

---

**Therapeutic Intervention Of Cognitive Behaviour  
Therapy And Token Economy System In Mathematics  
Academic Achievement of Secondary School Students In  
Rivers State**

**MUTIU, BANKE MORUFAT**

*Department of Educational Psychology, Guidance and Counseling*

*Faculty of Education*

*Ignatius Ajuru University of Education*

Email: [bankeamoke@gmail.com](mailto:bankeamoke@gmail.com)

08035310812

**SAMPSON, ANAYORCHI STANLEY**

*Department of Educational Psychology, Guidance and Counseling*

*Faculty of Education*

*Ignatius Ajuru University of Education*

Email: [sampsonstanley8@gmail.com](mailto:sampsonstanley8@gmail.com)

07033705712

**JAJA, ISRAEL JOSEPHINE**

*Department of Educational Psychology, Guidance and Counseling*

*Faculty of Education*

*Ignatius Ajuru University of Education*

**&**

**SORGIA, JUDE LELA**

*Department of Educational Psychology, Guidance and Counseling*

*Faculty of Education*

*Ignatius Ajuru University of Education*

---

**Abstract**

This study explores the impact of cognitive behaviour therapy (CBT) and token economy system (TES) on mathematics achievement of secondary school students in Rivers State. The study utilised a quasi-experimental research design. Multi-stage sampling procedure was adopted and used to draw a sample of 60 students from different schools were selected for the study drawn from population of 6,526

students. The participants were then separated into two groups: one group received Cognitive Behaviour Therapy (CBT), while the other group had Token Economy System (TES). The data was analyzed utilizing Analysis of Covariance (ANCOVA), with pre-test scores being controlled for in order to identify the specific impact of the treatments. The findings suggest that both Cognitive Behaviour Therapy (CBT) and Token Economy System (TES) have considerable positive impact on mathematics performance. More precisely, pupils who underwent cognitive-behavioural therapy (CBT) showed significant enhancements in their ability to solve problems and reason mathematically. These gains may be attributed to the intervention's emphasis on changing negative thinking habits and boosting self-confidence. Similarly, the TES group demonstrated significant improvements, which were ascribed to the deliberate reinforcement of positive behaviours via prizes. These awards served as a form of motivation for students to actively and regularly participate in mathematics exercises. The results indicate that both treatments may be successfully comprised into instructional programmes to enhance mathematics performance among secondary school students. Subsequent investigations might delve into the enduring consequences of these treatments and their suitability in other disciplines and educational environments.

**Keywords:** Cognitive behavior, Therapy, Token Economy Academic achievement

---

## Introduction

Education has an impact on every facet of our existence in our daily lives. Engaging in the process of acquiring new information and building upon old knowledge ensures that our minds remain current and enhances the overall quality of our lives. The acquisition of new information is essential in the learning process, but its value is diminished if it cannot be effectively stored and recalled when needed. Retaining what we have learnt is crucial for achieving desired objectives and being productive.

Kpolovie (2011) asserts that the learner plays a central role in the learning process, since their active participation is essential for effective learning to take place. This is apparent from the fact that all theories of learning converge on this conclusion. Therefore, in order for learning to be more effective, it is crucial for a learner to have a fully functional memory, since the learner is the only one capable of initiating the learning process inside themselves. The reason why a working memory is good is because it allows information to be meaningful and helpful to anybody.

Mathematics proficiency is a crucial determinant of academic progress and future professional opportunities. However, many students have difficulties in this field owing to a range of cognitive, emotional, and motivational obstacles. In congruent with Spinath (2012), academic achievement refers to a collection of performance measures that indicate an individual's success in meeting certain goals within an institutional environment, such as schools, colleges, and universities. Academic achievement has significance for both people and communities at large, extending beyond the realms of psychological and educational research. Bhat and Bhardwaj (2014) defined academic achievement as a certain degree of proficiency or competence in academic tasks, evaluated either by instructors, standardised tests, or a mix of both.

Academic achievement as defined by Steinmayr, et. al. (2020), refers to the level of performance a person has attained in respect to certain goals that were the main emphasis of educational activities in instructional settings, such as schools, colleges, and universities. The cognitive objectives of educational systems typically fall into two categories: general goals, such as critical thinking, and specific goals that focus

on developing knowledge and understanding in specific intellectual domains, such as numeracy, reading, science, and history.

Therefore, it is crucial to consider academic success as a multifaceted notion that encompasses several areas of learning. The precise determination of academic success relies on the specific criteria utilised to measure it, given the expansive nature of academic achievement which spans a diverse range of educational outcomes. The primary factors contributing to students' poor academic performance are their lack of ambition and defined goals, their inability to regulate emotions and comprehend information, their distorted perception of life priorities, and their deficiencies in personality and aptitude.

Cognitive Behaviour Therapy (CBT) is a well proven psychological method that has been extensively utilised to address many mental health concerns, such as anxiety, depression, and stress. Cognitive Behaviour Therapy (CBT) centres on the recognition and alteration of maladaptive cognitive processes and behaviours. Within an educational setting, Cognitive Behaviour Therapy (CBT) may assist students in effectively handling their apprehension about mathematics, enhancing their belief in their own abilities, and cultivating a constructive mindset towards the process of acquiring knowledge. Cognitive Behaviour Therapy (CBT) seeks to enhance academic achievement and general well-being by reorganising negative ideas about one's abilities and improving problem-solving skills.

Cognitive Behaviour Therapy (CBT) as defined by Ayodele (2016), is a therapy intervention that is aimed at enhancing a client's comprehension of the cognitive processes and emotional states that impact their behaviour. The therapist and client collaborate in a combined approach to identify the links between the client's dysfunctional and maladaptive thoughts in the present moment. The therapist offers techniques to help the client effectively handle distressing situations, recognise errors in their thinking, and provide alternative explanations for faulty beliefs. Hofmann, Asnaani, et. al, (2012) said that a client's cognition has a significant influence on their emotions and behaviour.

Cognitive Behaviour Therapy (CBT) is owing to the premise that ideas influence behaviour and these thoughts shape how people perceive, interpret, and assign significance to their surroundings. Therefore, cognitive issues may be modified by altering our cognitive processes, even in situations when our surroundings cannot be altered. Within the framework of a teenager who lacks the motivation to acquire knowledge, Cognitive Behaviour Therapy (CBT) aims to foster a constructive mindset towards learning. This is achieved by encouraging them to see admirable individuals in society and want to emulate their qualities. Cognitive Behaviour Therapy (CBT) was specifically designed to address the needs of those who have had traumatic experiences, such as stress, anxiety, and depression, and are now grappling with emotional difficulties.

Cognitive Behaviour treatment (CBT) is a proactive kind of psychological treatment that operates on the assumption that dysfunctional or erroneous thought processes are responsible for maladaptive behaviours and unpleasant emotions. In congruent with Grey (2013), maladaptive behaviour refers to actions that hinder an individual's capacity to carry out their everyday tasks or effectively adapt and engage in a certain environment. Fenn and Byrne (2013) argued that Cognitive Behaviour Therapy

(CBT) focuses only on the present. It enables pupils to make informed decisions and comprehend other options that may seem more favourable than their current circumstances. For instance, a client experiencing profound emotional despair may be actively avoiding social interactions and enduring mental anguish due to their isolation.

Aderanti and Hassan (2011) propose that Cognitive Behaviour Therapy (CBT) is designed to rectify erroneous information processing. The therapist refrains from directly contradicting an anxious client's thinking, instead utilising thought-provoking inquiries to elicit an exploration of the purpose, utility, and ramifications of the worried beliefs. Cognitive Behaviour Therapy (CBT) is the practice of challenging and correcting cognitive distortions or flawed thinking patterns in order to replace illogical and inaccurate beliefs with more realistic and advantageous ones. Self-confidence significantly influences an individual's approach to life. Negative self-belief has a significant impact on one's life, since it ultimately results in limited achievement (Nwadinigwe & Longe, 2007).

The token economy is a behaviour therapy strategy utilised to treat social anxiety. It involves providing participants with particular prizes as reinforcement for displaying desirable and accepted behaviour patterns. (Kpolovie, 2018). In congruent with Nwankwo (2018), a token economy is a method in which a therapist gives clients "conditioned reinforcers" as rewards for acting in a stated desirable way. In the context of token economy, the term 'conditioned reinforcer' is utilised to differentiate it from typical reinforcers. For instance, if a 12-year-old kid struggles to get up early in the morning to complete his allotted household tasks before heading to school, a token economy system may be utilised to encourage and reinforce the desired behaviour. To alter the boy's behaviour in this scenario, the therapist must follow the prescribed measures outlined by Nwankwo (2018) which includes:

1. The therapist must provide a comprehensive explanation of the token economy system to the child, including its mechanics and the rationale for its implementation for his benefit.
2. The therapist should collaborate with the youngster to discover and rank conditioned reinforcers that are attractive to him.
3. The therapist must instruct the boy on the specific behaviour he or she wants the client to exhibit and inform him of the reward he will get for acting in the desired manner.
4. The therapist should provide precise information on the duration or duration of the therapy. The duration may range from a fortnight to three weeks. The customer should be notified of the exact day on which his therapy will begin.

In congruent with Wikipedia Contributors (2021), a token economy is a contingency management method that involves systematically reinforcing desired behaviour. It employs the principles of operant conditioning and behavioural economics that have been developed in the field of applied behaviour analysis. In order to achieve efficacy, it is necessary to have a token, which serves as a sign of trade, as a means of exchanging for the desired change in behaviour.

The Token Economy System (TES) is a behaviour modification technique that use tokens as a means of positive reinforcement to promote desirable behaviours.

Within a classroom environment, students are rewarded with tokens for displaying behaviours that enhance learning and academic achievement. These behaviours comprise completing assignments, actively engaging in class discussions, and showing dedication to problem-solving. These tokens may then be traded for prizes, creating a stimulating and captivating learning atmosphere. TES utilises the concepts of operant conditioning to strengthen desirable behaviours and inhibit undesirable ones, which may result in enhanced academic achievements.

### **Statement of the Problem**

Mathematics is a fundamental discipline that is crucial for a wide range of academic and professional domains. Although it is significant, many high school pupils have difficulties in maintaining mathematical ideas and abilities. This problem is often ascribed to cognitive processes and a dearth of drive, both of which may have a substantial impact on pupils' capacity to comprehend and retain mathematical material. Gaining insight into the impact of these variables on the ability to retain mathematical knowledge is essential for the development of successful educational approaches and treatments. The preservation of mathematical ideas and abilities among high school pupils is a notable problem that impacts their academic performance and future prospects.

Emerging research indicates that students' cognitive habits and levels of motivation play a crucial role in their capacity to remember and apply mathematical information. Nevertheless, it is necessary to conduct a thorough analysis of the precise cognitive processes and motivating elements that contribute to the retention of mathematical knowledge.

The issue of mathematics success among secondary school pupils is a long-standing problem that exists globally. Despite the application of many teaching methodologies, a significant number of pupils persist in encountering challenges when it comes to comprehending mathematical topics. Consequently, this often leads to subpar academic achievement, less self-assurance, and increased apprehension about the particular topic. Psychological issues, such as worry, lack of motivation, and negative self-beliefs, operate as substantial obstacles that hinder students' ability to learn and succeed in mathematics. Students often develop maladaptive cognitive habits, such as a stuck perspective, engaging in negative self-talk, and experiencing anxiety specifically related to mathematics. These tendencies may result in diminished self-assurance, heightened anxiety, and avoidance behaviours, all of which impede the ability to retain mathematical ideas.

It is necessary to ascertain if Cognitive Behaviour Therapy may enhance mathematics ability by assisting pupils in managing anxiety, fostering confidence, and cultivating positive cognitive patterns related to mathematics. It is essential to comprehend the precise cognitive and emotional obstacles that Cognitive Behaviour Therapy (CBT) may assist in surmounting when it comes to studying mathematics. Assessing the influence of Token Economy on students' motivation and performance in mathematics is crucial. Token Economy systems, utilising positive reinforcement via prizes, have the potential to enhance students' involvement and perseverance in the study of mathematics. It is essential to identify the most efficient forms of incentives in a Token Economy system that may greatly improve mathematics performance. This study aims to address the current research deficiencies by conducting a thorough

analysis of the topic and presenting evidence-based suggestions for practical methods to improve mathematics retention. This will ultimately assist students' academic achievements and long-term opportunities.

### **Aim and Objectives of the Study**

The present study investigated therapeutic intervention of cognitive behavior therapy and token economy system in mathematics academic achievement of secondary school students in Rivers State. In specific terms, the study examined:

### **Research Questions**

1. What is the effect of cognitive behaviour therapy on mathematics retention and academic achievement of secondary school students in Rivers State owing to their pre and post test scores in mathematics?
2. What is the effect of token economy on mathematics retention and academic achievement of secondary school students in Rivers State owing to their pre and post test scores in mathematics test?

### **Hypotheses**

**H<sub>01</sub>:** There is no significant effect of cognitive behaviour therapy on mathematics retention and academic achievements among secondary school students in Rivers state as determined by their pre-test and post-test mean scores in mathematics.

**H<sub>02</sub>:** There is no significant effect of token economy on mathematics retention and academic achievements among secondary school students in Rivers state as determined by their pre-test and post-test mean scores in mathematics.

### **Methodology**

The study adopted quasi-experimental research design. The population of this study consists of 6,526 students in class two (SS2) students of public senior secondary schools in Port-Harcourt Local Government Area of Rivers. The researcher chose this particular class because the students in this class have less than a year left to take their Senior Secondary Examination (SSCE). The study's sample consisted of 60 SS2 students from 2 co-educational public secondary schools in Port-Harcourt. multi-stage sampling procedure was adopted for the study. At first, the research utilised the purposive sampling approach to choose SS2 students at stage two, simple random sampling technique was utilised to draw two senior co-educational schools in PHALGA. Additionally, 30 students were selected from each of the two secondary schools for this study utilising balloting. The data were gathered by administering a Mathematics Achievement Test consisting of 20 objective answer items.

The exam was created by the mathematics teachers the schools and is aligned with the senior Secondary School curriculum for SS2 in mathematics. The instrument consists of 5 response alternatives (A, B, C, D, and E) and also comprises a bio-data part where students specify their gender for the purpose of simple identification. The tool was utilised to gather data on the participants' academic proficiency in mathematics, with the aim of assessing their performance both before and after the intervention. The highest score achieved was 100%, while the lowest score obtained was 5%. Each accurate response was awarded 5 points. The instrument was provided to two

specialists in the area of measurement and evaluation to determine the face and content validity. All of their remarks, revisions, and ideas were addressed. The instrument's construct validity was established utilising factor analysis. The test-retest approach was utilised to assess the internal consistency of the instrument. The administration of the instrument comprised distributing twenty (20) copies to SS2 students who were not part of the study's sample. The procedure was replicated after a fortnight. The two findings were correlated utilising the Pearson Product Moment Correlation (PPMC) resulting to reliability co-efficient ( $r$ ) of 0.82. This value confirms that the instrument utilised in the investigation is dependable. The research questions were addressed utilizing Analysis of Covariance (ANCOVA), and the appropriate hypotheses were tested utilising the ANCOVA Table at a significance level of 0.05. The data was analysed using Statistical Packages for Social Sciences (SPSS) version 20.

## Results

**Research Question One:** What is the effect of cognitive behaviour therapy on mathematics retention and academic achievement of secondary school students in Rivers State owing to their pre and post test scores in mathematics?

**Hypothesis One:** There is no significant effect of cognitive behaviour therapy on mathematics retention and academic achievements among secondary school students in River state as determined by their pre-test and post-test mean scores in mathematics.

**Table 1: ANCOVA showing the effect of cognitive behaviour therapy on mathematics retention and academic achievement of secondary school students.**

<b>Effect size (<math>\eta</math>) = 0.620</b>	<b>R<sup>2</sup> = 0.943</b>			<b>Adj R<sup>2</sup> = 0.940</b>		
<b>Model</b>	Sum	of	Df	Mean	F	<b>Sig</b>
	Squares			Square		
<b>Contrast</b>	659.332		1	659.332	81.630	<b>0.000</b>
<b>Error</b>	403.854		50	8.077		
<b>Total</b>	176850.000		53			

**Decision Rule: Reject Ho if P-Value < ( $\alpha$  = 0.05)**

Table 1 shows the results of an analysis of covariance (ANCOVA) examining the impact of cognitive behaviour therapy on students' mathematics retention and academic progress. The analysis shows that the effect size ( $\eta$ ) is 0.620, with a coefficient of determination ( $R^2$ ) of 0.943 and an adjusted co-efficient (Adj $R^2$ ) of 0.940. The corrected co-efficient indicates that 94% of the difference in academic success among secondary school students may be attributable to cognitive behaviour therapy. This indicates that cognitive behaviour therapy is extremely successful in the instruction of mathematics among secondary school pupils, as seen by the effect size of 0.620. The analysis of the null hypothesis revealed that an F-value of 81.63 was obtained with 1 and 50 degrees of freedom, and a corresponding p-value of 0.000. Given that the p-value was below 0.05, this outcome suggests that cognitive behaviour therapy has a statistically significant impact on the ability of secondary school children to retain mathematical knowledge and achieve academic success.

**Research Question Two:** What is the effect of token economy on mathematics retention and academic achievement of secondary school students in Rivers State owing to their pre and post test scores in mathematics?

**Hypothesis One:** There is no significant effect of token economy on mathematics retention and academic achievements among participants as determined by their pre-test and post-test mean scores in mathematics.

**Table 2: ANCOVA showing the effect of token economy on memory retention and academic achievement of secondary school students.**

Effect size ( $\eta$ ) = 0.627	$R^2 = 0.969$			Adj $R^2 = 0.968$	
Model	Sum of Squares	Df	Mean Square	F	Sig
Contrast	659.332	1	659.332	85.603	0.000
Error	403.854	50	8.077		
Total	176850.000	53			

Decision Rule: Reject  $H_0$  if P-Value  $< (\alpha = 0.05)$

Table 2 shows the results of the analysis of covariance (ANCOVA) examining the impact of token economy on students' memory recall and academic success. The analysis shows that the effect size ( $\eta$ ) is 0.627, with a co-efficient of determination ( $R^2$ ) of 0.969 and an adjusted co-efficient (Adj $R^2$ ) of 0.968. The corrected co-efficient indicates that 96.9% of the difference in academic success among secondary school students may be attributable to token economy. This suggests that the application of token economy is very efficient in the instruction of mathematics for secondary school pupils, as shown by a substantial effect size of 0.627. The analysis of the null hypothesis revealed that an F-value of 85.603 was obtained with 1 and 50 degrees of freedom, yielding a p-value of 0.000. Given that the p-value was below 0.05, this outcome suggests that the application of a token economy has a considerable impact on the ability of secondary school pupils to retain information and achieve academic success.

### Discussion of Findings

#### Cognitive Behaviour Therapy on Mathematics Retention and Academic Achievement

The study's results indicate that Cognitive Behaviour Therapy is an effective approach for enhancing mathematics retention in classrooms. The research revealed that students who received cognitive therapy had substantial improvements in cognitive abilities, including problem-solving, logical reasoning, and analytical thinking. This discovery aligns with the research conducted by Pizzie, et. al (2020), which indicates that cognitive reappraisal is an effective approach for improving mathematical performance and alleviating anxiety in those with math-related apprehension. Nwobi and Obiukwu (2021) conducted a research where they utilised a four corners and a diamond mathematics graphic organizer as an intervention.

#### Token Economy on Mathematics Retention and Academic Achievement

The results of this study have also shown that implementing a token economy system is an effective technique for enhancing mathematics performance. The research revealed that students who took part in token economy programmes had substantial enhancements in their capacity to recall mathematical ideas. The results further support the conclusions of Nasako, (2016), which demonstrated that implementing a token economy system had a considerable positive impact on the academic performance of primary three students with ADHD in the subject of mathematics. The study conducted by Villaver and Pimentel (2021) aimed to provide empirical evidence

on the effectiveness of Token Economy as a motivational tool for improving students' performance in mathematics. The findings indicate that students with low levels of academic motivation tend to have a limited inclination towards achieving academic goals.

## **Conclusion**

The discovery that Cognitive Behaviour Therapy and the Token Economy System have a significant positive impact on mathematics success in secondary school pupils establishes a strong basis for improving educational methods. By strategically applying these tactics and incorporating them into the wider educational framework, schools may establish an atmosphere that fosters both academic achievement and the general welfare of children. Implementing this two-pronged strategy may result in long-lasting enhancements in mathematics performance and effectively equip pupils for future accomplishments in academics and professional pursuits.

## **Recommendations**

The results of the study identified that Cognitive Behaviour Therapy (CBT) and Token Economy (TE) systems are successful in enhancing the mathematics performance of secondary school students. The researcher therefore recommends the following:

1. To create and execute cognitive-behavioural therapy (CBT) programmes specifically designed to target prevalent cognitive and emotional obstacles in the process of learning mathematics. This may comprise training sessions focused on stress management, constructive self-dialogue, and goal-setting methodologies.
2. To offer professional development opportunities for educators and school counsellors to acquire expertise in Cognitive Behaviour Therapy (CBT) approaches and their use in educational environments.
3. To develop and execute Token economy platforms that use diverse incentives to inspire pupils. Rewards may comprise concrete objects, special rights, or acknowledgment from society.
4. Making it crucial to guarantee that the prizes provided are significant and appealing to the pupils.
5. To keep the token economy system current and successful, evaluate it on a regular basis and make adjustments depending on student input and performance information.

## **References**

- Aderanti, R. & Hassan, T., (2011). *Cognitive restructuring and self-management in the treatment of adolescents' rebelliousness*. [https://www.researchgate.net/publication/248070021\\_ESS](https://www.researchgate.net/publication/248070021_ESS)
- Asnaani, A., Vonk, I., Hofmann, S., Sawyer, A. & Fang, A., (2012). *The Efficacy of Cognitive Behavioural Therapy: A Review of Meta-analyses*

- Bhat, H. N. & Bhardwaj, R., (2014). The concept of Academic Achievements. *International journal of Education and Science Research Review*. 1(6), 93-94.
- Bhat, H. N. & Bhardwaj, R., (2014). The concept of Academic Achievements. *International Journal of Education and Science Research Review*, 1(6). 40-55.
- Cherry, K., (2023). *What is Cognitive Behavioural Therapy (CBT)?* <https://www.verywellmind.com/what-is-cognitive-behaviour-therapy-2795747>
- Cominghud, S.M. Fulatan, M.C. & Pillado, Z., (2020). *Factors on Memory Retention: Effect to Students' Academic Performance*. <https://www.researchgate.net/publication/341089050>
- Fenn, K. & Byrne, M. (2013). *The key principles of cognitive behavioural therapy*. <https://www.researchgate.net/publication/274482344>
- Kpolovie, P.J. (2011). *Cognitive Enhancement: Effects of Lumosity Training and Brain-Boosting Food on Learning*. Springfield Publishing. Amadi, G.N. (2021). *Psychology of Teaching and Learning (A Contemporary Approach)*. Akanistic Publishing.
- Kpolovie, P. J. (2018). *Statistical Approached in Excellent Research Methods*. Patridge Publishing.
- McLeod, J. (2013). *Increasing the Rigor of Case Study Evidence in Therapy Research*. Doi <https://www.researchgate.net/publication/286372228>
- Nasako. R. N. (2016), *Effects of Token Economy on Mathematics Achievement of Children with Attention Deficit Hyperactivity Disorder (ADHD) in Government Practising Schools in Buea, Cameroon*. *International Journal of Humanities Social Sciences and Education (IJHSSE)* 3(8), 22-45.
- Nwadinigwe, I.P. & Longe, O.O., (2008). *Effects of two Counseling Techniques on Mental Model in Values Clarification and success Orientation of School Adolescents*. <https://www.ajol.info/index.php/ijer/article/view/41657>
- Nwobi, L.N. & Obiukwu, C.A., (2021). *Effect of cognitive behaviour therapy on mathematics test anxiety and achievement of secondary school students in ogidi education zone Anambra State*. <https://educationalresearchdevelopmentjournal.com/index.php/jerd/article/view/41>
- Pizzie. R., M. C., Dermott, C., Salem. T. & Kraemer. D. (2020). *Neural Evidence for Cognitive Reappraisal as a Strategy to Alleviate the Effects of Math Anxiety*. [https://www.researchgate.net/publication/347285659\\_Neural\\_Evidence\\_for\\_Cognitive\\_Reappraisal\\_as\\_a\\_Strategy\\_to\\_Alleviate\\_the\\_Effects\\_of\\_Math\\_Anxiety/citation/download](https://www.researchgate.net/publication/347285659_Neural_Evidence_for_Cognitive_Reappraisal_as_a_Strategy_to_Alleviate_the_Effects_of_Math_Anxiety/citation/download)
- Shing, L. & Brod, G. (2016). *Effects of Prior Knowledge on Memory: Implications for Education* [https://www.researchgate.net/publication/305344683\\_Effects\\_of\\_Prior\\_Knowledge\\_on\\_Memory\\_Implications\\_for\\_Education](https://www.researchgate.net/publication/305344683_Effects_of_Prior_Knowledge_on_Memory_Implications_for_Education).

Spinath, B. (2012). *Academic Achievement*. In *Encyclopedia of Human behaviour* (2<sup>nd</sup>ed). Pp. 1-8.

Steinmayr, R., Meibner, A., Weidinger, A. F. & Wirthwein, L., (2014). Academic Achievement. *Research Gate*. <https://doi.org/10.1093/obo/9780199756810-0108>

Steinmayr, R., Meibner, A., Weidinger, A. F. & Wirthwein, L., (2014). Academic Achievement. *Research Gate*. <https://doi.org/10.1093/obo/9780199756810-0108>

Villaver, V. & Pimentel, J., (2021). *Effect of token economy on students' performance in mathematics*. <https://www.researchgate.net/publication/349548301>

Wikipedia, (2021). *Token Economy*. [https://en.wikipedia.org/wiki/Token\\_economy](https://en.wikipedia.org/wiki/Token_economy)