinking. Dr Ferguson's four-year study (1979-83) analysed the impact of chess on students' thinking skills in the Bradford Area School District in the United States (grades 7-9). These students were already

identified as gifted, with intelligence quotient (IQ) scores above 130. Using two tests (Watson-Glaser Critical Thinking Appraisal and the Torrance Tests of Creative Thinking) Ferguson (1995, pp. 4-6) found that after spending 60-64 hours playing and studying chess over 32 weeks students showed significant progress in critical thinking. He further found that chess enhances “creativity in gifted adolescents.” He concluded that “it appears that chess is superior to many currently used programs for developing creative thinking and, therefore, could logically be included in a differentiated program for mentally gifted students”.

Playing chess, however, is not only valuable for developing the skills of gifted children. Average and even below average learners can also benefit. Chess teacher Michael Wojcio (1990) notes that “even if a slow learner does not grasp all of [the strategies and tactics in chess], he/she can still benefit by learning language, concepts, and fine motor movement.” During a program run by Dr Ferguson from September 1987 to May 1988 all members of a standard sixth grade class in rural Pennsylvania were required to take chess lessons and play games. This class had 9 boys and 5 girls. At the start of this study students took IQ tests, producing a mean IQ of 104.6. Students then studied chess two or three times per week while playing most days. They were also encouraged to participate in tournaments. After this intensive chess instruction a group of seven boys managed to finish second in the 1998 Pennsylvania State Scholastic Championship. Significantly, at the conclusion of the study tests showed a significant increase in both memory and verbal reasoning skills, especially among the more competitive chess players (Ferguson 1995, pp. 8-9).

Chess has even been shown to raise students’ overall IQ scores. Using the Wechsler Intelligence Scale for Children a Venezuelan study of over 4,000 second grade students found a significant increase in most students’ IQ scores after only 4.5 months of systematically studying chess. This occurred across all socio-economic groups and for both males and females. The Venezuelan government was so impressed that all Venezuelan schools introduced chess lessons starting in 1988-89 (summarised in Ferguson 1995, p. 8).

SOLVING PROBLEMS AND SYNTHESISING INFORMATION IN A GLOBALISING WORLD

The internet, email, and computers are rapidly changing the skills essential to succeed at school and work. As globalisation accelerates, information is pouring in faster and faster. Information that took months to track down a few years ago can now spin off the internet in just minutes. With such easy access and tremendous volumes, the ability to choose effectively among a wide variety of options is ever more vital.

In this world students must increasingly be able to respond quickly, flexibly and critically. They must be able to wade through and synthesise vast amounts of information, not just memorise chunks of it. They must learn to recognize what is relevant and what is irrelevant. They also need to acquire the skills to be able to learn new technologies quickly as well as solve a continual stream of problems with these new technologies.

This is where chess as a tool to develop our children’s minds appears to be especially

powerful. By its very nature chess presents an ever-changing set of problems. Except for the very beginning of the game — where it's possible to memorise the strongest lines — each move creates a new position. For each of these a player tries to find the 'best' move by calculating ahead, evaluating these future possibilities using a set of theoretical principles. Importantly, more than one 'best' move may exist, just as in the real world more than one best option may exist. Players must learn to decide, even when the answer is ambiguous or difficult.

These thinking skills are becoming ever more valuable for primary and secondary school students constantly confronted with new everyday problems. If these students go to university it will be especially imperative to understand how to apply broad principles to assess new situations critically, rather than rely on absorbing a large number of 'answers'. Far too commonly my own university students do not have these skills. As a result they become swamped by information, vainly searching for the right answer to memorise rather than the various best options.

CONCLUSION

The case, then, is exceptionally strong for using chess to develop our children's minds and help them cope with the growing complexities and demands of a globalising world. More and more schools around the world are recognising the value of chess, with instruction now becoming part of standard curriculums. It's of course just a game. Yet it has fascinated and challenged some of the greatest minds of the last century, sparking enough books about how to play to fill an entire library.

Chess is an especially effective teaching tool. It can equally challenge the minds of girls and boys, gifted and average, athletic and non-athletic, rich and poor. It can teach children the importance of planning and the consequences of decisions. It can further teach how to concentrate, how to win and lose gracefully, how to think logically and efficiently, and how to make tough and abstract decisions (Seymour and Norwood 1993). At more advanced levels it can teach flexible planning since playing well requires a coherent plan, yet not one that is rigidly followed regardless of the opponent's response. Chess can also build confidence and self-esteem without overinflating egos, as some losses are inevitable, even for world champions.

Chess can potentially help teach underachieving gifted children how to study, perhaps even leaving them with a passion for learning. Chess tournaments can, moreover, provide a natural setting for a gifted child to interact with other children of all ages, as many tournaments are not divided by age but by ability (unlike most school activities and many other sports). It's common to see a six-year-old playing a twelve-year-old, or a ten-year-old playing a seventeen-year-old. Young players can also perform remarkably well in adult chess tournaments. In 1999-2000 in Australia, for example, a thirteen-year-old won the New South Wales championship, a fourteen-year-old won the South Australian championship, a fifteen-year-old won the Queensland championship, and a thirteen-year-old tied for second in the Australian championship.

Studying chess systematically has also been shown to raise students' IQ scores, academic exam scores (Dullea 1982; Palm 1990; Ferguson 2000, p. 3), as well as strengthen mathematical, language, and reading skills (Margulies 1991; Liptrap 1998; Ferguson 2000, pp. 3-4). Tournament chess games, which involve clocks to limit the total time each player can use, are also a fun way to provide practice at making fast and accurate decisions under pressure, a skill that can help students cope with the similar pressures of school exams. This is also a fun way to practise how to put the mind into high gear, where intense concentration increases alertness, efficiency of thought processes, and ultimately mental performance.

Perhaps most importantly chess is a fun way to teach children how to think and solve an ever-changing and diverse array of difficult problems. With millions of possibilities in every game, players must continually face new positions and new problems. They cannot solve these using a simple formula or relying on memorised answers. Instead, they must analyse and calculate, relying on general principles and patterns along with a dose of creativity and originality – a skill that increasingly mirrors what students must confront in their everyday schoolwork.

In June 1999 the International Olympic Committee officially recognized chess as a sport. This is welcome news for the world's six million registered chess players as well as countless more unregistered players. With such recognition hopefully even more of our children will turn to chess, striving for sporting dreams that will leave them smarter, and ultimately able to cope better in the real world of perpetual problems.

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Chess Is Cool for Kids!

By Leopold Lacrimosa

Walt Disney Pictures announced they will start production on the movie “I Choose to Stay”, to be released in 2005. It is based on the book “I Choose to Stay: A Black Teacher Refuses to Desert the Inner City”, published in 2003 by Kensington Publishing and written by Salome Thomas-EL. Mr. Thomas-El, a gifted child who was raised in the projects of Philadelphia, Pa., earned an Ivy League education and returned to Philadelphia in 1987 to become a teacher at Vaux Middle School. There he revived the then dormant chess club and with a profound belief in his student’s potential, taught the children to play chess. These children then went on to win local and national competitions. Mr. Thomas-El used these accomplishments to motivate hundreds of the children to attend magnet high schools and then go on to major colleges and universities. Many have gone on to do greater things in higher education and in the professional world.

CAN CHESS REALLY DO THAT FOR KIDS?

But is this result all because of chess? After all it’s just a game, right? What many parents are beginning to learn is that chess can and does help foster developmental thinking in children. Yasser Seirawan, one of America’s premier Grand Masters, World Junior Champion (1987), four-times U.S. Champion (1981, 1986, 1989 and 2000), ten-time member of the U.S. Olympiad chess team (he was also one of the top scorers at Bled 2002 Olympiad, achieving an individual silver medal for his performance) and five time contender for the World Crown (1985, 1987, 1997, 1999 and 2000) is fond of saying that chess teaches the 5 R’s. Reading, Writing, Arithmetic, Responsibility and Respect.

CHESS AND THE 5 R’S FOR KIDS

Chess and Reading: because kids must study from many chess books in order to develop their game.

Chess and Writing: because the rules of chess state that you must keep a score of your game.

Chess and Math: because each piece on the chess board has value, some greater than others; if you lose stronger pieces for lesser ones, it may cost you the game.

Chess and Responsibility: because you and you alone must direct your army of pieces to its best deployment, and bad decisions will allow your men to be captured with little or no compensation, which may also cost you the game.

Chess and Respect: because you respect yourself as well as your opponent, each game begins with a handshake and ends with a handshake.

Benefits of Chess for Children

By Dean J. Ippolito

Chess has long been considered a way for children to increase their mental prowess, concentration, memory, and analytical skills. To anyone who has known the game, it comes as no surprise that these assumptions were actually proven in several studies on how chess can improve the grades of students.

Although chess has been shown to increase the mental abilities of persons of all ages, the main studies have been done with children. This is first for the obvious reason that students are constantly tested anyway, and therefore the data need only be analyzed, and secondly because children's mental development is more rapid and can be more easily measured than persons at a later life stage.

EARLY CONCLUSIONS

After several informal studies were done in the early 20th century on the effect that chess has on logical thinking and other such functions, a primary conclusion was drawn that chess does in fact not only demand such characteristics, but develops and promotes them as well. John Artise in *Chess and Education* wrote "Visual stimuli tend to improve memory more than any other stimuli; chess is definitely an excellent memory exerciser the effects of which are transferable to other subjects where memory is necessary."

Improved memory is just the tip of the iceberg. Reports from students, teachers, and parents noticed the academic benefits of chess on math problem solving skills and reading comprehension, an increase in self-confidence, patience, logic, critical thinking, observation, pattern recognition, analysis, creativity, concentration, persistence, self-control, sportsmanship, responsibility, respect for others, self esteem, coping with frustration, and many other influences which are difficult to measure but can make a difference in student attitude, motivation, and achievement.

With this in mind, legislation in the U.S. in 1992 promoting and encouraging the incorporation of chess into the curriculum of schools was passed. The U.S. joined the more than 30 countries which already had chess included in some form in their school curricula. Today it is estimated that that number has more than doubled.

In part due to the educational community, which has noted the increased academic performance of students participating in chess, there has been an explosion in the number of children playing chess in the U.S. This popularity can be seen in the record number of players competing in National Scholastic Events. Scholastic chess players are increasing in numbers more rapidly than adult chess players; scholastic chess membership within the United States Chess Federation now represents more than 50% of the total members. An estimated 250,000 children in the U.S. are introduced every year through the school system to the basics of the game. As the number of children playing chess grows, it has become necessary for actual tests to be performed to determine the benefits of chess. Luckily,

these studies have already been done to confirm the hypothesis that chess is linked to increased grades in school; far too many to be listed here. I will touch on some of the more outstanding, thorough studies, all of which have similar findings.

CASE STUDIES

As reported in *Developing Critical Thinking Through Chess*, Dr. Robert Ferguson tested students from seventh to ninth grades from the years 1979-1983 as part of the ESEA Title IV-C Explore Program. He found that non-chess students increased their critical thinking skills an average of 4.6% annually, while students who were members of a chess club improved their analytical skills an average of 17.3% annually. Three separate tests to determine how chess affects creative thinking were also done as part of the same study. It concluded that on average, different aspects of creative thinking had improved at a rate two to three times faster for chess playing students, as opposed to their non-chess playing counterparts.

Subsequent studies by Dr. Ferguson further supported these original conclusions. In the Tri-State Area School Pilot Study conducted in 1986 and *Development of Reasoning and Memory Through Chess* (1987-88) chess playing students showed more rapid increased gains in memory, organizational skills, and logic.

In Zaire the study *Chess and Aptitudes*, was conducted by Dr. Albert Frank at the Uni Protestant School, during the 1973-74 school year. Using sufficiently large experimental and control groups, Dr. Frank wanted to confirm if the ability to learn chess is a function of special aptitude, perceptive speed, reasoning, creativity, or general intelligence. He hypothesized that in order to learn chess well one must have a high level of one or several of these abilities. He also wanted to see to what extent learning chess could influence the development of these abilities. His results were astonishing, yet predictable. There was a significant correlation between the ability to play chess well, and spatial, numerical, administrative-directional, and paperwork abilities. It showed that the ability in chess is not due to the presence of only one or two abilities but that a large number of talents all work together in chess. The conclusion was that students participating in the chess course show a marked development of their verbal and numerical aptitudes. Furthermore, this was noticed in the majority of chess students and not only those who were better players.

A study conducted in four large elementary schools in Texas in 1997 further demonstrated the positivism of chess. Through the Texas Assessment of Academic Skills (TAAS), the study was done to test the difference that chess club had on standardized tests. These schools were selected since all had a chess program in existence for a minimum of two years. The chess clubs met for one hour after school one day per week. Since a few thousand total students took the test and all types of students were tested from special education students to gifted and talented students, the sample was large and diverse enough to make a concrete conclusion. There were significant improvements in both reading and math for all grade levels and all classes of students (regular, gifted and talented, special education, academically able, etc.). Through the Texas Learning Index, or TLI, it was determined that on average

the students who played chess improved in reading and mathematics at a rate between 1.5 and two times faster than non-chess playing students.

In terms of verbal improvement specifically, a study by Dr. Stuart Margulies from 1991 addressed this. The study conclusively proved that students who learned chess enjoyed a significant increase in their reading skills. “Margulies Study is one of the strongest arguments to finally prove what hundreds of teachers knew all along-chess is a learning tool. (Inside Chess, February 1994).

“Can chess promote earlier intellectual maturation” was the question posed in the Chess and Cognitive Development study directed by Johan Christiaen from the 1974-76 school years in Belgium. The results again clearly confirmed that the group of chess playing students showed significantly more improvement than the non chess playing students.

In 1982, Dr. Gerard Dullea mentioned this study and proclaimed “...we have scientific support for what we have known all along-chess makes kids smarter! (Chess Life, November 1982) In a similar study done in a test series in New Brunswick, Canada called Challenging Mathematics, the mathematics curriculum used chess to teach logic from grades 2 to 7. The average problem solving score in the province increased from 62% to 81%. In Playing Chess: A Study of Problem-Solving Skills in Students with Average and Above Average Intelligence by Philip Rifner from the 1991-92 school term, the hypothesis that learning general problem solving skills in chess could then be applied to other domains was affirmed.

CONCLUSIONS

We can now say with full confidence that chess has been PROVEN to enhance creativity, problem solving, memory, concentration, intellectual maturity, self esteem, and many other abilities that a parent or teacher would desire. This proves what all of us involved in chess have been saying for years...chess makes you smart!

The Role of Chess in Modern Education

By Marcel Milat

According to Murray, Chess originated at the end of sixth century in India. The game was different then, elephants replacing the present day rooks and peasants replacing pawns. The “firzan” now known as the queen could only move diagonally one square at a time. Still, the basic elements of modern chess were present: the game was played on an eight by eight board with pieces and the sole goal being to checkmate the opposing king.

The game of chess has been dominated by Russians for nearly 70 years. With the exception of Bobby Fischer who won the world championship in 1972 and relinquished it in 1975 the past 11 world champions have been of Russian decent. Why are Russians the dominant figures in world chess?

Chess has been part of the curriculum for most Russian schools for over 40 years. Adolescents were encouraged to play chess at a very early age to increase their problem solving and reasoning skills. The gifted students were chosen and studied under the supervision of former world champion Mikhail Botvinnik.

Adrian de Groot, a psychologist in the 1960's became very interested in the use of chess as an educational tool. He began studying the thinking behavior of chess players in Russia. In particular he observed that there was a significant difference approach between those who highly skilled and experienced in chess to those who were new to the game. Initially de Groot assumed that the Grandmaster's superiority lay in their ability to organize well and to memorize concrete lines of play. What de Groot found was quite different: Grandmasters did not rely on superior memory skills. Grandmasters were not any better at recalling randomly placed pieces than novice chess players were. The Grandmaster however was able to take actual chess positions and in an astonishing 5 seconds recognize a complex chess configuration and decide on a successful move. How were the GM's able to give accurate, well thought out evaluations in so little time? It seemed that GM's (but not novices) were able to recognize familiar configurations, and associating them with appropriate moves and plans.

Recent research in the late seventies and early eighties in the US has confirmed these findings. Researchers concluded that meaningful knowledge is stored in memory in the form of networks and patterns, and these patterns provide the roots essential for recall. Thus the expert and GM players were able to remember and recognize chunks of information. In chess these chunks are visual representations in which particular configurations are recognized. These relate to and often cue prior successful responses or pattern responses. What is an involved long sequence of decision making of information for novices, is processed by experts in “one go”. It seems that other experts such as dancers, athletes and musicians operate mentally in much the same way. Responses are efficient and fast as understanding and experience are recognized and recalled in the essential structure of the activity. It seems that chess players develop complex but efficient structures for memory storage and management.

One of the essential goals of education is to teach children to think critically: students must learn to make reasoned judgments. Chess is an excellent tool to demonstrate the theme of critical thinking. During a game a player must formulate a plan of attack or defense.

The formulation of a plan entails that the player must not only reflect on how similar problems are solved (searching a database of previous knowledge) but also the player must perform a systematic checking of possible combinations of moves and then arrive at an evaluation of each line. The process is a mental exercise where pieces are envisioned to be moving from square to square and the player reflects on the characteristics of the position to finally produce a reasoned outcome (move). This is precisely the definition of critical thinking. Watson-Glaser appraised the value of chess as a learning tool and showed overwhelmingly “that chess improved critical thinking skills more than the other methods of enrichment.” Included in the study were future problem solving, problem solving with computers, independent study, creative writing and fantasy games like Dungeons & Dragons.

An important element of critical thinking in chess is the evaluation process where the strength of one's position is assessed. Beginners who play chess (and early computer programs) place significant emphasis on material -- reasoning that “the player with more material will win by sheer numbers”. If only chess was that simple. Material plays a central role in winning a chess game but many more ideas are needed for a useful evaluation of a position. More advanced players find a balance: included in their evaluation processes are the ideas of central control, pawn structure, material, space, maneuverability, king safety, initiative and development of pieces. The brain has internalized these values allowing the player to make a reasoned judgment of which particular themes are critical in evaluating his or her own position.

Mathematicians have estimated that there are approximately 10^{50} possible unique games of chess playable. Thus chess will never become just a repetition of previously played moves. So how can a player possibly make a decision as to which plan to choose with so many possible choices? Even with complicated evaluative techniques, choosing the best plan can be very difficult. The chess player must often must rely on intuition. The best chess players are often those who have an acute feel or intuition for which move is correct. This can be a useful tool in education. Intuition is generally undervalued in educational terms but can be a very useful tool in both problem solving and real life applications when the steps to solve a problem are not easily apparent.

Are there links between mathematics and chess? Chess players are often considered mathematically oriented and there are obvious similarities as chess is a game of problem solving, evaluation, critical thinking, intuition and planning -- much like the study of mathematics. Studies have shown that students playing chess have increased problem solving skills over their peers. Researcher suggests that while students playing chess learn concepts through physical and visual stimuli and correlate these concepts to cognitive patterns, mathematics in the classroom usually involves only pure symbolic manipulation. Thus there seems to be some evidence to suggest that chess acts as a sort of link in connecting form (symbolic) with understanding (physical and visual).

In the early 80's Faneuil Adams became president of the American Chess Foundation (ACF). Adams was convinced that chess was an excellent learning tool for the adolescent, especially the disadvantaged. The ACF embarked on the Chess in Schools Program which focused on New York's Harlem School district. Initially the program was focused on improving math skills for adolescents through improved critical thinking and problem solving skills. This was achieved as "test scores improved by 17.3% for students regularly engaged in chess classes, compared with only 4.56% for children participating in other forms of enriched activities."

Also noted was that many students social habits improved when playing chess. The game allows for students of dissimilar backgrounds to integrate with others. Many disadvantaged or special education students are becoming actively involved in chess programs as the value of chess as a social tool is further explored. Advocates of chess are hoping that some of New York's gang related problems will be solved as children and students play chess in their spare time instead of becoming involved with gang related activities. Thus chess steers youth away from trouble by keeping them off the streets as well as being a useful learning tool.

Jerome Fishman, Guidance Counselor, Queens, NY says: "I like the aspect of socialization. You get into a friendly, competitive activity where no one gets hurt. Instead of two bodies slamming into each other like football, you have the meeting of two minds. Aside from developing cognitive skills, chess develops their social skills. It makes them feel they belong. Whenever we get a child transferred from another school who may have maladaptive behavior, we suggest chess as a way of helping him find his niche. The kids become better friends when after the game they analyze possible combinations ... we have kids literally lining up in front of the school at 6:45am to get a little chess in before class."

Principal Jo Bruno, Brooklyn, NY : "In chess tournaments the child gets the opportunity of seeing more variety and diversity. There are kids who have more money than they have, but chess is a common denominator. They are all equal on the chessboard. I believe it is connected academically and to the intellectual development of children. I see the kids able to attend to something for more than an hour and a half. I am stunned. Some of them could not attend to things for more than 20 minutes." Bruno brings up the important point that chess can focus kids into concentrating on a task for long periods of time. Why is this? The author believes that many adolescents find chess fun and exciting. This corresponds to the youths playing (learning) for long periods of time without distraction.

Dr. Stuart Margulies, a researcher for IBM, stated that he "conclusively proved that students who learned chess enjoyed a significant increase in their reading ability". Dr. Margulies does not explain why he believes there is a correlation between chess and increased reading skills but it is the author's opinion that chess develops cognitive and attention skills. Furthermore, chess forces adolescents to visualize concepts and piece movement. This may allow for better visualization (interpretive) skills when reading.

Where is chess education headed? In the United States a major scholastic effort is underway to incorporate chess into the elementary school setting by the USCF, the US Chess Trust,

the AFC and thousands of teachers and volunteers. The USCF scholastic magazine School Mates has over 20,000 copies in circulation each month. Rosalyn Katz of New Jersey spearheaded a movement for scholastic chess volunteers to change the legislation for teaching chess in schools in the state of New York. Katz managed to pass two bills in senate: Bill #S452 and #A1122. The bills read :

“An act concerning instruction in chess and supplementing Chapter 35 of Title 18A of the New Jersey Statutes. Be it enacted by the Senate and General Assembly of the State of New Jersey:

1) The Legislature finds and declares that:

- chess increases strategic thinking skills, stimulates intellectual creativity, and improves problem-solving ability, while raising self-esteem;
- when youngsters play chess they must call upon higher-order thinking skills, analyze actions and consequences, and visualize future possibilities;
- in countries where chess is offered widely in schools, students exhibit excellence in the ability to recognize complex patterns and consequently excel in math and science; and
- instruction in chess during the second grade will enable pupils to learn skills which will serve them throughout their lives.

2) Each board of education may offer instruction in chess during the second grade for pupils in gifted and talented and special education programs. The department of Education may establish guidelines to be used by boards of education which offer chess instruction in those programs.

3) This act shall be made effective immediately.

The Province of Quebec has followed suit and also has programs in place where schools teach chess at the elementary level. Instructors are often professional chess players hired by the school board to teach part-time during the week. British Columbia has no official legislation regarding chess as an active learning tool but the author believes that it is only a matter of time until a comprehensive uniform stance is taken by the province on chess in the classroom. At present chess is taught at few schools in Vancouver, mostly under volunteer supervision. Lynn Stringer currently volunteers many hours starting chess programs in many Vancouver Island schools. As pressure grows from parents interested in better educational programs the author expects chess programs will be introduced province-wide in the near future . This will result in a greater demand for qualified people with the necessary skills to teach chess. Yasser Seirawan, US Grandmaster, said that, “Chess must no longer remain a civilized luxury of the leisure class in either appearance or fact; rather, chess must assume its fundamental role as a mental integrator and motivational activator. The hard scrabble nature of chess is equal to the task; are we equal to its full scholastic implementation?”

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