

## Issues in the Mathematics Curriculum

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There are salient issues in the mathematics curriculum which need discussing and resolving. Each teacher and supervisor needs to take a position on vital issues. Which issues might be relevant to synthesize?

### **Inductive Versus Deductive Teaching**

Pupils may attain significant concepts and generalizations through induction. Thus, learners with teacher guidance achieve learnings in mathematics using discovery techniques. Problems and questions then are identified by pupils. Pupils individually and in committees, using a variety of reference sources, secure necessary facts, concepts, and generalizations to solve problematic situations. From specific understandings attained, pupils develop broad ideas or generalizations. The generalizations supported by facts are usable to answer questions and solve problems.

Opposite of inductive procedures in teaching is deductive methodology. In deductive means (1) the teacher in a meaningful manner explains a new process to pupils. Learners might then apply that subject matter provided by the teacher(s). (2) A one way street of communication exists, i.e. from the teacher to the learner. However, the pupil must attach meaning to what has been acquired in order that the cognitive level of application may be utilized by pupils on an individualized basis.

### **Active Involvement Versus Passive Recipient**

Educators emphasizing active learner involvement within lessons and units believe that individuals learn by doing. Thus, pupils with teacher guidance identify and solve life-like problems in mathematics. To become proficient in problem solving, a learner needs to practice specific skills therein. The subskills in problem solving include problem selection, gather data or information in answer to the problem, develop a hypothesis or answer to the problem, test the hypothesis and revise the hypothesis if necessary. The sequential steps in problem solving are flexible and not rigid.

A passive receiver in learning may secure information (facts, concepts, and generalizations) from a sender. The sender usually is the classroom teacher. Thus, content moves from the teacher to the learner in explanation/lecture form. Individual differences need adequate provision. Hopefully, learners can apply that which was received from the sender. In contrast, active pupil involvement indicates the whole person (intellectual, emotional, social, and physical) is involved in projects and activities to solve problems relevant in society. Thus, school and society become integrated entities in the mathematics curriculum.

Advocates of active pupil involvement in learning believe that (1) learners are capable and

interested in making curricular decisions. (2) Learners are in a better position to sequence their own content, as compared to a logical curriculum offered by adults. (3) Learners need to be involved in self appraisal for evaluation techniques to be effective. Otherwise, adult means of appraising learning performance may lack impact upon the learner.

### **Measurably-stated Versus General Objectives**

How precise should objectives for pupil attainment be stated? With measurable ends, the teacher may select learning activities which guide learners to attain the chosen objectives. After which, the teacher may measure if a pupil has/ has not achieved the stated goal. Successful learners may then attempt to attain the next sequential objective. Unsuccessful learners may need a new teaching strategy to achieve the previously unattained objective.

Related procedures to measurable objectives in teaching mathematics are Instructional Management Systems (IMS), mastery learning, criterion referenced testing (CRT), and exit objectives. In each of the above named plans of instruction, precise measurable objectives are utilized in teaching and learning situations. Advocates of measurable ends believe that teachers need to possess clarity of intent in teaching. Thus, the teacher and pupils are clear on what the latter specifically will be learning. Vagueness and ambiguity as to what pupils will be learning is not in evidence.

The teacher can more effectively select learning activities if measurable rather than general objectives are used. Each experience selected is chosen on the basis of one criterion. Do the activities guide learners to attain specific objectives? If the activity is too complex or lacks challenge, it should be omitted. The teacher may measure personal success in teaching by obtaining objective data in determining if pupils have/have not achieved desired objectives. Furthermore, results of learner progress may be communicated clearly and precisely to parents. Evidence needs to exist to show to responsible individuals that pupils are/ are not achieving measurable objectives.

If pupils are not attaining measurable goals, feedback is received by the teacher. The teacher may then need to select a different teaching strategy to aid one or more learners to attain a previously unachieved objective.

Opposite of measurably stated objectives are (1) broad general goals to provide some kind of direction in determining the kinds of learners a teacher wishes to develop. (2) Evaluation procedures which lack precision in determining if pupils have/have not attained desired ends.

### **Learner-centered Versus Society-centered Curriculum**

Should most of the objectives in teaching and learning come from pupils themselves? Or, should attainable goals for pupils be selected on the basis of what society needs and deems to be highly significant.

How might ends be chosen which reflect personal interests and purposes of pupil? First of all, pupils can decide which tasks to pursue and which to omit when interacting with learning centers in the school/class setting. An adequate number of tasks needs to be in evidence at diverse learning centers in order that pupils may select, as well as omit, sequential experiences. Thus, learners individually might truly select interesting tasks to pursue. Hopefully, learners may also perceive purpose or reasons for participating in ongoing activities.

Additional teaching strategies emphasizing personal interests and purposes of learners include

**1. individualized reading.** Each pupil selects and reads a library book pertaining to mathematics which has interesting content and is on the reading level of the involved reader. The pupil may also select how to be evaluated in terms of using appropriate word recognition techniques and comprehension skills. Thus, the learner may read a self-chosen selection orally to the teacher. The teacher might then assist the learner in appraising quality utilization of word recognition techniques. To reveal comprehension, a pupil may develop a mural, diorama, model, or creative dramatics presentation to reveal what has been comprehended from the reading of the library book.

**2. the contract system.** The pupil with teacher guidance may specify which activities to complete involving mathematics within a particular period of time. The contractual agreement needs to be reasonable in terms of activities to be completed by the learner within the specified time in the contract. Mathematics activities in the contract need to reflect learner enthusiasm and reasons for its contents.

To emphasize societal needs in the mathematics curriculum, teachers and supervisors need to ascertain what society emphasizes that needs to be learned by pupils. Among other learnings, these might include

1. being able to compute the total cost of goods/services purchased in any given situation.
2. possessing skill to ascertain the amount of change to be returned from a larger cash denomination given after purchasing needed items.
3. being skillful in writing checks and keeping a responsible checkbook balance.
4. knowing how to obtain loans to make satisfactory investments.
5. possessing applicable concepts involving interest rates.
6. realizing specific abilities involved in ordering materials from mail order companies.
7. shopping intelligently for necessary goods and services used in the home setting.
8. buying insurance for property and health in an effective manner.
9. learning to live within budget requirements.
10. completing job application forms as well as being knowledgeable about required diverse forms used in taxation—local, state, and national levels.

### **In Conclusion**

Selected issues in the mathematics curriculum need studying, analyzing, and synthesizing. Teachers and supervisors need to become students of philosophical issues in curriculum development. Each issue needs to be resolved in terms of guiding learners to achieve optimally in interests, purposes, and meanings in the mathematics curriculum.