EFFECTS OF POSITIVE REINFORCEMENT AS A MOTIVATION STRATEGY ON
THE ACADEMIC PERFORMANCE OF LEARNERS: A CASE OF FORM 4 BIOLOGY
STUDENTS, MORRIS SECONDARY SCHOOL, 2016

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS OF THE POST GRADUATE DIPLOMA IN EDUCATION

DECEMBER 2016
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I declare that this research project is my own unaided work. It is submitted for the Post Graduate Diploma in Education in the Bindura University Science Education, Zimbabwe. It has not been submitted before for any other degree or examination in any other university.

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DEDICATION

This research project is dedicated to my mom and brother, Evans, for their love which is always my source of inspiration.
ACKNOWLEDGEMENTS

I would like to thank the Almighty, who strengthens me with mighty in the inner man. Heartfelt gratitude also goes to the Government, in collaboration with UNICEF for sponsoring my PGDE studies. I would like to thank Professor Denhere, for his unwavering guidance and support in conducting this research. Lastly, I acknowledge my mom and brother, my sources of inspiration and support. Love you.
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CHAPTER 1. INTRODUCTION

1.0 BACK GROUND TO THE STUDY

Students require some form of stimulus to activate, provide direction, and encourage persistence in their study and learning efforts. Motivation is the energy to study, to learn, to achieve and to maintain these positive behaviors over time (Hutt, 2011). Motivation is what stimulates students to acquire, transform and use knowledge. It has been the centre of attention among educational researchers throughout the years because it constitutes the backbone of the learning process. Learning in real sense gets completed through motivation (Stipek, 1997). Since the will to learn builds one of the basic elements of learning, students take an important step on the road to learning through motivation. However, students may sometimes lose their willingness and interest towards lessons, which puts a major barrier in front of effective learning.

Motivation is identified as a state of cognitive and emotional arousal which leads to a conscious decision to act and which gives rise to a period of sustained intellectual and/or physical effort in order to attain a previously set goal (Williams and Burden, 1997). From the definition, it is clear that motivation is a process. It is neither an aim nor a product. On the contrary, it is a tool that helps individuals to reach their respective aims. First, there is need for the student to feel an interest in the subject at hand, set a goal and then decide to take an action accordingly (Deci and Ryan, 1985). What is of even more significance is the ability to maintain that interest as one struggles to realize his/her previously set goal. Slavin (1997: 345) describes this process in a general sense: “...motivation is what gets you going, keeps you going and determines where you are trying to go”. As it is obvious, motivation provides students with a direction to follow. It is a concept revealing the reasons why people act and think as they do (Weiner, 1992). These aspects of motivation are supported by Brophy who says motivation is a theoretical construct used to explain the initiation, direction, intensity, and persistence of a behavior, especially goal-directed behavior. In the classroom context, the concept of student motivation is used to explain the degree to which students invest attention and effort in various pursuits, which may or may not be the ones desired by the teacher (Brophy, 1981). As it is obvious, motivation constitutes one of the significant backbones of the learning process in student life; hence a lot of studies place a high a value on this concept. However, lack of motivation still constitutes a serious problem both for teachers and
students in the classrooms. Therefore, this study seeks to explore the use of positive reinforcement in motivating students towards higher academic performance.

Motivation has several effects on students’ learning and behavior. Firstly, motivation directs behavior towards particular goals. Motivation also leads to increased effort and energy directed towards particular tasks. It determines whether a student will pursue a task with enthusiasm or a lackluster attitude. It also increases the initiation and persistence of activities. It increases a student’s time on a task and is an important factor in affecting their learning and achievement. Motivation enhances cognitive processing. It actually affects what and how information is processed because motivated students are more likely to pay attention and try to understand the material instead of simply going through the motions of learning in a superficial manner.

In contrast, unmotivated students are not apt to be systematic in their learning efforts. They may be inattentive during lessons, may not be organized in carrying out their tasks, note taking may be done haphazardly or not at all, they may not monitor their level of understanding or ask for help when they do not understand what is being taught. Lack of the above aspects, that is, effort, initiation, persistence and cognitive processing ultimately leads to suffering of the learning process.

More and more teachers are reporting that motivating their students to learn is one of their most difficult challenges (Gottfried et al, 2001). While some students seem self-motivated to learn, others show very little interest in learning, gaining new skills, or improving their abilities. Far too many students do not develop their academic abilities or talents because they lack the desire to do so. By the time a student has reached adolescence, poor motivation has become one of the chief contributors to underachievement (Stipec, 1996). However, fostering a motivated student requires expertise and creativity on the part of the teacher. Developing a student who will have a long-term commitment to learning is also an important educational outcome itself, according to Craighead et al, (1981). John Dewey (1963) said that the most important attitude that can be formed in a student is that of the desire to go on learning.
The problem however is that teacher education programs still give only minimal attention to the subject of student motivation (Stipec, 1996). Many teachers, therefore, begin their teaching careers with little working knowledge of how to motivate students (Ames, 1990). Teachers are left to improvise. Concerns about the quality of student motivation have received very little attention in recent debates about school reform. The focus of policy at the state level is often on district-level incentives for increased test scores and sanctions for low test scores, with little consideration of the kinds of impact such policies might have on teachers and, ultimately, student motivation (Hutt, 2011). Given these concerns, this research was aimed at finding the effects of positive reinforcement as a student motivation strategy on the academic performance of students.

1.1. Statement of the problem
Lack of motivation in students erect a barrier towards effective learning since motivation determines a student’s attitude towards school work, how he relates to teachers, how much time and effort he invests in studies, how much assistance and support he seeks from teachers and peers, lesson attendance as well as how he ultimately performs academically. Students often have problems sustaining intrinsic motivation towards school work due to lack of personal goals, low self esteem about their ability to perform tasks or due to affective oriented reasons where personal problems may interfere with present activities, personal problems such as low socio-economic status and unstable backgrounds. In spite of the best school administrators, faculties, curriculum, facilities and materials, how a teacher motivates a student in the classroom often is the demarcating line between poor and good academic achievement.

1.2 Assumptions
1.2.1 There is absence of an extraneous variable that may alternatively explain the outcome of the experimental study on effects of positive reinforcement on academic performance.
1.2.2 Academic performance is measurable using continuous assessment in the form of in-class tests
1.2.3 Assessment test items are valid and reliable since they were extracted from recognized examination boards, i.e ZIMSEC and Cambridge
1.2.4 Teachers involved in the study are professionals, who due to experience can note effects of positive reinforcement on students.
1.3. Purpose of Study
The purpose of this study was to examine the effects of positive reinforcement as a motivation strategy on the academic performance of Ordinary level Biology students at Morris Secondary school.

1.4. Research Questions.
This study sought to answer the following research questions:

1.4.1. What is positive reinforcement?
1.4.2. Do teachers understand what positive reinforcement is?
1.4.3. Do teachers make use of positive reinforcement in their teaching practice?
1.4.4. Does positive reinforcement motivate students to higher academic performance of ‘O’ Level Biology students at Morris Secondary school?

1.4. Research Hypothesis
In this study the researcher hypothesized that:

Null Hypothesis

1.5.1. There was no significant difference in academic performance of learners who received positive reinforcement from those who were not positively reinforced (Ho)

Alternative Hypothesis 1

1.5.2. There was a significant difference in the academic performance of learners who received positive reinforcement from those who were not positively reinforced.

1.5 Significance of the study
Research findings may positively influence the way teachers motivate students to higher academic performance. The study may enlighten instructional designers on the effects of positive reinforcement as a motivation strategy towards improved academic performance, on types of positive reinforcement to use in their teaching practice and the challenges that may be met in its use as well as how the challenges may be overcome.
1.6 Delimitations of the study
This study was conducted at Morris Secondary school, UMP District, Mashonaland East Province. The participants were selected from the Form Four Biology class as well as from the teachers at Morris secondary school. The class has 12 students. The students have from average to below average academic abilities, as evidenced by their Grade Seven results. The students are heterogeneously mixed, sex wise. The mixed method research design method was used mainly for expansion and complementarity of each set of results from both the quantitative and qualitative research methods. The experimental method was used to assess students’ academic performance under controlled conditions. Questionnaires were used mainly for their reliability and flexibility.

1.7 Limitations of the Study
One limitation in this study was student absenteeism, which hindered data collection times as well as interfered with the reinforcement schedule. The researcher got around the problem by having the students write the tests during their free periods. This consequently had a positive effect of discouraging absenteeism, and therefore worked to the researcher’s advantage.

The researcher used Morris Secondary School only for the study instead of a number of schools in the Uzumba Maramba Pfungwe district due to financial constraints. The researcher self-financed the study, and could not therefore secure enough funds for transport, printing of questionnaires as well as funds for buying varied reinforcers. The school administration chipped in with materials such as pens, diaries and rulers to be given to students as reinforcers, which proved to be of high value and desirability to the students.

1.8 Definition of Terms.
Scholl (2002) defined motivation as the force that energizes, directs, and sustains behavior. It is the driving force that encourages an action or behavior to occur. According to Hutt, (2011) motivation is an internal state or condition that serves to activate or energize behavior and give it direction.
Positive Reinforcement is the addition of a stimulus to increase or maintain frequency of a behavior (Scholl, 2002). It involves presentation of a reward immediately following a desired behavior intended to make that behavior more likely to occur in the future. In this context, positive reinforcement was defined as the provision of verbal, symbolic, tangible or other forms of rewards for desirable academic performance or effort at the classroom level.

Academic performance refers to the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in a school, college and university (Collins, 1982). Academic performance may also be taken to mean the acquisition of knowledge and understanding in a specific intellectual domain such as numeracy, literacy, science and history. Among the many indicators of academic performance are curriculum based criteria such as grades, or performance in educational assessment tests, cumulative indicators of academic achievement such as educational degrees and certificates. All mirror a person’s intellectual capacity.

A reinforcer is a stimulus that strengthens or weakens a behavior. A social reinforcer is a verbal stimulus aimed at strengthening or weakening a behavior.

A tangible reinforcer is a reward that is palpable, can be handled and touched, given with the aim of strengthening a behavior (Wheatley et al, 2001). Reward is an act performed to strengthen approved behavior. It can also be regarded as a recompense for worthy acts or retribution (Oxford Dictionary, 2015). It is something that is given in return for doing something.

1.9 SUMMARY

In this chapter, the background to the study was outlined. The researcher also spelt out the problem statement which explicitly gave a description of the problem under investigation. The researcher also gave the purpose statement, aims and objectives of the study, research questions, and hypothesis. The significance of the study was explained in relation to the value and contributions
the study will add to the existing body of knowledge as well as its relevance to stakeholders. Delimitations of the study, limitations of the study as well as definition of terms in the context of the research were also outlined.
CHAPTER TWO: LITERATURE REVIEW

2.0 INTRODUCTION
The aim of this chapter was to review literature relevant to the study on the use of positive reinforcement in motivating students towards higher academic achievement. Related literature from the internet, library books, journals and previous theses and dissertations was reviewed so as to provide a historical background to the study, establishing what has been done as well as establish knowledge gaps. Related studies on the use of positive reinforcement in the teaching practice were looked into in detail to gain more understanding of the use of positive reinforcement.

2.1 Motivation and learning
Worldwide, education advocates have dedicated huge amounts of time and energy to improving student achievement. Closer to home, the Zimbabwean education system recently embarked on a curriculum review program which saw the launch of a new curriculum blueprint and the training of teachers under the Teacher Capacity Development program in anticipation of the implementation of the new curriculum. But with the attention currently focused on factors like improving teacher quality, development of new assessments, curriculum review and rechanneling towards a pragmatic approach, one major factor is being overshadowed: the motivation of the students themselves. Usher (2012) in his research at the George Washington University Graduate school of Education and Human development noted that even with the best administrators, faculty, curriculum, and materials in place, if students are not motivated to learn and excel, achievement gains will be difficult, if not impossible.

Learning is an active process that needs to be motivated and guided toward desirable ends. For effective learning to occur, the learner must be motivated so that his interest will be directed towards a definite objective, which will spur him towards further learning. Higher motivation to learn has been linked not only to better academic performance, but to greater conceptual understanding, satisfaction with school, self-esteem, and social adjustment, and to lower dropout rates (Gottfried, 2009). Not only is student motivation the final piece of the school improvement puzzle—without it, the rest of the puzzle disintegrates.
Motivation affects every aspect of schooling. Although not as frequently discussed as other aspects of educational reform, motivation is a crucial part of a student’s experience from preschool onward (Deci, 1999). Adequate motivation not only sets in motion the activity which results in learning, but also sustains and directs it. It is concerned with the arousal of interest in learning. Motivation can affect how students approach school in general, how they relate to teachers, how much time and effort they devote to their studies, how much support they seek when they’re struggling, how much they attempt to engage or disengage their fellow students from academics, how they perform on assessments (and therefore how the school performs), and so on (Ryan & Deci, 2009). Hardly any aspect of the school environment is unaffected.

Motivation has also been shown to have several effects on students’ learning and behavior. Firstly, motivation directs behavior towards particular goals. Motivation determines the specific goals toward which people strive, thus it affects the choices students make, for example whether to allocate more time to a particular subject, at the expense of other subjects. Motivation also leads to increased effort and energy. It determines whether a student will pursue a task, even a challenging one with enthusiasm or a lackluster attitude. Motivation also increases the initiation and persistence of activities. A motivated student always increases the time he spends on a task.

Motivation also enhances cognitive processing. It actually affects what and how information is processed because motivated students are more likely to pay attention and try to understand the material instead of simply going through the motions of learning in a superficial manner.

### 2.2 Strategies for motivating students towards higher academic performance

The following are strategies that are recommended for motivating students towards higher academic performance.

**2.2.1 Use of extrinsic motivators in the form of positive reinforcements.**

External rewards have been used in the classroom for more than a century to bring about desired behavior.

**2.2.2 Teacher/student interaction**
Encourage students to set their own goals. Design experiments that are appropriately challenging in view of the experience and aptitude of the class. Give students as much control over their own education as possible. Let students choose paper and project topics that interest them. Assess them in a variety of ways to give students more control over how they show their understanding to you.

Punishment

Research has shown that corporal punishment does not improve students’ in-school behavior or their academic performance. In fact, recent studies have found that in American states where corporal punishment is frequently used, students have performed academically worse than those in states that prohibit corporal punishment. Ten states that had the longest histories of forbidding corporal punishment improved the most, with their improvement rates three times higher than those states which reported frequent use of corporal punishment. Children who have been subjected to hitting or other harsh disciplinary practices have reported subsequent problems with depression, fear and anger. These students frequently withdraw from school activities and disengage academically. The American Society for Adolescent Medicine has found that the victims of corporal punishment often develop deteriorating peer relationships, difficulty with concentration, lowered school achievement, antisocial behavior, intense dislike of authority and a tendency for school avoidance and drop-out (Society for Adolescent Medicine, 2003). The Zimbabwean government passed legislation prohibiting the use of corporal punishment in schools which is commendable given the vast evidence against the use of corporal punishment. However, this has been frowned upon by most Zimbabwean teachers, who had regarded corporal punishment as the most effective discipline and motivation tool.

Statutory instrument 1 of the constitution of Zimbabwe 200: mStatutory instrument 65 of the constitution of Zimbabwe 1992 forbids teachers to use corporal punishment. The law was reinforced quite recently, that is in 2015. Until then, corporal punishment has been tolerated and prescribed as an essential part of the pedagogue’s function (Shumba et al, 20120). The belief that corporal punishment is a necessary and effective way of disciplining children had become ingrained in teachers.
Teachers can enhance intrinsic motivation of their students by allowing the students to feel that they are in control of their own learning (Wellborn and Connell, 1990). The teacher allows the students to monitor and reinforce their own progress. Using this strategy, the teacher uses the discovery method to teach new and unfamiliar concept. Giving students the opportunity to feel competent by learning through discovery helps foster, maintain and enhance intrinsic motivation.

**Specific instructional strategies**

**Researchers** have made several recommendations for educators interested in supporting students’ motivation, including the use of rewards, increasing student autonomy and choice, using collaborative or cooperative learning methods, and creating a supportive classroom environment with respect to goal structures, attributions, and external evaluation. (Deci).

For example empirical literature on the effects of positive reinforcement on student motivation suggests that teachers should sparingly and carefully use these types of rewards in the classroom. Early researches on positive reinforcement had shown that the use of tangible rewards may have negative effects on both free choice behavior and self reported interest compared to intangible rewards. However, as researches progressed, it was noted that negative effects of reward on intrinsic motivation was observed for tasks that were interesting or novel only. Although some results such as these suggest that rewards should be avoided whenever possible, other researchers argue that extrinsic rewards may have a place in the classroom. Hidi and Harackiewicz (2000) dispute the claim that extrinsic rewards always damage intrinsic motivation. They argue that the value of intrinsic versus extrinsic motivation may depend on the length of involvement and complexity of the task. For very long and complex tasks, a combination of extrinsic and intrinsic rewards may be most effective. In addition, although intrinsic motivation is highly desirable, not all students

**What is positive reinforcement?**

Positive reinforcement was a phenomena first described by B.F Skinner in his theory of Operant Conditioning where he proposed that an individual’s behavior is a function of its consequences and governed by the law of effect. Through extensive review of literature, the meanings of positive reinforcement were established. The Oxford Dictionary (2010) defines it as the process of encouraging or establishing a pattern of behavior by offering a reward when the behavior is
exhibited. Slaving (1986) in his research on *Strategies for Reinforcement* explains positive reinforcement as the addition of a reward following a desired behavior with the purpose of increasing the likelihood of the behavior occurring again. A positive reinforcer is defined as any environmental event that when given in response to the behavior increases the strength and frequency of that behavior. In education, it is the offering of an environmental event in exchange for the student’s participation, service or achievement (Craighead et al, 1981). A reward functions as a reinforcer only when the student values it enough to affect a change in his or her behavior or performance. In this study, positive reinforcement is defined as the provision of verbal, symbolic, tangible or other types of rewards for desirable academic performance or effort at the classroom level. This definition includes

- Verbal reinforcement such as praise for correct responses during class discussions, accurate homework, improved test scores.
- Symbolic rewards such as gold stars, certificates, name on notice board.
- Tangible rewards such as edibles, toys, pencils, pens, notebooks,
- Activity rewards such as free time, field trips, being leader of an activity

**Reinforcement schedules**

A reinforcement schedule refers to the frequency with which a student receives reinforcement for performing a desired behavior. It is a protocol or set of rules that a teacher will follow when delivering reinforcers. There are four types of reinforcement schedules namely Continuous, intermittent, ratio and the interval reinforcement schedule.

With continuous reinforcement (CRF), reinforcement is given after each correct response. A reinforcer is administered for every occurrence of the target behavior. It has the advantage that learning occurs quickly, especially when a teacher wants students to gain a new skill. However, its time consuming and quickly results in satiation. There is always a high rate of extinction of the reinforcer due to students getting used to it.

With the intermittent type of reinforcement, reinforcement is given for some, but not all correct responses. Continuous reinforcement is more oftenly used to teach new behaviours while
intermittent reinforcement schedules are used for maintaining previously learned behaviours. Reinforcement is given after a specific number of correct responses. Its advantage is that it maintains behavior over time. However, it is not effective for teaching new behaviours.

The third type of reinforcement schedule is the ratio reinforcement schedule. Fixed ratio schedule, variable ratio schedule, fixed interval schedule, and the variable interval schedule.

The fixed ratio schedule is whereby reinforcement is delivered after a specified number of correct responses. It has the advantage that it builds a high response rate. However, irregular responding may occur if reinforcement is stopped.

The variable ratio schedule is whereby a learner is reinforced based on an average number of correct responses. Its advantage is that the learner’s rate of responding remains steady and constant. It is also very resistant to extinction. However, its main disadvantage is that its not suitable for teaching new behaviors.

The fourth type of reinforcement is the interval reinforcement schedule which can be a fixed interval schedule where a learner is reinforced following a specified time interval, for example reinforcing after a fortnightly test. It can also be a variable interval schedule where reinforcement is provided at varied time intervals, for example initially daily, then weekly and lastly fortnightly. Because students do not know when the next reinforcer interval will occur, they show behavior at a higher rate than with fixed interval schedules. Both types of the interval reinforcement schedules are easy to implement. However, the fixed interval schedule has the main disadvantage that due to its predictive nature, a student may only start using target skill only towards the next reinforcement period.

2.2 Historical background of Positive reinforcement.

One of the early theorists of motivation, Edmund Freud suggested that the unconscious mind drives all conscious actions. He posited that most human behavior and actions are a result of desires, impulses and memories that have been repressed into an unconscious state, yet can still influence actions (Stipec, 1996). The field of study on motivation went through some changes beginning in the 1950's. Motivation researchers and dissonance theorists began to reject Freud's idea that man is motivated only by drives and instincts (Festinger and Carlsmith, 1959). Festinger went on to
explain that motivation is man's attempt to change his environment, and then feel satisfied when the desired change occurs. These ideas, along with Deci's identification of intrinsic and extrinsic motivation led to the completion of many research studies on the effects of motivation on behavior. As a result, the idea began to emerge that extrinsic motivators were essential in building intrinsic motivation in a person, and could be sustained until a person became intrinsically motivated.

The reinforcement theory of motivation was proposed by BF Skinner and his associates. It states that individuals’ behavior is a function of its consequences. It is based on ‘law of effect’. That is individuals’ behavior with positive consequences tends to be repeated, but an individual’s behavior with negative consequences tends to be withdrawn (Whitley, 2001). According to Skinner, the external learning environment must be designed effectively and positively so as to motivate the student. Teachers should go out of their way to stimulate students’ interest in learning.

2.3 Implications of Positive reinforcement in Education.

The use of positive reinforcement as an effective, high-impact strategy for improving students' performance has been supported by documented research for a variety of school circumstances for both individual students and groups of students (Wheatley et al., 2009). Skinner's work has influenced the field of education, as well as the field of psychology. He believed that positive reinforcement was more effective than punishment when trying to change and establish behaviors. Through his work, Skinner identified five main obstacles to learning. These obstacles are a fear of failure, the task is too long and complicated, the task lacks directions, clarity in the directions is lacking, and there is little or no positive reinforcement (Frisoli, 2008). Skinner also recognized that people can be taught age-appropriate skills using the following techniques. These techniques are giving the learner immediate feedback, breaking tasks down into small steps, repeating the directions as many times as possible, working from the most simple to the most complex tasks, and giving positive reinforcement (Frisoli, 2008).

Positive reinforcement can either be a tangible reward for good behavior, or simply positive communication in the form of praise or encouragement, (McCarthy, 2010). Reinforcement is
designed to increase the probability that a desired behavior will occur with the delivery of an item immediately after the behavior is exhibited. The use of reinforcement procedures have been used with both typical and atypical developing children, teenagers, elderly persons, animals, and on learners with different psychological disorders (Sadowski, 2012). Positive reinforcement is a very powerful and effective tool to help shape and change behavior towards learning and academic performance. Positive reinforcement works by presenting a motivating item to the person after the desired behavior is exhibited, making the behavior more likely to happen in the future. (Sadowski, 2012) An example of positive reinforcement is a child receiving a certificate each time she comes out best student in an examination.

Numerous researches have shown that positive reinforcement is an effective tool in education. Previous studies in the field have shown the effectiveness of positive reinforcement on behavior modification. Deirich (2010) conducted a research in which she determined if the use of rewards and positive reinforcement was an effective method for teaching and encouraging students to display age appropriate behaviours and social skills, more specifically manners. Conclusions drawn from the study indicated that a focused, organized and detailed behavior management plan that consistently utilizes positive reinforcement positively influenced the appropriate use of manners during classroom interaction (Deirich, 2010). A comparison of pre and post reward system data showed that the frequency of disruptive behavior by students drastically decreased after the reward system was implemented. This finding reinforced what most educational and psychological research states about the effectiveness of behavior management systems on teaching students age appropriate behaviors and social skills.

In a similar research, Pettit (2013) investigated the effects of positive reinforcement on non-compliant behavior. The administration of positive reinforcements on a single student who formally exhibited disruptive behavior over a two month period showed a significant difference in the student’s behavior. This led to the conclusion that positive reinforcement does minimize non-compliant behavior.

Positive reinforcement has also been shown to improve lesson attendance. Hoque, (2013) conducted a research on the effects of positive reinforcement on the teaching and learning process. The study involved a control group that did not receive any reinforcement over a two month period.
and an experimental group that received positive reinforcement over the same period. The results of the study showed that weekly lesson attendance of the experimental group increased significantly, whereas there was no change in weekly attendance of the control group. Interestingly, the experimental group also showed an increased engagement in learning activities and classroom participation. The reinforced group became more actively involved in learning experiences, retained more information and was able to recall and apply this information better than the control group (Hoque, 2001). Students’ comments, attitudes and expressions from the members of the reinforced group indicated a high level of interest and satisfaction. The results of the study certainly supported the benefits generally attributed to Skinner’s Operant Conditioning theory.

Educators have long debated the value of financial and other rewards as incentives, but a series of experiments in Chicago-area schools showed that with the right kind of rewards, students achievement improved by as much as six months beyond what would be expected. The rewards apparently provide students with an incentive to take school work more seriously. One implication is that policymakers may underestimate students’ ability in otherwise low-performing schools, according to the research team that conducted the experiments.

2.4 Lack of motivation consequences.

Former United States of America Education Secretary Terrel Bell made this point forcefully when he said, “There are three things to remember about education. The first is motivation. The second one is motivation. The third one is motivation.” Data indicate that lack of motivation is a real problem affecting large percentages of students. Upwards of 40% of high school students, depending on the study, are disengaged from learning, are inattentive, exert little effort on school work, and report being bored in school, according to a 2004 National Research Council report. Unfortunately, this report noted, motivation and engagement in school decline steadily as students progress from Junior school to middle and high school. “Adolescents are too old and too independent to follow teachers’ demands out of obedience, and many are too young, inexperienced, or uninformed to appreciate the value of succeeding in school” (NRC, 2004, pp. 18-19). Losing motivation to learn has serious consequences that can culminate in students dropping out of school. In a 2006 survey exploring why students in America dropped out of high school, 70% of dropouts said they were unmotivated (Bridgeland, DiIulio, & Morison, 2006).
2.5 Positive reinforcement in the Zimbabwean School System

Scarce, if any, literature on motivation of students through positive reinforcement exists in Zimbabwean literature. Few, if any researches have been done with regards to the use of positive reinforcement in improving students’ academic performances. However, despite low activity in research on motivation using positive reinforcements, the use of positive reinforcement is indirectly and unsystematically implemented in the Zimbabwean Education System. Zimbabwe’s highest academic Board, ZIMSEC indirectly motivates students towards higher academic performance through the use of the grading system (Proffessional testing Inc, 2001). For example, a student who exhibits exceptional content mastery is given an A in a particular subject, and grades for poor performance also exist (D, E, O, F,U). This grading system in its own right acts as a motivator towards higher grades. The fact that employers and academic institutions reward exceptional academic achievers through better employment posts and more lucrative career choices only serve to fuel the race for higher grades. However, the grading system comes at the end of the race. What is of more significance is to motivate students at the classroom level, rather than at the end of a four year course. Unfortunately, during the day to day learning and teaching process teachers often focus more attention on punishing bad behavior than on rewarding appropriate behavior. Students are more likely to do things they will be rewarded for than punished for (Grossman, 2004)

This research was aimed at investigating the effects of positive reinforcement through the use of reinforcers at the classroom level, that is during the progress of the learning process, rather than at the end of the learning process. The knowledge acquired through this research is going to be of relevance mainly to the classroom teacher to improve his/her teaching practice. Through this research, the teacher will have information on the effects of positively reinforcing students as well as on the most effective form of reinforcement on students.

2.6 Summary
In this chapter, literature on related studies was reviewed. The historical background of motivation was analyzed. The importance and implications of motivation to learning were looked into, more focus being emphasized on previous related studies. This was done in order to identify knowledge gaps as well as establish what has already been done in the field. Lastly, the researcher looked at the use of positive reinforcement at the classroom level by the Zimbabwean education practitioner. The findings have exposed a need to carry out a research in the Zimbabwean education system context so as to add to the body of knowledge on the use of positive reinforcement as a motivation strategy.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction
The study sought to assess the effects of positive reinforcement on the academic performance of Biology students at Morris Secondary School. Both quantitative and qualitative research designs were used in carrying out the research, which makes it a Mixed Methods Research design. For data collection, two research instruments were used namely pre and post intervention tests and questionnaires. The justifications for the selection of the Mixed Methods research design were highlighted in this chapter and supported by relevant literature. In this chapter, the researcher also
justified the use of the selected data collection instruments as well as addressed the concerns associated with the use of each of the instruments. The population from which the sample was drawn as well as the sampling techniques employed to come up with the participants was articulated. Lastly, data collection, presentation and analysis procedures were discussed with regard to their validity, reliability and suitability to the research.

### 3.1 Research Design

Both qualitative and quantitative research designs were used in carrying out this research. This approach is called the Mixed Methods research design. The qualitative research design was used to address research questions:

1.4.1. What is positive reinforcement?
1.4.2. Do teachers understand what positive reinforcement is?
1.4.3. Do teachers make use of positive reinforcement in their teaching practice?

The quantitative research design was used to address the research question:

1.4.4 Does positive reinforcement motivate students to higher academic performance?

Driscoll (2007) simply defined a mixed method research as a kind of research that combines both quantitative and qualitative research approaches. Caracelli and Green (1997) say the mixing may be nothing more than a side by side or sequential use of different methods, or it may be that different methods are integrated in a single analysis. The mixed research design is used to enrich understanding of an experience or issue through confirmation of conclusions, extension of knowledge or by initiating new ways of thinking about the subject of the research (Annum, 2016). In this study, results from the quantitative research were used to complement the other set of results from qualitative research, to expand qualitative research results as well as to discover some aspects that would have been missed if only the qualitative approach had been used, as Annum (2016) recommends. These opinions further strengthened the suitability of the Mixed Methods research design for this study since the quantitative part was incorporated to enrich understanding of the effects of positive reinforcement, as well as to confirm conclusions drawn from the qualitative research design. Because of its logical and intuitive appeal, providing a bridge between the qualitative and quantitative paradigms, an increasing number of researchers are utilizing the mixed methods research to undertake their studies.
Morse and Ntehaus, 2009 give reasons for combining both quantitative and qualitative designs as:

- For triangulation, where a researcher seeks convergence from the different methods
- Complementarity, where the researcher seeks elaboration, enhancement, illustration and clarification of the results from the other method.
- Development where the researcher seeks to use the results from one method to help develop or inform the other method.
- Expansion where the researcher seeks to extend the breadth and range of inquiry by using different methods for different inquiry components.

The use of both qualitative and quantitative research designs results in corroboration where the researcher gets the evidence for results found in the alternative research design. The researcher opted for the mixed methods research design because it offered many benefits. Daniel (2016) says that an important feature of the mixed research method is the fact that it reduces the weaknesses of each method whilst drawing from the strong points of both quantitative and qualitative research designs. The mixed research design also assists in ensuring that results are even more accurate. Daniel (2016) says this is achieved through complementing the results gotten from one kind of research together with any other research methods. As a result, mixed methods research rarely misses accessible data. Migiro (2011) further supports this notion when he says the addition of a supplemental data set bolsters the effectiveness of the research. Using different processes of acquiring data can also lead to unexpected or emergent themes and information that would not have otherwise have come to light. It can also be used where compromises in sample size were made (Driscoll, 2007).

3.1.1 Quantitative Research design.

In this study, the quantitative approach was used to study the effects of positive reinforcement on academic performance. Thomas (2009) defines quantitative research as an approach to research that is used to quantify a problem by way of generating numerical data or data that can be transformed into usable statistics. It is used to quantify attitudes, opinions, behaviors and other defined variables. To assess students’ performance before and after positive reinforcement, students’ test scores had to be generated, recorded and analyzed for trends. This justified the use of the quantitative approach to research, rather than the qualitative one. Bergumisa (2009)
strengthens the justification of the use of quantitative research when he posits that it uses measurable data to formulate facts and uncover patterns in research. In this study, the researcher used test scores to uncover patterns in academic performance.

In particular, the experimental method was used. It involved a pre and post-test experimental design. The qualitative part of the research design was a case study one. The teacher also collected qualitative data using a questionnaire.

An Experimental Quantitative research design was suitable for investigating the effects of positive reinforcement on academic performance of students as supported by (Moore, 2008) who extrapolates that the purpose of an experimental research is to study cause and effect relationships. Bandele (1999) also posits that a researcher can obtain much stronger evidence of causality from experimental research than from non-experimental research. This further justified the use of the experimental design on this research since the aim of the research was to find the cause and effect relationship that may exist between positive reinforcement and academic performance. An experimental research design is a blueprint of the procedure that enables the researcher to test his hypotheses by reaching valid conclusions about relationships between independent and dependant variables. In this particular study, the relationship between positive reinforcement (independent variable) and academic performance (dependent variable) had to be established in order to make recommendations for or against the use of positive reinforcement. In addition, (Driscoll, 2000) further explains that an experiment is a test under controlled conditions that is made to demonstrate a known truth, to examine the validity of a hypothesis or to determine the efficacy of something previously untried. (Moore, 1994) did also identify four elements for true experiments. These are:

- **Manipulation**- where something is purposefully changed by the researcher in the environment
- **Control**- which is used to prevent outside factors from influencing the study outcome. If an experiment is controlled and manipulated, then the researcher becomes more confident that only the manipulation caused the outcome. Experiments include highly controlled and systematic procedures in an effort to minimize error and bias.
Another key element of a true experiment is random assignment. If there are groups or treatments in the experiment, participants are assigned to these groups or treatments randomly.

With reference to Moore’s characteristics, it is clear that an experiment is a study in which a treatment, procedure or program is intentionally introduced and a result or outcome is observed. All the above elements were met in carrying out this research. Thus considering the research questions proposed earlier and the significance of the study, an experimental quantitative study was most appropriate for addressing the research question:

1.4.4 Does positive reinforcement motivate students to higher academic performance?

3.1.2 Qualitative Research design

A qualitative approach to research was used to answer the research questions

1.4.1. What is positive reinforcement?
1.4.2. Do teachers understand what positive reinforcement is?
1.4.3. Do teachers make use of positive reinforcement in the teaching and learning of science and biology in particular?

The approach was used to gain understanding of teachers’ opinions, motivations, underlying reasons and perceptions of the use of positive reinforcement in motivating students to higher academic performance. A qualitative design was suitable for this study as it assists in uncovering trends in thought, opinions and insights into the use and effects of positive reinforcement to motivate students to higher academic performance. The focus with qualitative analysis is on learning the meaning the participants hold rather than the meaning brought in by the researcher. From these meanings, the researcher builds patterns, categories and themes by inductive analysis.

In particular, a case study method was used. The case study method is one of the most useful method available in educational research due to its flexibility and adaptability to a range of contexts, processes, people and foci (Macmillan and Schumacher, 1993). The case study method provides tools for researchers to study complex phenomena within their contexts (Baxter and Jack, 2008). (Bandele, 1999) defines a case study as the collection and presentation of detailed information about a particular participant or small group, such as a school class or specific social group frequently including the accounts of the subjects themselves. A form of qualitative
descriptive research, the case study looks intensely at an individual or small pool, drawing conclusions only about that participant or group and only in that specific context. The in-depth study of these few cases will enable the researcher to make feasible generalizations because of data and research conclusions credibility and transferability. Case studies give new insight into phenomena or experience. Because case studies are so rich in information, they give insight into new phenomena. These notions strengthened the researcher’s choice of the case study method in carrying out this research.

3.2 Population
A population is the entire aggregation from which samples can be drawn. Since a case study method was used, the research was limited to Morris Secondary School. The population was defined by students and teachers at Morris Secondary School, 2016.

3.3 Sample
A sample is a set of items selected at random from a population and used to test a hypotheses about the population. The participating group of students was made up of 12 Form four biology students at Morris Secondary School. The group was heterogeneously mixed, sex wise. The students were assigned into two groups, Group A (Control group) and Group B (Reinforced group).

3.4 Sampling techniques
Participants were assigned into the 2 groups, Group A (Control group) and Group B (Reinforced group) by simple random sampling. The reason for using simple random sampling was to reduce the potential for human bias in the selection of cases to be included in the sample and for accurate comparison of effects of positive reinforcement on academic performance. This also enabled the researcher to make generalizations, i.e. statistical inferences from the sample to the population.

3.5 Instruments
Two research instruments were used for data collection namely: pre and post treatment tests and a questionnaire. A questionnaire was used on teachers to gain understanding of teachers’ opinions, motivations, underlying reasons and perceptions of the use of positive reinforcement in motivating students to higher academic performance. A questionnaire is a systematically prepared form or
document with a set of questions deliberately designed to elicit responses from respondents for the purpose of collecting data or information. The researcher opted for a questionnaire over other data collection techniques because people are more truthful when responding to questionnaires because it offers anonymity and confidentiality. If properly constructed, questionnaires are reliable. One other advantage of a questionnaire is that data from a questionnaire can be analyzed more scientifically and objectively than other forms of research (Ackroyd and Hughes, 1990)

The aim of the questionnaire was to: (i) assess whether teachers understand what positive reinforcement is. (ii) Assess whether teachers apply positive reinforcement in the teaching and learning process. (iii) Assess whether the use of positive reinforcement on students by teachers at Morris Secondary School motivates students to higher academic performance.

The researcher also used pre and post-treatment tests as data collection instruments for investigating the effects of positive reinforcement on the academic performance of students. Although no test can perfectly measure what a person knows or fails to know, good tests give snapshots of the ability level (or state of mastery) at a given point in time. When used with other relevant pieces of information, test scores provide a strong foundation for well informed decisions. Well developed and well-constructed test items are reliable measures of targeted constructs (Professional Testing Inc, 2006)

PTI (2006) identified the characteristics of a good test. They argue that the most important criteria for the quality of a test are: validity (whether or not a test measures what it claims to measure), reliability (that is consistency and reproducibility) and fairness (its freedom from any kind of bias). To ensure that the tests met the postulated characteristics, the researcher took the following measures.

To ensure content validity, the test questions were set according to Bloom’s Taxonomy so as to get standard tests that test knowledge, comprehension, evaluation, analysis, synthesis and application. The questions were also drawn from past Cambridge and ZIMSEC O level Biology examination papers to ensure that the test items are well-constructed and reliable measures of a student's knowledge.
On test administration, every examinee received an equivalent test and students wrote them under similar conditions. Great care was taken to ensure that none of the students had an unfair advantage over others because of the test date, form, or location of the testing site. The tests were made to be appropriate for all students irrespective of religion, gender or age. The test did not disadvantage any examinee, or group of examinees, on any basis other than the examinee’s lack of knowledge and skills the test is intended to measure. To ensure standardization, the researcher gave the same instructions and time limit. The tests contained the same questions and the tests were scored and evaluated using the same criteria (marking scheme). Standardization improved reliability of the tests.

3.6 Data collection procedures

The intention of the study was to measure and compare the academic performance of learners before and after they were given positive reinforcements in order to determine the effects of positive reinforcement on the academic performance of students. In the first two weeks, 2 pre-treatment tests were administered to the students, that is tests before positive reinforcement to determine the baseline academic performance of the students. The researcher used an average of the 2 pre-intervention tests to improve reliability. The test scores were also used as the basis for positively reinforcing those in group B (the reinforced group). Thereafter, two post intervention tests were administered to the students at one week intervals. Students in group B were reinforced after each test so as to determine the effect of positive reinforcement on the academic performance of the learners. The independent variable in this study is the pre and post intervention data, while the dependent variable is the academic performance of the learners in the pre and post intervention tests. In recording students’ test scores, codes were used to maintain confidentiality.

The tangible reinforcers used were varied to prevent reinforcer satiation i.e. to prevent the students from getting used to the reinforcers. The researcher reinforced students using black pens, rulers, and diaries. More importance was placed in the sentimental values of the rewards to the students, rather than their monetary value.
Qualitative data was also collected using a questionnaire. A formal application was made to the headmaster of the school to seek permission to carry out the research on students as well as on teachers. Respondents to the questionnaires were also informed of what the research was about and how their responses would be used. For ethical reasons, the participants were asked not to indicate their names on the questionnaires. Individual respondent’s responses were not associated with real names to maintain confidentiality.

3.7 Data Presentation and analysis
Data analysis is a process of inspecting, cleaning, transforming and modeling data with the goal of discovering useful information, suggesting conclusions and supporting decision making. According to Cohen et al (2000) analysis means organizing and interrogating data in ways that allow researchers to see patterns, identify themes, discover relationships, make interpretations or generate theories.

Data from pre and post treatment tests was analyzed using statistical analysis. Statistical analysis refers to a mathematical process used to summarize data from which inferences can be made as to the outcome with quantifiable confidence. It is the science of collecting, exploring and presenting large amounts of data to discover underlying patterns and trends. The t-test for correlated (paired observations) was used to compare mean scores of the same group of students before and after treatment (positive reinforcement). The aim was to test if there was a significant difference in the academic performance of students after being positively reinforced.

Pre and post treatment performance was also compared by standardizing test scores using the standard score (Z-score). The Z-score is a derived score that expresses how far a raw score is from some reference point such as the mean in terms of standard deviation units (Yin, 1994) in T.O Adeyemi (2000). Yin (1994) says the Z-score is a very useful statistic because it enables comparison of two sets of scores that are from different normal distributions. It is used to compare tests measured on entirely different scales (Davis, 2010), the level of performance of an individual at different times (Oluwatayo, 2003) as well as compare students’ performance on two tests that may have different degrees of difficulty (Kolawale, 2001). In this research, the Z-Score was used
to compare students’ performance on different tests that may have different degrees of difficulty. Adeyami (2000) says a researcher can validly average test scores and convert them to standard scores. He can average them and derive a valid final index of average performance (Adeyami, 2000). The standard score does this by converting scores in a normal distribution to Z scores in what becomes a standard distribution.

\[
\text{Standard score (Z)} = \frac{\text{raw score} - \text{mean}}{\text{Standard deviation}}
\]  (Kolawale, 2001)

Z scores give rise to negative numbers and decimals. Kolowale (2001) recommends converting Z-scores to T-scores by multiplying a Z-score by 10 and adding 50.

\[
\text{T-Score} = 10Z + 50
\]  (Kolowale, 2001)

Questionnaire responses were first coded into a spread sheet by manually adding responses to the spreadsheet (Alan and Saunders, 2004). The Survey Methods Workbook. Polity. Buckingham. A third party then checked the data for accuracy. The number of respondents who selected each response was calculated, and the information displayed using pie charts and bar graphs. The data was analyzed using descriptive statistics and graphs (University of Leeds, 1996). Guide to the design of Questionnaires.

3.7 Reliability and Validity

Reliability is defined as the extent to which an instrument yields consistent information about the knowledge, skills or abilities being assessed (Heffner, 2016). In order to maintain reliability in the study, the researcher administered the same reinforcement schedule to all the participants. Additionally, all the teachers who were part of this study were given the same questionnaire with the same questions. The assumption was that the respondents interpreted the questions the same way since the questions were constructed in the English language. Some experts recommend the Test-retest Reliability where the same test is given to participants twice to assess consistency. However, the method results in the memory effect where students may answer test questions from memory, thereby distorting the true results of positive reinforcement on academic performance (Heffner, 2016). On account of that the researcher did not use the method.
Test validity refers to the degree to which a test or other measuring device is truly measuring what it was intended to measure. Validity in this context refers to whether or not a test measures what it claims to measure. As mentioned in Resnick (1987) an instrument is valid if it measures what it is intended to measure and covers all research issues in terms of content and detail. Thus validity refers to the extent to which the data collected gives a true measurement or description of social reality (what is happening in practice). To ensure content validity, the tests were set using Bloom’s taxonomy to ensure that test items tested all 6 of the Bloom domains, i.e knowledge, comprehension, analysis, synthesis, evaluation and application. The tests were also passed through an expert in the field of biology, as recommended by Dr Heffner, 2016 who posits that content validity is concerned with a test’s ability to include or represent all the content of a particular construct. He goes on to say there is no easy way of determining content validity aside from expert opinion (Heffner, 2016).

Michael (2015) writes that external validity is concerned with the extent to which the results of an empirical investigation can be generalized to and across individuals, settings and times. The research instruments were designed to obtain both validity and reliability. The two instruments provide adequate coverage of the topic as expert opinions were taken from literature searches and underlying theories or constructs.

3.8 Summary

Both quantitative and qualitative research designs were employed to carry out this research (the mixed research method) for complementarity and expansion. The quantitative aspect of the research involved a pre and post treatment experimental design aimed at assessing the effects of positive reinforcement to academic performance. Statistical analysis, specifically, a t-test for paired observations was done on experimental data so as to discover underlying patterns and trends. Qualitative data was collected using questionnaires to gain insights, opinions and motivations of teachers towards the use of positive reinforcement as a way of motivating students to higher academic performance.
CHAPTER 4: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction

Data from the questionnaire was analyzed to discover trends, themes and patterns in teacher opinion, motivation and insights into the use of positive reinforcement in motivating students to higher academic performance. Questionnaire responses were used to address the following research questions:

- What is positive reinforcement?
- Do teachers understand what positive reinforcement is?
- Do teachers make use of positive reinforcement in the teaching and learning of science and biology in particular?

The researcher used statistical analysis, specifically a t-test for paired observations, to make inferences about the effects of positive reinforcement on the academic performance of students. Pre and post treatment tests data was used to address the research question:

- Does positive reinforcement motivate students to higher academic performance?
4.1 Data presentation, analysis and discussion

Data was analyzed by interrogating and organizing it in ways that allow researchers to see patterns, identify themes, discover relationships, make interpretations or generate theories (Cohen et al, 2000). The researcher scrutinized responses from questionnaires inductively so as to draw reliable and valid conclusions. Research findings were presented as per research question.

Research Question 1.4.1: What is positive reinforcement?

Positive reinforcement was a phenomena first described by B.F Skinner in his theory of Operant Conditioning where he proposed that an individual’s behavior is a function of its consequences and governed by the law of effect. Through extensive review of literature, the meanings of positive reinforcement were established. The Oxford Dictionary (2010) defines it as the process of encouraging or establishing a pattern of behavior by offering a reward when the behavior is exhibited. Slaving (1986) in his research on Strategies for Reinforcement explains positive reinforcement as the addition of a reward following a desired behavior with the purpose of increasing the likelihood of the behavior occurring again. A positive reinforcer is defined as any environmental event that when given in response to the behavior increases the strength and frequency of that behavior. In education, it is the offering of an environmental event in exchange for the student’s participation, service or achievement (Craighead et al, 1981). A reward functions as a reinforcer only when the student values it enough to affect a change in his or her behavior or performance. In this study, positive reinforcement is defined as the provision of verbal, symbolic, tangible or other types of rewards for desirable academic performance or effort at the classroom level. This definition includes

- Verbal reinforcement such as praise for correct responses during class discussions, accurate homework, improved test scores.
- Symbolic rewards such as gold stars, certificates, name on notice board.
- Tangible rewards such as edibles, toys, pencils, pens, notebooks,
- Activity rewards such as free time, field trips, being leader of an activity

Research Question 1.4.2: Do teachers understand what positive reinforcement is?
Teachers were asked to outline what they understand by the term positive reinforcement. Their responses were tabulated in table 1 below.

**Table 1: Respondents’ definitions and understanding of positive reinforcement**

<table>
<thead>
<tr>
<th>Teacher Code</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A reward given to students for getting high marks</td>
</tr>
<tr>
<td>2</td>
<td>An incentive given to children for good marks</td>
</tr>
<tr>
<td>3</td>
<td>Rewards in the form of presents given to students to encourage them to continue working hard.</td>
</tr>
<tr>
<td>4</td>
<td>Things given to students who have come first in tests or examinations.</td>
</tr>
<tr>
<td>5</td>
<td>Encouragement given to students who acquire good test scores in examinations or who give correct answers during a lesson.</td>
</tr>
<tr>
<td>6</td>
<td>Punishment in the form of corporal punishment, manual work or detention aimed at discouraging a noted bad behavior</td>
</tr>
<tr>
<td>7</td>
<td>Are rewards given to pupils for motivation and to promote effective learning</td>
</tr>
<tr>
<td>8</td>
<td>Rewards given to pupils</td>
</tr>
<tr>
<td>9</td>
<td>Incentives given to students for doing something good</td>
</tr>
<tr>
<td>10</td>
<td>Rewards given to students for getting exceptionally high marks in tests or revision exercises</td>
</tr>
<tr>
<td>11</td>
<td>Words of motivation and encouragement given to pupils with the aim of making them work harder to get high grades in tests and examinations.</td>
</tr>
<tr>
<td>12</td>
<td>Rewards given to students to stimulate better grades in examinations</td>
</tr>
<tr>
<td>13</td>
<td>A stimulus that strengthens behavior</td>
</tr>
<tr>
<td>14</td>
<td>Gifts given to students who perform well during examinations or in-class tests</td>
</tr>
<tr>
<td>15</td>
<td>Rewards given to students for scoring high marks in tests</td>
</tr>
<tr>
<td>16</td>
<td>Gifts given to students who have shown exceptionally high academic performance</td>
</tr>
<tr>
<td>17</td>
<td>Rewards given to students for acquiring good marks in tests</td>
</tr>
<tr>
<td>18</td>
<td>Rewards given to students for being best students in examinations</td>
</tr>
</tbody>
</table>
Table 1 outlines teachers’ perceptions about what positive reinforcement is. The responses that were elicited from the teachers show that seventeen of eighteen teachers exhibited varying degrees of knowledge and understanding of what positive reinforcement is except for one teacher who was not able to explain what positive reinforcement is, and wrongly identified it as punishment aimed at discouraging the occurrence of a noted bad behavior. In the respondents’ responses, there was evidence of them knowing what positive reinforcement is and its main use in the teaching practice. However, the researcher noted that some teachers had misconceptions of what positive reinforcement is.

Eleven out of eighteen (61%) responses on what teachers understand by the term positive reinforcement indicated that they use positive reinforcement on students who have achieved good grades. It should be however noted that positive reinforcement should also be administered even on students who have attained poor grades but show that they are improving towards better grades. The responses also imply teachers’ misconceptions that the use of positive reinforcement is only for motivating students towards better grades, rather than for a broad spectrum of other aspects that make up the learning process such as classroom participation, completion of tasks within a stipulated time, punctuality, improved classroom participation and so forth. Brophy (1981) recommends reinforcing students not only for improvement in test grades, but also for other learning activities such as completing tasks on time, punctuality, good manners as well as for correct answers given during classroom interaction (Brophy, 1981). Positive reinforcement, however should not be given for merely participating but for marked improvements in all the above mentioned criteria (Brophy, 1981).

**Research question 1.4.3:** Do teachers make use of positive reinforcement in their teaching practice?

Of the eighteen respondents, 72% (thirteen) responded that they do make use of positive reinforcement in their teaching practice. The remaining 28% (five) do not use positive reinforcement at all. The information is presented graphically in fig 1 below.
Fig 1: Is a pie chart showing the percentage of teachers who positively reinforce their students and those who do not. From the above graphical presentation, it can be noted that a greater percentage of teachers make use of positive reinforcement in their teaching practice.

Of the 72% teachers who positively reinforce students, 100% postulated that they most frequently reinforce students for attaining high marks in in-class tests and revision exercises than for other reasons. However, Brophy (1981) in his research on ‘Guidelines for effective praise, recommends reinforcing students not merely for improvement in test grades, but also for other learning activities such as completing tasks on time, punctuality, good manners as well as for correct answers during classroom interaction. Positive reinforcement, however, should not be given for merely
participating, as implied by the teachers’ responses, but for marked improvements in all the mentioned criteria (Brophy, 1981) e.g. marked improvement in punctuality or in manners.

1.4.3.1 Types of positive reinforcers most frequently used by teachers.

Table 2: Frequency of use of tangible, social, activity, token and symbolic reinforcers by respondents

<table>
<thead>
<tr>
<th>Type of Positive Reinforcer</th>
<th>Frequency of Respondents who use type of positive reinforcement</th>
<th>Specific examples of reward given</th>
<th>Frequency of being used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangible reinforcers</td>
<td>1</td>
<td>Diaries, Parker pens</td>
<td>1</td>
</tr>
<tr>
<td>Social reinforcers</td>
<td>10</td>
<td>Good work, Excellent, Good, Well done, That’s correct, Keep it up</td>
<td>5, 1, 7, 4, 1, 2</td>
</tr>
<tr>
<td>Activity Reinforcers</td>
<td>2</td>
<td>Time in computer lab, Early dismissal if correct answer is given</td>
<td>1, 1</td>
</tr>
<tr>
<td>Token reinforcers</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Symbolic reinforcers</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 2 summarizes the number of teachers who make use of positive reinforcement, the specific type of reinforcement most frequently used by the teachers and the specific examples of positive reinforcers they most frequently use. The frequency of respondents who use each of tangible, social, token and symbolic reinforcers was also graphically presented in Fig 2.

Of the respondents who use positive reinforcement, ten responded that they most frequently use social reinforcers than any of the three types of rewards, one most frequently uses tangible rewards (diaries and branded parker pens), two use activity reinforcers and none use symbolic reinforcers and token reinforcers. On a general follow up on reasons why teachers shun symbolic rewards, the reason that most frequently came up was that the use of symbolic reinforcers such as “stars” and stickers do not work with secondary school students. It emerged that primary school students place more value on stars and stickers in test exercise books than secondary school students. Teachers also indicated that they are not familiar with token reinforcers.

**Frequency of use of tangible, social, activity, symbolic and token reinforcers among 18 teachers**

![Bar graph showing frequency of use of different types of reinforcers among 18 teachers.](image-url)
Fig 2 is a bar chart showing the frequency of use of tangible, social, activity, symbolic and token reinforcers. From the bar chart, it can be noted that the type of reinforcement most frequently used by teachers are social reinforcers, and to a lesser extent, activity and tangible reinforcers. None of the teachers use neither symbolic nor token reinforcers at all.

1.4.3.1 Use of Reinforcement Schedules

None of the teachers used reinforcement schedules in their administering of positive reinforcement during their teaching sessions. Those who indicated that they give positive reinforcement to their students said they do so randomly and unsystematically, without following any schedule. Smith (2010), however noted that reinforcing students unsystematically, or using the wrong type of reinforcement can be detrimental to the improvement of a learner’s academic achievements or behavior. Smith (2010) encourages that teachers should make the drawing up of a reinforcement schedule be an initial and integral aspect of a positive reinforcement intervention plan for it determines when and how frequently reinforcement is given to a student. It also helps a teacher identify and secure in advance reinforcers that will increase the likelihood of repetition of the target behavior by the learner in the future. This reduces early satiation of the reinforcer.

Effects of positive reinforcement

All teachers who use positive reinforcement noted improvement of academic performance as the main observable effect of positive reinforcement in their respective subject areas. Besides improved academic performance, teachers also postulated the following effects of positive reinforcement on the students they have reinforced by way of compliments, verbal encouragement, and through use of tangible reinforcers:

- Increased classroom participation
- Improved self confidence and self esteem on previously withdrawn students after being complimented
- Improved school and lesson attendance
- Improved punctuality
- Improved completion of tasks by students in the ‘B’ (slow learner) classes.
- Improved classroom concentration.
This view is also shared by (Hoque, 2013) who, in his research on *Effects of Reinforcement on the teaching-learning process*, found out that the control group which had not been reinforced exhibited less student participation and interaction than the experimental group that had been reinforced. The reinforced students’ attitudes indicated high levels of interest, satisfaction and increased students’ participation at the end of his research.

Although respondents had many things to say about the positive effects of reinforcement, they also cited negative effects they have encountered in the application of positive reinforcement. Six of the respondents cited increased competition among students to acquire best marks which may lead to a reward. Although the concern is true to some extent, Graighead et al (1981) says competition among peers is constructive since it fosters hard work in students.

Respondents also cited students’ dependence on reinforcers which led to deterioration of academic performance when the reinforcers were withdrawn. Hoque (2013) suggests using the variable reinforcement schedule where reinforcement is given after varying intervals of time instead of the continuous reinforcement schedule where reinforcement is given after every correct response. With the variable reinforcement schedule, individuals do not know when they are going to be rewarded and consequently remain motivated throughout the learning process in the hope of reinforcement. Rewards are unpredictable and keep students well-motivated through occasional rewards. The variable reinforcement schedule yields the strongest resistance to extinction. Skinner, as cited in Hoque, (2013) recommends a 100% schedule to begin with followed by a fixed interval and finally on the variable reinforcement schedule for better results in learning. Collins (1982) says the use of positive reinforcers is to build intrinsic motivation, and once that is achieved, reinforcers should be withdrawn. Dependence on reinforcers is caused by poor administration of reinforcers.

Another unanimous negative effect of positive reinforcement noted by teachers was that of students who lose interest in the positive reinforcers. The respondents argued that, after a period of reinforcer use, students no longer responded to the positive reinforcers, especially the social verbal ones. The administration of reinforcers or the promise of a reward to some students no longer motivates students towards higher academic performance. Collins (1982) terms this reinforcer satiation which is a situation whereby a reinforcer loses its effectiveness and appeal to students. For example if a student receives a blue pen every time she improves, it is likely that
after a period of time she will tire of the pens and no longer find them desirable. It is identified when learners’ performance which had improved after being reinforced start deteriorating, or when learners stop using the target skill that they had previously mastered. Collins (1981) says this is most common with edible reinforcers. Zirpoli and Melloy (1993) recommends the following to counteract reinforcer satiation:

- Varying the reinforcer, i.e. using a different reinforcer for each target behavior, for example diaries for improved marks, stickers for cleanliness, colored pencils for punctuality, etc.
- Monitoring the amount of reinforcement delivered. Teachers should use only enough reinforcers to maintain the target behavior.
- Avoiding edible reinforcers. This is also supported by Smith who recommends that edible reinforcers should be used sparingly, and during the initial stages of the reinforcement schedule.
- Moving from a continual and constant to an intermittent schedule of reinforcement as soon as improvements in academic performance and other learning aspects are observed.
- In designing reinforcement schedules, teachers should move from less natural reinforcement (tokens, tangibles) to more natural reinforcements (social reinforcement).

Teachers also cited constraints that have hindered the effective application of positive reinforcement in their teaching practice. All respondents cited lack of funds as the main obstruction to consistent application of positive reinforcement in the classroom. The government does not subsidize positive reinforcement use at the classroom level, leaving the teacher to improvise. As a result, teachers resort to use of social reinforcers only.

**Research question 1.3.4 Does positive reinforcement motivates students towards higher academic performance?**

Pre-treatment and post-treatment test data was used to answer the research question. Research findings are summarized below.

**Table 3: Reinforcement schedule and results for group A (control group)**

<table>
<thead>
<tr>
<th>Name of Student</th>
<th>Code assigned</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Average mark</th>
<th>Z-score</th>
<th>Test 3</th>
<th>Test 4</th>
<th>Average Mark</th>
<th>Z-score</th>
</tr>
</thead>
</table>

46
Chisango M  | A1  | 44  | 64.0 | 54  | -1.61 | 54  | 56  | 55  | -1.29  
Katambarare F  | A2  | 74  | 76   | 75  | 1.25  | 72  | 76  | 74  | 1.29    
Mhakayakora C | A3  | 72.0| 72.0 | 72  | 0.83  | 68  | 72.0| 70  | 0.75    
Chimbwanda    | A4  | 64.0| 62   | 63  | -0.38 | 56  | 60  | 58  | -0.88   
Machemedze M  | A5  | 60.0| 72.0 | 66  | 0.02  | 62.0| 62  | 62  | -0.34   
Nemhara B     | A6  | 64.0| 66   | 65  | -0.11 | 68  | 68  | 68  | 0.47    

<table>
<thead>
<tr>
<th>Student</th>
<th>Pre-treatment score</th>
<th>Post treatment score</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>54</td>
<td>55</td>
<td>+1</td>
</tr>
<tr>
<td>A2</td>
<td>75</td>
<td>74</td>
<td>-1</td>
</tr>
<tr>
<td>A3</td>
<td>72</td>
<td>70</td>
<td>-2</td>
</tr>
<tr>
<td>A4</td>
<td>63</td>
<td>58</td>
<td>-5</td>
</tr>
<tr>
<td>A5</td>
<td>66</td>
<td>62</td>
<td>-4</td>
</tr>
<tr>
<td>A6</td>
<td>65</td>
<td>68</td>
<td>+3</td>
</tr>
</tbody>
</table>

Table 3 above shows the control group’s test scores in the four tests. The control group did not receive any positive reinforcement. The students’ performance in the first two tests was compared with their performance in the last two tests using a t-test for paired observations. Their Z-scores were also calculated, tabulated and compared. From the above calculations:

t-calculated (-1.082) < t-critical (2.571)

Conclusion: Fail to reject the null hypothesis and conclude that there is no significant improvement on academic performance of students who have not been positively reinforced.
Table 4: Reinforcement schedule and results for the experimental group (Reinforced Group)

<table>
<thead>
<tr>
<th>Name of Student</th>
<th>Code Assigned</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Average Mark</th>
<th>Z-score</th>
<th>Test 3</th>
<th>Test 4</th>
<th>Average</th>
<th>Z-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gotora G</td>
<td>B1</td>
<td>68</td>
<td>64</td>
<td>66</td>
<td>0.81</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>0.83</td>
</tr>
<tr>
<td>Muzika Sophia</td>
<td>B2</td>
<td>44</td>
<td>40</td>
<td>42</td>
<td>-0.56</td>
<td>48</td>
<td>50</td>
<td>49</td>
<td>-0.45</td>
</tr>
<tr>
<td>Jonga Elson</td>
<td>B3</td>
<td>52</td>
<td>56</td>
<td>54</td>
<td>0.12</td>
<td>48</td>
<td>52</td>
<td>50</td>
<td>-0.389</td>
</tr>
<tr>
<td>Madziwa Alvin</td>
<td>B4</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>0.01</td>
<td>60</td>
<td>68</td>
<td>64</td>
<td>0.389</td>
</tr>
<tr>
<td>Mahachi Munya</td>
<td>B5</td>
<td>72</td>
<td>74</td>
<td>73</td>
<td>1.21</td>
<td>80</td>
<td>76</td>
<td>78</td>
<td>1.26</td>
</tr>
<tr>
<td>Mafusire Nigel</td>
<td>B6</td>
<td>28</td>
<td>20</td>
<td>24</td>
<td>-1.59</td>
<td>28</td>
<td>30</td>
<td>29</td>
<td>-1.56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student</th>
<th>Pre-treatment tests average score</th>
<th>Post-treatment tests average score</th>
<th>Difference (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>66</td>
<td>72</td>
<td>+6</td>
</tr>
<tr>
<td>B2</td>
<td>42</td>
<td>49</td>
<td>+7</td>
</tr>
<tr>
<td>B3</td>
<td>54</td>
<td>50</td>
<td>-4</td>
</tr>
<tr>
<td>B4</td>
<td>52</td>
<td>64</td>
<td>+12</td>
</tr>
<tr>
<td>B5</td>
<td>73</td>
<td>78</td>
<td>+5</td>
</tr>
<tr>
<td>B6</td>
<td>24</td>
<td>29</td>
<td>+5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N</th>
<th>d</th>
<th>Σd</th>
<th>ΣD²</th>
<th>Standard Dev</th>
<th>Standard Dev</th>
<th>Sed</th>
<th>t-calculated</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>5.167</td>
<td>31</td>
<td>295</td>
<td>11.575</td>
<td>3.402</td>
<td>1.389</td>
<td>3.7199</td>
</tr>
</tbody>
</table>
Table 4 above shows the experimental group’s test scores in four tests. The experimental group received positive reinforcement. The students’ performance in the first two pre-treatment tests was compared with their performance in the last two post-treatment tests using a t-test for paired observations. Their Z-scores were also calculated, tabulated and compared. From the above calculations:

$t$-calculated (3.7199) > $t$-critical (2.571)

Conclusion: Reject the null hypotheses and conclude that there is a significant improvement on academic performance of students after being positively reinforced.

On comparison of pre-treatment and post treatment standardized scores (Z-Scores), an improvement in performance was noted in five of the six students. From the above analysis, it can be concluded that positive reinforcement motivates students towards higher academic achievement.

Figure 2: Academic performance of experimental group: pre- and post- treatment test scores

Figure 3
Figure 4: Academic performance of control group (No reinforcement)
From the graphical presentation, it is evident that no significant improvement was noted for the control group that did not receive any reinforcement. On the other hand, the experimental group showed a significant improvement in test scores after receiving positive reinforcers.

### 4.2 Summary

In this chapter, data from questionnaires and pre- and post-treatment data was analyzed to find out if teachers understand what positive reinforcement is, if teachers use positive reinforcement in their teaching practice as well as find the effects of positive reinforcement on the academic performance of students. The analysis was made to enable the researcher to make conclusions. It was found out that teachers understand what positive reinforcement is, although a significant number thinks it is applied only to best performing students. It was also discovered that the main effect of positive reinforcement is improvement of academic performance. The other effects of
positive reinforcement noted were improved classroom participation, improved punctuality and improved lesson attendance.
CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

5.0 Introduction

In this chapter, a brief summary of the whole research process was provided. Conclusions drawn from the study were also outlined. Recommendations based on research findings were made. Furthermore, areas that require further research were suggested.

5.1 Summary.

In chapter one, the researcher examined the background to the study, thus putting the problem in its context. The aims and objectives for carrying out the study were outlined as investigating the effects of positive reinforcement on the academic performance of students. The scope of the study as well as probable limitations were outlined as delimitations to the study. In chapter two, the historical emergence of positive reinforcement as a motivation tool was outlined. The researcher reviewed existing literature on the use of positive reinforcement which enabled her to identify a theoretical and conceptual framework for the study. Literature also provided the basis for the use of the research methodologies (quantitative experimental and the exploratory research methodologies).

In chapter 3, the researcher examined the use of both quantitative and qualitative research methods (mixed method approach), extrapolating on its suitability to the study. The instruments used for data collection (pre and post treatment tests and questionnaires) were thoroughly examined. The population comprised of Morris secondary school students and teachers. Random sampling was used for assigning students into two groups: Reinforced and Control group. In chapter four, qualitative data was analyzed for trends, themes and opinions of teachers on the use of positive reinforcement in their teaching practice and its effectiveness. Quantitative data was analyzed using inferential statistics to find out if there is a significant difference in academic performance of positively reinforced students and those who were not.

5.2 Research findings

This study revealed that teachers had partial understanding of what positive reinforcement is, as well as on its use in effective teaching. From the teachers’ responses, the researcher concluded that teachers had the misconceptions that positive reinforcement is for students who would have
excelled in examinations, contrary to what is recommended, that is reinforcing for improvement in all aspects of learning. Respondents cited the following as the effects of positive reinforcement on students: improvement in academic performance, improvement in classroom participation by individual students, improvement in punctuality and improved completion of tasks by slow learner students. The experiment on the effects of positive reinforcement involving pre and post treatments ascertained that positive reinforcement do motivate students to higher academic performance.

5.3 Recommendations

On the basis of these findings it is recommended that teachers in-cooperate positive reinforcement in their teaching practice as a way of motivating students towards higher academic performance. Extrinsic reinforcers are needed to awaken intrinsic motivation. If positive reinforcement is properly matched to students’ academic abilities and age considerations, it is very effective in improving the overall behavior and performance of students in the classroom. Educators are urged to use positive reinforcement as it has a solid support in the literature. As Ormrod (2008) puts it, intrinsic motivation is ultimately what will sustain students over the long run, but extrinsic motivation in the form of extrinsic reinforcers may be the only thing that can get students on the road to successful classroom learning and academic achievement.

The researcher also recommends that teachers should be trained in how to identify age appropriate reinforcers, how to draw up reinforcement schedules as well as how to administer the reinforcers in a way that fosters intrinsic motivation.

References


The University of Leeds. [http://iss.leeds.ac.uk/info/312/surveys/217/gide](http://iss.leeds.ac.uk/info/312/surveys/217/gide) to the design of questionnaires


