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ABSTRACT
        Microcomputers can be used with simulation software
to provide students both with experience in the "real world" of
decision making and feedback on the decisions made. Such software
allows individual students to choose the roles they wish to play from
a menu of diverse roles and provides alternatives for them to
consider for each decision to be made. The emphasis in simulation
decision-making tends to be on the quality of the decision rather
than right or wrong answers, i.e., some decisions are better than
others. Simulation software for the classroom should be free of
grammatical errors; provide students with the opportunity to respond
frequently to stimuli; and be at the students' level of
understanding. Teachers need to be knowledgeable about the subject
matter, sequence of presentation, and the response students should
make to the programs; be good managers of student time devoted to
simulation usage; and utilize simulation programs with other
instructional materials. Objectives for student achievement should
address understandings, skills, and attitudes. Some educators
recommend that teachers develop their own simulation programs;
however, quality software is becoming more available, and the
commitment of time and energy involved in software development are
important considerations for teachers. A list of factors involved in
the effective use of simulated materials to assist students in
achieving higher cognitive level objectives concludes this paper. A
sample software evaluation form is included. (RP)

Simulations and the Curriculum

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Simulations and the Curriculum

Simulated experiences have been utilized for several decades by teachers. Simulations are to develop realistic experiences for students. Through stimulated activities, students experience situations resembling reality, but they are not the real world, in and of themselves. Very low risks are then involved by students in participating in simulated experiences. The traumatic, the unhappy and the sad, as well as the good, are experienced vicariously, not directly.

Teachers, in the past as well as presently, have guided students to dramatize content read from a library book or textbooks. The learner then plays the role of a character in the library book or textbook. Students attempt to feel and experience what characters in the reference books experienced. The attempt by the teacher is to have learners experience reality as much as possible, with actual risks reduced greatly or being at a zero level. Naturally, learners who are able to play the roles of characters in library books and textbooks will experience minimum risk with difficult situations experienced by characters in these reference books. Thus, in degrees, students will internalize involved feelings in role play situations.

With the use of puppetry, students may further simulate real live situations in life. A learner plays the role of a specific character as represented by the puppet. Certainly, selected learners will do a better job of role playing, as compared to others in the classroom. The intent remains in the use of puppets that

students attempt to simulate the real, the life-like, and the concrete.

Simulations and the Computer

Numerous classifications of software are on the market. A brief review will be given of the purpose(s) of each type of software.

A very common goal of software and microcomputer instruction is drill and practice. Drill and practice refers to review of content, previously presented to the learner. Learning opportunities involving drill and practice emphasize students retaining subject matter learned at an earlier time.

A second goal in utilizing software and the microcomputer is tutorial instruction. Tutorials emphasize new subject matter to be acquired by students. Thus, content is presented on the monitor. The learner must respond to a test item, such as a multiple choice type, to reveal comprehension covering the content. If correct, reinforcement will indicate the correctness on the screen. Generally, a second chance is given to respond correctly, if the first response given by the learner was incorrect. Based on his/her response, the student is given feedback.

A third goal in utilizing software and the microcomputer is the playing of games. Valuable learnings may be achieved through these games. Generally, several players can be at one terminal. For each correct response given by a student to an item on the screen, he/she may receive five points. The student receiving the most points wins the game. The stimuli for the diverse responses to be given by

students may come from any academic discipline or curriculum area.
Games can be challenging and interesting to students.

A fourth goal in computer technology is the use of
simulations. The balance of this manuscript will emphasize the use
of simulated materials. With simulated packages, students
individually have a choice as to which role to play. The menu will
list the diverse roles. After selection, the students plays the
chosen roles throughout the program, unless the learner decides to
exit from the program. For each decision to be made the student
must consider alternatives. A command is typed in by the student,
when ready to make a decision, based on information presented on
the screen. After the command has been typed on the keyboard to
indicate a choice made, the learner receives feedback. Based on the
feedback, he/she is ready to respond again to stimuli presented on
the screen. The stimuli again presents a problem for the role
player to make a choice or decision. The student types into the
microcomputer if a,b,c, or d is desired in terms of a decision. The
simulation continues with the student making choices or decisions
based on subject matter presented on the screen from the simulated
package. Decision-making tends to avoid right or wrong answers in
simulation. Rather, in degrees, there are better decisions, than
others, which are made. Quality in terms of decisions come an a
continuum. To be certain, a bad choice or decision can be made.
The consequences of the latter kinds of decisions involve, like all
decisions, low risks to learners. The bad decision is simulated,but
not experienced in reality. Vicarious valuable learnings accrue.
Decision-making is a definite part of life. Students need to have

ample practice in the making of choices, based on adequate

knowledge. Feedback based on the decision made is necessary.

Sequential choices and decisions are made by the student based on

subject matter presented on the screen.

In the software package entitled Choice or Chance (copyright

1984 Rand McNally & Company, Chicago, Illinois), the manual lists

the following objectives:

> -To develop an understanding of how the
> geography of an area affected the decisions
> people made, which then affected recorded
> history.
> -To develop a sense of sequence in the events
> relating to history.
> -To make decisions using problem solving skills,
> similar to those made in history.
> -To creatively "rewrite" the course of history,
> based on the geographical factors presented at
> the time the decision was made.
> -To review selected historical events
> surrounding these three time periods.

Objective number three above is the heart of the stimulated

materials. The role player in the simulation makes decisions, using

problem solving skills, similar to those made in history.

Situations and scenes are made as life-like and real as possible for

students. In Choice or Chance, the student plays the role of an

early explorer. The environment in the software is as similar, as

can be presented using the particular media, as possible to that of

the days of early explorers.

Criteria for Simulation Software

Teachers and administrators selecting software emphasizing

simulation must go by definite criteria. Criteria must be utilized

in all software selected. However, simulation needs to meet

additional standards than those stressed in other kinds of software

packages.

Certainly, debugging is necessary to take care of the spelling, punctuation, capitalization, usage, and other mechanical errors. Content in software provides a model for students to emulate in terms of the mechanics in writing. Selectors of software must demand that errors in the mechanics of writing do not exist.

Secondly, learners must be able to respond frequently to stimuli in software. Much printed subject matter on the monitor with few chances to respond to questions makes for a lecture situation. Textbooks and library books may present the subject matter in this manner much more effectively than can software content on the monitor. Learners then need to respond frequently to problems/questions in simulated programs.

An adequate number of simulations need to be available in any classroom. Simulated materials must be on the understanding level of students. They need to relate directly to a unit of study being emphasized in the curriculum. The teacher could teach an entire unit on problem solving using simulations. Sequentially, students learn problem solving skills from the different programs involving simulations. Software and nonsoftware programs of study could be used in these units of study. An adequate number of computers need to be available so each student may achieve in an optimal manner.

The classroom teacher, needs to be highly knowledgeable about the subject matter, sequence of presentation, and needed response to be made by students in the software programs. He/she must be on the lookout continuously for new simulations which stimulate and motivate learners.

Software must be catalogued in a manner whereby its retrieval is easy for teachers to utilize in a classroom. Red tape and cumbersome methods of securing software for students need to be eliminated. Easy access is a key concept in utilizing simulations effectively in the curriculum. Software involving simulation must meet the interest, needs, and purposes of involved learners.

The teacher needs to be a good manager of student time devoted to simulation usage. Time on task is important. The effective organization of students to use computer time wisely is important. Wasting time in computer utilization, as well as discipline problems of students, hinders the wise use of time for instruction. When problems and difficulties arise in computer and software use. the teacher must know how to proceed. An unskilled teacher in organizing students for instruction, as well as in using the computer, is a handicap in any instructional program involving the use of simulations.

Simulated programs in software should be utilized with other materials of instruction. The latter types of materials include textbooks, workbooks, worksheets, films, filmstrips, slides, tapes, instructional television, and video discs. Adequate data needs to be available so that the learner may attain optimally using software programs involving simulations.

Printouts of completed results can be important to students. If the microcomputer has a printer, each student might then look at the results to learn from subject matter presented previously. Increased background information is then available to learners. Growth in learning should be sequential and cumulative.

Balance among objectives needs to be achieved by students when
using microcomputer terminals. Subject matter containing facts,
concepts, and generalizations is inherent in simulation programs.
Understandings objectives may then be achieved by students. A
second category of objectives-skills--is a major category of ends for
students to attain in using simulated programs.
Relevant skills include problem solving, decision-making,
hypothesizing, making judgements, evaluating content needed to make
the next sequential choice, and working harmoniously with others in
committee settings involving the use of simulations. A third
category of objectives-attitudes-emphasizes students enjoying,
liking, and feeling positive toward the utilization of simulations
as an important means of learning.

Wright and Forcier[1] developed the following
evaluation form to appraise software quality:

Course Evaluation Form #3

Program name:_____

Indicate all that apply with yes or no:

Drill and Practice_____Tutorial_____

Simulation_____Tool·_____

    Interaction

_____ 1. Program is personalized

_____

[1]Edward B. Wright and Richard E. Forcier, The Computer: A Tool
for the Teacher. Delmont, California: Wadsworth Publishing company,
1985, page 160.

_____ 2. User can stop at any time

_____ 3. User can see score at any time

_____ 4. User can select level of difficulty

_____ 5. User can review instructions

_____ 6. User can review past mistakes

_____ 7. User goes at own speed

_____ 8. Testing occurs periodically during program

_____ 9. Program can select level of difficulty through

testing

Content

_____ 1. Appropriate subject matter

_____ 2. Appropriate for grade level suggested

_____ 3. No implied racial or sexual discrimination

_____ 4. Can reteach principles

_____ 5. Meets objectives (teaches what it is

supposed to)

_____ 6. Applicable to more than one subject

_____ 7. Presents correct information

_____ 8. Program is interesting

_____ 9. Program is involving

_____10. Program is realistic

_____11. Program is educationally sound

Teacher Developed Simulations

There are selected educators recommending teachers developing

their own simulation programs. The classroom teacher is in the best

possible position to know what students are ready for in terms of

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new learnings. Readiness for a new task must be in evidence for

individual pupils to benefit from new content being presented on the

screen.

The teacher should also be in the best position to know which

learnings students can attain sequentially. If a new step in

learning to too complex, the involved student may experience

failure. Reinforcement in learning is then not in evidence. A

problem that teachers do face, more so than a publishing company of

software, is the time and money necessary to debug a program.

Thus, a professional programmer can use pilot studies in determining

at which step or steps a program is not sequential. In the pilot

studies, students may reveal at which point the next step of

learning was too complex. This is not to say that commercial

companies do quality work in debugging a program. The opportunities

to do so, however, are more in existence

as compared to a classroom teacher who teaches full time and writes

one or more programs on weekends or after school hours. Kemp and

Dayton[2] wrote:

> Unlike human beings, computers are very
> particular about the accuracy of the instructions
> they receive. A single misplaced letter or symbol
> can render a computer program useless as an
> instructional tool. Therefore it is very important
> that CBI materials be thoroughly tested before they
> are released for broad use.

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[2]Jerrold E. Kemp and Deane K. Dayton, Planning and Producing

Instructional Media. Fifth ed. New York: Harper and Row,

Publishers, 1985, page 255.

Errors such as these are called "bugs" and the
process by which they are located and removed is
called debugging. This is   best accomplished by
letting a variety of people try the materials to see
what types of problems might occur. Ideally these
people should be representative of the learners for
whom the materials are designed and should go
through the materials under the anticipated
circumstances for their use. They should be asked
to work through the program several times, trying
all of the options, so that each branch can be
tested. In addition, they should judge the
effectiveness of the instructions and the clarity of
the documentation.

Programs written by a teacher can definitely fit in to an

ongoing lesson or unit. The contents in the program are then

related to objectives emphasized in the curriculum. It will be more

difficult to secure from a commercial company software that

sequentially harmonizes with present teaching and learning

objectives emphasized in the classroom. However, quality software

is increasing in number in schools whereby choices of content can be

made which definitely relates to what

is presently being taught in the curriculum.

Time is an important consideration for any teacher. Teaching

is a demanding profession. Much energy goes into quality

instruction in any classroom. Energy may not be available to

develop programs by instructors. The "adding on" concept to a

teachers load might well distract from a teacher's ability and

performance in teaching. Commercial companies hire programmers to

write, edit, evaluate, and produce course software. Administrators

and supervisors in schools need to emphasize the nomothetic (needs

of the institution or schools and their goals), as well as the

ideographic (personal needs cf teachers) dimension. A balance

needs to be emphasized between the objectives of the school and

objectives of human beings.

In Conclusion

There are numerous issues involved in the utilization of

simulations. Certainly, modern technology is here to stay and will

continue to change the quality of simulated materials. Hopefully,

the changes will be for the good. Students individually need to

achieve as much as possible in the curriculum. Microcomputer

instruction may well be a means to guide students to achieve course

goals more effectively. The use of simulated materials will assist

students to achieve higher cognitive level objectives. What will

aid students to achieve and progress continuously?

1. Each learner needs to be successful in learning

by experiencing quality sequence in ongoing

simulation programs.

2. Reasons or purpose need to be inherent in

diverse learning activities involving the

utilization of simulated materials.

3. Challenging, interesting experiences need to be

in the offing for pupils.

4. Adequate provisions need to be made for slow

average, and fast achievers in an atmosphere of

respect.

5. Students must understand and attach meaning to

what is being learned in each simulation.

6. Learners need to experience balance in the

curriculum. Thus, understandings, skills, and

attitudinal goals need to be stressed adequately in

the simulation curriculum.

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