Research Article

Improving Science Performance of Class VI Students through Positive Reinforcement: An Action Research

Ugyen Norbu*

Dorikha Primary School, Samtse, Bhutan

***Corresponding Author:** Ugyen Norbu, Dorikha Primary School, Samtse, Bhutan.*

Abstract

This study examined the effectiveness of positive reinforcement strategies - specifically the Weekly Star Badge System and Verbal Praise - on improving the Science performance of Class VI students at Dorokha Primary School. A convergent parallel mixed-methods design was employed; wherein quantitative and qualitative data were collected concurrently from 58 students (28 males, 30 females). The quantitative component consisted of a pre-test and post-test standardized assessment, while the qualitative component comprised student perceptions and behavioral responses collected through focus group discussions and classroom observations. Quantitative data were analyzed using descriptive statistics and a paired-sample t-test, which revealed a statistically significant improvement in post-test scores compared to pre-test scores.

Qualitative data, analyzed using thematic content analysis, indicated increased student motivation, confidence, and engagement in science learning as a result of the reinforcement strategies. The findings demonstrate that positive reinforcement significantly enhances both academic performance and classroom participation. The study concludes that positive reinforcement is an effective and practical pedagogical strategy for improving science learning outcomes. Further, it recommends its structured integration into regular classroom instruction to promote sustained academic growth and learner motivation.

Keywords: Positive Reinforcement; Science Achievement; Student Motivation; Classroom Engagement; Behavioral Improvement

Introduction

The science performance in midterm examination results 2025 for Class VI students at Dorokha Primary School indicated a concerning decline in academic performance.

Although previous academic years reflected strong performance above the national average, the midterm result showed a drop to a mean score of 65.73, signaling a loss in student engagement and motivation. This decline highlights the need for immediate pedagogical interventions to improve student performance in science and sustain academic excellence. According to Brophy [1], student participation and engagement are critical predictors of academic achievement. However, it is observed that only a few students actively engaged in science lessons, while the majority remained passive, hesitant to respond, and reluctant to participate in class activities.

Several studies have identified that student disengagement is often linked to a lack of positive reinforcement and encouragement in the classroom. Skinner [2] argued that behavior reinforced through positive consequences is more likely to be repeated, which forms the foundation of positive reinforcement theory. Although recent educational reforms in Bhutan promote learner-centered strategies [3], classroom practices often fail to address the motivational needs of students. Greenwood., *et al.* [4] emphasized that creating a supportive learning environment through reinforcement can significantly improve students' academic engagement and performance.

In the researcher's class, students frequently expressed feelings of fear and low confidence when answering questions. Only high-achievers demonstrated active participation, while average- and low-achievers avoided engagement due to fear of failure. This observation led the researcher to consider implementing positive reinforcement strategies such as verbal praise and weekly star badges to promote participation, motivation, and confidence among students. International research [5,6] supports the use of positive reinforcement as an effective intervention to encourage desirable classroom behaviors and improve academic performance.

This study therefore investigated the effectiveness of positive reinforcement - specifically the Weekly Star Badge System and Verbal Praise - as an instructional strategy to improve Science performance among Class VI students at Dorokha Primary School. By acknowledging and rewarding positive behaviors and academic effort, the intervention aimed to transform students' attitudes toward science from passive to active learning.

To guide this inquiry, the following research question was posed.

How do positive reinforcement strategies influence the Science achievement and classroom engagement of Class VI students at Dorokha Primary School?

Situation analysis
Reconnaissance

Derived from the French word reconnaitre, meaning "to look at". According to Maxwell [7], reconnaissance has three components - situational analysis (examining the context in terms of resources and practices), competences (the profile and expertise of the researcher), and literature (connecting the present work with existing studies in the field). Reconnaissance is conducted before the planning phase of an action research cycle to identify specific areas for improvement and to understand classroom realities that require intervention.

At Dorokha Primary School, Class VI students have historically performed well in Science, with mean scores increasing from 72.27 in 2023 to 77.70 in 2024, both surpassing national averages. However, the recent Midterm assessment revealed a concerning decline, with the mean score dropping to 65.73. This downward trend raises important questions about how to sustain students' academic progress in science and suggests possible gaps in teaching–learning engagement.

Although past results demonstrate the students' ability to perform at high levels, classroom observations reveal that participation during science lessons is minimal. Only a small group of learners regularly engage in discussions, answer questions, or take part in practical activities, while the majority remain passive listeners. Limited engagement of this kind can hinder deeper understanding, retention, and application of scientific concepts [1]. Furthermore, classroom practices often reward only correct answers rather than recognizing effort or active participation, which may discourage less confident students from contributing. As Skinner [2] emphasized, reinforcement when systematically applied to desirable behaviors - encourages their repetition. Thus, a lack of consistent positive reinforcement for classroom engagement may be sustaining passive learning behaviors.

The recent decline in science performance, coupled with low student participation, highlights the urgent need for strategies such as positive reinforcement to stimulate active engagement, rebuild confidence, and reverse the negative academic trend. This action research therefore explores the use of Verbal Praise and a Weekly Star Badge System as reinforcement techniques to enhance motivation and academic performance in Science among Class VI students at Dorokha Primary School.

Competence
Teacher-Researcher

The researcher possesses a strong understanding of students' learning behavior and performance in science, developed through three years of teaching experience in the subject. This experience has cultivated the researcher's ability to identify gaps in engagement, motivation, and classroom participation - factors closely linked to science achievement. The researcher has participated in several Action Research Training, enhancing methodological competence in classroom-based inquiry and reflective practice.

Students

The 58 students in Class VI at Dorokha Primary School display varied levels of understanding and interest in science. While a small group of high-achieving students consistently demonstrates curiosity and confidence during lessons, the majority show moderate to low participation. Many students hesitate to volunteer answers or engage in group discussions, indicating a need for strategies that build confidence and encourage active learning. On contrary, the students exhibit a genuine interest in practical activities and perform well when motivated through encouragement or recognition. This suggests that positive reinforcement, when systematically applied, can serve as an effective means of promoting participation, persistence, and academic growth. This action research therefore aims to understand how Verbal Praise and a Weekly Star Badge System can improve engagement and Science performance among Class VI students.

Critical friend

Mr. Mani Wangdi, a teacher, a research practitioner and expert in AR from Samtse LSS, is one of the critical friends in providing his extensive experience and insights on classroom-based research and intervention strategies. His deep understanding of action research methodology makes him an invaluable support throughout

this study. He has provided guidance during the planning phase, offered feedback on data collection tools, and assisted in reviewing findings and reflections. His constructive insights have helped in ensuring the research remains focused, ethical, and methodologically sound, thereby improving its overall quality and impact.

Literature Review

This section outlines the relevant literature on positive reinforcement as a behavioral and instructional strategy. It begins with an overview by defining the concept and its theoretical grounding, followed by empirical evidence on the use of specific reinforcement strategies used; Verbal Praise and the Weekly Academic Star Badge System. The subsequent discussion presents criticisms and concerns regarding its implementation, and concludes with the relevance of these findings to the Bhutanese education context.

Overview of positive reinforcement

Positive reinforcement is a behavior modification strategy aimed at increasing desirable student behaviors by providing rewards or recognition immediately after the behavior occurs. Rooted in B.F. Skinner's behaviorist theory, it suggests that reinforced behaviors are more likely to be repeated [2]. In the classroom setting, positive reinforcement may take verbal forms such as praise, or tangible forms such as badges, tokens, and certificates. The present study focuses on two specific reinforcement strategies: Verbal Praise and the Weekly Academic Star Badge System, where students are rewarded with badges to recognize consistent academic effort and positive classroom behavior. These strategies aim to enhance student engagement, reduce disruptive behavior, and promote a positive learning environment.

Theoretical underpinnings and criticisms

Verbal Praise provides immediate and personalized feedback that reinforces students' self-efficacy and motivates intrinsic engagement with learning [8]. The Weekly Academic Star Badge serves as a symbolic reward that motivates students through recognition and healthy competition, encouraging consistent academic participation and responsible classroom behavior. However, critics argue that excessive reliance on extrinsic rewards may reduce intrinsic motivation over time, as students may focus more on earning badges rather than developing interest in learning itself [9]. Despite these concerns, researchers note that when reinforcement is applied thoughtfully and gradually internalized, it can promote self- regulated learning and long-term behavioral improvement.

Empirical studies on positive reinforcement

International studies have consistently shown the effectiveness of positive reinforcement in improving academic performance and classroom behavior. Rumfola [6] reported that token-based reward systems led to a significant reduction in disruptive behaviors and increased on-task performance in elementary classrooms. Similarly, Allday and Pakurar [8] found that verbal praise significantly increased student participation and attentiveness. In studies involving badge systems, tangible rewards were shown to boost student motivation, confidence, and willingness to engage in class activities [5]. These findings demonstrate that combining verbal and symbolic reinforcement strategies is effective in promoting both academic engagement and positive behavior.

Relevance to the current study

Although previous studies have demonstrated the benefits of positive reinforcement in primary and elementary education, there is a limited focus on its structured application among Class VI learners using both verbal and badge-based reinforcement strategies. Existing literature emphasizes that reinforcement is most effective when used consistently and strategically, yet few studies have examined its impact on both academic achievement and classroom participation simultaneously. Therefore, this study addresses this gap by investigating the effectiveness of Verbal Praise and the Weekly Academic Star Badge System in improving Science performance and student engagement in Class VI. The findings will help the educators facing similar behavioral challenges to adopt it as one of the strategies to handle them.

Participants

Total of Fifty-eight Class VI students (28 males, 30 females) participated in this study. All the participants were taught the science subject by the researcher in a single class setting. Ethical approval was obtained from the school administration, and informed consent was collected from both students and parents. For the purpose of intervention, no academic grouping was used; instead, all students received the reinforcement strategies (Verbal Praise and the Weekly Academic Star Badge System) uniformly during regular classroom instruction.

Research design

A convergent parallel mixed-methods design, as described by Creswell and Creswell [10], was employed in this study. Quantitative and qualitative data were collected concurrently, analyzed

separately, and integrated through triangulation to provide a comprehensive understanding of the effects of positive reinforcement on academic performance. The pre-test and post-test scores provided quantitative data on students' Science achievement, while focus group discussions and classroom observation notes generated qualitative insights into students' motivation, engagement, and learning behaviors. These data sets were then converged to interpret how reinforcement strategies such as the Weekly Academic Star Badge and Verbal Praise influenced both academic outcomes and classroom participation.

Figure 1: Mixed-method research design approach (adopted from Cresswell & Cresswell, 2018).
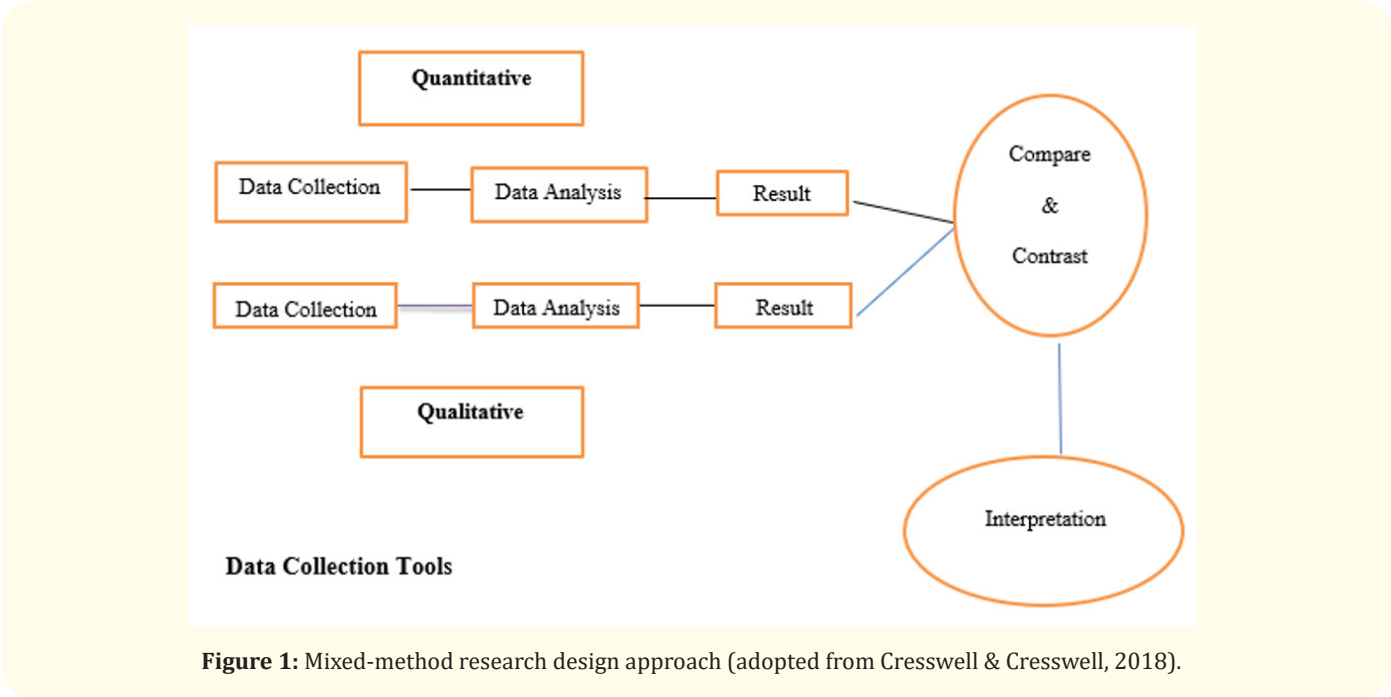
Quantitative — Achievement test

A structured achievement test consisting of 15 items worth 2 marks each (total 30 marks) was developed to assess students' Science performance before and after the intervention. The items were constructed to reflect core topics from the Class VI Science curriculum and measured different cognitive levels, including recall, understanding, and application.

Content validity was ensured through expert review by science faculty members, who confirmed alignment with curriculum standards and age suitability. The reliability of the instrument was verified using Cronbach's alpha ($\alpha = 0.747$), demonstrating acceptable internal consistency. The same instrument was used as both the pre-test and post-test to measure the effectiveness of the positive reinforcement strategies on academic performance.

	Cronbach's α
Scale	0.747

Table 1: Reliability.

Qualitative

Focus group discussion (FGD)

A semi-structured focus group discussion was conducted with students representing different achievement levels to explore their perceptions of the reinforcement strategies. The FGD focused on students' motivation, engagement, confidence, and attitudes towards science learning after receiving verbal praise and weekly academic star badges. Discussions were audio-recorded with consent and later transcribed.

Observation notes

Unstructured classroom observations were conducted throughout the six-week intervention period. The researcher recorded students' behavioral responses, level of participation, attentiveness, and interaction during science lessons. When time was limited, key behavioral indicators were recorded as brief keywords and later expanded upon after class. Observation notes captured real-time changes in student engagement and academic behavior in response to verbal praise and star badge recognition.

Data analysis approach
Quantitative analysis

The quantitative data collected from the pre-test and post-test were analyzed using Jamovi version 2.6.26. Descriptive statistics, including mean, median, standard deviation, minimum, and maximum values, were used to summarize students' performance before and after the intervention. A paired-sample t-test was conducted to determine whether the positive reinforcement strategies resulted in a statistically significant improvement in academic performance. Additionally, Cohen's d was calculated to determine the effect size, providing insight into the magnitude of change.

Qualitative analysis

The qualitative data obtained from focus group discussions and classroom observation notes were transcribed verbatim and analyzed using Thematic Analysis as outlined by Braun and Clarke (2006). An inductive content analysis approach was applied, where recurring statements were coded and grouped into emerging themes. These themes were interpreted to gain deeper understanding of students' behavioral and motivational changes in response to the reinforcement strategies.

Validity and reliability

The achievement test was developed based on the Class VI Science curriculum to ensure alignment with learning objectives. Content validity was established through review by science teachers, who evaluated each item for clarity, relevance, and cognitive appropriateness. The test was piloted with a group of students not included in the main study to assess clarity and timing. Reliability was confirmed using Cronbach's alpha, which yielded a coefficient of 0.747, indicating acceptable internal consistency for measuring academic performance.

Intervention

This study implemented two positive reinforcement strategies - Weekly Academic Star Badge and Verbal Praise - to enhance the academic performance of Class VI students in science subject. The intervention was carried out during regular classroom lessons over four weeks. Students were informed of the criteria at the outset, and reinforcement was provided immediately when desirable academic behaviors occurred, such as active participation, task completion, and improvement in test scores.

The Weekly Academic Star Badge was awarded to one or more students who demonstrated consistent academic effort and progress, while Verbal Praise was used during lessons to acknowledge correct responses and perseverance. A reinforcement log was maintained to ensure consistency and track behavioral and academic changes. The goal of the intervention was to motivate students, increase engagement, and improve science achievement through systematic positive reinforcement.

Finding

The combined quantitative and qualitative results showed that the Weekly Academic Star Badge and Verbal Praise positively improved students' Science performance, motivation, engagement, confidence, and cooperation.

Quantitative results

The quantitative data were analyzed using descriptive statistics and a paired-sample t-test in Jamovi (version 2.6.26). Descriptive statistics were first computed to compare pre-test and post-test scores, examining measures such as mean, median, standard deviation, minimum, and maximum values to determine changes in overall student performance.

The Shapiro–Wilk test was then performed to assess the normality of the data distribution. The results for both the pre-test (W = 0.982, p = 0.519) and post-test (W = 0.973, p = 0.227) indicated normal distribution, justifying the use of parametric analysis. Consequently, a paired-sample t-test was conducted to determine whether the difference between pre-test and post-test mean scores was statistically significant.

Descriptives		
	Pre	Post
N	58	58
Missing	0	0
Mean	12.2	18.7
Median	12.0	19.5
Standard deviation	5.07	5.46
Minimum	2.50	7.50
Maximum	25.0	30.0
Shapiro-Wilk W	0.982	0.973
Shapiro-Wilk p	0.519	0.227

Table 2: Descriptives table.

Qualitative results

Focus group discussion (FDG)

The qualitative data from focus group discussions (FGD) were analyzed using inductive thematic analysis to explore students' perceptions, motivation, and behavioral changes resulting from

			Statistic	Df	P	Mean difference	SE difference		Effect size
Pre	Post	Student's t	-17.3	57.0	<.001	-6.57	0.379	Cohen's d	-2.28

Table 3: T-test.

Note. H_a μMeasure 1 - Measure 2 ≠ 0

the Weekly Academic Star Badge and Verbal Praise strategies. Students consistently reported that these reinforcement strategies increased their motivation and enjoyment of learning. Many shared that they were more eager to participate in class activities and complete tasks carefully because they wanted to earn recognition. For example, one student explained, "I try harder in every science activity because I want to earn the star badge each week" (S5, Class VI), while another remarked, "I feel excited when the teacher praises me; it makes the lesson fun" (S8, Class VI).

Students also reported that the strategies encouraged them to follow classroom rules and put in greater effort. One student noted, "Even if I make a mistake, I try again because the teacher encourages me" (S15, Class VI), and another added, "I make sure my notebook is neat and complete because I want to earn stars" (S3, Class VI). These responses indicate that the reinforcement strategies not only motivated participation but also promoted persistence and diligence in learning activities.

Positive emotional responses were another key aspect highlighted by students. Several participants mentioned that receiving praise or badges made them feel proud and confident. One student stated, "When the teacher says 'Well done!' I feel proud and less nervous to answer questions" (S10, Class VI), while another shared, "Getting a badge makes me feel that my hard work is recognized" (S14, Class VI). These statements suggest that the strategies helped students develop self-confidence and a sense of accomplishment.

The FGD data further revealed that the system encouraged collaboration and supportive behavior among peers. Students often described helping classmates understand concepts so that everyone could succeed. For instance, one student said, "I explain my answers to friends so we can both earn stars" (S6, Class VI), and another remarked, "We discuss our answers in small groups before presenting them, so everyone can improve" (S2, Class VI).

Students also reflected on the fairness and clarity of the reinforcement system, noting that everyone had an equal opportunity to earn recognition. One participant commented, "I feel it's fair because if I work hard, I get recognized, just like others" (S1, Class VI), and another said, "Everyone has the same chance to earn praise and stars, so I focus on doing my best" (S13, Class VI). Many students expressed enjoyment and acceptance of the strategies, describing the classroom as more fun and friendly, while some suggested ideas for improvement, such as additional challenges or smaller groups to provide more opportunities for recognition.

Classroom observation

During the intervention sessions, the researcher conducted systematic observations and elaborated on the notes after each class to capture detailed insights into students' responses to the Weekly Academic Star Badge and Verbal Praise strategies.

The observations revealed that students were more attentive and engaged throughout the lessons. They actively participated in discussions, experiments, and group activities, and consistently followed instructions. Students who had previously been hesitant were observed attempting tasks multiple times and demonstrating greater persistence in completing their work.

Positive emotional responses were also evident. Students appeared proud, confident, and enthusiastic when recognized with praise or badges. Cooperation and supportive behavior increased, with students helping peers, sharing ideas, and working collaboratively during group activities. The structured reinforcement system encouraged students to focus on tasks, adhere to classroom expectations, and maintain consistent effort.

Overall, the classroom observations, elaborated after each session, indicate that the reinforcement strategies enhanced students' motivation, engagement, focus, confidence, effort, and collaborative behavior, complementing the FGD findings and the improvements seen in the quantitative results.

Summary of Results

The combined quantitative and qualitative findings show that the Weekly Academic Star Badge and Verbal Praise strategies positively impacted students' Science performance and classroom behavior. Post-test scores increased significantly (pre-test mean = 12.2, post-test mean = 18.7; $t(57) = -17.3$, $p < .001$, Cohen's d = -2.28). FGD revealed that students were motivated, confident, and

engaged, putting greater effort into tasks and collaborating with peers. Classroom observations confirmed increased attention, persistence, and cooperative behavior. Overall, the strategies enhanced academic achievement, focus, and socio-emotional development.

Discussion

The findings of this study support the broader literature on positive reinforcement, confirming that structured strategies like Verbal Praise and the Weekly Academic Star Badge System can enhance both academic performance and classroom engagement among Class VI students. Quantitative results revealed a significant improvement in Science scores, with the mean increasing from 12.2 in the pre-test to 18.7 in the post-test, and a large effect size (t(57) = -17.3, p < .001, Cohen's d = -2.28), demonstrating that these reinforcement strategies led to measurable academic gains. This aligns with previous studies showing that token-based and badge systems improve student achievement and on-task behavior [5,6].

Qualitative insights from focus group discussions further contextualize these gains. Students reported increased motivation, engagement, confidence, and enjoyment in learning, frequently attributing their efforts to recognition through praise or badges. Comments such as "I try harder in every Science activity because I want to earn the star badge" (S12, Class VI) and "I feel excited when the teacher praises me; it makes the lesson fun" (S8, Class VI) illustrate how these strategies fostered persistence and self-efficacy. These observations are consistent with Allday and Pakurar [8], who emphasized that verbal praise reinforces student self-efficacy and promotes active participation.

Classroom observations corroborated the self-reported data, showing that students were more attentive, cooperative, and persistent in completing tasks. Even students who were previously hesitant became more engaged, indicating that the structured reinforcement system supported both academic effort and positive social behavior. These findings address concerns in the literature regarding reliance on extrinsic rewards [9], suggesting that when applied thoughtfully, badges and praise can enhance intrinsic motivation over time by promoting a sense of accomplishment and pride.

Overall, the study demonstrates that combining verbal and symbolic reinforcement strategies effectively improves academic outcomes and classroom behavior among Class VI learners. By confirming both the cognitive and socio-emotional benefits ob-

served internationally, these findings provide practical evidence for the implementation of structured positive reinforcement in Bhutanese classrooms, bridging the gap identified in prior research on its simultaneous effect on achievement and engagement.

Recommendation

While the decision to implement reinforcement strategies lies with individual teachers, their impact should be carefully monitored. This study showed that the Weekly Academic Star Badge and Verbal Praise significantly improved students' Science performance, motivation, engagement, and collaborative behavior. Therefore, teachers should apply these strategies consistently, ensuring that all students, regardless of ability, benefit equally. Special attention should be given to students who are less confident or less motivated, providing additional support to encourage participation and effort.

School administrators and policymakers should create supportive conditions for teachers by offering professional development on the effective use of positive reinforcement, including combining verbal and symbolic rewards to enhance both academic and socio-emotional outcomes. The allocation of recognition should be fair, transparent, and based on clear criteria to maintain student trust and motivation.

Practitioners should regularly assess the impact of these strategies by tracking academic progress, classroom engagement, and student feedback. This will allow for informed adjustments to maximize benefits and address any unintended challenges, such as over- reliance on extrinsic rewards.

Furthermore, while positive reinforcement has been widely studied internationally, research in Bhutan is limited. Future studies should explore its use across different subjects and age groups to validate its effectiveness and provide context-specific guidance for implementation in Bhutanese classrooms.

Conclusion

This study found that the positive reinforcement specifically Weekly Academic Star Badge and Verbal Praise are effective strategies for improving students' science performance. These reinforcement strategies encourage students to put in greater effort, participate actively, and collaborate with peers, creating a positive and supportive classroom environment. Importantly, all students, including those less confident, benefit from consistent recognition and encouragement. Teachers can use these strategies to foster

both academic achievement and socio-emotional growth, provided they are implemented fairly and thoughtfully. Given the demonstrated positive outcomes, structured positive reinforcement can be a valuable approach in Class VI Science lessons to enhance learning outcomes and classroom engagement.

About Author

Mr. Ugyen Norbu is a teacher and an enthusiastic action research practitioner who is committed to improving classroom practices through reflective and evidence-based approaches. He has hands-on experience working with students and continually seeks strategies that support positive behavior, active participation, and meaningful learning. His work in action research reflects a strong belief in professional growth, student-centered teaching, and creating a classroom environment where every learner can succeed.

Bibliography

1. Brophy J. "Motivating students to learn (3rd ed.)". Routledge (2010).

2. Skinner BF. "Science and human behavior". Macmillan (1953).

3. Ministry of Education and Skills Development. "Bhutan Education Blueprint 2019-2023: Rethinking education". Royal Government of Bhutan (2019).

4. Greenwood C R., *et al*. "Academic engagement as a predictor of school success: Strategies for classroom intervention". *Journal of Positive Behavior Interventions* 24.3 (2022): 145-158.

5. Simonsen B., *et al*. "Evidence-based practices in classroom management: Considerations for research to practice". *Education and Treatment of Children* 31.3 (2008): 351-380.

6. Rumfola L. "Positive reinforcement to improve classroom behavior". *Journal of Education and Practice* 8.5 (2017): 134-141.

7. Maxwell JA. "Qualitative research design: An interactive approach (2nd ed.)". (2003).

8. Allday RA and Pakurar K. "Effects of teacher praise on attending behaviors of students with emotional and behavioral disorders". *Journal of Applied Behavior Analysis* 40.1 (2007): 15-23.

9. Deci E L., *et al*. "Extrinsic rewards and intrinsic motivation in education: Reconsidered once again". *Review of Educational Research* 71.1 (2001): 1-27.

10. Creswell JW and Creswell JD. "Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.)". SAGE Publications (2018).