

# Learning Curve: An effective device to monitor the progression in/of learning experience

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**Abstract:** *The process of acquiring knowledge and skill needs time and practice. The amount of practice makes the performance better. A Learning curve is a concept that describes how new knowledge and skills can be acquired in the learning process. The rate of progress in the process of acquisition of knowledge and skill can be represented graphically and psychologists termed it as learning curve. Whenever an individual is introduced to a new skill or information, it may need practice and repetition to acquire that skill or knowledge. A learning curve is a graphical representation of rate of progress in one's learning experience. This article discusses the role and significance of learning curve in the education process and how it can be used in teaching learning situation.*

**Key Words:** *learning curve, education, teaching- learning process.*

## 1. INTRODUCTION:

Have you ever thought about the learning process and its progress? Do you think learning keeps a steady progress? Have you ever noticed variations in the rate of learning? In this article we will discuss these questions?

Learning is not always in a steady progress. Sometimes there is rapid progress in learning, while at other times there is hardly any progress at all. Sometimes one notices even a decline in the process of learning. This is graphically presented with the help of a Learning curve. Learning curve is a graphical representation of the progress and rate of learning, forgetting and retention. Learning curves are usually used to measure the learning progress of an individual. Hermann Ebbinghaus (1885), a German psychologist coined the term Learning Curve during his research on memory and memorization. In his work, *Memory: A Contribution to Experimental Psychology*, he described his findings regarding both the learning curve, or rate at which knowledge is gained, and also he described the forgetting curve, a related graph that measures how quickly memorized information is lost. His work is considered as a groundbreaking work in the field, and quickly led to the popularity of using these curves as a means of measuring learning progress. Sometimes after some learning there is a 'standstill stage' when literally no learning can be observed due to various reasons such as acquisition of wrong habits or skills which may intervene learning, student's satisfaction, lack of motivation, problems related to attitudes, interest and need and so on.

In learning and acquisition of skills and knowledge, there is a commonly used idiom, which says practice makes perfect and in most of the time it makes learning permanent also. Thus practice, drill, learning by doing etc. are very relevant to enhance learning. It also has an impact on everyday life and carriers in business, industry, sports and even in domestic aspects of our personal lives. In the process of acquisition of skills and knowledge, it is very much necessary to gain insight regarding one's progress and to measure, evaluate and update it at various phases of learning by using effective tools.

## 2. LITERATURE REVIEW:

**Soy** (2015) conducted a study to find out the positive impact on learning curve of students by introducing ICT in teaching-learning. Pre and post-test were conducted, after pre-test lesson were delivered by using ICT and the data were analysed by using statistical tools and the result indicated a significant positive impact on student's learning curve.

**Linda A** (2013) pointed out that as an organisation produces more of a product, the cost of production per unit decreases at a decreasing rate. A learning curve for the production of military jet by plotting, the number of direct labour hours required to assemble each jet craft on the vertical axis and cumulative number of aircraft produced is on the horizontal axis. As experience was gained, the number of direct labour hours required to assemble each jet craft decreased significantly and the rate of decrease declined with rising cumulative output. This and related phenomena are referred as learning curve, progress curve, experience curve or learning by doing.

**Brent M**, et.al. (2011) pointed out that learning curves can be used to evaluate and compare personalised educational systems and describes three studies to demonstrate how learning curves can be used to derive changes in the user model.

The results of these studies demonstrate the successful use of learning curves in formative studies of adaptive educational systems.

**Elke W** (2007) examined a number of conditions that influence the ability and opportunity of organizational units and their employees to facilitate autonomous learning. The study brought out that various diverse experiences result in a deeper process of cognitive understanding and therefore to the ability of employees to transfer successful routines from one product to other related products. The findings of the study was variation in learning rates by the percentage of temporary employees used, the level of excess capacity, the degree to which regions face problems in other important performance dimensions and it provide insights into strategies in the processes of designing work to maintain a positive learning curve.

**Willard and Paul** (1998) proposed an approach based on learning cycle where in each period management takes an action to improve the process, to observe the results and thereby learns how to improve the process further overtime. The analysis of the study suggested a differential equation that not only characterize continuous improvement but also reveals how learning might occur in the learning curve. This differential equation might help management to evaluate the effectiveness of various procedures and to improve and enhance industrial process more quickly.

**Paul and Kim** (1991) conducted an exploratory study that sketches some of the behavioural processes that give rise to the learning curve. The study used data from two manufacturing departments in electronic equipment's company to construct a model of productivity improvement as a function of cumulative output and two managerial variables-engineering changes and workforce training. This model highlights complex relationship between first-order and second-order learning. The time required for a single task decreases as the proficiency with which participants repetitively perform a task increases.

### 3. MATERIALS AND METHODS:

Bryan and Harter (1987) found a learning curve in their study of the acquisition of the telegraphic language which had the rapid rise at the beginning followed by a period of retardation and was thus convex to vertical axis. But Arthur Bills (1934), a psychologist gave a more detailed description of learning curves. He also explained the properties of different types of learning curves such as negative acceleration, positive acceleration, plateaus, and give curves.

#### 3.1 Types of Learning Curves

There are different types of learning curves depending upon the nature of the learner, nature of the task or learning materials, time and conditions under which the learning takes place.

**Straight Line Curve-** This type of curve shows the constant rate of improvement in learning.

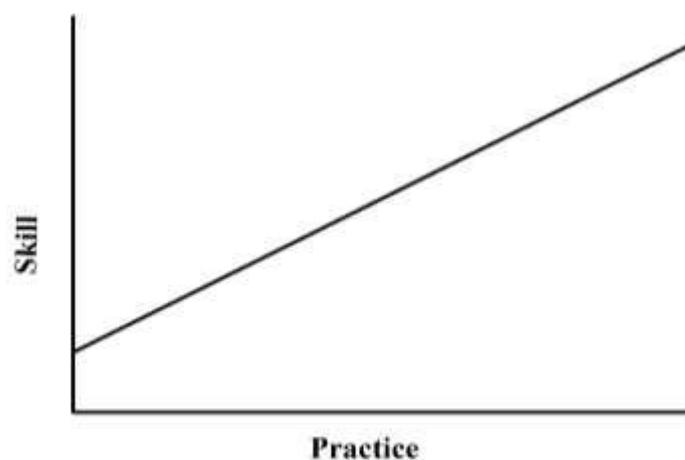
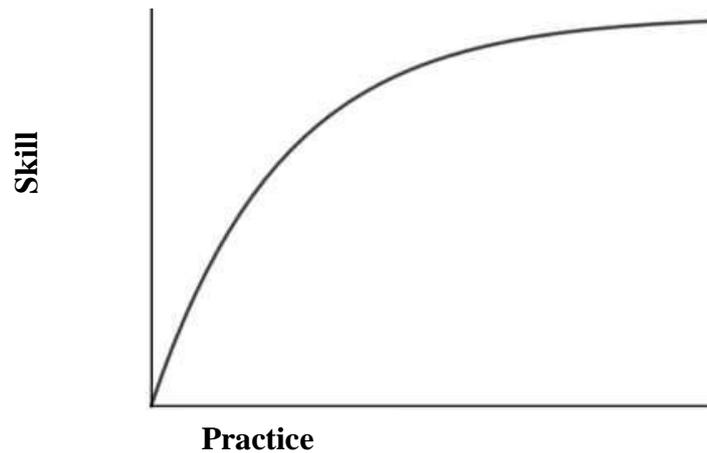


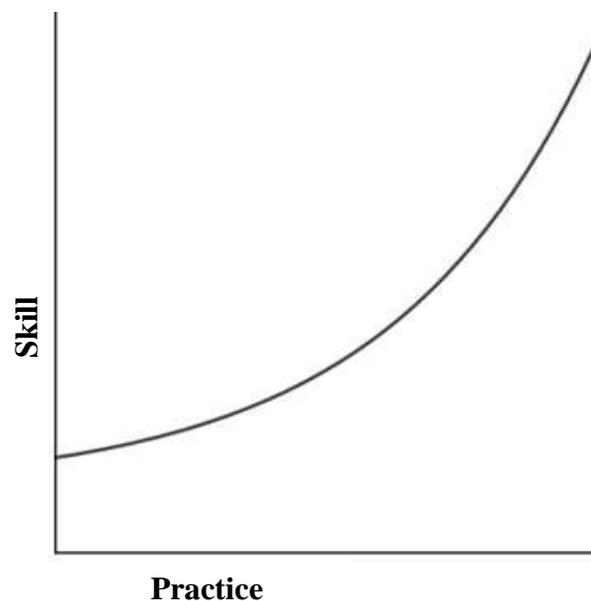
Fig. Straight Line Curve

**Negatively accelerated curve or convex curve-** In negatively accelerated curve, there is an initial rise but gradually declines and the curve ultimately becomes a straight line plateau. In this type of learning curve obtained when the task is simple and also the learner has previous experience on a similar task.



**Convex Curve**

**Positively accelerated curve or concave curve** - In this type of curve there is a slow rise in the beginning and this initial rate gradually increases. We get this type of curve when the task is difficult.



**Concave Curve**

**Combination type of curve**- In this type of curve we find the combination of convex and concave type with intervening plateaus. Combination type of curve looks like the English alphabet's 'S'. Depending upon the nature of the task the curve takes concave or convex in the beginning. We rarely found this type of curves in our actual situations. We find fluctuations in learning in this type of curves.

### 3.2 Stages of Learning Curves

There are five stages in the learning curve and they are:

- **Initial stage** – Progress of learning at the initial stage is slow. The learner takes some time to grow and get familiar with the materials he/ she wants to learn. E.g. an infant's progress in learning to talk is in a very slow rate.
- **Spurts** - This is a period of rapid progress where the learner's output increases rapidly. These spurts of periods of learning or rapid learning occurs after the learners have overcome the initial stage difficulties of learning. In driving the motor vehicles, once the learner has developed coordination between eyes, hands and legs, we can observe a rapid progress.
- **Plateau** - After some time of learning there occurs plateaus where no visible addition to learning at all or it becomes a stand still phase. E.g. After making a consistent learning in driving for some time, the learner reaches a point where there may not be any further progress for some time.

- **Period of rapid Learning** - This is a period of sudden rise after the end of plateau where there is a spurt in the achievement. The reason for this sudden rise is because the learner while he was on the plateau acquires better techniques which help the person to show rapid progress.
- **Psychological Limits in Learning** – The concept has immediate interest only in connection with the skill subjects. Few persons reach this limit and the ratio of actual to theoretical psychological limit is for each person a measure of his achievement. At this stage, learning will finally slow down to such an extent that the learner will ultimately reach a limit beyond which no improvement is possible. It is called as psychological limit.

#### 4. Detailed Discussion on Plateaus :

How to surpass and overcome a plateau in learning, is an educational concern for both learners and teachers. Plateaus are one of the prominent features of learning curves where we cannot find any improvement in learning curve preceded and followed by improvement in learning. At this stage learning curve is a horizontal straight line. Rate of learning at this phase neither increases nor decreases but it remains constant. A period of no visible progress in learning curve is known as a plateau. A plateau some time indicates a period of satisfaction or stability where the learner may be acquired a desired level of learning and needs resources, motivation, feedback, orientation regarding higher goals, reflection, analysis regarding past learning experiences etc. are needed for further progress. Sometimes plateau indicated that the learner has acquired some wrong habits and skills which may be affected the progress of the learner. A good teacher identifies it in the right time and helps the learner to eliminate them. Sometime it may indicate the satisfaction of the learner due to attaining certain level of success where the learner lacks motivation and should encourage them to move forward. Sometime plateau may be happened when the learner is moving up to a higher level of learning where the learner has to concentrate and master various subskills and consolidate them and in such situations plateau is desirable.

#### 5. Causes of Plateaus Analysis and Findings :

There are various factors that affect learning include

- Negative attitude, lack of need and interest of the learners
- Fatigue and boredom
- Lack of interest, motivation, purpose etc. on the part of learners
- Loss of initiative and less attention
- Defective and un-inspirational methods of teaching
- Attention shift from one phase of performance to another E.g. from speed to accuracy
- Because of undue attention on the part of activity which disorganizes the various response
- Errors in the transfer of learning from one part of activity to another
- Insufficient co-ordination of the simpler task with more complex ones
- Lack of balance among various phases of learning complex skills
- Lack of persistency in practice
- Lack of consistent and suitable methods of learning
- Due to high difficulty level of the subject matter
- Due to the feeling of satisfaction

#### 6. Ways to Overcome Plateaus :

- Redistribute the work to the coming class hours
- Rearrange the subject matter properly according to the mental and interest level of the pupils
- Make use of appropriate methods and strategies teaching and learning. Teacher has to follow the maxims of teaching that is, from concrete to abstract, known to unknown, simple to complex and from whole to part.
- Bring changes in the task - Replace mental work by physical work in order to avoid fatigue and keep up freshness in the learner.
- Provide motivation, feedback

#### 7. Educational implications of Learning curves and Recommendation :

- A learning curves is a graphic representation of the rate of leaning which gives evidences of one's rate of progress in learning.
- It is an effective motivational device for the learner.

- Whenever decrease in efficiency is predicted, the curves suggest the teachers to take necessary steps like to make continuous inventories and periodic examinations to detect errors, to organize learning materials and methods of teaching and to provide correct incentives etc.
- Learning curves can be used to minimize the occurrences of plateaus by using effective teaching methods.
- Students' progress can be/ may be arrested due to various reasons such as complexity of the task, undesirable study habits, lack of motivation etc. At that situation, the teacher diagnose the reasons for the lack of progress and help the learner to proceed.

## 8. CONCLUSION :

Understanding the learning curve of the students is beneficial for both teacher and learner. In the process of learning maximum learning happens in the period of rapid progress. If a learner shows an unusual long duration on slow progress, then, he/ she may be a disadvantaged learner and remedial measures are necessary to help the learner. If a person's learning curve indicates lot of rapid progress that person can be a gifted one. More and difficult tasks can be given to such learners in order to channelize their potential in the right direction. An effective teacher may understand and identify learning curves of every student and take necessary actions in order to cater the needs of the individual learner by using appropriate teaching-learning strategies and the progress should be communicated to the respective parents.

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