

Principles of Learning and the Mathematics Curriculum

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There are selected principles of learning that need adequate emphasis in teaching-learning situations in the mathematics curriculum. These principles or guidelines should aid pupils in attaining optimal achievement. Which principles of learning should the teacher stress in ongoing units of study?

Purpose in Learning

Pupils need to perceive purpose or intent to learn. Thus, if learners, for example, are studying a unit on "Uses of Graphs," adequate time should be taken to develop reasons for participating in ongoing learning activities. Pupils could be guided in developing a picture graph pertaining to visitors to the school-class setting during American Education Week or National School Lunch Week. Experiences that pupils have personally in these situations can be shown on the picture graph. A cutout or a drawing for each visitor can be put in the picture graph for each of the days of the week—Monday through Friday.

Pupils may be guided to notice that the contents of a picture graph can simplify information for readers. Thus, the reader of the completed graph may quickly notice trends in terms of visitors, for each of the days of the week, coming to the school-class setting.

Sequentially, as pupils progress through the public school years, more complex learnings may be stressed in developing diverse kinds of graphs such as in the following learning activities:

1. Showing population figures of diverse countries being studied in ongoing social studies units on picture, line and bar graphs.
2. Presenting data pertaining to growth in the Gross National Product (GNP) covering several decades within the framework of appropriate kinds of graphs.
3. Using relevant graphs portraying data on inflation covering selected years.

Intent to learn or reasons for attaining selected understandings and skills need to be emphasized when initiating a unit as well as when developmental and culminating activities are in evidence. Appropriate attitudes may be a significant end result when pupils perceive purpose in learning.

Interest in Learning

Interesting learning experiences need to be provided for pupils. Thus, learners may attend to and extract relevant information as well as abilities from ongoing activities. There are several methods to utilize in emphasizing the concept of interest in the mathematics curriculum. The teacher, for example, may utilize a variety of activities such as markers, place value charts, an abacus, filmstrips, slides, films, pictures, as well as content from reputable mathematics textbooks

to stimulate pupil interest in learning. Varying learning experiences are necessary to develop and maintain interest in ongoing units of study. Attempts also need to be made to determine present achievement levels of each learner in the mathematics curriculum. Continuous progress then is possible when new objectives, related learning activities, and evaluation procedures are sequentially perceived by learners. Pupils may lose interest in learning if content to be learned is excessively complex or easy. Learning experiences need to be challenging but not overwhelming!

Problem Solving in the Mathematics Curriculum

Learners need to have ample opportunities to engage in solving realistic problems. Situations in life demand that human beings become proficient in problem solving. Thus, pupils should have ample opportunities to engage in the solving of real problems. Pupils with adequate background knowledge could solve problems such as the following:

1. A miniature supermarket could be housed in the class setting. Learners may bring empty cereal boxes, fruit and vegetable containers, candy bar wrappers, flour sacks, and sugar bags. These items should be placed on a counter, properly labeled and priced. Pupils may "buy" needed items using toy money. Thus, needed addition, subtraction, multiplication, and division facts may be learned in this manner.
2. A "cafeteria" could also be set up in the class setting. Cutouts of appropriate food items may be pasted on paper plates. Each food item would need to be priced meaningfully. Learners again may use toy money to purchase selected food items in the "cafeteria."
3. The mathematics laboratory concept of teaching and learning can well become an important facet of the mathematics curriculum. Thus, pupils may measure areas, distances, and determine volumes of specific containers in actual problem solving situations utilizing the English as well metric systems of measurement.
4. Realistic problems may also be solved by pupils within the framework of the use of reputable textbooks, films, filmstrips, slides, video-tapes, and life-like situations in society.

Meaningful Learnings in the Curriculum

Pupils need to understand and attach meaning to learnings obtained in ongoing units of study. For learnings to be meaningful to pupils, the following criteria may well need to be in evidence:

1. Adequate emphasis placed upon manipulative materials, and semi-concrete materials before emphasizing abstract learnings in the mathematics curriculum.
2. Sequential experiences perceived by learners need to be inherent in teaching-learning situations.
3. Adequate readiness experiences to progress to increasingly more abstract levels of learning.
4. Pupil-teacher planning being a part of the mathematics curriculum.

If objectives are excessively easy to attain, selected learners generally will feel a lack of challenge in learning. Also, if the objectives in ongoing units of study are excessively complex, pupils may not have needed background experiences to make adequate progress. Thus, for each learner, new objectives to achieve need to be in evidence; however, pupils individually need to be successful in their attainment.

Providing for Individual Differences

There are diverse ways to provide for individual differences in achievement in the mathematics curriculum. The following, among others, are ways to provide for diverse achievement levels in the mathematics curriculum:

1. Use the mathematics laboratory concept in teaching-learning situations. Thus, pupils on an individual bases sequence their own progress through the actual weighing of selected items, measuring of surfaces, as well as finding the volume of selected containers.
2. Utilize learning centers in the school-class setting. Learners sequentially choose the task to work on at a particular center. Ideally, the task or learning activity provides for new challenging experiences.
3. Utilize problem solving methods. Pupils with teacher guidance may select realistic problems to solve on an individual basis. These problems must be on the present achievement levels of individual learners.
4. Pretest pupils using a reputable series of mathematics textbooks. Each learner is then at a different place within the confines of the textbook in terms of achievement. Pupils individually progress as rapidly as possible in satisfactorily completing sequential learnings in the textbook. The teacher gives explanations and guidance to learners as the need arises. Continual help is also given to diagnose errors made by learners in specific problematic situations. Remedial aid is given to learners to overcome identified deficiencies.
5. Use contracts in the mathematics curriculum. Pupils with teacher guidance write up in contract form what the former are to achieve within a given period of time, such as a few days or a week. The level of accuracy of completed work may also be spelled out in the contract. Both pupil and teacher sign the agreement or contract. If the contents of the contract later appear too difficult for the learner to achieve, needed modifications can then be made.
6. Have pupils individually achieve objectives of diverse levels of achievement. Thus, for example, pupils who achieve at a less complex level, as compared to fast achievers, may be guided in attaining objectives suitable to their optimal level of development.

The teacher needs to think of and implement the principle of providing for each level of achievement in the mathematics curriculum. Only then, can learners attain optimal achievement.

In Summary

There are selected principles of learning which need adequate emphasis in the mathematics curriculum. These include:

1. Pupils perceiving purpose in learning.
2. Learners being involved in the solving of problems.
3. Meaningful learning experiences being inherent in the mathematics curriculum.
4. Provision being made to guide each learner in achieving optimal gains in ongoing units of study.