INTRODUCTION

Reinforcement is an important concept in psychology whose relevance to teaching and learning is underscored every day in every classroom. With regard to definition of reinforcement, Berlyne (1967) is of the opinion that one of the most critically unsolved problems of psychology concerns the nature of reinforcement. Thus, what are the conditions that determine whether something will reinforce a learned response and if so, how strong? Yet reinforcement appears to be an important factor in sustaining human behaviour, especially in a teaching/learning process and the problem appears real for every teacher.

Definition of Reinforcement.
Kimble in Hilgard and Marquis (1967 p. 137) notes that there are two different meanings of reinforcement. Namely:

1) There is factual meaning that refers to any wide range of conditions that will increase the probability of a given response reappearing in the same situation. Contemporary psychologists, therefore, use the term reinforcement to refer to the presentation of a situation that affects learning. Specifically, a reinforcer is any stimulus which, when presented after a response is made in a given situation, will affect the probability that the same response will be repeated when the individual is again put in that situation. The presentation of a reinforcer is called reinforcement.

2) The second is a theoretical meaning that varies from theorist to theorist (i.e. Hull's need drive reduction, Skinner's stimulus manipulation and Thorndike's satisfaction or annoyance-law of readiness). Thus in classical conditioning the term reinforcement is used to refer to paired presentation of the unconditioned stimulus and the conditioned stimulus, while in operant conditioning, reinforcement refers to occurrence of an event such as giving of food or water following desired responses. Reinforcement viewed in this regard mean that Ivan Pavlov sees reinforcement as stimulus that response while Thorndike and Skinner see reinforcement as stimulus that follows red responses.

Using the above as forms of reference, Hilgard, Richard and Rital (1975 p.208) view reinforcement as "any event whose occurrence increases the probability that a stimulus will on subsequent occasion evoke a response". Our knowledge of and the application of reinforcement in the teaching and learning process must be well-understood.

Reinforcement and Learning
Psychologists have carried out intensive and extensive empirical studies on the effects of reinforcement on the course of learning. Research evidence abounds
that the greater the amount of reinforcement, the more rapid the rate of learning. If this statement is true, then it is correct to assume that behavior could be controlled by the action (response) reward association (i.e. responses are directed, sustained and maintained by the reinforcement that accompanied them) If the school children make desired responses that would lead to desired goal, then good grades and praises for school children are the least expected of teachers. Skilful manipulation of the reinforcement will refine the responses children make until they reach a level of desired perfection.

Types of Reinforcement

The quality and distinctive feature of Skinner's experimental studies are his outstanding contributions to knowledge particularly in the realms of reinforcement. If Skinner's theory has a basic law, it must be that of reinforcement as this scholar would say: "when any pattern of behaviour will probably reappear under similar conditions". Some of the types, natures, schedules and application of reinforcement are therefore examined below.

(a) **Primary Reinforcer**: A primary reinforcer is explained as a reinforcer whose reinforcing properties are not acquired through a process of learning. Hull sees food, water etc. as primary reinforcers that can be used to satisfy or reduce hunger and thirst. If everything we learn has to be followed by primary reinforcer, the occasion for learning would have been very much restricted. In d^{-1} to avoid this situation, there is what we call secondary reinforcer.

(b) **Secondary Reinforcer**: A secondary reinforcer is that which has acquired its reinforcing properties through association with a primary reinforcer i.e. through learning. Secondary reinforcer, therefore, reduces the strength of a learned or secondary drive. A typical example of secondary reinforcer in human experience is MONEY because human beings have learnt to value money as it can be changed for any primary drive. Psychologists have demonstrated in several ways that responses to Primary reinforcers could be used to learn a secondary reinforcer. Pavlov, for instance, conditioned a dog to salivate to the ringing of a bell. Pavlov went further to flash light along with the ringing of the bell till the point when the flashing of light alone elicited the conditioned response and Pavlov called this process "higher order classical conditioning" or "second order conditioning". Thus, the flashing of light has again become a secondary reinforcer.

Skinner accepts the principles of secondary reinforcement through conditioning; a stimulus acquires the power to condition but explains that secondary reinforcer could be positive or negative. Interesting demonstrations of the operations of secondary reinforcers are provided by investigations in which a learned response or skill is shown to extinguish less rapidly after removal of the primary reinforcer, if some stimulus that always accompanies the primary reinforcer is present during extinction. (For further details, read Hilgard et.al 1975 p. 204 or Lewis 1962 p. 228).

Secondary reinforcement has, therefore, important practical implications because of its wide degree of generalization. Influenced by this view, Skinner, having analyzed several of his experimental studies, prefers to designate secondary reinforcer, as generalized reinforcer, since a wide variety of elements are associated with the primary reinforcer. Skinner, therefore, uses money as an obvious example of a generalized reinforcer because money is associated with a greater number of primary
reinforcers. The principle is stated "Once established, a secondary reinforcer can strengthen responses other than the response used during its original establishment and can do so with drives other than the one prevailing during the original training" (Hilgard et.al. 1975 p. 204). It is thus established that any behaviour that is socially approved can have a wide range of effects in other human endeavour. Secondary reinforcement greatly increases the role of possibilities of what we can learn because if learning is primarily premised on primary reinforcers, our learning experience would be very limited. Thus, secondary reinforcers like praise, expectation, anticipation, behaviour, social acceptability, fear of unknown, and dignity have motivated man to reach appreciable heights in learning rather than anticipation of primary reinforcers.

(c) Positive and Negative Reinforcers: A Positive reinforcer is the stimulus which when presented increases the probability of the proceeding responses. Experimental psychologists such as Pavlov, Thorndike and Skinner have used food, water, light or similar substances that animals could be deprived of as positive reinforcers. With human beings, especially in the classroom environment, positive reinforcers include among others, all valuable items that are useful to mankind as well as knowledge of result as feedback, in terms of praises, clapping of hands, teachers' good remarks, recognition, promotions, cash, and material rewards, teaching aids of all kinds ranging from computer to teacher-locally-made apparatus.

Negative reinforcers, on the other hand, are stimuli which, when removed, increase the probability of the proceeding responses. Negative reinforcers include, among others, evasion of shock, relief from pain and anxiety. Worthy of note is that negative reinforcement is not punishment because punishment is defined as the infliction of pains ranging from knock to shock whose administration inhibits learning and its consequences lead to hatred.

(d) Schedule of Reinforcement: One of the major contributions of Skinner's studies is the development and assessment of reinforcement schedule. A schedule of reinforcement is a rule stating the basis on which reinforcements will be delivered. A schedule of reinforcement is thus categorized into two:

(i) Using Time as a factor. That is the period between which-successive reinforcement is determined,

(ii) Using Response as a factor. That is the number of responses between which successive reinforcement is determined.

Using these two factors, Time and Response, schedules of reinforcement have been classified into four categories as shown below:

(I) Time: The time as a factor could be fixed or varied as follows
(A) Fixed Interval: Reinforcer is given at fixed intervals, such as every 30 seconds i.e. 30, 60, 90, 120 seconds.
(B) Variable Interval: Reinforcer is given at no particular time but varied i.e. the first reinforcement at 30 seconds, followed by another at 10 seconds interval, then 40 seconds interval, then 5 seconds interval etc.
(ii) Response: Using response as a factor can equally be fixed or varied and we speak of ratio referring to the ratio-behaviour reinforcer and response thus:

(iia) **Fixed Ratio:** Reinforcer is given after a fixed number of correct responses such as an x number of correct responses.

(iiib) **Variable Ratio:** Reinforcer is given at random; no particular response interval.

Thus at the 5th correct response, reinforcer is given, followed at the 12th correct, again at the 15th correct response, reinforcer is given etc.

Research evidence shows that animal's rate of responding during acquisition and extinction depends on the reinforcement schedule employed. For instance, an animal on a fixed interval schedule makes few responses until the end of the interval approaches, at which time, the rate of responding becomes quite rapid. Conversely, one of the most impressive effects of the variable interval schedule is the very high resistance to extinction of learned responses.

(e) Continuous and Partial Reinforcement

Two other types of reinforcement extensively studied are the amount and frequency of reinforcement. In general, it has been established that the probability or strength of response increases with the number and magnitude of reinforcement. Thus, food-deprived animals will learn more rapidly for a large or frequently presented food reward than for a small and infrequent one.

In continuous or 100 percent reinforcement, the animal is reinforced for every correct response while in partial reinforcement, the animal is reinforced only occasionally. The difference between the effects of continuous and partial reinforcement lies in the number of responses or trials required for extinction of the response. Research evidence shows that:

1) Animals partially reinforced during learning extinguish less rapidly than animals who learn 100 percent or continuous reinforcement.
2) That the greater the number of reinforced training trials, the stronger the S-R bond or habit at least, until the habit has reached the maximum possible strength.
3) Non-reinforced trials (i.e. when the response is evoked but not followed by a reinforcer) contribute to the inhibition of the learned response. It means, a non-reinforced trial weakens in two ways:
   (a) Directly by generating inhibition and
   (b) Indirectly by not reinforcing the habit and thus strengthening it.
4) The stronger the habit formed or learned response, formed or learned response, the greater the number of extinction trials necessary to extinguish the response totally.

**Implications of Reinforcement for Teaching/Learning**

If an individual is to become a truly professional teacher, he/she must be able to skillfully apply the knowledge of reinforcement in teaching and learning situations, it is a known fact that among the problems of teacher education, one of the most persistent is that of relating a teacher's practice to the principles of development and learning, particularly in the areas of reinforcement. The need for effective reinforcement in teaching and learning is the need for the individual's development, intellectually, physically, socially and emotionally. So as to become intimately involved in learning, it is a sad reflection that in
most developing countries of the world, most teachers are often not aware nature and the complexities that determine whether learning is reinforced and, if it is, how adequately. If a teacher has a better understanding of the nature of the complexities involved in reinforcement, then attempts to match his/her understanding of reinforcement to teaching/learning situation, it is then such a teacher will see him/herself actually within the learning process and be able to derive the most suitable and specific methods. On the basis of the above, therefore, we can now examine the implications of reinforcement for teaching and learning.

1) On the aggregate of Skinner's studies, scholars have emphasized the role of reinforcement in teaching and learning and went further to claim that such reinforcement must be immediate. This statement gave rise to self-instructional techniques that paved way to the growth of educational technology. Educational technology has provided material for instructional purpose ranging from silent and sound motion picture projects, tape recorders, closed-circuit television, teaching and machines to computer-based teaching systems.

2) Scholars of reinforcement have had remarkable success in the use of reinforcement in shaping many desirable responses and they have demonstrated amply that reinforcement is an important factor in teaching and learning.

3) The use of aids accomplishes many purposes such that teachers can enrich any learner by the judicious use of audiovisual materials that are time-saving as well as handling many students through programmed instructions.

4) Partially reinforced acquired behaviour extinguishes less rapidly than behaviour or learning acquired through acquired through continuous reinforcement.

5) The greater the number of reinforced training traits, the stronger the stimulus response bond or habit at least until the habit has reached maximum possible strength.

6) None reinforced trials contribute to the inhibition of the learned responses.

7) The stronger the habit formed or a learned response through reinforcement, the greater the number of extinction trials necessary to extinguish the response.

8) Reinforcement is necessary to increase operant strength or behaviour or learning but punishment has a diverse range of negative effects. It typically suppresses the response thus; punishment of all kinds inhibits learning.

Problems Commonly Associated with Reinforcement in Learning.

A point has to be made that among the problems of teacher education, one of the most persistent is that of relating a teacher's practice to the principles of development and learning especially reinforcement. As teachers, they have to decide what responses are to be rewarded, the kind of reinforcer to be used and the time of reinforcement and these are by no means easy to determine. One of the most interesting stories about Skinner is the supposed explanation of his interest in education. Invited to visit the fourth grade in which his child was studying, Skinner was shocked of the learning conditions. It appeared to him that the teacher, no matter how capable, was unable to reinforce pupils' response and thus encourage meaningful and permanent learning. On the basis of the above, the following have
been identified as the common problems of teachers in their attempts to reinforce pupils' responses effectively:

(a) The problem of when, how and what responses are to be reinforced by teachers. Teachers need some specialized skills to overcome these as well as a kind of mechanical help.

(b) The classroom atmosphere should by nature, provide for encouragement, adequate and proper material, meaningful goals if reinforcement is to achieve desired goals. Thus reliable reinforcement to some extent depends on external variables within the classroom atmosphere over which the teachers may have no control.

(c) It has been amply demonstrated in experiments with animals that the slightest delay in reinforcement causes a disintegration of behaviour and for human beings, a loss of interest. Thus immediate reinforcement is preferred to delayed reinforcement, meaning that most pupils lose interest in the kind of reinforcement given by most teachers as feedback on their classroom work.

d) Reinforcing a large group of pupils or students is still a big problem because in such a large class, everybody cannot be doing well at the same time. The laggard may feel confident that the teacher approves of his progress. A small, carefully controlled segment of the class is preferable for effective reinforcement. There is, however, hardly any such desired small group or class size, particularly in the Nigerian school for now. Thus, this is a problem at least for Nigerian teachers.

e) Brunner (1964) is of the opinion that learning depends upon knowledge of results, thus the learner must be free to decide for him/herself when, where his/her responses are inadequate as a means of reaching his/her goal. External reinforcement should be to encourage students to search for such signs that determine the correctness of their responses. Reliance upon external reinforcement is thus weakened.

f) What teachers should know is that reinforcement, though a vital part of learning is not the sole explanation of the learning process. In fact, infants learn by progressive processes of cognitive integration and classification rather than rote memory. Teachers should provide for self activity in an attempt to reinforce pupils' responses.

Conclusion

Whatever the constraints involved in the teachers' attempt to efficiently reinforce pupils' responses for effective learning, we have to accept that reinforcement is an important concept in psychology whose relevance to teaching and learning is underscored everyday in every classroom. Its knowledge is worthwhile for a professional teacher.

REFERENCES


