

Intervention of Visual Supports Combined with Token Economy on Classroom Disturbance Behavior of Students with Autism Spectrum Disorder

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Abstract: Students with autism spectrum disorder often struggle to understand or disregard social rules due to their developmental disabilities. Consequently, they are more likely to exhibit disruptive behaviors in the classroom, which can negatively impact the learning environment for all students. This single-subject experimental study investigated the effectiveness of a combined intervention using visual supports and a token economy system in reducing classroom disruptive behaviors of a 14-year-old student with autism spectrum disorder. The independent variable was the implementation of visual supports and a token economy, while the dependent variable was the frequency of disruptive behaviors exhibited by the student during class time. The results indicated that the combined intervention of visual supports and a token economy was effective in reducing the frequency of disruptive behaviors in the student with autism spectrum disorder.

Keywords: Autism Spectrum Disorder (Asd); Visual Supports; Token Economy; Classroom Disruptive Behaviors

1. Introduction

The study states that we should accelerate the improvement of the special education system, continuously perfect the special education guarantee mechanism, and comprehensively improve the quality of special education [1]. It is evident that the special education cause now has relatively comprehensive national laws and regulations as guarantees, which can provide support for the development and progress of special education.

Since autism spectrum disorder was first reported, its incidence has continued to rise. According to the latest 2023 report by the U.S. Centers for Disease Control and Prevention, the prevalence of Autism Spectrum Disorder (ASD) in children is estimated at 2.8 percent. This means that about 1 in 36 children aged 8 years old will be diagnosed with autism. This is an increase of about 0.5% compared to previous data, reflecting the increasing trend in autism prevalence over the years. This underscores the urgent need for educational interventions for children with autism.

Students with intellectual disabilities, especially those with autism spectrum disorder, make up a significant proportion of the student population in special education schools. Due to their repetitive behaviors, social difficulties, and other challenges, these students often struggle to follow classroom rules and may exhibit disruptive behaviors that interfere with the learning environment, causing significant distress to teachers. This single-subject research study aims to investigate the effectiveness of a combined intervention using visual supports and a token economy system in reducing classroom disruptive behaviors of a student with autism spectrum disorder. The goal is to provide special education teachers with an effective strategy for managing disruptive behaviors of students with autism spectrum disorder in the classroom.

Autism, also known as loneliness, from the Greek word *Autor*, meaning "self", is a neurodevelopmental disorder. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V), which is the most widely used, states that the core impairments of children with autism include: social communication deficits,

narrow interests, and repetitive stereotyped behaviors (American Psychiatric Association, 2013). The visual cueing strategy uses Quill's definition of visual cueing, which is a strategy that uses real portrait pictures of the case to create a map of classroom rules to help the case understand the rules that need to be followed in the classroom and to reduce the occurrence of disruptive behaviors. Token system is a behavioral shaping method based on Skinner's theory of operant conditioning, which simply quantifies tokens as rewards, and students are rewarded with the appropriate number of tokens for their preferences when they complete the target task. Classroom disruptive behaviors are verbal disruptions that occur in the classroom that interfere with teaching and learning. The operational definition is that in an indoor classroom, a case of interrupting the teacher's speech or classmates' answers to questions through language, interfering with the ongoing activities, affecting the normal order of teaching and learning, and lasting more than two seconds, is recorded as a single behavior. For example, interrupting to answer a question without the teacher's consent, interrupting classmates or the teacher, or fighting loudly for the opportunity to answer a question.

2. Literature Review

2.1 Current Research on Visual Cueing Strategies in Autism Interventions

Children with autism spectrum disorder cannot be fully cured through medical means at present, and their rehabilitation mainly relies on education and training. Therefore, exploring effective training methods for children with autism spectrum disorder has become a hot research topic for researchers worldwide. The effectiveness of training methods has been successively verified, such as intervention in interpersonal relationship development, structured teaching methods, and sensory integration training methods, which are commonly used in the education and training of children with autism spectrum disorder [2]. As an important component of structured teaching methods, visual supporting strategies have been proven to be an effective evidence-based training method and are widely used in education and training. In China, Wang Wenxuan (2022) intervened in classroom disruptive behaviors of children with autism spectrum disorder through visual supports [3], and Li Mengru (2020) used

visual supports to improve the pretend play ability of children with autism spectrum disorder [4]. In foreign research on autism spectrum disorder, visual supporting strategies have been widely used to correct problem behaviors in children with autism spectrum disorder or help them acquire skills. Moody, Amelia K. Family Connections (2012) used picture cues [5], Barnett H J, Cleary S (2019) used activity flowcharts for visual supporting intervention studies [6], proving that these forms of visual supports can help children with autism spectrum disorder understand the operational steps and key points of a skill, thus enabling children with autism spectrum disorder to master new skills. Genevieve T. & Rutherford M. (2014) used video demonstrations to reduce spontaneous noise and the problem of invading other people's privacy in children with autism spectrum disorder, helping them to better integrate into the collective [7].

A combination of domestic and international research has shown that visual cueing strategies have been relatively well established in the field of autism, and the age range of the autistic subjects studied is large, including preschool, school-age, and adults. From the perspective of research content, visual cueing strategies are mainly applied to teach students with autism to master certain skills or correct problematic behaviors. Visual cues are often used in conjunction with other strategies in a variety of forms, such as classroom rule charts, activity flow charts, etc., and visual cues alone are rarely used to reduce problem behaviors in autism.

2.2 Current Study of the Token System's Interventions for Students with Autism Spectrum Disorder

Token economies have been commonly used in previous research and in real-life settings for classroom management and correcting individual problem behaviors [8]. Li Chun (2021) pointed out that token economies can help students with intellectual disabilities develop good behavioral habits in the classroom [9], and Cui Ting and Geng Huahua (2017) used token economies to correct students' swearing behavior [10]. Abroad, Tarbox et al. (2006) used token economies to intervene in early childhood autism spectrum disorder, leading to a significant increase in their participation behaviors [11].

In summary, token system is one of the effective intervention methods for correcting problematic behaviors of students with autism, and it has

significant effects on the improvement of undesirable behaviors, such as inattentive classroom behaviors, swearing behaviors, and self-stimulating behaviors. Most of the token system case studies have used a single-subject approach, and the research sites are concentrated in schools, less involving different settings such as family and community. Therefore token system for problematic behaviors of students with autism has been more mature, but the research field and direction need to be innovative.

2.3 Current State of Research on Visual Cues Combined with Token Systems

In domestic studies, scholars have used visual cues and token systems in combination for intervention with some success. Fan, Jialu, and Huiziran (2024) developed an individualized token system to intervene with two students with hearing impairment for different classroom problem behaviors through a thematic token board. Although the main intervention strategy was the token system, the researcher used visual cues by posting pictures of the target behaviors that needed to be performed by the two cases at the corner of the desk during the intervention period. The researcher stated that in the use of the token system, the visual cues were able to enable the hearing impaired students to understand what behaviors would earn them tokens, which ensured the proper implementation and ultimate effectiveness of the token system ^[12]. Cui Haijiao (2019) pointed out that the combination of behavior management system and token system has a positive contribution to the behavior management of students in Pui Chi schools. In the behavior management system, the control of antecedents can be done by using visual cues, such as presenting the behaviors that students need to comply with in the form of pictures or words on the desk or blackboard. The combination of the two effectively increases students' target behaviors and leads to the correction of undesirable behaviors ^[13]. It has also been noted that combining visual cues with a token system clarifies the target behavior. If the target behavior is not clear, it will directly affect the intervention effect of the token system, so the combination of visual cues with the token system can exert more significant intervention effectiveness (Huang Yanchun, Wang Tingyuan, He Peng, 2022) ^[14]. These studies have shown that visual cues combined with tokens can lead to more significant results for both strategies, but

few studies have used visual cues combined with tokens solely for case studies, generally incorporating other different strategies or focusing on classroom management studies.

In summary, visual cueing strategies have been shown by numerous researchers to be consistent with the cognitive characteristics of children with autism, and visual cues are commonly used to intervene in special needs children's problems or to help them acquire certain skills. Token systems have been widely used for classroom management and individual problem behavior modification, while the most widely used method for classroom disruptive behaviors in children with autism is positive behavioral intervention. Although visual cues and tokens are well established, there are not many studies that combine the two to correct autistic classroom disruptive behaviors, and the use of visual cues and tokens in special schools is not individualized and targeted. Therefore, individualized visual cues combined with tokens can provide some insights for teachers in special schools to correct autistic problem behaviors.

3. Research Design

3.1 Participants

The participant was a 14-year-old male with autism spectrum disorder. He had normal vision and hearing and no other significant medical conditions. After graduating from a regular elementary school, he transferred to a special education school and is currently in the eighth grade. The participant demonstrated a relatively high level of cognitive ability and could engage in simple conversations with others. However, during class, he had difficulty maintaining attention for extended periods, often provided irrelevant answers to teachers' questions, and frequently interrupted others or talked to himself.

3.2 Methods

A single-subject experimental design with an A-B-A reversal was used to intervene in the classroom disruptive behaviors of the student with autism spectrum disorder. The study consisted of three phases: baseline, intervention, and maintenance. Following the experiment, interviews were conducted to assess the effectiveness of the intervention and its maintenance.

3.3 Research Tools

The research tools included "Preferences Questionnaire", "Records of Classroom Interference Behavior", "ABC Behavior Observation Table" and "Behavior Intervention Social Validity Interview".

3.4 Intervention Process

3.4.1 Baseline phase

Consistent with the requirements of a single-subject experimental design, no intervention was implemented during the baseline phase. The primary objective was to observe and record the baseline frequency of classroom disruptive behaviors exhibited by the participant during the second and third periods each day. This process involved no intervention strategies and lasted for five days, with one observation per day, each lasting 70 minutes.

3.4.2 Intervention phase

Upon entering the intervention phase, a visual supports card was posted on the upper right corner of the participant's desk. Before the start of the second period each day, the researcher would review the rules on the visual supports card with the participant and emphasize the token economy exchange rules. When the participant exhibited disruptive behaviors during class, the researcher would use physical prompts to direct the participant's attention to the visual supports card, interrupting the disruptive behavior and recording the occurrence. If the participant did not exhibit any disruptive behaviors within the specified time frame, the researcher would place a stamp on a

record sheet on the participant's desk without interrupting the ongoing lesson. At the end of the third period, the participant would exchange the earned stamps for rewards, and the classroom rules displayed on the visual supports card would be reviewed again. The intervention phase lasted for 15 days, with each session lasting 70 minutes.

3.4.3 Maintenance phase

During this phase, the visual supports and token economy system were removed. Similar to the baseline phase, the frequency of classroom disruptive behaviors was recorded during the second and third periods each day. The maintenance phase lasted for four days, with each session lasting 70 minutes.

3.5 Reliability and Validity

The primary researcher acted as the primary observer, and another intern teacher in the class was invited to serve as a second observer. Both observers conducted observations and recorded data throughout the entire study. The inter-observer agreement for the baseline, intervention, and maintenance phases is shown in Table 1. The inter-observer agreement exceeded 80%, indicating a high level of reliability in the study. After the experiment, the researcher conducted a visual analysis of the data and interviews with three participants to assess the effectiveness of the intervention. This was used as evidence to examine the social validity of the study.

Table 1. Observer Consistency Percentage Table

	Baseline Phase	Intervention Phase	Withdrawal Phase	Average IOA
Classroom disruptive behaviors	100%	80%	100%	93.33%

4. Research Results and Discussion

4.1 Visual Analysis

The x-axis of the graph represents the number of observation days, and the y-axis represents the frequency of classroom disruptive behaviors exhibited by the participant. The collected data points were plotted as a line graph. Figure 1 shows the frequency curves of the participant's classroom disruptive behaviors during the baseline phase (A), intervention phase (B), and maintenance phase (A). Visual analysis of the table shows that the range of the baseline phase for the case's classroom disruptive behaviors was 5-7, with an average of 6. The level of change within the phase was 0, showing a stable trend of both increases and decreases (level stability: 60%,

trend stability: 80%). Although there were unstable influencing factors in the baseline data, the overall frequency of the case's classroom disruptive behaviors was high and showed a declining trend, thus prompting the intervention phase.

Upon entering the intervention phase, the average level of disruptive behaviors decreased to 2.33, with a level change of -4 within the phase, showing an unstable downward and improving trend (level stability: 33.33%, trend stability: 46.67%). From the baseline phase to the intervention phase, the inter-phase level change was -1, and the average level change was -3.67, indicating a positive trend and effect, with an overlap rate of 6.67%. $t=5.76$, $p<0.001$, indicating a significant difference, suggesting that the intervention strategy was significantly effective in

reducing the frequency of classroom disruptive behaviors.

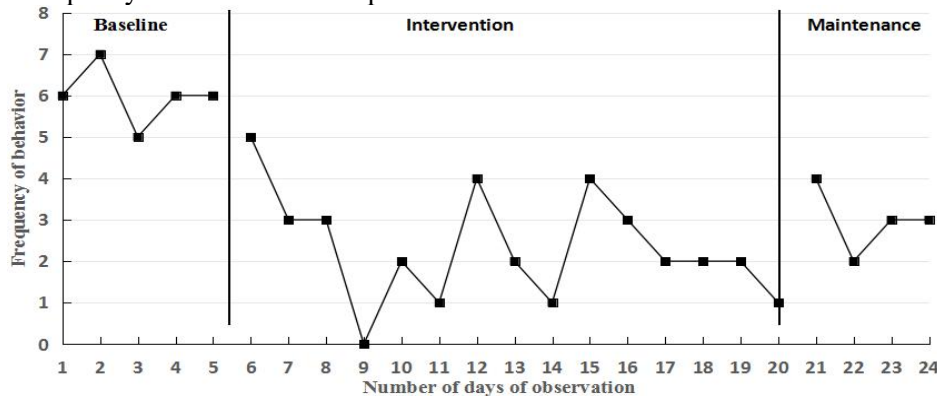


Figure 1. Line Graph of the Intervention Effect of Visual Supports Combined with A Token Economy on Classroom Disruptive Behaviors in Students with Autism Spectrum Disorder

In the later stages of the intervention, level stability improved. However, due to time constraints of the researcher, the intervention strategy was removed, and the maintenance phase began. From the intervention phase to the maintenance phase, the inter-phase level change was 3, and the average level change was 0.67, indicating a positive trend and effect, with an overlap rate of 100%. $t=-0.93, p>0.05$, indicating no significant difference. This suggests that after removing the intervention strategy, the frequency of classroom disruptive behaviors increased compared to the intervention phase. However, compared to the baseline phase, the frequency of disruptive behaviors decreased significantly, $t=5.92, p<0.05$, indicating a significant difference. This shows that the combination of visual supports and a token economy was effective in reducing the occurrence of classroom disruptive behaviors.

4.2 Social Validity

After the intervention, the researchers interviewed the case's homeroom teacher, vice homeroom teacher, and life teacher. All three teachers agreed that the frequency of disruptive behaviors in the classroom had significantly decreased after the intervention, and there was a certain maintenance effect even after the intervention strategy was removed. The teachers indicated that they would also try to use visual supports combined with a token economy system to correct the problem behaviors of other students. It is evident that this study has been recognized by the three interviewees and has good social validity.

4.3 Discussion

This study aimed to intervene in the classroom disruptive behavior of a middle school student

with autism spectrum disorder using a combination of visual supports and a token economy system. According to visual analysis and social validity interviews, the frequency of classroom disruptive behaviors during both the intervention and maintenance phases was lower than the baseline phase, demonstrating that the combination of visual supports and a token economy system can effectively reduce classroom disruptive behaviors in individuals with autism spectrum disorder. This finding is consistent with the conclusions of Wang Wenxuan (2022) and Fan Jialuo and Hui Ziran (2024), who found that visual supports combined with a token economy system were effective in correcting problem behaviors. Notably, while Wang Wenxuan's study focused on two elementary school students with autism spectrum disorder and Fan Jialuo and Hui Ziran's study targeted elementary school students with hearing impairments, the current study involved a middle school student with autism spectrum disorder, and both studies successfully reduced participants' classroom disruptive behaviors. The consistency with Wang Wenxuan's (2022) findings can be attributed to the development of individualized visual supports strategies based on the case's characteristics and visual preferences. Similarly, the consistency with Fan Jialuo and Hui Ziran's (2024) findings can be attributed to the enhanced effectiveness of the token economy system when combined with visual supports.

The maintenance effect of this study was not significant, and data collection was stopped during the maintenance phase due to non-compliance with the standard, resulting in a discrepancy with the conclusions of previous studies on classroom disruptive behavior interventions. Previous case studies on classroom

disruptive behavior, such as that of Xu Sheng and Sun Tao (2020) with autistic individuals, demonstrated significant maintenance effects. The limited maintenance effect in the current study may be attributed to the short duration of the study, which lasted only a little over twenty days, and the lack of follow-up data during the follow-up period.

5. Conclusions and Suggestions

5.1 Conclusion

This study employed a combination of visual supports and a token economy system to intervene in the classroom disruptive behavior of an individual with autism spectrum disorder. The aim was to investigate the effectiveness of this intervention in reducing classroom disruptions among students with autism spectrum disorder. After analyzing all experimental data and conducting social validity interviews, the following conclusions were drawn:

Firstly, the intervention using visual supports combined with a token economy system was effective in reducing the frequency of classroom disruptive behaviors;

Secondly, the combination of multiple intervention strategies can optimize the intervention effects on classroom disruptive behaviors;

Thirdly, the intervention using visual supports and a token economy system demonstrated generalization effects. The individual exhibited a decrease in interrupting behaviors in other settings;

Fourthly, the intervention using visual supports and a token economy system was deemed appropriate. The implementation process was simple and convenient, making it suitable for teachers to use in the classroom without requiring excessive manpower, material resources, or time.

5.2 Reflections

Due to time constraints on the part of the researcher, the intervention strategy was completely withdrawn after the maintenance phase, and no further verification or replication of the intervention effects was conducted. The lack of a follow-up study prevented us from understanding the occurrence of classroom disruptive behaviors in the case after a longer period of intervention strategy withdrawal. The study employed a single-subject experimental design, with a limited number of participants and

a single type of disability, which restricts its applicability.

5.3 Suggestions

5.3.1 Future studies should appropriately extend the intervention time and expand the range of research subjects and contexts

Based on the limitations of this study, it is recommended that future researchers plan their time in advance to ensure that there is sufficient time for the intervention to achieve optimal effects. Additionally, future related studies could expand the application of visual supports combined with a token economy system to various types of special children with different levels of disabilities. Furthermore, this study only conducted interventions in the classroom. Future research could explore the generalization effects of visual supports combined with a token economy system in different contexts.

5.3.2 Researchers should pay attention to controlling variables during the intervention implementation process

There are too many confounding variables in this study. It is recommended that future researchers control the research variables well, such as observing and intervening in Chinese language classes or other teachers' classes, to reduce the interference of irrelevant variables on the research results. At the same time, interview questionnaires, preference assessments, etc. should be tested for reliability and validity, strengthen the rigor of the research, and improve the effectiveness of the research results.

5.3.3 The formulation of token economy and visual supports and related research should keep pace with the times

There have been relatively mature research results on token economy and visual supports strategies in the field of special education. In the current era of information technology, future researchers or frontline teachers in special education can consider how to link token economy and visual supports strategies with information technology, innovate ways of token systems and visual prompting strategies, and expand research directions and fields. Because most of the visual cues used in existing research and education schools are presented through paper materials, they are easily torn or destroyed by students. The token economy is presented to students through physical tokens, seals, and other means, and some students may easily lose their tokens or lose their sense of novelty. If information technology can

empower visual supports and token economy, it can not only avoid material damage, but also conform to the development trend of the times and improve the efficiency of intervention strategy formulation.

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