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AUTHOR Ediger, Marlow
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ABSTRACT

The nine essays in this collection examine various issues regarding the utilization of computers in the school curriculum, including the selection of objectives, learning activities and appraisal procedures in curriculum development; providing for individual differences among learners; staff development; behaviorism as an emphasis for programmed instruction; mathematics lessons emphasizing drill and practice, problem-solving, and gaming; software selection to assist learner goal attainment; word processing to improve learner writing skills; and the need for teachers and supervisors to study, appraise, and ultimately implement vital strands from diverse philosophical schools of thought. The individual essays are entitled: "The Word Processor in the Curriculum Today"; "Computer-Assisted Instruction and the Learner"; "Inservice Education and the Computer"; "Computers: Programmed Learning versus Problem Solving"; "Experimentalism and the Computer"; "Microcomputers in the Mathematics Curriculum"; "The Microcomputer in the Classroom"; "The Word Processor in the Curriculum"; and "Philosophy and Goals in the Curriculum." References are provided for most of the essays. (DJR)

COMPUTERS IN THE SCHOOL CURRICULUM
(A Collection of Essays)

by
Dr. Marlow Ediger
Professor of Education
Northeast Missouri State University
Kirksville, Missouri 63501

THE WORD PROCESSOR IN THE CURRICULUM TODAY

Relevant objectives need selecting for learners to attain. Numerous changes occur in society. Seemingly, situations in life are not stable nor static. Rather, change is a key concept. Changing societal situations need to be incorporated into the curriculum. The word processor, when more numerous in number than presently, may well provide vital goals in teaching-learning situations.

Objectives in ongoing Lessons and Units

There are selected criteria which need to be followed in choosing objectives. Thus, outcomes for student achievement must be:

1. purposeful so that reasons for learning are inherent.
2. meaningful in that what is being learned is understood.
3. interesting to stimulate intrinsic learner attention.
4. attainable in a manner which provides for diverse levels of achievement.

To translate the above named criteria into goals for learners to realize, relevant ends need choosing reflecting the utilization of the word processor. The following concepts might well provide direction for selecting objectives, learning activities, and evaluation procedures in using word processors:

1. control card--a magnetic card containing instructions for the central processing unit.

2. electronic typewriter--electronic in nature and not mechanical in operation. The number of moving parts is few and operates in a silent manner.

3. automatic carrier return--the operator does not need to return the carriage at the end of a line of type. Automatically, the carrier is returned by the machine. Automatic centering is completed with a keystroke command to the central processing unit (CPU).

4. central dictation system--direct wiring of a system to a central location whereby dictation from others is received.

5. input--content which goes into a computer.

6. K (kilo)--represented by 1000 characters, approximately. Thus, 30K equals 30,000 characters.

7. keyboarding--the actual operation of a typewriter.

8. log sheet--a document which is used by supervisors to record cost efficiency as to incoming/outgoing work of computer service.

9. magnetic diskette-diskette which has a magnetic coat on which 130 pages, approximately, of typed content may be recorded.

10. magnetic tape--tape which has magnetic coat and is used for recording of information.

11. memory--within the central processing unit, an internal device in which subject matter can be stored and retrieved upon demand.

12. printer--a facet of the output device which prints content on paper.

13. record--storing typed content on a magnetic medium for use in the future.

14. search--a command to the word processor which causes the location of a specific section.

15. shared logic--two or more terminals can utilize the memory of the same central processing unit (CPU).

16. software--includes manuals, programs, and flowcharts to assist in making optimal use of the computer. Software then are materials used to operate and control the hardware (computers).

Learning Activities to Achieve Objectives

Experiences for students should guide in achieving relevant objectives. Each student is at a different level of achievement compared to other learners. Thus, students individually will progress at different rates of speed in attaining objectives.

A variety of activities should be utilized in teaching and learning. Hands on approaches in utilizing the word processor should predominate as a learning activity. However, illustrations, slides, films, tapes, excursions, and filmstrips may also be utilized to provide for individual differences. Success in learning is important in order that each student might optimalize learning.

Sequence in learning is vital. If learnings are sequential, students individually have excellent opportunities to achieve objectives. A lack of learner progress may well be due to improper order of content and skills presented.

Ultimately, student achievement needs to be evaluated. A variety of evaluation techniques may be utilized. These include:

1. teacher observation of learner progress in operating a word processor.

2. teacher written test items, such as true-false, multiple choice, matching, essay, and completion.

3. discussions to notice learner progress.

4. checklists and rating scales to notice if objectives are being attained by learners.

5. anecdotal statements. Thus, the instructor records random behavior of each student in learning to utilize the word processor.

In Conclusion

The school curriculum should not be separated from trends in society. The use of word processors in the societal arena has tremendous implications in selecting objectives, learning activities, and appraisal procedures in curriculum development.

COMPUTER ASSISTED INSTRUCTION AND THE LEARNER

Computer assisted instruction (CAI) may well aid in providing for individual differences among learners. The use of computers provides a specific learning style for students. More traditional methods of teaching include use of textbooks, encyclopedias, pamphlets, cassettes, library books, films, slides, filmstrips, films, educational television, as well as transparencies and the overhead projector. These materials are highly useful as learning activities to guide optimal learner progress. New technologies are constantly incorporated into the curriculum; one of which is the microcomputer. Computers are utilized in numerous ways in the business world, as well as personal use in homes. The school cannot separate itself from society. Thus, computers have a relevant role to perform in the instructional arena. Learners need to perceive purpose and meaning in the curriculum.

Programmed Learning and the Computer

Programmed learning emphasizes a specific method of instruction. Programmed learning can be emphasized in textbooks, as well as in computer software. If stressed in computer use, computer assisted instruction (CAI) is in evidence.

Programmed learning emphasizes a definite philosophy of education. Philosophical ideas inherent include:

1. the programmer determines which facts, concepts, and generalizations students are to achieve. Student-teacher planning of objectives, learning activities, and evaluation procedures is definitely not advocated in programmed items.

2. subject matter for students to attain is sequenced in ascending order of complexity.

3. a student reads a few sentences or sees a demonstration on the screen

of the computer. Next, the learner responds to a related completion or multiple choice item by typing in the response on the keyboard. If the student responded correctly, a smiley face may appear on the screen as reinforcement. If an incorrect response was provided by the involved student, he/she may try again on the same item by typing in a different answer on the keyboard. If correct, the learner is also ready to attempt the next sequential linear item shown on the monitor. Throughout the utilization of programmed items, the student reads, responds, and checks in sequential items provided by the programmer.

4. Answers provided by students (using the keyboard) with results shown on the screen are either right or wrong. Thus, measurable results are in the offing.

5. Reinforcement of correct responses are important, spurring students on to greater efforts.

6. Students progress on an individual level. Thus, students individually do not need to wait for others to complete a task, before moving on to the next sequential item.

7. Learners, after responding to an item, see immediate knowledge of results. Thus, students do not need to wait to notice if a given response was correct or incorrect.

8. Programmers predetermine what students are to learn. A programmer then selects the goals, sequence of experiences, and means of appraisal.

9. Students achieve a high rate of success and miss few responses if a quality program is in evidence. Field tested programs allow for a 90 to 95 per cent success rate in terms of answers provided by learners.

Gibson wrote the following pertaining to B. F. Skinner:

> In his observations of the Boston public schools during the 1940s, Skinner discovered a number of ineffective teaching techniques.

Classes were large, and the teachers taught all students the same thing at the same time without regard for individual abilities; they could provide very little immediate feedback to the students, and had to leave reinforcement primarily to chance.
Skinner designed a mechanical teaching device that instructed each student individually and provided immediate feedback. He programmed the machine to present the student with progressively more complex problems step by step. Each step (or frame) contained a question. The student would answer the question, and the machine would immediately tell him whether the answer was right or wrong. Skinner phrased the questions so that the student would most likely make correct responses, which the machine immediately reinforced, thereby increasing the probability of more correct responses. In this manner a student proceeds through a subject area from simple to complex problems and receives continual immediate feedback.

A Variety of Activities

The teacher, in addition to providing experiences with student interaction involving computers, will utilize numerous other activities. Why? Each student has a preferred learning style. Thus, using computers may/may not be a preferred means of achieving relevant goals. Other worthwhile activities for students include the use of textbooks, encyclopedias, models, objects, slides, film , filmstrips, dramatizations, transparencies, drawings, illustrations cassettes, educational television, and excursions.

Learning activities need careful selection in order that students may achieve vital objectives. Activities chosen need to be interesting, meaningful, possess purpose, and provide for individual differents. Students individually then should achieve optimally in the curriculum. Pratt[2] wrote:

> Students vary in innumerable way; so do teachers. The kinds of learning and the instructional context introduce additional variety into the classroom. Advocacy of any "one best method" is out of place in instructional design. Neither art nor science supports monolithic prescription. . .
> The role of the curriculum designer, therefore, is not to impose strategies on the teacher, but to help liberate the teacher from imprisonment within a limited range of conventional techniques: to suggest principles and possibilities that the teacher can apply creatively to generate new and more effective approaches. The structure and clarity of the scientist and the variety and imagination of the artist: these have been, and are likely to remain, the keys to instructional effectiveness.

Selected References

[1]Gibson, Janice T., Psychology for the Classroom. Englewood Cliffs, New Jersey: Prentice-hall, Inc., 1976, pages 134 and 135.

[2]Pratt David, Curriculum Design and Development. New York: Harcourt Brace Jovanovich, Inc., 1980, pages 321 and 322.

INSERVICE EDUCATION AND THE COMPUTER

With an increasing number of computers in the curriculum, staff development becomes important. Societal trends emphasize a continual emphasis being placed upon the utilization of computers in the business world, as well as in personal lives of individuals. The school curriculum must not be separated from society. Thus, the computer has a highly significant role to play in teaching-learning situations.

Workshops as Inservice Education

A theme for a workshop should be selected cooperatively by teachers with administrative guidance. The theme must reflect curricular needs of a school. One relevant need in the curriculum might well be computer utilization in teaching and learning.

A first level of participation in a workshop should involve all participants in a general session. The leader and involved individuals should then identify problem areas or facets of computer use that should be studied. Criteria to be followed in the general seesion include:

1. All should participate and no one dominate.
2. Each participant should stay on the topic being discussed and not stray to unrelated areas.
3. Participants should respect ideas being presented. Minimizing or ridiculing ideas presented definitely hinders achievement in communication.
4. Ideas need to be presented clearly and meaningfully among general session members.
5. Content expressed by individuals needs to circulate among members in a group, rather than between the leader and a respondent in sequence.

Which problem areas involving computer use might be identified as relevant to pursue? The following are provided as suggestions:

1. Which criteria need to be followed in selecting computers which harmonize with objectives of the school and class?
2. Which standards need utilization in choosing computer software?
3. How might computers be utilized in problem solving activities in the curriculum?
4. How might programmed learning be utilized to provide for individual differences?
5. Which guidelines need following to assist learners to attain optimally in using computerized drill experiences.
6. How might simulations and games involving computer usage assist students to develop decision-making skills?

After an adequate number of vital problems have been selected within the general session framework, participants may choose which committee(s) to work in. Each participant should select committee membership based on the following criteria:

1. Meeting personal needs to improve the curriculum in the class setting.
2. Promoting perceived purpose by the participant in solving vital problems in the classroom setting.
3. Stimulating interest in wanting to use computers to provide for individual differences.
4. Developing an attitude of wishing to utilize computers effectively in ongoing lessons and units of study.

An adequate number of reference sources need to be available to assist workshop participants to secure needed information in the solving of problems. These reference sources may include textbooks, periodical articles, pamphlets, films, slides, filmstrips, transparences, and illustrations. Proficient consultant and resource personnel also need to be available to participants in the solving of problematic situations.

In addition to general sessions and committee endeavors, individual participants also need opportunities to work on projects of their very own choosing. Thus, personal needs may be met in using computers in the classroom. A teacher, for example, may wish to develop his/her own programs for programmed instruction. Quality assistance needs to be available from an expert to guide teachers to develop their own programs of computerized instruction.

Achievements in committee work and individual projects may be shared with members of the total workshop within the framework of the general session. Whatever is achieved may, hopefully, be implemented in teaching-learning situations in the school/class setting.

In Conclusion

Inservice training of administrators and teachers is necessary to optimalize computer usage in the curriculum. Only then might quality objectives, learning activities, and appraisal procedures be selected to challenge student achievement in the curriculum.

COMPUTERS: PROGRAMMED LEARNING VERSUS PROBLEM SOLVING

How should computers be utilized in the curriculum? Behaviorism, as a psychology of learning, might well emphasize programmed instruction in ongoing units of study. Somewhat toward the other end of the continuum, experimentalism emphasizes computer usage to solve problems.

Behaviorism and the Computer

Behaviorism emphasizes that students

1. learn a small smount of subject matter, respond to a test item, followed by checking the personal response with that provided by the programmer.
2. see immediately if their response was correct before progressing to the next linear item.
3. experience rather continuous success in responding. Thus, few incorrect responses are made in programmed materials used by learners. Readiness for learning needs to be in evidence.
4. achieve positive reinforcement, as a result of being successful in learning.
5. respond to sequential items developed by the programmer.
6. learn best when subject matter is broken down into small segments of knowledge. A small segment is acquired prior to responding to a completion item. The completion item appraises if a student has grasped the small bit of information presented by the programmer.
7. are rewarded by responding correctly to sequential programmed items.
8. produce observable, not internal, results in achievement.

A programmer then might develop quality programmed materials in which pupils perceive a cl , brief, concise demonstration of a new procedure on a screen or monitor. The involved learner at the terminal is asked to respond to a completion item, multiple choice item, or other objective response. After which, the correct response is presented on the screen to the learner. In linear programming, the successful student may proceed to the next sequential demonstration presented on the screen, followed by active learner response to a test item. The learner again checks his/her response with the correct ... as provided by the programmer. The student supplying an incorrect answer to a test item sees the correct answer on the screen and also is ready for the next sequential demonstration of a new learning on the screen, as is true of the successful responder.

Computerized programmed learning is excellent if

1. it is varied with other methods and media in ongoing lessons and units.
2. it is on the understanding level of participating students.
3. it reflects a preferred learning style of students.
4. perceived purpose is involved in learning.

Biehler[1] wrote:

> In arranging the sequence of steps, programmers may use a linear program, which tries to insure that every response will be correct, since there is only one path to the terminal behavior. Or they may use a branching program, in which there is less concern that all responses be right; if a wrong answer is supplied, students are provided with a branching set of questions to enable them to master the troublesome point. Since it would be impossible to provide supplementary frames for all the wrong answers that might be written in by a student, branching programs are often multiple choice. Students thus select their answers from a small number of alternatives, and a branch is supplied to correct wrong responses. Another type of branching program provides students with a more complete explanation of the misunderstood material and then urges them to go back and study the original explanation more carefully.

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[1]Robert F. Biehler, Psychology Applied to Teaching, Third Edition, Boston: Houghton-Mifflin Company, 1978, page 241.

Experimentalism and the Computer

Experimentalists believe in utilizing computers to solve life-like problems. Thus, problems existing in society may well provide content in the curriculum. The teacher needs to provide a stimulating environment to guide students in identifying vital problems. A variety of media, such as slides, filmstrips, films, transparencies, illustrations, and excursions might be utilized as experiences to motivate student problem identification. After the problem has been chosen and delineated, learners with teacher guidance may gather related data. Information retrieved from a computer, in part or whole, might provide content to solve the problem. The data is utilized to develop a hypothesis or tentative solution to the problem. The hypothesis needs testing, since it is tentative and not permanent or absolute. The computer may well be utilized to test the chosen hypothesis through additional retrieved subject matter. Other reference sources can also be utilized to test the identified tentative hypothesis. The hypothesis may need revising if evidence warrants.

New problems and hypotheses may well be identified throughout the problem solving experience.

Use of the computer in problem solving is highly recommendable if

1. identified problems are accepted intrinsically by learners.
2. computer data is available to aid in gathering content to develop a viable hypothesis.
3. learners possess readiness factors to utilize and interpret computerized content.
4. retrieved data from computer sources can be utilized to test a hypothesis.
5. students perceive reasons for using the computer to gather data and

and test hypotheses.

Morris and Pai[2] wrote:

> But what, to ask the final question, ought we to want? To this the Experimentalist has no answer, for it is an ultimate question, and ultimate questions have no answers. Since values are to be found in the context of experience, we will have to find out what we ought to want in this selfsame, relativistic circumstance of ordinary experiencing. There simply is no absolute answer.
>
> The only kind of sensible answer one can give is that people ought to want what they in fact do want when presented with all the alternatives and the knowledge of their consequences--which is no more than saying that a community of human beings, employing a kind of public sharing of preferences and values and being intelligent about the whole business, can come to a working notion of the kind of civilization they would like to build, that is to say, the values that they would like to work for and attain. But in the working for and attaining of these values, other values have a tendency to suggest themselves. Humanity's valuing becomes, then, a constant creation of and accommodation to the changing moral environment about it. As the consequences that flow from humanity's principles change, the principles themselves change.

In Summary

There are diverse instructional technologies which may be implemented in the curriculum involving computer use. Behaviorism, as a psychology, of learning emphasizes considerable structure in the curriculum. Thus, a programmer selects measurable objectives, sequential tasks, and appraisal procedures for learners. Toward the other end of the continuum, experimentalists advocate rather heavy student involvement with teacher stimulation to select goals, learning activities, and means of evaluation.

Teachers and principals need to select worthwhile methods and procedures which guide students to achieve in an optimal manner in the curriculum.

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[2]Van Cleve Morris and Young Pai. Philosophy and the American School, Second Edition. Boston: Houghton Mifflin Company, 1976, page 253.

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MICROCOMPUTERS IN THE MATHEMATICS CURRICULUM

Each learner needs to attain optimally in mathematics. The arithmetic component in mathematics is one of the three R's (reading, writing, and arithmetic). Mathematics is considered a basic. Essential learnings need to be achieved by students in mathematics to function effectively in school and in society.

New technology in society needs incorporating into the school curriculum. Societal trends should not be separated from teaching-learning situations in the school and class setting.

Drill in the Curriculum

A major use of microcomputers in mathematics is to emphasize drill. Repetition of learnings is involved in drill. Background understanding and meaning must be attached by learners to drill items. Thus, drill for students should not be emphasized as rote learning only. The involved student must be able to explain content inherent in the learning activity involving drill.

In basic addition, subtraction, multiplication, and division number pairs, students need to comprehend these facts prior to experiencing drill. Thus, if a student understands meanings attached to 56 + 73, drill may well be utilized to guide the learner in retaining or remembering what has been learned. How does a student show meaning pertaining to 56 + 73, as an example? He/she may explain 56 as representing boys, girls, dogs, cats, rocks, as well as other animate/inanimate items. The learner could even show 56 on a place value chart. Six separate slips of paper can then be placed in the ones column and five slips of paper in the tens column to represent five tens or fifty. Similar ways of revealing understanding of 73 may be shown by students.

In using a place value chart, a student may demonstrate what is involved when 56 and 73 are added. Six ones and three ones are nine ones shown in the ones column of the place value chart. Five tens and seven tens make twelve tens. The twelve tens need to be regrouped so that an end result is two 10 and one 100, using the ones, tens, hundreds pockets in the place value chart.

Drill is very appropriate in the mathematics curriculum when meaning is attached to facts, concepts, and generalizations. With quality software, a learner may progress continuously using a microcomputer. The involved learner needs to type in the proper commands on a terminal to secure the correct lesson involving drill. Next on the screen, a computation item appears involving addition, subtraction, multiplication, or division, depending upon the specific learning that makes for proper sequence in the individuals repetoire. The involved student types in the correct answer using keys on the terminal. If correct in responding, the learner may see the words "that's excellent" on the screen. If incorrect, the words "try again" can be seen. Usually, if a learner responds incorrectly the second time, the correct answer is given on the screen.

After completing sequential computations in a lesson, the student, as well as teacher, notice what percent of the items were responded to correctly the first attempt, as well as the second try.

Behaviorism, as a psychology of learning, is emphasized in drill. Which strands of thought are followed when programmed learning, software, and microcomputers are utilized?

1. A programmer has selected the subject matter for pupils to acquire.

2. Programmers order or sequence which computation in drill should come first, second, third, and so on for learners to respond to.

3. The programmer determines what the correct answer is to each sequential item that involves responses by learners.

4. The learner interacting with software in the computer obtains immediate feedback if a response is/is not correct.

5. Students are rewarded for responding correctly to any one item. The reward might come from being successful in giving a correct answer. Quality programmed materials are developed so that a learner experiences much success in responding to sequential items. Additional reinforcers pertain to the involved learner seeing "that's correct," or similar concepts, on the screen.

6. Learners individually acquire a small amount of content, after which he/she makes a response to show comprehension or retention.

Practice and the Microcomputer

The concept of practice involves the presentation in a meaningful manner of a new concept or generalization with sequential opportunities for learners to use what has been acquired. Thus, the learner needs to type in the correct instructions in terms of the lesson to be pursued. Assuming that a student is to identify geometrical figures the software will present a triangle, square, and circle on the screen. A brief description of each figure is also presented. Next, the involved learner is asked to identify which is the triangle by using the keyboard to punch either a (triangle), b (square), c (circle), or d (rectangle). The multiple choice response may present the abstract word or the geometrical figure in and of itself. Both the geometrical figure and the related abstract word could also be presented for responses a, b, c, or d. The student then has opportunities to practice what has been learned from the initial geometrical figures presented and their related descriptions.

If the student typed in the correct answer, immediate feedback is shown on the screen with "that's correct" or similar wording. If the learner responded incorrectly, he/she may be given a second chance to type the correct answer. The correct response will then be shown on the screen or monitor. Learners individually may then progress to the next set of illustrations and related descriptions on geometrical figures. Each student can progress on an individual basis as rapidly as possible. Provision then is made for students of diverse capacity and ability levels.

Involving the concept of practice, Copeland[1] wrote:

> The behaviorist then takes the content to be taught, divides it into components, and chains the components together in a logical sequence (connectionism). If a child misses any component, he goes back or repeats the sequence leading to that component. T... petition is the correctional mode. The premise is that if he repeats it, ...r or later he will remember it. Thus the procedure is the familiar "drill and ...tice."

[1]Copeland, Richard, <u>Mathem...cs and the Elementary Teacher</u>, Fourth Edition, Macmillan Publishing Co., Inc., 1982.

> The developmentalist holds that drill and practice will not necessarily teach the concept involved. Also, there will be little if any transfer to a new problem situation requiring use of the same concept. The behaviorist responds that he expects little transfer.
>
> The developmentalist holds that to correct errors children must first understand the logical or mathematical concept involved. This involves more than repetition. The child must explore the situation for himself using physical or concrete materials. He must structure for himself the necessary concept. To understand addition, for example, the child should put sets of objects together, noting their number before and after they are put together. He should separate and reassemble the objects. Even this will not be enough without the necessary readiness factors.

The concept of practice emphasizes learners revealing skills to use what has been learned previously. To minimize forgetting, students need to use what has been learned in a new setting. The new setting does not involve problem solving. It does, however,emphasize a transfer of learning from one situation to another. The two situations must be somewhat identical since drill is also inherent in practicing what has been learned previously.

Problem Solving and Computer Use

To solve problems, perplexity as a concept needs to be in evidence in the ongoing situation. Within the framework of drill, for example, exact precise answers are needed in performing operations on addition, subtraction, multiplication, and division. The final answer to a problem in mathematics may also be exact. But, to determine solutions to problematic situations, the learner must think. Thinking involves analyzing -breaking down a problem into component parts to notice what is essential and what is nonessential in acquiring a solution. Synthesizing also needs to be stressed. After analyzing any situation, putting the parts together into a new whole or relationship is necessary. Thus, a synthesis is achieved.

Shepherd and Ragan[2] wrote the following involving problem solving situations:

> The goals of programs in the 1960s was for the pupil to experience and think about mathematics in ways familiar to the mathematician. The goal of programs in the 1970s is for the pupil to experience and think about mathematics in ways which the average citizen does when producing, adapting, and functioning. The goals

[2] Shepherd, Gene D., and William B. Ragan, Modern Elementary Curriculum, Sixth Edition, Holt, Rinehart and Winston, 1982.

for the 1980s stress computation and problem solving. Objectives related to the development of efficient and effective computational skills tend to emphasize the lower-energy cognitive behaviors to recall, recognition, paraphrasing, translating, and applying. Objectives related to the establishment of the processes of inquiry tend to emphasize the higher-energy cognitive behaviors of analysis, synthesis, and evaluation. The curriculum builders of the programs of the 1960s recognized an imbalance in the distribution and achievement of objectives in the older programs. Therefore, the programs of the 1960s were designed to emphasize the higher cognitive behaviors. Critics of the "new math" program in the 1970s see an imbalance in other ways: higher cognitive behaviors over lower cognitive behaviors. Both the 1960 and 1970 groups, pro and con, seem to have reached a compromise in proposing a curriculum with a balanced emphasis and achievement of objectives at all classification levels of all domains for the 1980s.

To be involved in problem solving, there needs to be an identified problem. The problem needs to possess clarity and conciseness. Data is then gathered to solve the problem. Next, a hypothesis, or answer, is developed (based on the data) in answer to the problematic situation. Hypotheses are never absolutes, but are tentative and subject to testing. A hypothesis that does not stand up under the test is modified or rejected. Modifications of a hypothesis also need to be evaluated. Rejected hypotheses may indicate a need exists to

(a) identify a new problem

(b) gather new data

(c) achieve an hypothesis, based on the data.

(d) test the hypothesis and modify or revise if necessary.

Games and the Computer

New Software is continually arriving on the scene which emphasizes the concept of games or gaming. Games can provide highly interesting experiences for students in the mathematics curriculum. Interest in learning experiences should be inherent regardless of concepts emphasized (drill, practice, problem solving, or games) in computerized learnings for students in mathematics. Hofmeister[3] wrote the following elements present in games, as identified by Malone:

> Malone (1980), in a study of electronic games, identified the following elements present in many popular games: (1) goal; (2) score; (3) audio effects;

[3] Hofmeister, Alan, Microcomputer Applications in the Classroom, Holt, Rinehart and Winston, 1984.

(4) randomness; (5) speed of responses count; (6) visual effects; (7) competition; (8) variable difficulty level; and (9) fantasy. He summarized these elements under the areas of challenge, fantasy, and curiosity. Malone concluded his report, "What Makes Things Fun to Learn? A Study of Intrinsically Motivating Computer Games."

Hofmeister[4] further wrote:

> The new technology of computer--with its uniquely rich possibilities for responsive fantasy, captivating sensory effects, and individual adaptability--has an unprecedented potential for creating fascinating educational environments. But as our cultural experience with television indicates, great potential does not guarantee wise use. I have tried to point the way, in this report, towards a human and productive use of this new educational technology that avoids the dangers of soulless drudgery on the one hand and mind-numbing entertainment on the other.

Grossnickle[5] et. al. wrote the following pertaining to hardware and software in computer usage:

> The term hardware refers to the computer and the many pieces of equipment, called peripherals, that can be attached to it. Common peripherals include video monitors or television sets, disks, cassette drive, and printers.
>
> The computer is instructed in what to do by computer programs, which are also called software. The availability of appropriate software is just as important as the quality and flexibility of the hardware. Without software, computers are almost useless unless highly skilled programmers are available. Most pupils can learn to write a simple program in a short time but even a skilled programmer may need dozens or hundreds of hours to construct a useful educational program.

In Summary

Microcomputers are heavily utilized in society to perform a variety of tasks. The school curriculum must incorporate and reflect relevant content from society. Microcomputers in mathematics lessons and units may emphasize drill, practice, problem solving, and gaming. Software for use in microcomputers needs to:

1. acquire interests of students.
2. develop purpose or reasons for learning.
3. provide sequential content for learners.
4. give students appropriate feedback for each step in learning.
5. have relevant, vital content for learners.

[4] Ibid. page 4-6.

[5] Foster E. Grossnickle, et. al., Discovering Meanings in Elementary School Mathematics. Seventh edition. New York: Holt, Rinehart and Winston, 1983, page 200.

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THE MICROCOMPUTER IN THE CLASSROOM

There are numerous problems needing resolving in emphasizing computer use in the curriculum. Teachers and administrators need to study and analyze means of implementing the use of the computer to aid optimal student achievement.

Integrating the Microcomputer into the Curriculum

Numerous materials are available in classrooms to guide students to achieve objectives. These materials include films, filmstrips, slides, transparencies and the overhead projector, illustrations, study prints, textbooks, workbooks, library books, encyclopedias, and pamphlets. The computer also needs incorporation into ongoing lessons and units. Computers certainly are in evidence in society. School and society need to be integrated, not segregated entities. Thus computers, along with other materials of teaching/learning, should aid students to achieve worthwhile goals.

Software selected to assist goal attainment should

1. provide meaningful experiences for learners.
2. motivate students to achieve in an optimal manner.
3. emphasize sequential learnings.
4. stimulate feelings of success. Each student then needs to experience success in ongoing lessons and units.
5. provide for students of diverse capacity and achievement levels.

Computer assisted instruction (CAI) has diverse types of software to emphasize in teaching-learning situations. Drill may be stressed. To review what has been learned, students need to practice knowledge and skills previously acquired. Otherwise, retention in learning may be greatly minimized. Software emphasizing drill experiences must be selected on the basis of having students achieve vital goals. Repetition for the sake of repetition is not recommended. Rather, review of relevant learnings needs to be stressed. There are definite objectives which learners must attain. Relevancy is a key concept to emphasize in choosing software emphasizing drill for learners.

Review for students should stress sequential experiences for learners. What is too complex in terms of drill experiences for students needs to be avoided. Also, excessively easy sequential repetitious steps must also be minimized. Students need to experience drill in worthwhile tasks. What is vital and needs retention must be practiced by learners. The computer with inherent software may well provide these experiences. This frees the teacher to work with other students who need assistance and guidance which computerized instruction cannot provide.

A computer does not tire of presenting drill experiences to learners. Nor does a computer become frustrated and rude. For correct responses provided by students to programmed drill items, a smiley face appearing on the screen of the computer can indeed personalize learning. Each sequential programmed item responded to correctly by the involved student provides a reward on the screen of the microcomputer.

A second means in emphasizing CAI might well stress new learnings to be acquired by students. Each student using a computer terminal may experience programmed instruction. With programmed learnings, a learner may read a few statements or see a demonstration on the screen of the computer. A student in return responds to a multiple choice or completion item based on what was comprehended from the sentences read or demonstration experienced. After responding, the computer screen may show a smiley face if the response given was correct. If incorrect, the involved student may try again to respond correctly. If a second wrong response was given. the correct answer is provided on the screen. The successful learner in each response given is ready to progress to the next linear item. The student responding incorrectly also is ready for the next sequential item, after seeing the correct response on the screen. Read, respond, and check are concepts emphasized again and again in sequential programmed items. New learnings, not drill and practice, is being emphasized.

Each student can achieve individually at his/her own unique optimal level of achievement. No student needs to wait to have other learners progress at a similar level of achievement. Learners individually may progress as rapidly as personal capabilities permit using computer terminals.

Software used in programmed learning must emphasize:

1. significant sequential learnings.
2. learners being successful in ongoing steps of ordered progress.
3. gain the attention of learners.

CAI may also provide problem solving experiences for students. Thus, a problem is pre ted on the screen of the mic mputer. The student using keys on the microcomputer types in a related decision. Feedback on the screen is provided to the learner relating to the typed decision. A new problem is then presented directly related to feedback to the involved learner regarding the previously made decision. Again, the student types a choice to be made involving, perhaps, four alternatives in a multiple choice item. Feedback is again provided to the student on the quality of decision made, as well as a new sequential problem presented on the screen. The reader will now recognize a pattern in sequential steps to be followed by students involving problem solving.

Problem solving involving microcomputer use emphasizes:

1. higher levels of cognition, such as applying what has been learned

previously but in a new situation. Analysis, synthesis, and evaluation are also emphasized at different complexity levels of cognition.

2. decision-making experiences by students.

3. active involvement, not passive recipients in learning.

4. creative, not conformity behavior, when students select consequences from among alternatives.

Developing Competence in Using Microcomputers

To achieve proficiency in computer usage, a variety of inservice procedures need to be emphasized. The following means may be utilized:

1. workshops stressing relevant objectives.

2. faculty meetings containing vital agenda items.

3. video tape presentations on model procedures in computer usage.

4. slides, filmstrips, and films presenting sequential significant content.

5. qualified resource personnel speaking to participants on curriculum uses of the computer.

6. visits to classrooms in which effective computer usage is being stressed.

Inservice education for teachers and administrators in microcomputer use in the curriculum should:

1. provide sequential new learnings.

2. emphasi... utilitarian values in teaching and learning situations.

3. emphasize meaningful, understandable content.

4. inculcate purpose or reasons for learning.

In Closing

A variety of activities may be provided for learners to guide each to attain optimally. The microcomputer, as well as traditional reading and audio-visual materials, need to be utilized as learning activities to assist students to attain worthwhile goals. Competence in the utilization of each activity and experience needs to be in the offing so that learners may perceive meaning, purpose, and interest in learning.

THE WORD PROCESSOR IN THE CURRICULUM

In many ways, the word processor is challenging the worth of the traditional typewriter in the curriculum. With the utilization of microcomputers in the school/class setting, even young learners are increasingly mastering the use of the keys on the keyboard. The keys on the computer keyboard are in the same sequential positions as is true of keys on a typewriter. A few additional keys can be present in selected keyboards on computers.

Six year old pupils on the first grade level can generally press the correct keys in responding to computer assisted instruction items (CAI) emphasizing drill and practice. Thus, on a computer screen, the involved pupil may see the basic number pair 5 + 2 = __. To be correct in responding, the learner needs to press the "7" key. On the screen, a smiley face emphasizes reinforcement for answering correctly what 5 + 2 equals. If a pupil responded incorrectly, he/she may see on the screen "try again." A second attempt is made by the pupil to answer correctly 5 + 2 = __. If the response is incorrect again, the correct answer is now shown on the screen. This learner, as well as the pupil who responded correctly initially, is ready for drill and practice on a different ordered number pair. Thus, through responding to items on the screen in any curriculum area, the learner becomes increasingly proficient in using the keyboard on a computer and these skills are the same/similar as those demanded in traditional typing. The traditional typewriter, however, is easier to move and is more mobile as compared to the word processor.

Uses of the Word Processor

Already on the early primary grades, pupils with teacher assistance may make use of the word processor. For example, if young learners have had an experience such as viewing a set of meaningful slides pertaining to an excursion, they may present the resulting ideas, individually or in small groups, to the teacher who in return uses the keyboard to type the content. Pupils may then see talk encoded into words and sentences. What learners present in ideas can be seen on the screen of the word processor. Modifications, insertions, and corrections may be made by the teacher without typing anew the experiences presented by learners.

Pupils with teacher guidance can read the typed content seen on the monitor. The teacher points to words and phrases as the subject matter is being read by learners. Thus, the experience chart method is being emphasized in teaching beginning reading. An experience chart approach emphasizes the following:

1. learners have personal experiences which provide content for reading instruction.
2. content is provided by pupils based on what has been experienced.
3. learners can see their ideas in print.
4. guided practice is provided in having learners read the sequential ideas.

Sequential Experiences and the Word Processor

The primary grades may well provide foundational learnings in utilizing the word processor. Sequentially, as readiness permits, students need to achieve competency in using the word processor to write

1. business and friendly letters.
2. announcements and thank you notes.
3. notices of sympathy.

4. poems, plays, and stories.
5. invitations.

The content for each of the above named purposes can be typed using the keyboard on the word processor. The encoded ideas appear on the screen. The mechanics of writing (spelling, punctuation, capitalization, usage, and indentation) can be quickly modified in order to develop more accurate and meaningful communication. Insertions, deletions, and rearrangement of subject matter is readily possible without retyping an entire page (or pages). Writing experiences sequentially developed by learners, using the word processor, become

1. more enjoyable as compared to the utilization of more traditional means, such as paper and pencil rough drafts and the typewriter. Novelty, newness is involved in learning.
2. the routine and the mundane are being minimized. Rewriting or retyping a written product is no longer necessary. The word processor can take care of repetitious correcting of errors. The operator needs to possess needed skills in instructing the computer to make necessary modifications.

In Conclusion

Rapid technological changes are occuring in society. The computerized word processor has the potential to provide learners with quality experiences to improve the writing curriculum. As time goes on, an increased number of word processors, no doubt, will be found in classrooms. Learners, hopefully, will do more writing as compared to previous times. Increased skills in writing with a greater number of purposes involved should be an important end result. Interest in writing must also be increasingly in evidence as revising, rodifying, and editing become less grievious. Students then may achieve more opti ally in understandings, skills, and attitudinal goals.

PHILOSOPHY AND GOALS IN THE CURRICULUM

Each teacher and supervisor possesses a philosophy of curriculum development. It might even be that the educator in the school setting can not verbally state the perceived philosophy. However, there are a set of beliefs which provide guidance in performing selected acts and deeds, in teaching lessons and units. How then does a specific philosophy provide direction in determining educational goals?

Essentialism in the Curriculum

Essentialists believe there are essential learnings that all pupils need to achieve. Thus, a common body of basic knowledge and skills exist which a learner must acquire to become a successful adult in society. The pupil then needs to be prepared to fulfill life's responsibilities at a later time. Education is a preparation for life.

Which learnings are essential for pupils? The three r's (reading, writing, and arithemetic) generally are considered basic for all. Thus, to ultimately contribute effectively in society, the learner presently needs to become a proficient reader, and writer, as well as compute effectively in addition, subtraction, multiplication, and division. Goals can be developed to reflect worthwhile learnings for pupils pertaining to the three r's. The goals may be stated as general or measurably stated ends.

Are there additional essential curriculum areas for pupils to master relevant knowledge and skills? The older social science disciplines of history, political science, and geography are generally included. No doubt, anthropology, sociology, and economics would be minimized. The curriculum area of science also has solid subject matter for each learner to acquire.

Essentialists believe that frills and fads should be eliminated in the curriculum. Thus, even physical education may be placed on the back burner in terms of a relevant essentialist curriculum.

Which objectives might then be emphasized by essentialists?

1. Skills in word recognition in reading, such as use of phonetic analysis, structoral analysis, context clues, picture clues, syllabication, and configuration clues.

2. Skills in comprehension in reading, such as reading to scan, skim, acquire facts and main ideas, as well as reading to obtain sequential ideas. Higher cognitive comprehension skills involve critical reading, creative reading, and reading to solve problems.

3. Skills in utilizing the table of contents, the index, the glossary, dictionary, almanac, atlas, the card catalog, encyclopedia, and other vital reference sources.

4. Skills to spell words correctly, write legibly, develop coherent sequential paragraphs, punctuate sentences correctly, and capitalize words properly.

5. Possess adequate knowledge to present subject matter content in depth in the writing curriculum.

6. Skills to correctly add, subtract, multiply, and divide when utilizing counting numbers, whole numbers, rational numbers, and integers. Definite high standards need to exist in arithemetic, algebra, geometry, calculus, probability, and statistics for all learners to achieve.

7. Knowledge pertaining to key structural ideas in history, political science and geography.

8. Solid subject matter in the science curriculum. Thus, pupils need to achieve vital subject matter in astronomy, geology, chemistry, physics, biology, zoology, and botany. Methods of acquiring subject matter for pupils should resemble those utilized by scientists in a laboratory setting.

Peter F. Oliva[1] writes the following pertaining to esssentialism:

> The goals of the essentialist are primarily cognitive and intellectual. Organized courses are the vehicle for transmitting the culture, and emphasis is placed on mental discipline. The 3 r's and the "hard" (i.e.

[1]Peter F. Oliva', Developing the Curriculum. Boston: Little, Brown and Company, 1982. Page 188.

> academic) subjects form the core of the essentialist curriculum. In one sense the essentialist tailors the child to the curriculum whereas the progressivist tailors the curriculum to the child.

Oliva[2] also states:

> The aim of education, according to essentialist tenets, is the transmission of the cultural heritage. Unlike the reconstructionalists who would actively change society, the essentialist seeks to preserve it. Again, unlike the reconstructionalist who would seek to adjust society to its populace, the essentialists seek to adjust men and women to society.

Perennialism in the Curriculum

Perrenialists believe in having learners acquire Great Ideas of the past. These Ideas have stood the test of time (history) and space (the planet earth). Ideas expressed by recent writers may be culled as time goes on, and thus not become an inherent part of enduring subject matter. The Great Books is an important concept in curriculum development, according to the thinking of perennialists. Perhaps, one cannot come up with better literature, than that expressed in the Great Books. The thinking of Buddha, Confuscious, Plato, Aristotle, John Locke, John Stuart Mill, and Bertrand Russell, among others, cannot be improved upon. The Great Ideas of these thinkers continually remain to be significant. Brubacher[3] writes the following pertaining to Robert M. Hutchins, late leading advocate of perennialism:

> Education, rightly understood, Hutchins claimed, was a cultivation of the intellect, which, he further claimed, was the peculiar excellence of all men of all times and in

[2] Ibid, page 188.

[3] John S. Brubacher. A History of the Problems of Education. New York: McGraw-Hill Book Company, Second Edition, 1966, pages 454-455.

> all places. The intelluct was to be cultivated through studies of permanent worth. These were to be found in the great books of all time. A "great book" was one that is contemporary with any age. But in order to read great books the student must know how to read them. To learn this he must go back to a curriculum made up of the trivium of grammar, logic, and rhetoric together with some formal mathematics from the quadrivium.
>
> Exacting as were Hutchin's standards, he did not limit liberal education to the few, as had the genteel tradition. On the contrary, the liberal education he had in mind was for the whole student population in so far as they had time to pursue it.

Which objectives might then be emphasized by perennialists?

1. skills in reading so that abstract learnings might be acquired by learners.

2. knowledge of significant ideas written by classical writers whose thoughts are enduring.

3. skills in logical thinking, including deductive reasoning developed by Aristotle.

4. skills in writing in order to develop outlines, summaries, precis, critiques, and originality in compositions.

5. attain essential subject matter in general education, such as in literature, science, history, and geography.

Existentialism in the Curriculum

Existentialists believe that individuals should choose their own goals and their own personal destinies. There are no absolutes nor infinite guidelines to follow. Each person then makes or breaks himself. First, one exists, then the self needs to find purpose or reasons for living. This is an awesome responsibility. There are so many choices to be made. Complete freedom must be in evidence for any being to make the decisions.

The concept of morality is important to follow when any decision is made. Thus, moral decisions need to be made in an unrestrained environment. How any choice made affects others must be considered in the moral dimension. The chooser must accept complete responsibility for decisions made. Others can not be blamed for the consequences of an act or deed. The end result of doing may be positive. It can also result in alienation. Decisions made may offer dread, fear, and anxiety to the chooser.

Existentialists do not like the following concepts for adherence purposes: authoritarian, group or committee endeavors (unless the latter is personally chosen), universal ideas (unless the decision maker selects these ideals without compulsion), objective content, and externally imposed obedience. What is within the person needs to come to the surface in making choices. The locus of control is from within rather than from without.

Ozman and Craver[4] write the following pertaining to Jean-Paul Sartre's thinking on existentialism:

> In his philosophical works, Sartre views the human predicament in terms of the lonely individual in an absurd world. Essentially, he views human existence as primarily meaningless, for man is thrown into the world totally without meaning, and any meaning which man encounters in the world he must construct himself. The development of meaning is an individual matter, and since both the world and individual man are without meaning, man has no justification for existing.....Thus, when man steps back and views himself as he really is, he sees that nothing determines him to do anything, for all the absolutes, rules, and restrictions are simply the puny and absurd creations of man. If there are no primal restrictions, then there is no determinism. Everything is possible. Man is absolutely free, or as Sartre puts it in his own characteristic terminology, "man is condemned to be free."

Which curriculum areas might existentialists then emphasize?

1. subjective academic areas such as art, music, literature, and history. The human condition is best represented in these curriculum areas.

2. units of study in learning more about the self and others. Pupils should realize feelings, beliefs, and concerns possessed by individuals.

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[4] Howard Ozman and Sam Craver. Philosophical Foundations of Education. Columbus, Ohio: Charles E. Merrill Publishing Company, 1976. pages 165-166.

3. emphasis upon decision-making representing subjective, not objective content. Learners need to make decisions which they will personally feel accountable for.

4. moral acts and deeds need to be emphasized in the curriculum of life.

Realism in the Curriculum

Realists believe that one can know the natural and social enviroment as it truly is. One's values, attitudes, and beliefs are then omitted in terms of learning about objective phenomena. Using the methods of science to acquire subject matter allows learners to achieve that which is factual and real. Subjectivity is then minimized and perhaps omitted. In utilizing the methods of science the learner must:

1. Observe carefully and identify factual statements.

2. Use the senses of sight, hearing, taste, touch, and smell to acquire information. Feelings and opinions must be minimized in teaching-learning situations.

3. Realize that content in science is subject to testing, modifying, and verifying.

4. Use a variety of reference sources to acquire objective subject matter.

5. Communicate results accurately and objectively.

6. Develop skills to predict consequences in testing a hypothesis (or hypothoses).

7. Develop attitudes involving a desire to utilize methods of science to gain subject matter.

8. Use mathematics to express science content in a precise, quantifiable manner.

The supervisor or teacher adhering to realism, as a philosophy of education, has selected recommendations to make in the curriculum. First of all, pupils need to experience comprehensive science courses of study.

Thus, pupils need to achieve vital objectives in astronomy, biology, botany, zoology, chemistry, physics, and geology. Objectives in each of these academic areas should be stated in measurable terms. After instruction, the teacher may measure if each pupil has/has not attained desired ends. Alternative teaching strategies need to be utilized for those pupils who have not achieved stated objectives.

Secondly, the teacher needs to provide a variety of learning activities to guide learners to attain desired ends. Thus, excursions, films, filmstrips, slides, educational television, transparencies, illustrations, encyclopedias, basal science textbooks, and other reference materials might be utilized by pupils to gather needed information.

Thirdly, learners with teacher guidance need to use laboratory methods of acquiring subject matter. Subject matter attained should be utilized to solve problems and test hypotheses. Learners then need to have ample opportunities to work as scientists do, within a laboratory setting.

Fourthly, learners need to have a quality current events curriculum involving the world of science. In each academic discipline in science, current happenings occur at an accelerating rate.

Wahlquist[5] writes the following pertaining to realism, as a philosophy of education:

> Realists generally agree in stressing the need of making philosophy scientific. A major part of the realist program of reform consists in emphasizing the close relation of philosophy to the sciences. There are those who think that the proper procedure for philosophy is to utilize the method of abstraction perfected in mathematics and made the basis of all scientific investigation. Generally, realists agreed that the method of scientific analysis is the fundamental approach. The ultimate determinant of the truth of an idea is regarded as something external to the personality, and not dependent upon it. Consequently, truth must be discovered by objective means, as free as possible from the subjectivity of the experimenter. The realist is interested in the temperature of the room as registered by a gadget, not the impressions of the persons in the room.

[5] John T. Wahlquirst. The Philosophy of American Education. New York: The Ronald Press Company, 1942, page 56.

Idealism in the Curriculum

Idealists believe in an idea-centered curriculum. The person cannot know the real world as it truly is or exists. However, ideas can be acquired dealing with natural and social phenomena.

A quality general education curriculum may provide needed ideas to learners. Thus, pupils need to study literature, history, geography, grammar, writing, mathematics, and the sciences to secure needed subject matter. Pupils may then achieve universal ideas. Universal ideas, or generalizations, are supported by facts. The broad generalizations, however, are more important than factual content. A well educated person then achieves universal content which has stood the test of time and space. This person becomes less finite and moves increasingly in the direction of the Infinite.

Ethically, an idealist attempts to practice the universal standard of 'do unto others as you would have others do unto you'. Or, as Immanuel Kant (1724-1804) believed-others need to be treated as ends and not as stepping stones or means to an end (the Categorical Imperative.)

The human mind develops order and sequence of perceptions noticed in the environment. Ideas, not objects per se, are significant. The human mind needs developing through a variety of rich experiences. Only then, might subject matter guide learners to lean in the direction of the Infinite being.

Morris and Pai[6] write the following:

> In idealism, therefore, we need to divide reality into two major divisions: the apparent and the real. The "apparent" realm is our day-to-day experience as mortals. This is the region of change, of coming and going, of being born, growing, aging, and dying; it is the realm of imperfection, irregularity, and disorder; finally, it is the world of trouble and suffering, evil and sin. The "real" world, fortunately, is not like this. It is the home of the mind, the realm of ideas, it is the home of eternal qualities, of permananence, of regularity, of order, of absolute truth and value.

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[6]Van Cleve Morris and Young Pai. Philosophy and the American School. Second Edition. Boston: Houghton Mifflin Company. 1976, page 47.

> Of the two, quite obviously, the ideal is of higher rank. Not only is it distinct from the world we know directly, but it stands existentially higher. This is because perfections reign there. Perfect things are those things that do not change; they don't have to. What conceivably could they change to? Since eternal ideas do not change, they represent a perfect order.

Which objectives might an educator stress with idealism, as a philosophy of education?

1. a thorough understanding of vital subject matter. Academic areas to be understood by learners include literature, history, geography, mathematics, science, writing and grammar. Each pupil also needs to attain skills necessary to acquire and use information, such as achieve abilities to read, write, and compute effectively.

2. gaining generalizations and main ideas (universals in subject matter) in the curriculum.

3. an attitude of wanting to increase the fund of subject matter acquired. Each person needs to become less finite and move in the direction of becoming an Infinite being.

4. a mental set in desiring an idea centered curriculum.

5. a will to learn. Interest in learning is not adequate. Each person must possess a will or desire to learn. This is true even if obstacles exist in the learning environment.

Experimentalism in the Curriculum

Experimentalists believe that ultimate reality is what one experiences. Human beings cannot know the real world as it truly is and exists. But the person has experiences in the natural and social environment. Humans experience change, not a stable environment. Scenes and situations change continuously. Since change abounds, problems arise. These problems need identification. Related content needs to be acquired from diverse reference sources in order to secure information pertaining to the identified problem. A hypothesis, needs testing in an actual life situation. The end result may be to accept, modify, or refute the hypothesis.

Life itself consists of identifying and solving problems. The school curriculum should not be separated from what is relevant in society. William James[7] states the following pertaining to pragmatism, also known as experimentalism:

> Pragmatism represents a perfectly familiar attitude in philosophy, the empiricist attitude, but it represents to me, both in a more radical and in a less objectionable form than it has ever yet assumed. A pragmatist turns his back resolutely and once in for all upon a lot of inveterate habits dear to professional philosophers. He turns away from abstraction and inefficiency, from verbal solutions, from bad a priori reasons, from fixed principles, closed systems, and pretended absolutes and origins. He turns toward concreteness and adequacy, towards facts, towards action, and towards power. That means the empiricist temper regnant and the rationalist temper sincerely given up. It means the open air and possibilities of nature, as against dogma, artificiality, and the pretense of final truth.

Which objectives in general, do experimentalist educators advocate in the curriculum?

1. the methods of science. Content needs to be objective and as unbiased as possible to be of use in the real world.

2. problem solving procedures. Learners with teacher guidance need to identify and solve relevant problems.

3 experience a minature society. What is relevant in society needs to be emphasized in the school curriculum. School and society are intergrated, not segregated entities.

4, subject matter used to solve problems. Preferably, subject matter should not be learned for intrinsic values, but rather to resolve problematic situations.

In Conclusion

Teachers and supervisors need to study, appraise, and ultimately implement vital strands from diverse philosophical schools of thought. In teaching and learning, each student needs to (a) perceive purpose (b) experience interest (c) attach meaning.

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[7]William James, "What Pragmatism Means", as quoted in Selected Readings in the Philosophy of Education. (Joe Park, Editor), New York: The Macmillan Company, 1968, page 58.

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