UNIT 12 FACTORS INFLUENCING LEARNING

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12.1 INTRODUCTION

In the previous three units of this Block, you have studied the concept of learning, approaches to learning and domains of learning. A question related to learning that strikes the teacher's mind is: Why is the extent of learning different for different students? Several factors or conditions may be responsible for differences in learning. In this unit, we shall discuss three factors which influence learning. They are personal factors, environmental factors and learning methods related factors.

12.2 OBJECTIVES

After going through this unit, you will be able to:

- classify personal and environmental factors influencing learning;
- describe the personal and environmental factors influencing learning.
12.3 PERSONAL FACTORS INFLUENCING LEARNING

The process of learning is influenced by a variety of personal factors. A thorough knowledge of these factors will prove very helpful for teachers and parents in understanding and guiding their children’s learning. Some of the personal factors that influence the learning process may be classified as under: sensation and perception, fatigue and boredom, maturation, emotional condition, needs, interests, motivation, attention, intelligence, aptitude, attitude, etc. Let us discuss the important personal factors in the following sub-sections.

12.3.1 Sensation and Perception

Apart from the general health of the students, sensation and perception are the psychological factors which help in learning. Sensation is at the core of perception. There are five sense organs i.e., skin, ears, tongue, eyes and nose. These sense organs are the gateways of knowledge and help in perception of various stimuli in the environment. Any defect in any of the sense organs will affect learning and hence acquisition of knowledge. For example, defects of vision such as myopia, hypermetropia, astigmatism, etc., cause headaches, nausea and general disinclination to study. A blind person depends upon the sense of touch or skin for learning and thus acquires knowledge and skills, as he can not visualise the objects. The stimuli are perceived and assimilated, and hence learnt through various sense organs. In this way we can say that sensation and perception is the bases of knowledge and learning.

12.3.2 Fatigue and Boredom

It is virtually boredom or lassitude rather than fatigue which bothers the students. The difference between the two is that fatigue is mental or physical tiredness which decreases in efficiency and competency to work. Boredom, on the other hand, is a lack of desire or an aversion to work. Such an aversion makes one feel fatigued without being actually fatigued. Studying seldom causes fatigue. It is mainly boredom which, besides causing the impression of fatigue, decreases student efficiency in learning.

12.3.3 Age and Maturation

Learning is directly dependent upon age and maturation. No learning can take place unless individual is matured enough to learn. Some children can learn better at earlier age while others take more time to learn the same content.

Mental age increases with the chronological age and ceases at about the age of sixteen years. Increase in age means intellectual maturation which helps in solving difficult problems. The principle of maturation warns us against enforcing learning on a child when he is not mature enough to learn the specific skills. Teachers should explain this principle to parents who are over ambitious or over enthusiastic in sending their children to school at the very early age.

Check Your Progress 1

Notes:  a) Write your answers in the space given below.

b) Compare your answers with those given at the end of the unit.

i) In what ways do the interests of an infant differ from an adolescent?

ii) What is the effect of forcing an immature child to read and write?
12.3.4 Emotional Conditions

Desirable emotional conditions enhance the quality and speed of learning. Happiness, joy and satisfaction are always favourable for any type of learning. Adverse emotional conditions, on the other hand, hinder learning. Many studies have established the fact that emotional strain, stress, tensions, disturbances, etc., are extremely inimical to scholastic pursuits.

12.3.5 Needs

A need is the lack of something which, if provided, would facilitate child’s usual behaviour. The lack of something is experienced by the child. The child then tries to perform that activity which culminates in the satisfaction of the need. Thus, the needs are associated with goals. Among human beings, the needs are relatively permanent tendencies which seek satisfaction in achieving certain specific goals. When these goals are achieved, the particular need is satisfied or met for the time being, but it recurs sooner or later and energises further activity. The needs in human beings can be physiological such as need for oxygen, food, water, etc. They may be social such as the need for affection, recognition, self-regard, etc. Social needs are however, quite different from physiological needs. Social needs might originate after physiological needs are satisfied. These needs have a complex structure and dominate the individual’s behaviour.

There is not equal urgency in the satisfaction of all needs. Some have to be satisfied before others can manifest themselves.

In schools, children are not expected to do any intellectual thinking unless their physiological needs are satisfied. Poor, starved children may concentrate less on attainment of knowledge than on food. Similarly, very cold or hot classrooms or overcrowded seats will not be conducive to good learning. Likewise the need for safety, love and esteem, all act as powerful motives in the learning situations. If the child is afraid of the teacher or feels unsafe while in the school on account of too much beating or some other form of punishment, no learning can take place. Similarly, his needs for warmth and affection are very stimulating and hence results in effective learning.

12.3.6 Interests

Let us consider Mr. Aditya, a photographer, who gets absorbed while doing any work connected with photography. It means that photography matters to him and he is interested in photography. Take another example, a farmer, an artist, and a botanist standing on a hill together and looking down over the landscape, they perceive different things differently. The farmer primarily perceives the crops and fertility of the land; the artist perceives the aesthetic aspect of the landscape; and the botanist sees the vegetation, relationships among living organisms, etc. They attend to different aspects of the situation depending on their interests. Thus, interest is something that concerns us, as teachers, and can be a cause of an activity in which we may like to participate.

Various types of interests of the students can be exploited to facilitate their learning. The interests during early infancy are mostly limited and short lived. As the child grows older his interests diversify and stabilize. You, a school teacher, should have thorough knowledge of children’s interests. You can eliminate much drudgery, monotony and boredom from the school work if you make your instruction lively and stimulating and arouse student interest in it.

Once the student’s interest is aroused in an activity you should expend more effort on it. No learning can be achieved without proper expenditure of effort on it. Students can even overcome distraction, fatigue and boredom if they feel interested in your instruction and class activities. It has often been found that, in most cases, fatigue in reality is loss of interest in the
learning activity. Interest should be exploited to yield results of greater quantity and quality learning in school.

Life is so exciting that many interesting things and activities often clamor to attract our attention. Children frequently face the dilemma of mutually conflicting interests. Immediate interests often seem to be clashing with the remote ones. A student might be in a quandary at least for the time being when his interest in sports upsets him towards the play-field and his interest in studies force him to concentrate on books.

In such cases of conflicting interests a lot of hesitancy, wastage, frustration and unhappiness is bound to follow. What is needed is education at home and school which helps/trains children to achieve a healthy balance in their interests. They should be trained to budget their time in such a manner as to pay a reasonable attention to various interests, scholastic, athletic, social, etc., within the time at their disposal.

12.3.7 Motivation

Motivation is the heart of the learning process. It generates the will in an individual to do something. Adequate motivation not only engages the student in an activity which results in learning, but also sustains and directs learning. Two types of motivation are commonly recognised. These are: intrinsic and extrinsic motivation.

Intrinsic motivation arises when the resolution of tension is to be found in mastering the learning task itself; the material learned provides its own reward. For example, the student who studies the construction of model aeroplanes diligently so that he can make a model, is experiencing a kind of intrinsic motivation.

Extrinsic motivation occurs when a student pursues a learning task but for reasons which are external. If a student engages in construction of model aeroplanes because he thinks it will please his father, who is an expert pilot, rather than because of intrinsic motivation. We should remember that in most learning situations motivation can not be dichotomised so neatly. It is the function of the total learning situation and hinges on some blend of personal concern for the work itself and the concern for some extrinsic factors as well. As a working principle, motivation is probably a function of an interactive situation where reward to a particular action acts as an incentive. Some of the common forms of extrinsic motivation are:

- **Purposive striving, goals and ideals**: The goal and purposes of learning clearly perceived by the individual, provide strong motivation for better action and learning.

- **Knowledge of results**: Knowledge of results in terms of success and failure provides incentive for greater efforts on the part of the student. If a student practices a task without knowing the accuracy or inaccuracy of his performance, he may practise wrong task. In such a case, all learning will be futile. Therefore, if results of performance are known to the student, he learns better as compared to when he does not know about the results. Mere repetition of a task without knowledge of its results fails to bring about learning. Knowledge of results serves two purposes: (i) it enables the subject to evaluate his efficiency and to change his responses in the direction of greater accuracy; and (ii) it adds to the satisfaction in reaching a goal, one tends to repeat rewarded responses.

- **Punishment and rewards**: Punishment can be understood as an act of inflicting pain deliberately with the purpose of affecting the future conduct of an individual being punished. Punishment is based on fear of physical pain, embarrassment and loss of status. Thus, punishment or fear of being punished is one of the common and obvious methods of keeping under control and guiding the students. Punishment or fear is a very strong stimulus, a negative incentive to learning especially when errors occur. Thorndike showed that generally punishment speeds up learning and reduces the number of errors as it produces emotional excitement which tends to fix at punished response. But it does not mean that punishment under all the circumstances and with all the students is equally effective. For example it may prove disastrous and destructive when task is very difficult.

Contrary to punishment, rewards are certainly better and positive incentives to learning. They are responsible for initiative, energy, competition, self-expression and creative ability. According to law of effect, reward is satisfying and pleasant, thus reward strengthens learning. Rewards may in the form of gifts, prizes, money, badges, cups, certificates of merit, or other objects of some value. Motivation through such objects feeds the natural drive in all the human beings. But, when these rewards are too much strived for, they degenerate the whole learning.


Praise and blame: These are also strong incentives for effective learning. Praise stimulates average and inferior children, but has less effect on those of superior intelligence. Reproof is felt most by superior children, but girls seem more susceptible to praise than do boys. Regardless of age, sex, or initial ability, praise is the most effective of the incentives. Reproof seems to be less effective for all students. Chase (1932) reported praise to be less effective than blame with young children, but Hurlock (1920) generalised, still accepted by contemporary investigators, that praise is more effective stimulus in motivating both immediate and long-continued tasks.

Rivalry: The rivalry between students which leads to resentment, jealousy, etc., or rivalry between groups of students which creates hatred, is the least desirable type of incentive to be encouraged in the schools. Self-rivalry or rivalry in the form of healthy competition is the most valuable type. This tendency should be developed in the student. Though experimental researchers have shown rivalry to be a powerful motivating influence, the emotional and social consequences of rivalry must be considered by the teacher.

In a nutshell, the major functions of motivation in learning are as follows:

- to energise the students in learning
- to direct behaviour
- to select behaviour
- to help capture the attention
- to help in acquiring knowledge
- to help in character formation
- to develop social qualities

Check Your Progress 2

Notes: a) Write your answers in the space given below.
   
   b) Compare your answers with those given at the end of the unit.

i) What is motivation.

ii) State the common devices of increasing extrinsic motivation in students.

iii) In what ways is motivation important in learning?

Attention in relation to motivation: Attention is the basic pre-requisite of all learning in the classroom. Learning is possible only if students concentrate their attention on the object or stimuli to be learnt. Attention increases the amount and rate of learning, and also the efficiency of work.
Attention is closely related to motivation. Attention is motivated behaviour, in which the student makes a variety of efforts for achieving the goal. Thus motivation helps in capturing attention. You can help your students by motivating them to concentrate their attention on the tasks to be learnt by them.

12.3.8 Intelligence

Intelligence as expressed by an I.Q. score on an intelligence test is positively related to learning. Generally, students with higher I.Q. learn rapidly. However, higher I.Q. in itself is no guarantee for rapid learning, since other factors such as needs, interest, motivation, etc., of the students and the methods used for learning are also important.

12.3.9 Aptitude

A student who possesses appropriate aptitude for a particular subject of study or skill, will learn better and retain it for a longer time. On the other hand, he will require relatively longer time to study a subject for which he lacks natural aptitude. He is liable to forget it soon besides feeling bored and unhappy all the time while learning it. Hence it is extremely desirable to analyse the aptitude of students before prescribing courses of study for them.

12.3.10 Attitude

The learning process is also influenced considerably by the attitude of the student. If he is alert, attentive and interested in the material to be learnt, he is bound to have a favourable attitude towards it. Such an attitude will enable him to tackle the learning situation economically, pleasantly and effectively. Conversely, if he is inattentive and is uninterested in the material his attitude is bound to be unfavourable. This will hinder the smooth learning of the material in hand besides involving undue strain and tension in the learner.

12.4 ENVIRONMENTAL FACTORS

Environmental influences begin since the time of the conception of the child in the womb of the mother. Mother’s mental, physical and emotional conditions influence the development of fetus in the womb. The external environment starts from the time of birth of the child. It (external environment) refers to the surroundings which prevail in home, school and locality. At these places, the child interacts with members of the family, teachers, classmates or peers and neighbours and establishes relationship with them. The relationship with the members of the society, and the surroundings may affect the development of the child and also the way he learns. Some of the environmental factors are discussed as follows:

12.4.1 Surroundings: Natural, Social and Cultural

As the title of the sub-section indicates, we shall discuss here natural, social and cultural environment the child interacts with and gets influenced.

Natural surrounding covers the climatic and atmospheric conditions. These conditions affect learning directly. It has been found that high temperature and humidity reduces mental efficiency. For a limited time, humidity and high temperature can be tolerated but prolonged humidity and high temperature become unbearable and decrease mental efficiency. The intellectual productivity and creativeness of people living in hot regions are much low. Likewise, the morning time is always better for mastering difficult tasks. Mental efficiency decreases due to increased humidity and temperature. Studies on the academic progress of evening school students show losses of efficiency varying from one to six percent.

Social surrounding includes especially the environment of home, school and locality. Physical conditions at home such as large family, small family, (specific place of the study), insufficient ventilation, improper lighting, uncomfortable temperature, noisy home environment due to use of radio, TV, etc., noisy neighbourhood, constant visits by friends or relatives, etc., influence the intellectual learning of the student. The socio-emotional factors such as child rearing practices, reward and punishment, scope for freedom and independence in activities and decision making, play and study facilities, ambitions and aspirations of the parents, disorganisation and discord among birth positions such as eldest, youngest or single child have their definite influence on learning. For example, a student who comes from a very poor family and never had any intellectual stimulation at home remains dull and unresponsive in the class. In some societies there is a strong sex role bias. Girls are directly or indirectly told that education is not meant for them. In the middle class families, on the other hand, parents
are rather over-ambitious. They wish their children to make quick academic progress, grow-up and find a respectable vocation preferably a white collar job. Such children, therefore get sufficient incentive from their families. This, of course, is most favourable to scholastic learning, although an overdoes of family emphasis on acquiring academic excellence might affect the child’s mental and physical health adversely. Similarly, school activities, study facilities and teaching methods and behaviour of teachers, principals and non-teaching staff have an impact upon learning. If the school atmosphere is uncondusive, it adversely affects the learning process. Locality also has an influence on a child. If the locality is bad, the learning will be ineffective to some extent.

Cultural demands and social expectations also influence learning. The spirit of culture is reflected in its social and educational institutions. Children’s learning, therefore, is greatly determined by the demands and expectations of their culture. Thus, for instance, in an industrialized culture the emphasis mostly centres on mechanical sciences and preparing children for highly mechanised vocations. In an agriculture based community, on the other hand, the educational process focuses on preparing its members for those skills which are suited to the needs of an agrarian community.

The philosophical elements of culture also influence the spirit of children’s learning. Children in a democratic culture tend to acquire democratic values and attitudes. A feudal, aristocratic or dictatorial culture, on the other hand, promotes autocratic modes of thought and behaviour.

12.4.2 Relationship with Teachers, Parents and Peers

The teacher is an important constituent in the instructional process. S/he plays an important role in shaping the behaviour of students. The way s/he teaches and manages the students has an effect on their learning. An authoritarian teacher will create an aggression and hostility among students while a democratic teacher will create a participatory climate for learning. The democratic environment leads students to constructive, thoughtful and cooperative behaviour. Generally, students learn better in a democratic setup because they like democratic procedures. The teacher is no more an instructor or the director of learning in a democratic setup. S/he helps his/her students in their learning. The teachers no more dominate the scene; they can get better results by decentralizing authority, increasing independence of students. They can attend to the comments and questions of the students. They can encourage students to participate in learning activities in and outside the class. There should be more emphasis on activity-centred classroom where student’s active participation in the teaching-learning process is encouraged and the teacher acts as a guide to promote learning.

Relationship with parents plays a vital role in the learning process of the student. If the child-parents relationship is based on mutual respect and faith, it can provide the child a congenial atmosphere which in turn can facilitate his/her learning. A distorted and unhealthy environment, on the other hand, adversely affects the learning of the student. The upward mobility brings resistance on the part of the student to learn. Students in such families find themselves unable to cope up. A subtle but powerful influence on the growing child arises from his/her position among the children in the family. The parents of the first born expect the child to act like miniature adults and hence the first-born are found to encounter a variety of expectations and stresses. Whereas parents tend to be more relaxed in their do’s and don’ts with the last-born. Factors like traumatic events at home, separation or death can also precipitate learning problems in the normal child.

A healthy peer group relationship also plays an important role in learning. Student-student relationship in the classroom, school, society, etc., create a particular type of emotional climate. The climate solely depends upon their relationships. A sound relationships provides a tension free environment to the student to learn more and to compete in the class. If the relationship among peers is not good, it adversely affects their learning. Therefore, to improve the classroom learning climate, free discussion should be there. You should help your students understand each other in formal or informal meetings. They should be encouraged to meet each other and their teachers freely. If any mis-understanding is created or developed, it should be immediately clarified so as to maintain the healthy climate and cordial relationship among peers.

12.4.3 Media Influence on Learning

Media has been considered an important component of transmitting information. Media can be divided into two broad categories - print and non-print media. Print media refers to texts or printed materials. It is economical and has traditionally been used for pedagogical purposes.
But, it may not be the only or the perfect medium to impart education. Non-print media, also known as modern electronic media, have certain unique qualities which, in certain cases, facilitate learning much more faster than the print medium. These help meet diverse learning objectives more efficiently than the printed matter.

Certain non-print media formats and delivery systems contribute well to student's learning activities. For example, audio tapes or computers can be used effectively to drill and practice in language and learning arithmetic. Electronic media can help promote the discovery approach to learning. For example, a film can be exploited for discovery teaching in the physical sciences. Students keep watching the various sections of the film until they perceive the relationships between the visuals. Then they are curious to find out the principles that explain those relationships. Likewise, in the social sciences various media can be used to present students with visual and auditory experiences that provide related inquiry. Films and stimulation are often used to present real-life or laboratory learning situations to students.

The role of the electronic media has proved effective for teaching students. These excite the student psychologically and prepare/motivate them to participate in teaching-learning activities. Non-print media perform following functions:

- direct attention,
- arouse motivation,
- increase student's concentration, and
- help them actively involve in the learning process.

### Check Your Progress 3

**Notes:** a) Write your answers in the space given below.

b) Compare your answers with those given at the end of the unit.

i) List the environmental factors which effect the learning of a child.

ii) In what ways can the non-print media influence the teaching-learning process? List at least four uses.

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### 12.5 METHODS OF LEARNING

The methods of learning involve the question of how to study. Correct ways of study always enhance learning. Effective learning promotes good memory of the corresponding material. The type of material helps decide the method(s) of learning. Some effective methods of learning are discussed in the following sub-sections. These methods are being discussed with the view of their impact on the quantity and quality of learning.

#### 12.5.1 Whole Vs. Parts Learning

You might have come across the debate, whether it is better to memorise poem stanza by stanza or as a whole i.e., from the beginning to the end at a time. Actually it depends upon the amount of material, the kind of material, the mental age of student and related factors. There are advantages and disadvantages of both the approaches/methods. Generally, the whole method
is probably more effective with the brighter and more mature students especially when the material to be learned is not too long and has a natural unity or logical sequence. Younger, slow, and average students who learn the material which is not well organised, will probably find the part method more advantageous. It has the advantage of keeping the student motivated. When the part method is used, the feeling that the student is progressing comes after small interval and he can experience success as he gets mastery over the subject.

12.5.2 Mediating Method

The whole method, strictly interpreted, proves cumbersome and even wasteful when the learning material is lengthy and difficult. If some parts of the material, such as involving obscure meanings or unusual phrases are difficult, there will be repetitions of the whole poem in order to register difficult parts in the memory. To overcome this difficulty, a modification in the whole method has been incorporated. According to this modification, the difficult words or phrases are required to be mastered to begin with and then the whole method is employed. This method is applicable to long vocabulary materials as well as to more logical whole. It proceeds from whole to parts as before, but allows the marking off more difficult or unfamiliar parts for more intensive study. It is still the whole method and the students neither lose sight of the relation of the parts to the whole nor concentrate on the parts to the exclusion of the whole.

12.5.3 Spaced Vs. Unspaced Learning

Spaced learning is also known as distributed learning. In spaced learning, a long assignment is completed with an interval or rest. This is based upon try-rest-try. For example, if we want to work on a learning task for eight hours in one day, it is distributed over four days for two hours an every day. Similarly, in unspaced or massed learning, a lesson is learnt without any interval or rest. Thus, in this method the student works on a learning task or lesson continuously.

The length and spacing of study sessions depends on the nature of the material (content) and the maturity of the student. Shorter study periods are more effective for younger children. It has been observed that when the interest and motivation levels are high and the material is easy, massed learning is more effective. Contrary to this, when there is lack of interest or motivation on the part of the students and the material is difficult, spaced learning is more suited. If however, students are relatively bright and depth of concentration is high, longer periods are recommended.

12.5.4 Recitation Method

Recitation means reciting to oneself. In other words, it simply means checking up one’s own sell by being one’s own inquisitor from time to time. It consists in reading the material once or twice and then try to recall that without looking at the material. The student can, however, look promptly at the points which could not be recalled.

Several studies have shown that self-recitation is a more economical use of one’s study time than mere re-reading. This method not only economises the energy to be applied but also helps towards permanent retention. This method helps the student identify and correct his errors, decide his immediate goals to work for and keep him informed of his progress. Calling upon students to explain in their own words what they have just learnt in the classroom and the periodic administration of review tests are effective means of stimulating attempted recall.

The method of recitation helps a student focus his attention on portions that require special effort.

12.5.5 Memory Systems

Let us consider the case of Mr. Ashwani, a renowned mathematician who has a sharp memory. Within seconds, he can tell correctly the day of any year and any month, without any device or even the paper and pencil. Though it is a rare capacity, still we are curious about what it is that helps him respond so promptly. The only answer scientists can attribute to this is his excellent mental imagery with a well-designed retrieval plan. He makes good use of his memory skills by performing practical feats of mental calculations and problem solving. All of us have the capacity to recall our past, remember a person, situation or place, act the way we have learned, and guide our future behaviour on the basis of what has been useful and purposeful to us in the past. It is possible only because we have memory. Memory is an intricate
Understanding the Learning Process

network of associations established through learning. We use these associations in order to bring into consciousness the material we are trying to remember. So, memory is an indication that learning has taken place and persisted over time.

Layman usually defines memory as the power of reproduction, but it is a complex concept. One general meaning of the concept refers to a repository of our accumulated knowledge of specific and general things. But another does with processes of memorising and remembering. Both the computer and the human memory can be viewed as processing information. There are three steps in information processing.

First, the information must be encoded or recorded in some form which enables it to enter the system. In computer, the material to be entered is transformed into electronic signals which the computer memory accepts. For human beings, it is transformed into images, impressions or meaningful units which the human memory can process.

Secondly, the information must be stored or retained by the system over a time. In a computer, the information is stored magnetically on a disc; in human beings, this is done with the brain.

Thirdly, there must be a method by which the information can be retrieved, brought back or located and get out when needed. Computers can search the memory storage and present the retrieved information on the screen or in the print-out form; people retrieve memory less exactly by combining their stored information with what they currently believe.

Thus, these three tasks of encoding, storage and retrieval (recall, recognition and re-learning) are the basic systems of our memory, as well as of the computer. But human memory, though possesses a truly phenomenal information system, has limited capacity. It can attend to only a very few things at once and it has a limited capacity to retrieve stored information.

In this way, we see that memory depends on encoding, storage or retention and retrieval. Encoding takes place in the form of images or impressions given through five senses - sight, hearing, smell, taste and touch. Accurate sensation and perception always help in adequate encoding. Proper encoding facilitates learning. If encoding is distorted, it will adversely affect learning. Secondly, storage of information is influenced by over-learning, organization of subject matter, length, difficulty and meaningfulness of material, periodic review or self-recitation and methods of learning. If the storage capacity of a person is large, he may learn the material easily and acquire maximum information. Contrary to this, if the storage capacity is small, the learning will be limited to some extent. Thirdly, the retrieval of information depends upon encoding and storage capacity of the learner. What has been stored, can be retrieved. Thus, memory system helps in acquiring, storing, and reproducing information or learning material.

12.5.6 Laws of Association

There is a popular notion that persons who learn quickly also forget quickly. This notion, however, has not been fully verified by experimental studies. As a matter of fact, those students who learn meaningless or disconnected materials quickly tend to forget it (what is learnt) faster than those who learn by the whole method and who make use of logical associations. Those who forget quickly, on the other hand, usually employ the part method and learn by rote. Thus, the speed of forgetting is closely related to the method of learning. Information acquired by rote is more quickly forgotten than that acquired by the logical method. Therefore, in this connection, associative learning is of immense use. Associative learning may be considered as the process of registering and linking together in consciousness two or more mental products (sensations, images, precepts, ideas, concepts, etc.). So that one concept will serve as a stimulus for the revival of the other ideas. There are several laws of association which influence learning and recall. Let us discuss them briefly.

Law of contiguity or nearness: The law of contiguity controls the ideas in two ways - one with regard to space and the other with regard to time. We see an engine almost attached to a train. These two objects often appear near each other in space. Hence, the idea of engine at once brings forth the idea of the train. Here, it is nearness in space which determines the flow of ideas. The law of contiguity also manifests and determines ideas through contiguity in time. At the railway station, the train always starts soon after the whistle of the guard. As soon as we hear the familiar sound of the whistle, we are reminded of the movement of the train and we at once run to the train to occupy our seat. This is how the law of contiguity works in time.

Law of similarity: This law states that similar events and facts become linked up with each other so that the one easily recalls the other. If two ideas A and B are similar, then when A
comes to mind, B will also tend to come. That is why the idea of a ball reminds us of moon due to structural similarity. Also the idea of a blank notebook can remind us of a pen or pencil.

**Law of contrast:** This law states that the contrasted characters get associated with each other so that one reminds the other that stands in contrast to it. For example, seeing a white object, we remember about a black one. Extremely hot weather makes people think of cold weather. Hectic examination time reminds many a student of the impending vacations.

Besides the above three important laws of association, there are many more laws such as law of primacy, recency, frequency and vividness, etc., which are also responsible for strengthening the bonds of association and consequently, developing recall.

Making associations is conducive to memorisation. It is always good to follow the principle of association in learning and memorisation. Association of ideas facilitates memorisation. For example, the word VIBGYOR has proved very useful in memorising the colours of the rainbow spectrum (violet, indigo, blue, green, yellow, orange and red). Similarly, if you want to remember that the first step in the solution of arithmetical problems is the opening of the bracket and the successive steps are of division, multiplication, addition and subtraction and in order to facilitate it, an association between ‘B’ and bracket, ‘O’ and/or, ‘D’ and division, ‘M’ and multiplication, ‘A’ and addition, ‘S’ and subtraction may be formed, keeping in mind that the letters represent the first letter of each word. These letters should now be put together to form the word ‘BODMAS’ which when remembered, will keep this law in mind. Other associations in different subjects may be formed similarly. Therefore, you should follow the laws of association in your teaching method.

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**Check Your Progress 4**

**Notes:**

a) Write your answers in the space given below.

b) Compare your answers with those given at the end of the unit.

i) List three methods of effective learning.

ii) State the components of the memory process.

iii) How does human memory differ from computer memory?

iv) List the laws of association.
12.6 LET US SUM UP

Learning is one of the most important and pervasive activities of human life. It begins from the birth and covers our entire life span. It is influenced by the individual's psychological and physiological states, his environment and methods of learning. Children learn best when they are mature enough and ready to learn; when they are motivated, attentive and interested in learning; when they feel confident that they can learn; when they experience the lack of something which tend to further the welfare of them; when they have no physiological and physical impairments; when they find themselves emotionally stable; when they are mentally and physically alert; when they find what they are learning is meaningful to them and has a functional significance to them.

Also essential to learning are a conducive physical climate and healthy social surroundings at home, school and locality; when they receive parental care, and emotional attachment with teachers, parents and peers; when they are provided suitable transmitting media, material and companions, freedom to select and use them, and appropriate and skillful guidance in learning. Apart from these, learning is influenced by the methods of study, methodical presentation of learning material, length, difficulty and meaningfulness of the task, memory system and the laws of association.

12.7 UNIT-END EXERCISES

1. Select any two students having different learning outcomes or capability from the school or neighbourhood. Observe them for a considerable period of time and collect information regarding their learning difficulties from all probable sources like parents, peers, teachers, etc. List those factors or conditions which are responsible for their learning outcomes.

2. Tryout in your class any three methods of effective learning.

12.8 ANSWERS TO CHECK YOUR PROGRESS

1. i) An infant's interests are mostly limited and short lived while the interests of an adolescent are diversified and stabilised.

ii) The effects of forcing an immature child to read and write is always adverse. Immature child may develop wrong habits, lose interest and then will require more time to unlearn the wrong habits.

iii) Fatigue is mental and physical inefficiency while boredom is the lack of desire to do work or an aversion for it. Boredom always causes impression of fatigue which decreases student's efficiency in learning.

2. i) *Motivation generates an urge or will in an individual to do something. Motivation is a state of mind which forces an individual to learn. It is of two types - intrinsic and extrinsic.

ii) Common devices of increasing extrinsic motivation are: definite objectives to be achieved, knowledge of results, rewards, and punishment, praise and blame, rivalry, desire for social approval, the urge to excel, the urge to dominate, etc.

iii) Motivation is important in learning because it energises, directs, selects behaviour and helps students to capture attention, to develop interest, to acquire knowledge, to form character and to develop social qualities.

3. i) The following environmental factors affect learning:
   - Surroundings - natural, social and cultural.
   - Relationship with teachers, parents and peers.
   - Media of teaching and learning.

ii) Non-print media facilitate the teaching-learning process in the following ways:
   - Arouse motivation;
   - Direct and hold attention;
• Satisfy the needs of the individual learner;
• Give opportunity to the learner for active participation in the learning process.

4. i) Your answer may include the following methods:
• Whole Vs. parts method;
• Mediating method;
• Spaced Vs. unspaced method;
• Recitation method.

ii) There are three components of the memory process:
• Encoding;
• Storage or retention;
• Retrieval (recall, recognition and relearning).

iii) Computer can search the memory stores and present the retrieved information on a
screen or in a print-out while human memory cannot be seen as such on screen.
Human memory, though possesses a truly phenomenal information process system
has a limited capacity to retrieve stored information.

iv) The laws of association are:
• Law of contiguity;
• Law of similarity;
• Law of contrast;
• Law of primary, recency, frequency and vividness.

12.9 SUGGESTED READINGS

Delhi.

Ltd., Madras.

Jersey.

Pvt. Ltd., New Delhi.


Ltd., New Delhi.

GLOSSARY

Accommodation : Piaget used this term for modification or reorganisation of existing cognitive
structure (schemata) to deal with environmental demands. Accommodation is the adjustment
the individual makes when incorporating external reality. Piaget uses this concept in conjunction
with assimilation, which is the individual’s response to the immediate and compelling
environmental demands that have been and are being assimilated.
Advance Organisers: Introductory information intended to facilitate a student's learning by providing a framework and organisation for the material to be learned.

Affective Domain: One of the categories of educational objectives for students' attitudes, values, and emotional growth. The affective domain includes five basic categories: receiving, responding, valuing, organisation, and characterisation by a value.

Assimilation: Assimilation is the process of taking within, or internalising, one's environmental experience. The term is used by Piaget for the process of making sense of experiences and perceptions by fitting them into previously established cognitive structure (schemata). Assimilation is used by Piaget in conjunction with the concept of accommodation. Piaget believes that assimilation is a spontaneous process on the part of the child.

Attitudes: A learned predisposition to respond either positively or negatively to persons, situations, or things. Attitudes carry a strong emotional component and therefore can never be neutral.

Attribution Theory: The term attribution refers to the explanation a person gives for his or her own or another person's actions or beliefs. An attribution based on internal factors is called a dispositional attribution, and one based on external factors is called a situational attribution.

Behaviourism: A school of thought in Psychology usually considered to have originated in the work and writings of John B. Watson in 1913. Watson argued against the use of introspection in gathering psychological data. He considered observable behaviour the only valid data in Psychology. According to Watson, any concepts, like mind or consciousness, that have mentalistic overtones must be purged from the field of psychology. The most famous current representative of this tradition is Harvard University's B.F. Skinner.

Classical Conditioning: A procedure in which the conditioned stimulus, after being paired with the unconditioned stimulus often enough, can then be substituted for it. It is often called "stimulus substitution".

Cognition: The process of faculties by which knowledge is acquired and manipulated (e.g., thinking or remembering).

Cognitive Domain: A part of Bloom's Taxonomy of educational objectives. Bloom divided the objectives in the cognitive domain into six categories: knowledge, comprehension, application, analysis, synthesis, and evaluation.

Cognitive Style: The consistent way in which an individual responds to a wide range of perceptual tasks.

Computer-assisted Instruction (CAI): The use of a computer as tutor to present information, give students opportunities to
practice what they learn, evaluate student achievement, and provide additional instruction.

**Computer-managed instruction (CMI)**: The use of a computer for managerial purposes in instruction, such as determining error rates, student progress, and class averages and making assignments based on the diagnosis of student weaknesses. In many instruction programmes, computer-assisted instruction (CAI) and CMI are used in an integrated manner.

**Concept learning**: The acquisition of pattern-recognition knowledge involving the learning of a rule or rules for classifying a number of objects into mutually exclusive categories based on one or more salient characteristics of the objects.

**Conditioned response**: A response elicited by a conditioned stimulus. The response is similar but not identical to its associated unconditioned response.

**Cognitive learning**: The view that learning is based on a restructuring of perceptions and thoughts occurring within the organism is called cognitive learning. This restructuring allows the learner to perceive new relationships, solve new problems, and gain understanding of a subject area. Cognitive learning theorists stress the reorganisation of one's perceptions in order to achieve understanding, as opposed to the behaviourist theorists, who stress the importance of associations formed between stimuli and responses.

**Conditioned response**: The term is used both in classical conditioning and in operant conditioning. In classical conditioning, the conditioned response is the response being elicited by the conditioned stimulus. The stronger the conditioning, the greater the magnitude of the conditioned response and the shorter its latency. In Pavlov's experiment the conditioned response was the dog's salivation to the tone.

In operant conditioning, since the response must precede the reinforcer, the conditioned response is defined not in terms of magnitude or latency, but in terms of either the rate of response or its resistance to extinction. For example, a strongly conditioned operand will occur far more rapidly than one that has been only weakly conditioned. Also, a strongly conditioned operand will be far more difficult to extinguish.

**Conditioned stimulus**: In classical conditioning, the previously neutral stimulus takes on the power to elicit the response through association with an unconditioned stimulus. For this to occur, the conditioned stimulus must precede the unconditioned stimulus on enough occasions to cause the conditioned stimulus to serve as a signal that the unconditioned stimulus will follow. In Pavlov's experiment on conditioning the dog, the tone was used as the conditioned stimulus. The tone was consistently followed by...
Conditioning: Process of learning whereby stimuli and responses become associated through training. There are two general types of conditioning, classical and operant. In classical conditioning, a conditioned stimulus is presented, followed by an unconditioned stimulus. Conditioning is exhibited when the organism learns to respond to the conditioned stimulus alone. In operant conditioning the operant is allowed to occur and then is followed by a reinforcing stimulus. Operant conditioning is exhibited when the rate of responding increases over the original, preconditioned rate.

Convergent thinking: A term used by Guilford to describe the type of thinking in which an individual produces a single response to a specific question or problem.

Creativity: The capacity of individuals to produce novel or original answers or products.

Culture: The ways in which a group of people think, feel, and react in order to solve problems of living in their environment.

Cumulative records: A file on a student that includes such information as family data, health, academic grades, standardized test scores, attendance, and teacher comments.

Discovery learning: Term is used to describe a form of learning that results not from rote memorization or conditioning but from the active exploration of alternatives on the part of the learner. This learning is largely a result of learner's own efforts. Learning attained through discovery is more meaningful and long-lasting than that from memorization.

Divergent thinking: A term used by Guilford to describe the type of thinking wherein an individual produces multiple responses or solutions (often non-traditional) to a single question or problem. Divergent thinking is associated with creativity.

Egocentrism: Piaget's term for describing children in the preoperational stage, who have difficulty in assuming the point of view of others.

Enactive: Bruner's first stage of cognitive development, in which children understand the environment through physical action on that environment.

Encoding: The short-term memory process of transforming incoming information into episodic or semantic form and associating it with old knowledge for storage in long-term memory.

Entry behaviour: The knowledge, skills, or attitudes that a learner brings into a new learning situation.

Formal-operational stage: This is a stage of cognitive development, according to Jean Piaget, occurring during early
adolescence. The period of formal operations (eleven to sixteen years) is the last of Piaget's stages and is characterised by the youth's ability to develop full, formal patterns of thinking based on abstract symbolism. The youth is able to reason things out logically at the abstract level, develop symbolic meanings, and generalize to other situations. This is the highest level of thinking and, according to Piaget, must await the maturation of certain structures in the brain for its full development.

**Equilibration**

A motivation principle in Piaget's theory that identifies human beings as active and exploratory in attempting to impose order and meaningfulness on experiences. This order or balance occurs through the processes of assimilation and accommodation.

**Evaluation**

This is a process of obtaining information to form judgments so that educational decisions can be made.

**External locus of control**

A feeling that one has little control over one's and the failure to perceive a cause-and-effect relationship between actions and consequences.

**Extrinsic motivation**

Motivation influenced by external events such as grades, marks, or money.

**Gestalt psychology**

A school of thought maintaining that the organised whole, configuration, or totality of psychological experience should be the proper object of study. Founded in Germany by Max Wertheimer in the early 1900s, gestalt psychology's first interest was in the field of perception. Later, under Wolfgang Kohler's direction, studies were done in the area of learning and, under Kurt Lewin's direction, in the area of motivation. Gestalt psychologists tend to emphasize cognitive processes in the study of learning. They stress that true understanding occurs only through the reorganisation of ideas and perceptions, not through memorisation or conditioning.

**Information processing**

Theory of learning and remembering that is based on the computer as a model. Information is seen as flowing into and within the organism. The sense organs respond to incoming information, and it is passed along and encoded in the memory and nervous system. The encoded information may then be stored and processed and finally retrieved and acted on. As with the computer, there is information input, storage and/or processing, and output.

**Insight**

A suddenly realised solution to a problem, sometimes called the "a-ha! phenomenon". Introduced by Wolfgang Kohler, the concept of insight is used to explain the apparently spontaneous appearance of a solution to a problem. Insight results from the reorganisation of ideas and perceptions rather than from simple trial-and-error behaviour. The concept of
insight is used typically by gestalt psychologists.

Inquiry learning

A process that is similar to discovery learning. Students learn strategies to manipulate and process information, test hypotheses and apply their conclusions to new content or situations.

Intelligence

The capacity, or a set of capacities that allows an individual to learn, solve problems, and/or interact successfully with his or her environment. As a hypothetical construct, intelligence has come to mean higher-level thought processes, or intellectual abilities. Statistical studies of intelligence utilize the concept of measured intelligence, which is the score received on a standardized intelligence test.

Intelligence Quotient (IQ)

Originally, a measure of intelligence calculated by dividing a student’s mental age (MA) by the chronological age (CA) and multiplying by 100, that is, \(IQ = \frac{MA}{CA} \times 100\). This is called the ratio method of obtaining an IQ.

More recently, IQ has been computed by the deviation method. One’s deviation IQ is defined by one’s relative standing among peers. The deviation IQ is computed on the basis of how far one’s score deviates from the mean score obtained for the entire group of individuals of the same chronological age. This technique is based on the standard, or z-score concept and assumes a normal distribution for each age group.

Law of effect

This is one of E.L. Thorndike’s main laws of learning. It states that when an association between a stimulus and response is followed by a satisfying state of affairs, the association (or connection) is strengthened. When the association is followed by an annoying state of affairs, it is weakened. In brief, reward strengthens and punishment weakens any connection between stimuli and responses. In a later version of the law, Thorndike soft-pedaled the importance of punishment of a weakening agent. Thorndike’s law of effect is considered by many psychologists to be the cornerstone on which B.F. Skinner built his system of operant conditioning.

Law of exercise

One of E.L. Thorndike’s three main laws of learning. It states that the more frequently a stimulus response connection occurs, the stronger the resulting association and, hence, the stronger the learning. The repetition of a learned response strengthens the bond between stimulus situation and the response. The law was later amended to incorporate the importance of the consequences of the action; thus, practice without knowledge of results is not nearly as effective as when the consequences become known to the learner.
Law of readiness: One of E.L. Thorndike's three main laws of learning. It states that learning occurs when the student is mentally ready to learn. The reference here is to momentary readiness rather than maturational readiness.

Learning: Learning is a very general term referring to a process that leads to a relatively permanent change in behaviour resulting from experience. Thus, such activities as acquiring physical skills, memorizing poems, acquiring attitudes, etc., are all examples of learning. Learning may be conscious or unconscious, adaptive or maladaptive, overt or covert. Although the learning process is typically measured on the basis of a change in performance, most psychologists agree that an accompanying change occurs within the nervous system. Though there are a great many theories and explanations concerning learning, there is general agreement regarding its definition.

Locus of control: The concept identifies the type of personal control used by an individual. When the locus of control is internal, individual views himself as personally in charge of his own destinies. When the locus of control is external, the person feels he is at the mercy of external circumstances.

Long-term memory (LTM): In the information-processing system, LTM is the second of the two main storage systems. Information that is in short-term memory may, under certain conditions, be passed along for processing and consolidation into a more permanent storage site, long-term memory. Long-term memory has the potential for holding encoded information for long periods.

Mental age: Term first used by Alfred Binet as the unit for measuring intelligence. Binet defined mental age in terms of the age at which a given number of test items are passed by an average child. If, for example, the average six-year-old could correctly answer a certain number of items, then any other child correctly answering the same number of items would be assigned at least a mental age of six.

Motivation: A general psychological term used to explain behaviour initiated by needs and directed toward a goal. Motives may be biogenic (that is, stemming from tissue needs within the organism) or acquired (that is, learned through interaction with the environment, especially the social environment).

Among learning theorists, Jerome Bruner makes much of the principle of motivation, assuming that almost all children have a built-in "will to learn".

Nature-nurture controversy: Debate over which component, nature (heredity) or nurture (environment), is more influential in determining behaviour. In Psychology the behaviourists consistently
argued on behalf of nurture, and the intelligence testers favoured nature. Educational Psychology has long been the battleground on which this issue has been fought, since the psychologists primarily concerned with this issue were the learning theorists (largely behaviourists).

Theory proposed by Abraham Maslow that suggests that human beings place their needs on the following universal, order-of-importance scale: (i) physiological needs, (ii) safety needs, (iii) love needs, (iv) esteem needs, and (v) self-actualising needs.

The part of the motivational cycle seen as deficits that lie within the individual. These may be physiological (e.g., the needs for food) or psychological (e.g., the need for approval).

Body language. Based largely on the theory of Charles Galloway and some research by Robert Rosenthal, the teacher's non-verbal behaviour represents an important avenue for the transmission of teacher expectations. Galloway has shown how non-verbal behaviour can promote or reduce student learning. Rosenthal has shown how his test (Profile of Non-verbal Sensitivity) can identify the channels for communicating how teachers really feel about their students.

Responses, according to B.F. Skinner, for which the original stimuli are either unidentified or non-existent are called operants. The consequences of operant behaviour can be observed even though the stimulus is not known. For example, if a rat presses the lever in a Skinner box and this results in reinforcement, an increase in operant rate will be observed despite the fact that no stimulus could be identified as initiating the original stimulus could be identified as the original lever pressing. In operant conditioning, reinforcement is contingent on the operant's first being emitted. The organism must in some way "operate" on the environment in order that the reinforcement will follow. Operant responding at one time was called instrumental responding by some psychologists.

A type of learning that involves an increase in the probability that a response will occur as a function of reinforcement. This is a form of conditioning, described by B.F. Skinner, in which the free operant is allowed to occur and is followed by a reinforcing stimulus that is, in turn, followed by an increased likelihood of the operant's occurring again. For optimum conditioning the reinforcing stimulus should follow the operant immediately. The rate of responding for a conditioned operant may jump dramatically over the preconditioned rate (operant level).
Operant level: The original, or preconditioned, rate of operant responding before any reinforcing stimuli have been introduced. If a rat happens to press the lever in a Skinner box four times an hour (without being reinforced), the operant level for that response is established at four per hour. Thus, the operant level is the rate at which the free operant is typically emitted prior to conditioning.

Positive reinforcement: A procedure that maintains or increases the rate of a response by presenting a stimulus (a positive reinforcer) following the response.

Preoperational stage: The second stage in Piaget's theory of cognitive development, in which the lack of logical operations forces children to make decisions based on their perceptions.

Primary reinforcement: The process of using a stimulus that is reinforcing in the absence of any learning. Such stimuli as food and water are primary reinforcers.

Programmed instruction (PI): PI is an arrangement of instructional material in a step-by-step sequence designed to lead the student to a specified goal. The material being presented is broken down into small steps called frames. There are two general approaches to programming: (i) linear programmes, in which all students go through the entire programme and the frames gradually increase in difficulty, and (ii) branched programmes, in which the student skips forward or backward in the programme (the order of the frame presentation varies) as a result of the success or failure experienced in responding.

PI can be in book form, or it can be presented through the use of a teaching machine and/or computer. The concept of programmed instruction is credited to B.F. Skinner.

Psychoanalytic theory: This reveals the theory/method of studying and treating mental illness presented by Sigmund Freud. The theory attempts to give a rational explanation for irrational thoughts and responses. Psychoanalytic theory states (i) that all behaviour is determined by specific motives; (ii) that most human motives lie at the unconscious level, and therefore people are unaware of the reasons for most of their own behaviour; (iii) that neurotic symptoms result from an individual's inner conflicts; and (iv) that inner conflicts are a product of childhood trauma and anxiety. The technique is based on the therapist's revealing to the patient the source of his or her anxiety and helping the patient achieve insight and emotional release.

Puberty: The biological changes that lead to reproductive maturity. Its onset is identified by such factors as the growth of body hair, voice changes in males, and menstruation and breast development in females.
Understanding the Learning Process

Punishment: A method for controlling behaviour through the use of aversive stimulation. In other words, punishment is a procedure in which an aversive stimulus is presented immediately following a response, resulting in a reduction in the rate of response. Punishment, though not itself causing the extinction of a conditioned response, does severely reduce the rate of responding while the punishment is in force. Punishment should not be confused with negative reinforcement.

Reinforcement: Any stimulus that increases the likelihood of a response’s recurring. Reinforcement, as a Skinnerian concept, should not be confused with reward, feelings of pleasure, or any other concept with subjective mentalistic overtones. Reinforcement may be used in either classical (respondent) or operant conditioning. In respondent condition the unconditioned stimulus serves as the reinforcement. In operant conditioning the presentation of any stimulus following the emitted response can be considered a reinforcement if it results in a higher response rate.

Schemata: Cognitive structures created through the abstraction of previous experience. Schemata function in the comprehension and recall of data and can aid learning or be responsible for many types of distortion in recall.

Secondary reinforcement: A process that uses a stimulus that is not originally reinforcing but that acquires reinforcing properties when paired with a primary reinforcer. Money is a secondary reinforcer.

Self-actualization: Maslow’s term for the psychological need to develop one’s capabilities and potential in order to enhance personal growth. It refers to a person’s constant striving to realise the potential within and to develop in heret talents and capabilities.

Self-concept: The total organisation of the perceptions individuals have of themselves.

Self-esteem: The value, or judgement, individuals place on their behaviour. Self-esteem and self-concept are often used interchangeably in educational literature.

Self-reinforcement: A procedure in which individuals reinforce their own behaviour.

Sensitive period: This is a time period when an organism is susceptible to a change in behaviour due to certain kinds of environmental stimulation. The sensitive periods typically occur early in the organism’s life and tend to produce behaviour changes that are relatively long-lasting. The process of mother-infant bonding is said to occur only during the baby’s first three days of life.
### Short-term memory (STM)

In the information processing system, STM is the first of two main storage systems. Sometimes it is called working or active memory. Estimates of how long information may be retained in short-term memory vary from about twenty seconds to over a minute.

### Social facilitation

The concept from the field of social psychology is used to explain the fact that in some circumstances individuals perform more quickly when in a group situation than when alone. Social facilitation is most pronounced in the case of fairly simple mechanical tasks. The more difficult and the more intellectual the task, the less the effect of social facilitation.

### Social learning theory

Theory, proposed by Albert Bandura, suggests that a large part of what a person learns occurs through imitation or modeling. Bandura's major concern is with learning that takes place in the context of a social situation in which individuals come to modify behavior as a result of how others in the group respond. Social learning does not require primary reinforcement.

### Stimulus-response

A theory that stresses the importance of the build up of stimulus response associations in defining learning. Most behaviourists adhere to stimulus response learning theories, the major exception being E.C. Tolman. The leading stimulus response theorists are E.L. Thorndike, Ivan Pavlov, J.B. Watson, Edwin Guthrie, C.L. Hull, and B.F. Skinner. Stimulus response theorists stress the importance of nurture in the nature-nurture debate. Most theories of learning during the first half of the twentieth century were stimulus response theories. The cognitive-gestalt position, however, was not based on a stimulus-response theory.

### Stimulus variety

Variation, at all sensory modes, of stimulus inputs. Stimulus variety was seen by many early-experience theorists as the crucial ingredient in intellectual development. The more the child hears, sees, and touches, the more he or she will want to hear, see, and touch, and the more intellectual growth will occur.

### Teaching machine

A device used to present an instructional programme one step (or frame) at a time. The student either writes in answers or presses a button corresponding to the correct alternative. The advantages of the teaching machine are that (i) the student can proceed at his or her own pace; (ii) the student receives immediate feedback; (iii) for many students the machines are intrinsically motivating.

### Unconditioned response

An unconditioned response is any response that can be elicited automatically by the presentation of a certain stimulus, without any training or learning. The term is used in classical conditioning, and in Ivan Pavlov's original experiment the unconditioned response was
salivation to the stimulus of meat powder being placed in the dog's mouth.

Unconditioned stimulus

: Any stimulus that will elicit a given response automatically, without any training or learning. The term is used in classical conditioning, and in the case of Ivan Pavlov's own experiment, the unconditioned stimulus was meat powder placed in the dog's mouth.