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Token Economy Intervention in an Elementary School Classroom

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This research examines the effect of a token economy on student behavior in a fourth grade, elementary school classroom. There has been extensive research on token economies in the classroom; however, at the time of this study, there was little existing research on the benefits of cognitively stimulating token reinforcers or a variable ratio schedule of token delivery. Therefore, the purpose of this research was to apply these additional characteristics in a reinvented token economy intervention. Twenty-two students from a fourth-grade classroom in Northern Illinois participated in this study and data were collected for seven weeks, one hour in the morning and one hour in the afternoon. The data demonstrated a significant decrease in problematic behaviors and a general trend of increased productive behaviors during token economy intervention, which suggests that the intervention may have been responsible for changes in students' behavior.

Keywords: token economy, elementary education, fourth grade, student behavior, motivation, engagement

Introduction

Educators constantly seek evidence-based practices to improve their classroom management and student engagement. Through my own pre-student teaching experience in a high-need, second-grade classroom in a northern Illinois city, I learned how important it is to have a consistent method of classroom management. Two students in my class struggled to stay focused and had frequent outbursts. As a solution, my cooperating teacher decided to implement her version of a token economy. During this intervention, both students exhibited an increase in productive behaviors and a decrease in disruptive/off-task behaviors—the stark improvement fascinated me, which ultimately led me to this research. Considering my student teaching, I wondered if a similar token economy system could improve behavior in a whole class setting instead of just for a few students. Therefore, this project served as my inquiry into this question.

This research examined the effect of a token economy on student

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behavior in a fourth-grade classroom, which I student taught. Research suggested that token economies could be effective in reducing problem behaviors and increasing productive behavior exhibited by elementary age students (Higgins et al., 2001). At the time of this study, there was existing research on token economy interventions; however, according to Higgins et al. (2001), there was little research on the use of cognitively stimulating activities as token reinforcers (non-cognitively simulating reinforcers include items such as toys, free time on an electronic device, etc.). Understanding the value of a token economy remains important to the educational community because of its potential impact on behavior, engagement, and classroom management—all of which, when managed effectively, are foundational aspects of a productive, well-run classroom. In this project, a token economy was operationally defined as a system of reinforcement where "neutral items (i.e., tokens) are awarded for the demonstration of targeted behaviors;" these tokens can be exchanged later for "backup reinforcers" (Soares et al., 2016, p. 380). Students were given desirable, cognitively stimulating token reinforcers in response to productive behavior choices. Examples of cognitively stimulating reinforcers included coding/typing computer games, math games, art projects, extra independent reading time, and read-alouds. Tokens were not taken away, nor given for, problematic behavior choices and were presented in a variable ratio schedule of reinforcement to reduce the probability of extinction (Skinner, 1969). In this study, token reinforcers were inherently desirable or interest-based, cognitively stimulating, promoted a sense of autonomy (the child could choose from a host of options), and used as a positive reinforcer to promote productive behavior.

At the time of this study, there was a gap in knowledge regarding the use of cognitively stimulating token reinforcers to promote productive behavior in the context of a token economy. Through this mixed-methods, quasi-experimental research, I attempted to answer the following sub-questions: did cognitively stimulating reinforcers make a difference in the success of a token economy? Did a variable ratio schedule make a difference? How did a system of only positive reinforcement play a role? What impact did student autonomy and choice have on the success? What about student interest? The overarching research question was as follows: What happens in an elementary school classroom when you implement a token economy? Therefore, the purpose of this research was to understand what happened when a positively reinforced, autonomous, cognitively stimulating, and interest-based token economy system was implemented, so that elementary teachers could decide whether to use a token economy system in their classrooms.

Literature Review

There has been extensive research on token economies in the classroom; however, at the time of this study, there was little existing research on the benefits of cognitively stimulating token reinforcers or a variable ratio schedule of token delivery. The current study examined these ideas and was largely rooted in the philosophies of behaviorism, empiricism, and progressivism. Skinner (1969), who studied the influence of the environment on behavior, argued that the way an organism behaves is directly related to the consequences that they receive. Skinner's ideas influenced the development of the token economy, which explicitly highlighted the relationship between stimulus and behavioral response (Skinner, 1931; Skinner, 1969). John Locke, an empiricist whose philosophy of education is rooted in choice, play, and student interest, and John Dewey, founder of the pragmatist school of philosophy, influenced the decisions made in terms of autonomy and interest-based, cognitively stimulating reinforcers (Locke, 2012/1693; Dewey, 2012/1938). One goal of this research was to examine these philosophical and pedagogical ideas in action, in a fourth grade, elementary school classroom.

Through their reinforcement research, Ferster and Skinner (1975) found that out of all potential schedules—fixed interval, fixed ratio, variable interval, and variable ratio—variable ratio schedules of reinforcement (reinforcement that comes after an unpredictable number of responses) were the most resistant to extinction. This meant that once removed, the effects of the token economy would remain constant longer than those that followed a different schedule of reinforcement. This finding was important for my research because I realized that a variable ratio schedule could potentially prolong the behavior changes exhibited by students during the intervention. Lee and Belfiore (1997) claimed that the use of schedules of reinforcement as means of behavior modification and classroom management was frequently overlooked. They stated that a benefit of using a variable ratio schedule in the classroom was the "elimination of post-reinforcement pause," (this pause occurs when the subject predicts when the next reward will come and pause or decrease the quality of their responses until right before the next predicted event approaches). which led to a consistent rate of response across the intervention (Lee & Belfiore, 1997, p. 212). Under a fixed schedule, the participant was able to gauge when the next reinforcer would come because the schedule of reinforcement was consistent. Participants could correctly estimate the next reward, so they knew when they could start and stop their responses and still elicit a reward. When the schedule was randomized, the participant did not engage in a post-reinforcement pause because they did not know when to expect the next reward. Therefore, in the classroom, a variable ratio schedule was ideal for this project, because

the time students spent engaged in the task would increase. The strength of a variable ratio schedule was well-researched, and highly effective in modifying behavior and combatting the extinction process (Ferster & Skinner, 1957; Lee & Belfiore, 1997, Peele et al., 1984; Reynolds, 1975). While many studies implemented either a fixed interval or fixed ratio schedule of reinforcement (Carnett et al., 2014; Fachin, 1996; Filcheck et al., 2004, Higgins et al., 2001; Kourilsky & Hirshleifer, 1976; Leidig et al., 2018; Tiano et al., 2005), the current study was among the first to implement a variable ratio schedule in a token economy intervention.

Dewey (2012/1938) argued that schools should operate as mini democracies to teach students how to be active members of the democratic society in their adult lives. According to Dewey (2012/1938), foundational aspects of democracy include participation on "equal terms" and being a part of a "conjoint communicated experience" (p. 242). Therefore, I argued that students should be included in the decisions made in a classroom. In this study, the students collectively created a list of cognitively stimulating, interest-based activities that they chose from as token reinforcers. Students also were given the opportunity to select their own activity from this list during each reward period. Doing this gave the students freedom of choice and the opportunity to participate in a democratic society. Similarly, Dewey contended that "thinking which is not connected with increase of efficiency in action, and with learning more about ourselves and the world in which we live, has something the matter with it just as thought" (Dewey, 2012/1938, p. 254). This led me to the following question: How would I get students to thoughtfully select and engage with meaningful, cognitively stimulating activities?

One solution to this question was to incorporate student interest into the token reinforcers. Past research suggested that interest-based reinforcers increased the effectiveness of a token economy intervention. Carnett et al. (2014) compared the effects of a token economy on Troy, a 7-year-old boy with autism, when the tokens were of interest or not of interest to the child. The researchers sought to understand whether interest-based tokens, jigsaw puzzles, would improve behavior problems more than non-interested-based tokens, pennies (Carnett et al., 2014). During Troy's baseline period he fluctuated between 11% and 13% on-task behavior, during the interest-based condition his average percentage of on-task behavior was 59.7%, and during the neutral token condition his percentage of on-task behavior was 45% (Carnett et al., 2014). These data demonstrated that while both token economy conditions were beneficial in decreasing Troy's problem behavior, the interest-based condition was more effective (Carnett et al., 2014). These findings supported the idea that the use of a token economy that takes the participant's interests into account could have potentially been more effective in reducing disruptive behavior

than one that does not (Carnett et al., 2014). Based on this success, I chose to implement token reinforcers that were interesting to the child in this research.

A challenge to this idea was the overjustification effect, the theory that applying an extrinsic reward to a once-intrinsically rewarding task decreases intrinsic motivation to do that task in the future (Akin-Little & Little, 2004). Akin-Little and Little (2004) tested this theory by pairing a reward with the obedience of classroom rules in a third grade token economy. They found that there was no negative effect on intrinsic motivation when given a reward for the expression of the desired behaviors (Akin-Little & Little, 2004). I hoped to find a similar effect in my study. But, as an additional protection against this effect, I incorporated options for student choice in the token reinforcers with the hope that students would be intrinsically motivated by their own autonomy.

Another solution to the above philosophical question was adding elements of student choice into the intervention. Patall et al. (2010) suggested the importance of autonomy and choice in the classroom. The self-determination theory stated that autonomy—the ability to have free choice and control over one's life, was crucial to intrinsic motivation (Deci & Ryan, 1975). According to this theory, students would have more intrinsic motivation when they felt autonomous and competent (Patall et al., 2010). The idea in this study was that allowing students to have free, democratic choice over a variety of cognitively simulating activities would increase intrinsic motivation, and in turn, increase willingness to change their behavior in accordance with the token economy intervention.

Patall et al. (2010) tested the self-determination theory through their study of the effect of providing choice on homework assignments. The experimental group was given the choice between two assignments and the control group was given no choice (Patall et al., 2010). The results indicated that homework choice was a significant predictor of interest, enjoyment, perceived competence, test scores, and homework completion (Patall et al., 2010). Overall, researchers found that students felt more autonomous and motivated when given the opportunity to choose their homework assignment (Patall et al., 2010). In this research, I aimed to contribute to the existing research on autonomy and choice by allowing the participants to choose their back-up token reinforcers. Previous studies on token economies found that the intrinsic motivation resulting from autonomous choice had a positive impact on student motivation and behavior management (Fachin, 1996; Higgins et al., 2001). The goal in doing this, as Dewey (2012/1938) stated, was to avoid letting the thinking process become separated from the action. When given the opportunity to decide on their own list of cognitively stimulating reinforcers, I predicted

that the students would engage with the material more thoughtfully. Instead of separating the thought from the action, I argued that students would connect more deeply with the aim of education—growth (Dewey, 2012/1938). In this research, the students brainstormed a list of productive behaviors and behaviors they wanted to avoid (problematic), as a class. After they created this list, my cooperating teacher and I narrowed them down to five productive behaviors and five behaviors to avoid to make data collection more concrete and reliable.

Only one existing study implemented a token economy that included cognitively stimulating token reinforcers (Higgins et al., 2001). The goal of this study was to "evaluate the effects of contingently presenting a student with tokens which were later exchanged for math worksheets" (Higgins et al., 2001, p. 100). The researchers observed a 10-year-old male participant that was in third grade, who frequently exhibited disruptive behavior (Higgins et al., 2001). During the token economy test phase, which was 3 to 12 days, the participant earned check marks on a piece of paper for each appropriate behavior and at the end of each day of testing, the participant turned the check marks in for math worksheets, academic computer games, or reading time (Higgins et al., 2001). During the intervention, the researchers saw a notable decrease in the number of inappropriate behaviors exhibited by the student (Higgins et al., 2001). Disruptive outbursts for one of the targeted behaviors decreased from a mean of 6 to a mean of 0.8 per 20-minute observation (Higgins et al., 2001). The success of cognitively stimulating token reinforcers was promising in this study; therefore, I implemented a similar intervention in my own research.

An additional benefit of using cognitively stimulating activities as back-up reinforcers was that students could potentially experience increased enjoyment of academic activities. Based on the previously referenced research, effectiveness of an intervention increased when participants were given interest-based choices and the freedom of autonomy (Carnett et al., 2014; Deci & Ryan, 1975; Fachin, 1996; Higgins et al., 2001; Patall et al., 2010). Given a variety of options to choose from, people begin to develop an internal locus of control—the belief that the outcome of a situation is entirely dependent on their own actions (Zimbardo, 1985). When a person believes that they have control over their choices, they develop a stronger sense of self-efficacy, work harder, and report being happier (Kundi et al., 2014). I theorized that as these feelings began to develop around the cognitively stimulating reinforcers in this study, the students might attribute them to the reinforcers and feel more driven to earn them.

As this research is founded on ideas stemming from Skinner's operant conditioning, a distinction between reinforcement and punishment was

necessary. Locke (2012/1693) argued that "good and evil and reward and punishment, are the only motives to a rational creature" (p. 109). This idea prompted the following questions: was punishment actually an effective method of behavior control? Did both methods of reinforcement, positive and negative, have the same effect? Skinner, a behaviorist, argued that positive reinforcement, when systematic, motivational, and meaningful, was most beneficial to students (Ozmon, 2012). He also stated that conditioning should not be used at all times; instead, the teacher should get to know their students and decide when and how they will implement a system (Ozmon, 2012).

Similarly, Locke (2012/1693) clarified his views on punishment by stating that while it was the teacher's job to make students "obedient to discipline" and "pliant to reason," he did not endorse any physical or other severe punishment (p. 109). He argued that schooling should not be fear-based; rather, education should encourage play, exploration, and intellect (Locke, 2012/1693). Locke (2012/1693) encouraged teachers to

> Keep [students] to the practice of what you would have grow into a habit by them, kind words and gentle admonitions, rather as minding them of what they forget, than by harsh rebukes and chiding, as if they were wilfully guilty (p. 111).

Conditioning should mimic these beliefs—that is, rooted in positive reinforcement and autonomous choice (Locke, 2012/1693).

Based on these philosophic ideas, more recent research noted benefits of a token economy system based purely on positive reinforcement. A host of studies examined the impact of a response cost token economy program on behavior management. Tiano et al. (2005) defined a response cost program as a system of negative consequences in response to problem behaviors; according to a meta-analysis that compared 16 response cost studies to studies that did not use response cost, those that implemented a response cost program had a lower effect size (Soares et al., 2016). This meant that there was a weaker relationship between the token economy program and the desired outcome behaviors with the response cost system. So, the data suggested that negative reinforcement was not the most effective method when used in concert with token economy intervention (Soares et al., 2016). On the other hand, studies that implemented a token economy system paired with positive reinforcement saw strong improvements in outcome behavior (Carnett et al., 2014; Fachin, 1996; Higgins et al., 2001). Participants in all three studies exhibited more positive behavior and less negative behavior (Carnett et al., 2014; Fachin, 1996; Higgins et al., 2001). Based on these data, the current study focused solely on positive reinforcement in the hopes that there would be a change in behavior and engagement in the classroom.

Methods

The participants in this study were 22 fourth-grade students, ages 9-10, from a northern Illinois suburb. There were 12 students of Asian descent, 3 students who were Black or African American, 1 student who was Hispanic or Latino, and 6 students who were White or European American. One additional student's data was removed from this study due to lack of parental consent. In the whole school population, 16 percent were considered low-income students and 28.1 percent were English Learners. There were three students in my class who had 504/I.E.P. plans and four students who were regularly pulled out for extra math and/or reading enrichment.

This study took place during the COVID-19 pandemic and the school employed a hybrid model of instruction. At the beginning of the study, on Monday and Tuesday, there were 5-6 students in the classroom and the remaining 17-18 on Zoom, on Wednesday all students were remote, and on Thursday and Friday there were 7 students in the classroom and the remaining 16 students were on Zoom. Halfway through this study, all in-person students came at the same time (13) and the rest remained on Zoom (10).

In this mixed-methods, quasi-experimental design, I collected data through regular observation periods, a student brainstorming activity, and a teacher interview. The teacher interview was centered around the academic processes that motivated the students most, and each student's general ability to focus in school. These data were used to establish the cognitively stimulating backup reinforcers and to narrow the focus of the token economy intervention. All students in my class participated in this project; therefore, each student's parent/guardian was provided an informed consent form that explained the intervention. Since all students were under the age of 18, I obtained written consent from the parent/guardian of each child and verbal assent from the students in the class. Within the consent form, I provided parents/guardians with contact information for both my academic program chair and the chair of the relevant review board for research with human subjects in the case that they had any concerns. One parent did not return the form, so their student's data was removed from this project. This student still received rewards at the same time as others to ensure that they were not treated unethically.

I operationally defined productive and problem behaviors based on of the student-led brainstorming activity and the interview I held with my cooperating teacher. The five productive behaviors decided upon were as follows: 1) being respectful and kind, 2) teamwork, helping and motivating classmates, 3) waiting to be called on/staying muted on Zoom, 4) on-task, paying attention, and 5) having a growth mindset. The five

problematic behaviors were as follows: 1) being disrespectful, unmuting the microphone on Zoom/talking out of turn in person, 2) not listening to the teacher/classmates, 3) abusing the chat feature on Zoom, 4) damaging school property/annotating on the teacher's PowerPoints on Zoom, and 5) being unprepared.

There were three phases of this intervention. In Phase 1, which lasted 8 days, I instructed and observed instruction of the class using the pre-existing methods of behavior management that were established by the regular classroom teacher. For each of the 8 days in this phase I observed two hours of class, one hour in the morning, and one hour in the afternoon, for a total of 16 hours. I counted the total instances of productive and problematic behaviors for each student. These data were used as my baseline number, and I refined my operational definition of productive and problematic behaviors based on what I observed. To track the number of tokens earned, I used a private, password protected document that contained each student's name, and I discretely wrote a tally mark each time they exhibited the productive or problematic behavior choice.

In Phase 2, which lasted 20 days, I implemented the whole-class token economy. Since I was teaching for most of this phase, I jotted the tallies down on a piece of paper (or in an online document) to keep track of behaviors. The students earned tokens based on a variable ratio schedule of reinforcement. After each day of the intervention, I used a random number generator to select the ratio with which I would reinforce the desired behaviors. I used the mean number of productive behaviors for the day as the number I plugged into the random number generator and reinforced each student every nth number. This number changed daily to ensure that the students did not catch on to any particular pattern of reinforcement. I used the same password protected document to track each of the behaviors. Then, I translated the exhibited number of desired behaviors into the randomized reward sequence for each student. At the end of each day of this phase, students and parents/guardians were privately informed, through the website Class Dojo, of each positive token the student earned. The students were given access to this website so they could track their individual progress. Students could see only their token totals and no one else's. The students had the opportunity, during the first 30 minutes of the day on Friday, to redeem their tokens for a cognitively stimulating activity of their choice—this being the token reinforcer, which was a desirable item or task that could be purchased with tokens (Simonsen et al., 2008; Higgins et al., 2001). The cost of the rewards increased each week to reflect the growing totals of student tokens. Data analysis (referred to as Phase 2b) was only done during the last two weeks of the intervention in order to gauge the full effect of the token economy.

In Phase 3 of the intervention, which lasted 4 days, I removed the token economy system and returned to the original method of behavior management, observed and collected data for 8 more hours, and recorded the number of productive and problematic behaviors to see if the changes that were present in the token economy condition became resistant to extinction. The outcome of the intervention was measured by comparing the amount of problem and productive behaviors before, during, and after intervention, and through my own observations of the students. Additionally, I ran several paired samples t-test to compare the means over the course of the two main phases (control and experimental), individual student means between the phases, and the means between time of day—the intention was to see if there was an increase or decrease in productive and/or problematic behaviors. All procedures were approved by the relevant institutional/review board for research with human subjects. The conclusions made through this research were limited to the context of the study. Through this study, I aimed to contribute to the existing body of research on token economies and to add merit to the use of cognitively stimulating token reinforcers; in doing so, I desired to improve each student's behavior and engagement in school.

Results and Discussion

Comparison of Productive Behaviors

After the data was collected for all three phases of the token economy intervention, several paired samples *t*-test were conducted in SPSS. I wanted to see if differences were present between productive behavior choices before and during the intervention. A paired samples t-test was conducted to compare productive behavior choices between the control condition (Phase 1) and the experimental condition (Phase 2b). The results indicated that there was no difference of productive behavior choices between the control condition ($M = 4.94$, $SD = 1.03$) and the experimental condition ($M = 6.26$, $SD = 2.22$), $t(7) = -1.509$, $p = 0.17$. Although the results were not significant, there was a difference in mean between the two conditions. On average, during the token economy intervention, students in the class exhibited more productive behaviors per person per hour than before the intervention (a mean of 4.94 compared to 6.26). This shows that the token economy implemented in this study might have had an effect on the number of productive behaviors present in the classroom.

The full course of this action research project took 7 weeks to complete and during this time, I noticed an increase in many of the productive behaviors exhibited by students. Once the students decided on their own list of positive traits that they wanted to see more of in the classroom, they seemed to truly make an effort to demonstrate to me that

they were working on them. For example, after the first week of data collection for Phase 2a, a student realized that he did not have as many positive points as he would have liked when he checked Class Dojo. This student said, "I want to buy the typing training reward next week, so I am going to work really hard this week." Comments like these were frequent after students realized that their productive behavior choices positively correlated with the type of academic reward they would be able to purchase. Most notably, I noticed that a wider variety of students raised their hands to participate responsibly, and more students were on task and paying attention to the lesson taught by either myself or my cooperating teacher (CT).

Comparison of Problem Behaviors

The next paired samples *t*-test that was conducted focused on the number of problematic behavior choices before and during the token economy intervention. In planning for this study, I was most curious to see if my choice of the sole use of positive reinforcement, instead of negative reinforcement or positive or negative punishment, would in turn affect the number of problematic behaviors exhibited. A paired samples t-test was conducted to compare problem behavior choices between the control condition (Phase 1) and the experimental condition (Phase 2b). The results indicated that the control condition ($M = 2.57$, $SD = 1.72$) had a significantly higher rate of problem behaviors than the experimental condition ($M = 0.27$, $SD = 0.22$), $t(7) = 3.719$, $p = 0.007$. Therefore, these results indicated that the token economy intervention might have been responsible for a decrease in problematic behaviors. These data could potentially provide evidence to show that a focus on positive reinforcement in an elementary classroom can, in fact, lead to a reduction in problematic behavior choices. Again, on average during the token economy intervention, students in the class exhibited far fewer problematic behaviors per person per hour than before the intervention (a mean of 2.57 compared to 0.27).

The most striking change in this fourth-grade classroom was in the reduction of problematic behaviors. Before this intervention, the students realized that they could improve, as a whole, in five core ways. The behaviors they wanted to avoid were as follows: 1) being disrespectful, unmuting the microphone on Zoom/talking out of turn in person, 2) not listening to the teacher/classmates, 3) abusing the chat feature on Zoom, 4) damaging school property/annotating on the teacher's PowerPoints on Zoom, and 5) being unprepared. Once we were soundly into Phases 2a and 2b of this experiment, the shift in behavior was dramatic. The most commonly exhibited problematic behaviors were 1) being disrespectful, unmuting the microphone on Zoom/talking out of turn in person, and 2)

not listening to the teacher/classmates. For behavior 1, students exhibited an average of 1.43 acts of being disrespectful per person per hour before the intervention and for 2, students exhibited an average of 0.47 acts of not listening to the teacher/classmates per person per hour. During Phase 2b of the intervention, students exhibited an average of 0.16 acts of being disrespectful per person per hour and an average of 0.09 acts of not listening to the teacher/classmates per person per hour. For both behaviors, students demonstrated a decrease in prevalence once the intervention started. This might have indicated that the intervention was responsible for the reduction in the number of problematic behaviors exhibited per person per hour.

Comparing Means Amongst All Three Phases

The extinction phase for this research only lasted for one school week, or four days. However, crucial comparisons can still be made between means in all three phases. In comparing the means for productive behaviors in Phase 1 ($M = 4.94$), Phase 2b ($M = 6.26$), and Phase 3 ($M = 5.39$), it was evident that after the token economy was removed, the mean number of productive behaviors per person per hour started to regress back to the pre-intervention mean. These data suggest that, potentially, a token economy may need to be in effect for a longer period of time to avoid the beginning effects of extinction when it comes to productive behavior choices. In a similar comparison of the means for problematic behaviors in Phase 1 ($M = 2.57$), Phase 2b ($M = 0.27$), and Phase 3 ($M = 0.56$), it was also evident that there was a slight uptick in the mean problematic behaviors per person per hour. These findings were unique because they suggested that after a removal of the token economy intervention, there were slightly more occurrences of problematic behaviors. This could mean two things. The first is that similar to the positive behaviors, the token economy needed to be in effect longer to combat the process of extinction. The second is that students were motivated by the characteristics of the token economy and once it ended, they were no longer motivated to continue the new learned behaviors. Regardless, these data suggested that the token economy had a potential impact on student behavior in that productive behaviors increased, and problematic behaviors decreased. These pieces of evidence will be useful in future token economy interventions.

As an observer, it was clear to me that once the token economy intervention was removed, students began to slowly resort back to their original behaviors. Once it was announced that the reward system was ending, the students expressed their disappointment. One student stated, "Why can't we continue with Class Dojo? I wanted to earn more rewards!" This statement echoed the sentiment of the whole class once this

decision was announced. I argue that this disappointment led to the above results in the extinction phase. However, these reactions provided hope for future research with token economies. When a token economy system is autonomous, reinforced with cognitively simulating activities, is provided on a variable ratio schedule, and draws from student interest, students could potentially be motivated to exhibit more productive behaviors and fewer problematic behaviors.

Student Engagement and Behavior Based on Time of Day

In the initial interview that was conducted with my CT at the beginning of my student teaching placement, she mentioned that the students were usually far more focused in the morning than the afternoon. She believed this was because the students tired of sitting in school by afternoon and often got restless, and because the longest period of the day is afternoon math. This statement made me think: how would the effectiveness of a token economy vary based on time of day? I ran an additional paired samples *t*-test in SPSS to determine whether there was a significant difference in mean behaviors exhibited between the morning and afternoon times of day. After analyzing these data, it was clear that, in comparing the number of problematic behaviors before and after intervention in the afternoon, there was a decrease in frequency of these behaviors. A paired samples *t*-test was conducted to compare problematic behaviors between the afternoon of the control condition (Phase 1) and the afternoon of the experimental condition (Phase 2b). The results indicated that there was a significantly higher rate of problematic behaviors during the afternoon in the control condition ($M = 1.14$, $SD = 0.81$) than during the afternoon in the experimental condition ($M = 0.14$, $SD = 0.21$), $t(7) = 3.136$, $p = 0.02$. Therefore, the token economy intervention might have had an effect in decreasing the number of disruptive behaviors in the afternoon time. These results suggested that if at a certain time of day students are exhibiting more problematic behaviors, it might be beneficial to implement a token economy for that time.

Individual Student Data

In addition to the whole class metrics, I was interested to see if the token economy intervention had a consistent impact on individual student behavior. In my initial interview with my CT, she mentioned several students who frequently spoke out of turn and disrupted class in various ways—one of these students was diagnosed with ADHD. I took a closer look at the means for each of these students, and found that, for all three of them, they exhibited increases in mean productive behaviors per hour and decreases in mean problematic behaviors per hour—this trend echoed the whole class metrics.

Table 1
Individual Student Behavior Pre- vs. Post Intervention

Student Name	Productive behavior before intervention (Phase 1)	Productive behavior during intervention (Phase 2b)	Problematic behavior before intervention (Phase 1)	Problematic behavior during intervention (Phase 2b)
Sarah	7.87	10.75	10.62	1.25
Sam	9.37	10.50	6.25	0.50
James	6.25	8.12	3.62	0.37

Note. Mean productive and problematic behavior occurrences per hour.

The first student, "Sarah," had an average of 7.87 positive behavior occurrences per hour before intervention and a mean of 10.75 during intervention. The second student, "Sam," had an average of 9.37 positive behavior occurrences per hour before intervention and a mean of 10.50 during intervention. The final student, "James," had an average of 6.25 positive behavior occurrences per hour before intervention and a mean of 8.12 during intervention. In terms of problematic behaviors, Sarah had an average of 10.62 per hour before intervention and 1.25 per hour during the intervention. Sam had an average of 6.25 per hour before intervention and 0.50 during intervention. James had an average of 3.62 per hour before intervention and 0.37 during intervention. Each of these students demonstrated an increase in positive behaviors and a decrease in negative behaviors. For Sarah and Sam, both of the decreases in problematic behaviors were significant, $t(7) = 5.480$, $p = 0.01$, and $t(7) = 5.675$, $p = 0.001$, respectively. These data demonstrated that for students who had frequent behavior problems, a token economy that was inherently interest-based, autonomous, based on a variable ratio schedule, and had cognitively stimulating reinforcers, can potentially be effective in reducing problematic behaviors and increasing productive behaviors.

Critique of and Modifications to Behaviorist Theory

The results of this study brought a core principle of behaviorism into question. Skinner (1969) stated of his operant conditioning theory that when a behavior (or behaviors) is reinforced they will occur more frequently. Alternatively, Skinner (1969) theorized that when a behavior (or behaviors) is punished, it will occur at a less frequent rate. Based on the results of this study, behavior modification may not necessitate punishment or negative reinforcement. The study employed a positive-reinforcement-only method of behavior management and as a result, productive behaviors increased, and problematic behaviors significantly

decreased—both for individuals and as a whole class. These data could be interpreted as a critique to original behaviorist theory. In this experiment, student behavior improved without a need for punishment, or negative reinforcement (removal of already given tokens). This finding is crucially important to educators who seek to create a classroom environment centered around positivity and growth. Neglect of human emotion and cognitive processes are common, well-established critiques of behaviorist theory. The success of this research should be reason enough to further investigate the benefits of an autonomous, positively reinforced behavior management system in the hopes to better appreciate the cognitive abilities of students and to value opportunities for collective growth.

Limitations and Future Studies

Now, as mentioned at the beginning of this paper, it was necessary to address the limits of generalizability for this study. The study was conducted in a fourth-grade classroom in a Northern Illinois suburb and the results were specific to this classroom in particular—they cannot and must not be generalized to fit any other fourth-grade elementary classroom across the world. An additional variable that ought to be taken into consideration was that this research took place during the COVID-19 pandemic. Throughout the course of this experiment the mode of learning changed frequently and without much warning. Many students were on Zoom, others were present in the physical classroom, some alternated between the two learning modalities, and their willingness and ability to participate depended on many factors; some of which included Internet connection, willingness to speak while on camera, distractions at home and in the classroom, and comfortability speaking in the classroom. Each of these factors potentially had an effect on the data collected during this research.

An additional limitation of this study was that these data were collected under the instruction of two different teachers with two different classroom management styles—this was due to the fact that I was student teaching in another full-time teacher's room. A week into this study, I began gradually assuming responsibility for all instruction given during the school day and potentially, this change in teacher presence could have affected student participation and engagement in a positive or negative way. In future studies, it is recommended that the teacher giving the instruction, and all other confounding variables, remain consistent throughout the course of intervention. Since this study was done on a class of only 22, it also held low power. To increase the power of this study, it was recommended that this intervention be given to multiple classes over the course of several years as this would increase the efficacy rate of the intervention.

Finally, it would also be beneficial to test this intervention on a select number of students in a class. While there are obvious ethical reasons to avoid this, it would be interesting to see the potential impact on behavior. In this study, there were several students who tended to exhibit more productive behavior choices, and a number of students who tended to exhibit more problematic behavior choices. These students in both conditions carried most of the weight when it came to calculating the class averages. Therefore, if possible and ethically sound, it would benefit both the psychology and educational communities to conduct an experiment as such.

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