Students' Perceptions of the Benefits of Scholastic Chess Instruction

Brock Education

A journal of educational research and practice

2021 Vol. 31 (1) 39-51

https://journals.library.brocku.ca/brocked

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Abstract

This paper explores students' perceptions of the benefits of chess-based instruction as part of an evaluation of a Chess in Schools (CIS) program implemented in 2017-2018 by a State Department of Education in the southeastern United States. The data were collected using a cross-sectional survey administered to students at the end of the academic year after 1 year of exposure to the CIS program. Results from the student survey responses (n = 1,286) indicated that a majority of students across all grade levels felt they had experienced a variety of positive outcomes because of their exposure to scholastic chess-based instruction. These perceived positive outcomes are beneficial for understanding the holistic impact of chess-based learning as they provide insight beyond measuring students solely on test scores or GPA metrics.

Keywords: scholastic chess instruction, chess-based instruction, student perceptions, chess benefits

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Thoughtfully playing a game of chess is an engaging mental experience. The inherent strategic nature of chess demands analytical awareness of its workings from players, and somehow the game can be enjoyable and accessible despite its depth and complexity. A skilled chess player must examine the current position of the pieces on the board and think carefully about moves that have yet to occur (Gumede et al., 2017). In addition to mere fun and entertainment, chess has many potential benefits and positive effects, including intellectual maturation, critical reasoning, and logical thinking. Chess players are also presumed to perform better academically than non-chess players, especially in mathematics and other disciplines that require systematic thinking (Gumede et al., 2017). Other virtues promoted by chess include increasing players' sense of patience, community, planning, and self-esteem (Aciego et al., 2012). According to Aciego et al. (2012), "chess helps to develop intellective thinking, improving all the skills and capacities that are related to intelligence" (p. 552). It is not only the intellect that is stimulated when playing chess; socio-affective abilities are potentially impacted as well (Aciego et al., 2012).

Any instructional intervention or educational tool is only as good as its ability to produce a desired effect on learners. For example, there have been some successes with the near-transfer of learning in settings where teachers utilized chess as an instructional strategy to impart subject-area content knowledge or to increase measurable academic achievement levels (Sala & Gobet, 2016). Near-transfer occurs when learning from one domain is transferred to another closely related domain. An example of this could be a student who learns about chemistry and is able to apply this knowledge to the subject of biology. Researchers have speculated that mathematics and chess occupy a similar subject domain, which could account for learning transfer as evidenced by academically related metrics (Ferreira & Palhares, 2008; Sala & Gobet, 2016). Far transfer, on the other hand, is when a subject from one domain is transferred to a subject that is not obviously related. An example of this could be when a student learns about mathematics and is able to apply this knowledge to the subject of history. However, some chess researchers have argued that far transfer is rare or nonexistent (Gobet & Campitelli, 2006; Sala & Gobet, 2017).

Chess can be introduced readily into an instructional environment, but it might not necessarily benefit students in easily measurable ways. Evaluating the cognitive processes involved in playing chess should be of primary interest to researchers who hope to incorporate its potential benefits into educational settings. To this end, many studies have examined the link between chess playing and academic outcomes (e.g., Celine, 2001; Gumede et al., 2017; Martinez, 2012; Nicotera & Stuit, 2014; Sala & Gobet, 2016). However, when the focus is only on test scores, student input is often omitted from chess-based education studies. Thus, this study makes a case for the importance of student perception in chess-related research by focusing on students, giving them a platform to voice their perceptions of how chess might have impacted them. In sum, the present study addresses the deficit in the existing literature in terms of student voice.

Positive Outcomes: Cognitive

Chess has many cognitive benefits for students. One of the most regarded and frequently researched benefits of chess is its potential effect on mathematics learning. Nicotera and Stuit (2014) reviewed over 50 different studies on chess instruction—implemented both during and after school—and its presumed effects on student mathematics learning, and concluded that chess had a "positive and statistically significant impact on student mathematics outcomes" (2014, p. 1). However, Nicotera and Stuit only looked at quantitative studies; they considered qualitative research as analogous to anecdotal information and not empirical by their definition. Also noteworthy was the fact that they, along with most other chess-based education researchers, focused only on cognitive outcomes, leaving out of consideration noncognitive outcomes (Aciego et al., 2012; Martinez, 2012). The omission of measuring noncognitive skills and outcomes dovetails with the exclusion of student voice in most chess-related research.

Noncognitive Aspects of Chess

Noncognitive skills (e.g., attitude, self-control, and patience) are often intangible and difficult to measure (Patterson & Ferguson, 2012; West et al., 2016). Although such skills can be difficult to operationalize and are somewhat new to the empirical scene, they are widely regarded as essential to mastery of their cognitive cousins (Beckmann & Minnaert, 2018; West et al., 2016). Aciego et al. (2012) studied the noncognitive effects of chess instruction in 170 students aged 6–16 years whereby students self-reported and teachers rated their students on noncognitive skills. After 1 year of exposure to chess instruction, most students were rated—by both self and teacher—as having better attitudes towards learning, higher teacher satisfaction, and an increase in self-esteem. These perceptions of increased noncognitive benefits from scholastic chess instruction aligned with higher scores on the assessment used in the study that measured cognitive abilities (Aciego et al., 2012). Aciego et al.'s work highlighted the importance of considering students' perceptions. Their findings indicated that students' perceived benefits of chess-based instruction were connected to tangible academic outcomes and gave credence to the relationship between cognitive outcomes and the points of view of the intended beneficiaries. Furthermore, these findings align well with the thinking of the authors of this paper. Simply put, student perception of chess-based education matters.

Emotion is a powerful and defining human characteristic that is amplified in pursuit of a positive academic outcome (Goetz et al., 2003). Goetz et al. (2003) defined academic emotions along five domains: "(1) attending class, (2) taking tests and exams, (3) studying or doing homework by oneself, (4) studying or doing homework in a learning group, and (5) other situations in which one is cognitively occupied with academic achievement" (p. 11). These are emotions that occur in academic settings when a student is pursuing a potential outcome such as a test score. Gumede et al. (2017) theorized that these factors, which they called "affective

states," would moderate a chess intervention on elementary students' academic performance (p. 4). They assessed the affective states of boredom and happiness, and the findings indicated that students who typically were bored or unhappy at school tended to experience an increase in mathematical abilities after exposure to chess. This increase could be related directly to subject transfer, in that chess strengthens the same skills needed to be successful at mathematics.

Purpose of the Study and Program Description

Given this background, the purpose of the current study was to assess students' perceptions of the use of chess in school, and to learn about the benefits of chess from their perspective after at least a year-long exposure to chess by their teachers. The Chess in Schools (CIS) initiative was implemented in 2017–2018 by a State Department of Education in the southeastern United States. The program trained public school teachers to use chess in the classroom as a means to teach curriculum standards, critical thinking, and 21st century skills. These teachers came from a variety of schools, areas of content expertise, and spanned grades 1 through 12. Participating teachers attended a 4-day professional development (PD) session in the summer prior to the start of the school year with the goal of learning to incorporate chess instruction into their class to best meet their students' academic needs. Prior to the summer PD, most teachers had little to no chess training. The summer training and subsequent instructional delivery to students incorporated the use of an online chess playing and tutoring site called ChessKid. As a prerequisite to the 4-day PD, teachers were given ChessKid accounts and asked to complete the pawn-level series of lessons to learn how each chess piece moves. The training introduced teachers to the game of chess while emphasizing curriculum connections in literacy, math, critical thinking, and life skills. In addition, teachers created lesson plans using chess to teach a curriculum topic and learned how to use the technology provided by ChessKid.

Methods

Instrumentation, Sample, and Data Analysis

After being exposed to 1 year of CIS—either during class time, after school (chess clubs and online), or a combination of both settings—student participants provided their perceptions of chess and its perceived effects via a survey, which was developed by the researchers in collaboration with the program coordinators who worked directly with the school teachers. The survey was informed by the goals of the program pertaining to expected student outcomes, as well as extant literature. Through an iterative process, the instrument was revised and validated by the research team and other university faculty with expertise in survey methods. Two equivalent forms of the instrument were created, one suitable for younger students in grades 1 to 4 (with emojis for response choices), and the other for students in grades 5 to 12 (with numerical values and descriptions for response choices). A total of 1,286 students in grades 1

through 12 completed the survey. Table 1 displays the distribution of students by grade level and self-identified gender. The proportion of participants who identified as males and those who identified as females was nearly identical for grades 1–4. In grades 5–12 there were slightly more participants who identified as male (54.2%) than female (45.8%). There were no differences in reporting the perceived benefits of chess based on the genders identified by the students. Both male and female students reported similar perceived benefits of chess playing.

Table 1

Distribution of Students by Grade Level and Gender

Grade level	Grade	Frequency	Percent
Grades 1–4	1	36	7.5%
	2	181	37.5%
	3	97	20.1%
	4	169	35.0%
	Total	483	100%
Grades 5–12	5	240	29.9%
	6	153	19.1%
	7	139	17.3%
	8	78	9.7%
	9	76	9.5%
	10	106	13.2%
	11	7	0.9%
	12	4	0.5%
	Total	803	100%
Grades 1–4	Female	237	49.1%
	Male	246	50.9%
	Total	483	100%
Grades 5–12	Female	368	45.8%
	Male	435	54.2%
	Total	803	100%

Survey data were analyzed using descriptive statistics. The data were analyzed separately for grades 1–4 (n = 483) and grades 5–12 (n = 803). Findings are reported for the two broad categories of grades rather than by each grade level. The researchers did not seek to draw comparisons between the two grade-level groupings.

Findings

Use of ChessKid.com and Chess Playing Outside of School

Students reported practising chess on ChessKid.com more in grades 5–12 (82.9%) than in grades 1–4 (67.4%). Table 2 shows that overall, 41.3% of students in grades 1–4 and 39.6% of students in grades 5–12 used ChessKid.com to practise chess sometimes or many times outside of school. The percentage of younger students who reported using ChessKid.com to practise or play chess at school other than during chess class, at least sometimes, was 60.7%, and 66.6% for older students.

Table 2

Use of ChessKid.com

Grade level	Response	I use ChessKid.com to practise or play chess outside of school	I use ChessKid.com to practise or play chess at school other than during chess class
Grades 1–4	Not at all	58.8% (n = 281)	39.3% (n = 186)
	Sometimes	28.7% (n = 137)	34.7% (n = 164)
	Many times	12.6% (n = 60)	26.0% (n = 123)
	Total	100% (n = 478)	100% (n = 473)
Grades 5–12	Not at all	60.4% (n = 479)	33.4% (n = 265)
	Sometimes	31.3% (n = 248)	45.3% (n = 359)
	Many times	8.3% (n = 66)	21.3% (n = 169)
	Total	100% (n = 793)	100% (n = 793)

In grades 1–4, 34.8% (n = 166) of the students participated in chess clubs, and in grades 5–12, 31.8% (n = 253) participated in chess clubs. Regarding how often they played chess outside of school, overall, 30.6% of students in grades 1–4 and 37.9% in grades 5–12 stated they played chess with their friends outside of school sometimes or many times. A higher percentage of students in grades 1–4 (55.2%) reported playing chess at home than those in grades 5–12 (46.2%).

Perceived Ability to Play Chess

As shown in Table 3, students in grades 1–4 generally rated their perceptions about their ability to play chess higher than those in grades 5–12. Most students indicated that chess was a fun game, they enjoyed playing it, and they enjoyed playing the game with their classmates. Also, most students in both grade level categories indicated that chess provided entertainment, a detail that may be important to foster student engagement.

Table 3

Students' Perceptions About Experience With Chess by Grade Level

Statement about experience with chess…	Grades 1–4	Grades 5–12
Anyone can learn chess.	78.9% (*n* = 355)	70.5% (*n* = 549)
Chess is a fun game.	84.1% (*n* = 398)	64.4% (*n* = 508)
Chess is something I am good at.	71.4% (*n* = 327)	49.0% (*n* = 385)
Chess provides entertainment.	79.8% (*n* = 375)	60.9% (*n* = 479)
I am confident in my ability to play chess.	77.6% (*n* = 346)	56.1% (*n* = 439)
I enjoy playing chess.	82.7% (*n* = 392)	64.7% (*n* = 514)
I enjoy playing chess with my classmates.	83.4% (*n* = 393)	72.1% (*n* = 572)
I find chess confusing.	40.7% (*n* = 185)	26.6% (*n* = 209)
I put a lot of effort into my schoolwork.	90.4% (*n* = 426)	82.5% (*n* = 651)
My teachers make learning exciting.	82.4% (*n* = 384)	62.5% (*n* = 494)
When I am doing my schoolwork, I get very engaged.	71.7% (*n* = 329)	59.9% (*n* = 471)

Table 4 shows students' perceived benefits of chess for grades 1–4, categorized by their self-identified gender to check for any statistical differences based on gender identity. Students were asked to reflect on their experiences since they started learning chess in school. The top five items based on students' rankings were: I work harder on my schoolwork (82.7%); I can now do the hardest work if I try (80.6%); I work better with my teachers at school (77.7%); my grades have improved (76.4%); and I am more excited about learning (76.3%). It is worth noting that a majority of students indicated that all items listed in Table 4 had occurred. Generally, the percentages of females tended to be higher than males across most items.

Table 4

Perceived Benefits of Chess Grades 1–4 (Ordered by Rank)

Since I started learning with chess…	Female	Male	Total
I work harder on my schoolwork.	84.5% (*n* = 196)	80.9% (*n* = 191)	82.7% (*n* = 387)
I can now do the hardest work if I try.	82.0% (*n* = 187)	79.2% (*n* = 183)	80.6% (*n* = 370)
I work better with my teachers at school.	83.0% (*n* = 191)	72.6% (*n* = 172)	77.7% (*n* = 363)
I feel more successful at school.	78.5% (*n* = 175)	76.4% (*n* = 178)	77.4% (*n* = 353)
My grades have improved.	80.0% (*n* = 180)	72.8% (*n* = 166)	76.4% (*n* = 346)
I am more excited about learning.	78.9% (*n* = 180)	73.7% (*n* = 174)	76.3% (*n* = 354)
I participate more in class.	74.2% (*n* = 170)	75.2% (*n* = 179)	74.7% (*n* = 349)
I can organize my life better.	74.6% (*n* = 167)	71.9% (*n* = 169)	73.2% (*n* = 336)
I work better with other students at school.	73.0% (*n* = 162)	69.7% (*n* = 163)	71.3% (*n* = 325)
I can organize my schoolwork better.	68.7% (*n* = 156)	69.9% (*n* = 167)	69.3% (*n* = 323)
I am better at managing time.	68.6% (*n* = 155)	66.7% (*n* = 158)	67.6% (*n* = 313)
I am more interested in school.	71.2% (*n* = 166)	63.4% (*n* = 151)	67.3% (*n* = 317)

Table 4 (cont'd)

Perceived Benefits of Chess Grades 1–4 (Ordered by Rank)

Since I started learning with chess…	Female	Male	Total
I spend more time working with my classmates.	70.9% (*n* = 166)	63.5% (*n* = 153)	67.2% (*n* = 319)
I enjoy mathematics more.	67.2% (*n* = 156)	64.4% (*n* = 150)	65.8% (*n* = 306)
I am more interested in mathematics.	65.4% (*n* = 149)	61.7% (*n* = 145)	63.5% (*n* = 294)

As shown in Table 5, the five highest ranked items by students in grades 5–12 were: I can now do the hardest work if I try (65.7%); I work harder on my schoolwork (65.7%); I feel more successful at school (64.4%); my grades have improved (59.5%); and I work better with my teachers at school (56.2%). Items that scored the lowest were: I enjoy mathematics more (43.6%), I am more interested in mathematics (41.9%), and I spend more time working with my classmates (41.5%). Similar to students in grades 1–4, the percentages of females tended to be higher than males for most of the items.

Table 5

Perceived Benefits of Chess Grades 5–12 (Ordered by Rank)

Since I started learning with chess…	Female	Male	Total
I can now do the hardest work if I try.	67.4% (*n* = 242)	64.3% (*n* = 270)	65.7% (*n* = 512)
I work harder on my schoolwork.	69.1% (*n* = 248)	62.8% (*n* = 263)	65.7% (*n* = 511)
I feel more successful at school.	64.2% (*n* = 231)	64.6% (*n* = 272)	64.4% (*n* = 503)
My grades have improved.	59.7% (*n* = 216)	59.3% (*n* = 254)	59.5% (*n* = 470)
I work better with my teachers at school.	58.5% (*n* = 210)	54.2% (*n* = 228)	56.2% (*n* = 438)
I can organize my life better.	56.5% (*n* = 204)	55.1% (*n* = 236)	55.8% (*n* = 440)
I participate more in class.	57.4% (*n* = 209)	52.5% (*n* = 227)	54.8% (*n* = 436)
I can organize my schoolwork better.	57.9% (*n* = 210)	51.3% (*n* = 222)	54.3% (*n* = 432)
I work better with other students at school.	51.9% (*n* = 188)	54.8% (*n* = 235)	53.5% (*n* = 423)
I am better at managing time.	51.4% (*n* = 186)	49.4% (*n* = 211)	50.3% (*n* = 397)
I am more excited about learning.	50.8% (*n* = 182)	47.9% (*n* = 201)	49.2% (*n* = 383)
I am more interested in school.	52.7% (*n* = 192)	43.6% (*n* = 188)	47.8% (*n* = 380)
I enjoy mathematics more.	45.1% (*n* = 164)	42.5% (*n* = 183)	43.6% (*n* = 347)
I am more interested in mathematics.	41.7% (*n* = 151)	42.1% (*n* = 181)	41.9% (*n* = 332)
I spend more time working with my classmates.	44.1% (*n* = 160)	39.4% (*n* = 171)	41.5% (*n* = 331)

Discussion of Findings Related to Students' Perceptions

The data presented in this paper generally paint a positive picture of students' perceptions across all grade levels for both genders that were identified by the participants. Of the 1,286 chess-playing student respondents, the majority indicated an overall increase on a range of

cognitive and noncognitive abilities since they started playing chess. Survey items with the highest percentage of respondents answering positively were those related to working harder and achievement at school. Such positive perceptions can indicate a multitude of both cognitive and noncognitive related outcomes. The following sections speak to some of the specific findings, initial surprises, and suggested future research within the context of existing literature.

Potential Cognitive Related Outcomes

Survey responses presented in this paper provide information on student perceptions that could be valuable to researchers looking for the reasons why a particular outcome occurs with chess-based instruction. In their comprehensive review of the literature, Nicotera and Stuit (2014) found that scholastic chess instruction—both during and after school—had a positive effect on student learning of mathematics. Consistent with previous research, the data presented in this paper indicated that a large percentage of students in grades 1–4 (65.8%) and in grades 5–12 (43.6%) had an increased enjoyment of math after participating in chess-based instruction. Enjoyment and fun can potentially be powerful human motivators for engagement, participation, and success. Increased student engagement in learning activities and lessons can produce higher academic outcomes overall as engaged students often retain more information. More specifically, it is possible that playing chess increased the students' enjoyment of systematic thinking, which could potentially be linked to higher math achievement. In addition to increases in math enjoyment, many students—63.5% in grades 1–4 and 41.9% in grades 5–12—reported growth in their interest in math after participating in CIS. This aligns with prior research that suggests chess-based instruction could be responsible for improving students' problem-solving and strategic thinking (Ferreira & Palhares, 2008). Chess and mathematics often share many similar concepts centered around strategic and systematic thinking and problem solving. When students enjoy learning the concepts related to chess, they may begin to see the interesting aspects of also continuing to learn and apply such concepts in mathematics. If students develop an increased interest in mastering such concepts, their academic achievement and mastery could potentially progress and flourish. Perhaps it is this increased interest and enthusiasm in the types of problems frequently encountered when learning the concepts of mathematics that contributes to the development of student ability in this subject. These findings are consistent with the research and strengthen the current body of literature in favour of chess instruction for academic benefit.

In addition to exposure to math-related concepts, chess also challenges players to persevere and continually practise to be successful at the game. Working harder and at an increased complexity level could conceivably benefit students in several ways. Many students felt an overall increase in their ability to work harder on their school assignments after having been

exposed to chess-based instruction (grades 1–4: 82.7%; grades 5–12: 65.7%). According to the students, incorporating chess into their curriculum impacted their sense of applying themselves to tasks at school. Playing chess well requires thoughtful practice. As students work to become better at chess, this understanding of the need for thoughtful practice can be transferred to the students' approach to school tasks in that they learned the necessity of diligent practice in relation to their scholastic betterment. This conclusion supports Sala and Gobet's (2016) research on near-transfer of learning. An increase was also shown on a similar survey item related to the students' abilities to complete the most difficult school assignments. This item revealed that most students in grades 1–4 (80.6%) and in grades 5–12 (65.7%) felt that they were more capable of meeting the challenges posed by the most difficult assignments after having participated in CIS. Furthermore, chess can be a daunting game to those who are unfamiliar with its rules. Perhaps it was a boost in student self-confidence that occurred after having learned the rules of chess, helping students to feel less intimidated by other intellectual challenges. After finding success in learning and participating in chess, the students may have realized the depth of their ability to tackle and master complex and daunting tasks. Once students recognize their ability to meet such challenges, they can begin to apply this realization to academic work. The hope is that student fear and discouragement with attempting to complete new and challenging academic tasks decreases and allows students to reach their full academic potential. With this information, instructors can learn to help students recognize their own abilities using programs such as CIS. Instructors can begin to facilitate a more positive and proactive approach to intimidating academic work through the use of engaging and enjoyable activities such as chess. Such activities can create a lower-stakes environment for students to begin to fully develop their self-confidence and determination.

Potential Noncognitive Related Outcomes

Several survey items asked students for their perceptions of their noncognitive abilities. Of particular interest was the topic of organization. Many students in grades 1–4 (73.2%) and many in grades 5–12 (55.8%) responded that they felt they could organize their lives better after having been exposed to scholastic chess instruction. A similar item was related to students' perceptions of their ability to organize their schoolwork. More than two-thirds of the students in grades 1–4 (69.3%) and more than half of the students in grades 5–12 (54.3%) responded that they felt an increase in their ability to organize their schoolwork. As the nature of chess is strategic and tactical, it is fitting that organizational skills would be a potential byproduct of chess instruction. Learning to plan movements in chess with the purpose of achieving an intended outcome of success presumably encourages students to organize their thoughts to plan actions to achieve successful outcomes. In the above-mentioned data, the participants perceived an increase in organizational-related abilities after learning the skillset associated with chess instruction. This information could heavily influence the importance of incorporating

chess in academic instruction for younger students. Younger students (such as those in grades 1–4) are at an impressionable age. Academic and life skills learned at a young age have the potential to set students on a trajectory of success both academically and nonacademically.

Another item on the survey asked students to rate their time management skills, with over half of respondents in both the 1–4 and 5–12 grade level groups reporting an improvement—67.6% and 50.3%, respectively. All these survey items indicate that students felt an increase in their overall organizational abilities. In this context, it could be reasoned that students felt better prepared to deal with the daily demands of their schedules because of organizational and systematic thinking learned from their exposure to scholastic chess instruction. It is plausible to think that students who are more comfortable and prepared to plan and manage their daily activities and requirements may have more time to focus on their academic pursuits. This is one additional benefit to developing these much-needed organizational abilities. Reviewing the literature on the topic of chess and increased student organizational abilities reveals a scarcity of such studies having been conducted to understand this possible dynamic. As organization is essential to achievement in school and work, this could be a fruitful area of research that is largely unexplored. Future research could address this dynamic by seeking to understand the daily focus and intent of students with increased abilities in organization because of chess instruction as compared to their counterparts.

Lastly, of note are the percentages of students who found chess to be fun and enjoyed the game whether they played on ChessKid.com or with a physical chess set. Large percentages of students responded that they used ChessKid.com outside of school either sometimes or many times. Roughly one-third of the students indicated playing chess with friends outside of school (grades 1–4: 30.6%; grades 5–12: 38.1%) or at home (grades 1–4: 55.2%; grades 5–12: 46.2%) either sometimes or many times. This general enthusiasm for the game is one reason why chess could potentially be perceived to be so effective inside the classroom environment. As with the potential increase of academic achievement and progress discussed in the cognitive related outcomes, enjoyment in playing chess can also foster positive social interactions. Such positive interactions can increase student enjoyment in understanding and solving challenging problems with their peers or competitively. When students increase their participation in chess outside of the academic setting, they are fostering their enjoyment in understanding and honing their skills of the game. With more practice comes mastery, which should make transfer of learning more likely (Sala & Gobet, 2017). This is a positive outcome in that it teaches students to work hard to fully grasp concepts and complete tasks that challenge them outside of the academic setting, and it teaches students that thought-provoking and problem-solving tasks can be socially enjoyable with their families and friends. Social enjoyment can open the door for many students to share or inquire about other challenging and thought-provoking academic work they may engage in at school. This is another area of research that potentially could be explored further to better understand the social impacts of chess instruction for students.

Conclusions

Student perceptions of the benefits of scholastic chess instruction revealed in this paper could give meaning and provide further avenues of critical exploration for scholastic chess instruction research apart from the well-worn path of only examining outcomes based on test scores. Per the review of the literature, many unexplored cognitive and noncognitive skills related to chess-based instruction could be studied, which were highlighted by the perceptions of the students presented here. This paper's findings indicate an increase in student perceptions of enjoyment, interest, self-confidence, and organizational skills after participating in the chess program. Follow-up studies should examine the relationship between student perceptions and their outcomes along a variety of cognitive and noncognitive abilities. For example, it would be beneficial to know how many of the students who said they felt more successful at school had improved outcomes in their academic achievement. As previously mentioned, it also would be beneficial to explore the student-perceived long-term academic and social implications of introducing such programs to students at a young age. Comparing student perceptions with their achievement data and history of academic success could also potentially shape the implementation of programs such as CIS.

Surveys of students are not without limitations. It could be argued that students potentially responded to the survey items in a biased way to reflect what they felt were socially desirable traits (West et al., 2016). There were, however, many respondents (n = 1,286) and similar results were found across the spectrum of grades surveyed. This indicates a degree of common perception that was uniform to many participants. Also, the point remains that consulting with students about their own understandings of a chess-based learning strategy could be beneficial when researching scholastic chess instruction compared to only considering a numerical outcome. Student perceptions and voice should continue to be a focal point when considering program development and implementation for students. This study demonstrates how powerful student voice can be in addition to numeric outcomes when evaluating program outcomes, successes, and areas for improvement. Incorporating student voice and perceptions about learning chess could be monumental in expanding the current body of literature focused on future program development and instruction to enhance student outcomes.

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