Chess in Education

or

Education With Chess?
2001: First Koltanowski, Dallas

Trial Study presented.

Proposed the angle of chess instruction for economically disadvantaged students.

Goal was initially to study how chess instruction effected student self perception, but the dissertation committee chair wanted a quantitative study.
2006 Chicago:

Presented the results of the 2003 full research project emphasizing the impact of chess instruction on the academic potential of economically disadvantaged students.

Suggested a shift in the “language” of Chess in Education

From:
“chess makes you better in math, reading, etc...”

To:
“chess develops the thinking skills that are at the foundation of improvement in math and reading” .... Weightlifting Analogy
Reflecting on 10 years, during which time much has been learned about “how we learn”.

**Neuroscience is taking us to the next level**

**The Next Question:**

Neuroscience is contributing to a biological understanding of cognitive development...

... can we now also use neuroscience to better understand affective development?..
“It is recommended that research be conducted on the effects of chess on the control motive which could provide needed research on the affective benefits of chess instruction.”
A Review of the 2003 Research
Introduction

Efficiency Contradicts Equity

If streamlined curriculum reduces the enrichment needed to develop cognitive processes, then providing enrichment opportunities for cognitive development would be an important step in educating children from poverty. Enrichment programs are still most “accessible to middle and upper-income families.”

The purpose of this study was to investigate the impact of chess instruction on the verbal, quantitative, and nonverbal reasoning abilities of students identified as economically disadvantaged. Schools with predominantly low-income populations might be able to solve the standardization dilemma with the inclusion of chess instruction as a heuristic enabler for improving the problem-solving skills of children from poverty.
Review of the Literature

Constructivism

Cognitive Development and Social Context

Enriched environments have an unmistakable effect on brain development.


Enrichment promotes higher-level thinking.

Cognitive Development and Social Context

Impoverished Environments

As a result of a lack of enriched experiences many children from poverty enter the school system deficient in problem solving abilities and language skills.


Students from poverty begin school at risk of academic failure.

Review of the Literature

Constructivism

Cognitive Development and Social Context

Verbal Skills

“If children have limited opportunity to learn language, organize perceptions, and develop other higher order cognitive processes, their ability to solve problems and think independently is negatively affected.”

Review of the Literature

Constructivism

**Stipek and Ryan**: Motivation versus Cognitive Competency

“Significant SES differences were found on all eight cognitive assessments given, including tests of basic reading related and number skills, problem solving, creativity, memory, and language skills.”

Disadvantaged children on a **trajectory of low academic achievement** and all of the negative social and personal outcomes that are associated with poor school performance.”

Review of the Literature

Constructivism

Cognitive Development and Social Context

**Alvidrez and Weinstein:** When socioeconomic status was controlled, preschool teachers’ *perceptions* of I.Q. significantly predicted G.P.A. and S.A.T. scores fourteen years later.

Cognitive Development and Social Context

The deficiencies that developed from the culture of poverty should be addressed in the manner in which they developed...

Socially
Play is considered to be a significant component of cognitive and social development.

What Kind of Game?

Gobet and Simon: **pattern identification** played key role in **problem solving**.


Leamnson: problem solving should be **hands-on**.

Review of the Literature
Chess and Problem Solving

Chess and Cognitive Development

Beyond the studies of psychologists, chess and cognitive development has been more extensively researched than chess and social skills.
Research Design, continued...

Four Pretest-Posttest

CogAT Verbal Reasoning Test (outcomes)

CogAT Quantitative Reasoning Test (outcomes)

CogAT Nonverbal Reasoning Test (potential)

Naglieri Nonverbal Abilities Test (potential)
Nonverbal Cognitive Abilities Tests (CogAT)

This set of tests does not correlate to academic success as much as the verbal and quantitative tests, but “is more useful...for obtaining an accurate assessment of the cognitive development of students who have difficulty with reading or for whom English is not the first language.”

Description of Instruments

Naglieri Nonverbal Abilities Test (NNAT)

NNAT: pattern identification, serial reasoning, spatial visualization

Used for measuring general ability as a “predictor of scholastic achievement” for students “from diverse cultural and language backgrounds.”

Summary, Conclusions, and Recommendations
Summary

Verbal Reasoning

• Statistical significance for all students in chess group
• No statistical improvement for control no chess group
• No statistical improvement for economically disadvantaged chess students
• Advantaged students improved significantly
• Advantaged students in chess group improved significantly compared to economically disadvantaged students in chess group
Summary
Quantitative Reasoning

• No significant improvements for either socioeconomic group in chess and non chess groups.

• Economically disadvantaged students in chess group had greater improvement over non chess economically disadvantaged than the advantaged student differences between chess and non chess groups.
Summary
Nonverbal Reasoning

• Two nonverbal tests administered were consistent in all evaluations.
• Statistical improvement for all students in chess group
• No statistical improvement for students in no chess group
• Both socioeconomic groups in chess group showed significant improvement.
• Greatest change in performance level was advantaged students in chess group over advantaged students in no chess group.
Conclusions

Verbal Reasoning

✓ Improvements for advantaged students in chess group are consistent with review of literature verbal studies.

✓ Time period of 12 weeks instruction is shorter than the 1 and 2 year studies found in the review of literature.

✓ Economically disadvantaged students may need more TIME to demonstrate improvements in verbal reasoning.
Conclusions

Quantitative Reasoning

✔ Expectations for improvements after twelve weeks of instruction were low, based on length of instruction in review of literature.

✔ The larger change in performance levels from pretest to posttest for the economically disadvantaged chess students over the advantaged non chess players students suggests that there is potential for chess instruction to improve quantitative reasoning abilities.
Conclusions

Nonverbal Reasoning

✓ The purpose of this study was to measure the impact of chess instruction on economically disadvantaged students, and thus the need for nonverbal measurements.

✓ This data drawn from two separate nonverbal measurements supports the conclusion that chess instruction had an impact on the nonverbal reasoning abilities of students in the chess classes, but specifically for economically disadvantaged students, and, therefore, improved their academic potential.
Teaching the Affective Before the Cognitive
Review of the Literature
Constructivism

Cognitive Development and Social Context

Alvidrez and Weinstein: When socioeconomic status was controlled, preschool teachers’ perceptions of I.Q. significantly predicted G.P.A. and S.A.T. scores fourteen years later.


Kids try hard at things they think they are good at.
Chess in Education

In the Context of Changes in Education
Agricultural Age (10,000 – 12,000 B.P.)

Farming

Division of Labor

Skills needed: Planting and harvesting

Influence: School Calendar

Alvin Toffler *The Third Wave*, 1993
Industrial Age (mid-1700’s – early 1900’s)

Factory Work

City People

Concept of Time

*Skills Needed:* Show up on time, discipline, productivity

*Influence:* Industrial model for school organization, business model of curriculum
Information Age (mid 1950’s to Present)

Average person makes a living processing information

**Skills Needed:**
Attention, Working memory, Processing speed, Visual processing, Long-term memory, Auditory processing, Reasoning and logic, comprehension

**Influence:** minimal, as education is rooted firmly in the previous two ages.
What has changed in the last 10 years?

Technology – “dial up” to “smart phones”

Amount of information available is staggering

The role of the educator is changing faster than our ability to comprehend the shift into this new age that will require a different skill set.
Ten Years of Applying the “Weightlifting” Analogy
At
A Title One School
Chess as an “environmental” change rather than preparation for tournaments

What changes?

Bughouse is now o.k. It’s how I get kids hooked on chess.

Bughouse is social, exciting, FUN, and they learn to use pieces in combination.
Chess Players from a Title One School, Academic Teams Outcomes

Lone Star Challenge (grades 4-6) 5 State championships

7th grade Academic Pentathlon 4 state championships,
1 National Championship

8th grade Academic Pentathlon, 6 state championships,
4 National Championships

Academic Octathlon (grades 9 and 10) 8 state championships

Academic Decathlon (grades 11 and 12), 11 Region Championships,
8 top 5 state ranks,
1 National Championship
Chess ... Academic Outcomes