THE GREAT SPIRIT / Canadian Broadcasting Corporation, directed and produced by Sig Gerber, 1975. National Film Board of Canada (distributor). 27:50 min. : sd., col.; $380.

While this is not a very recent film, its importance transcends its date. In Saskatchewan settings of great religious importance for Indians, Roy Bonisteel talks with Ernest Tootoosis, spiritual leader of the Crees.

Tootoosis describes the basic beliefs of the Cree and explains some of the rituals. He compares Manitou, the god of the Cree to the Christian god and elaborates upon the reverence of the elements — sun, wind, water and fire. While there are similarities between the beliefs of the Christians and Cree, the Cree did not have an Adam and Eve. So, in 1492 when the Whiteman arrived, the Cree were still living in paradi Man was humble and recognized he w merely a part of the environment, no grea or more important than the smallest sto There was no need to conquer natu Manitou provided everything the Cree ne ed. Since that time, the Cree have adopt Whiteman's ways and no longer live in h mony with nature. Nature is responding this disrespect by such phenomena polluted streams. Tootoosis feels that the ly hope for Indians today is to get back touch with their spirituality and re-establi the harmony with nature.

The information in this film is bountif cogently presented and offers a rare insig important for understanding Natives. In respects, it surpasses most other films on t same theme which are available now.

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Patricia A. Dolan Lewis

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Applying Principles of Instructional Development To Problem Solving: A Case Study

William J. Egnatoff

When a teacher identifies a task which cannot be handled automatically in the daily routine, it is appropriate to approach the problem from a higher conceptual level. Such was the case with the author's attempts over the past ten years to improve the problem-solving skills of several groups of students. The thrust of this study was twofold: to develop skills in instructional design and to use these skills to develop an effective approach to teaching problem solving. The first entailed adapting tools of instructional design to the character of the author. The second entailed assembling a framework for understanding the anatomy and physiology of problem solving, practising the diagnosis of problem solving difficulties, and developing effective prognoses.

Consider the following example from daily life. A husband was required to unpack and assemble a new vacuum cleaner according to the manufacturer's directions. The simple, structure-blind solution, following the instructions, was rejected by the husband, who dislikes following written instructions (emotional block). He felt that if the machine were well designed, he should be able to assemble it. Two sections of the handle had to be bolted in place. The first was to be attached to two pre-drilled brackets mounted on the machine. There was some difficulty in determining which bracket should take the bolt and which, the threaded collet into which the bolt was to be fastened. There was also some puzzlement concerning the orientation of the handle section. Eventually it was fastened securely. The next task was to bolt the second section in place. Its orientation was dictated by the bend at the top which had to face back to serve as a handle (correct solution dictated by proper function). At this point the wife, who had begun to supervise, pointed out that the cord cleats of the two handle sections were not aligned. Both sections were removed and the lower one rotated. Finally the two sections were mounted correctly and the dust bag was hooked in place. The husband noticed to his dismay that a piece, whose function was to cover the mounting brackets for appearance sake, was lying on the floor (failure to use all the given). Finally the handle was disconnected at the base, the additional piece inserted, and the handle reattached. Why did the husband not seek through simulation (laying out all the parts in order and imagining the assembly procedure) to plan his solution? Why did he focus on one subproblem (bolting the first section in place) without considering its relations to the whole?

A key hypothesis in this study is that conceptual tools, applicable to a wide range of problems, can be developed through instruction. It is also assumed that the automatic employment of these tools will be enhanced through directed practise.

Attention was restricted to formal problems in mathematics and logic. Such problems have well-defined given elements, co
ditions, and solutions. Some attention w
also given to problem finding as a method
exploring uncharted intellectual territory.

The study was conducted in an actu
teaching situation. The author w
employed by the University of Saskatch
wan as a Sessional Lecturer for the Depa
ment of Mathematics during Summer S
sion 1980. The course taught was Math 20
An Introduction to Modern Mathematic
The course was attended by teachers a
students in the College of Education.

Rationale

There can be no question that everyo
has need for the capability of flexible,
dependent thinking. If problem solving ski
are highly developed in an individual he w
be more competent to deal with new a
challenging situations and will have
stronger will to see himself through d
ficulties. Such a person will be intrinsica
motivated.

> "A key hypothesis in this study
> that conceptual tools, applicab
> to a wide range of problems, c
> be developed through instru
> tion."

The joy of discovery and the opportun
for the teacher to foster it are stated by th
mathematician and teacher whose proble
solving model is at the root of this stud
(Polya, 1957).

*A great discovery solves a great proble
but there is a grain of discovery in the so
tion of any problem. Your problem may
modest; but if it challenges your curios
and brings into play your inventive faculti
and if you solve it by your own means, y
may experience the tension and enjoy
triumph of discovery. Such experiences a
susceptible age may create a taste for men
work and leave their imprint on mind a
character for a lifetime.*

*Thus a teacher of mathematics has a gre
opportunity. If he fills his allotted time w
drilling his students in routine operations
kills their interest, hampers their intellect
development, and misuses his opportuni
But if he challenges the curiosity of h
students by setting them problems propo
tionate to their knowledge, and helps the
to solve their problems with stimulati
questions, he may give them a taste for, a
some means of, independent thinking. (p.*

It is assumed in this study that proble
solving skills in mathematics can be
quired, can be taught, and are better learn
if explicit instruction is designed. The aut
has noticed a definite improvement in
own ability to solve problems as he
studied the process and attempted to teach
in recent years. There is increasing evidence that a scientific approach to the teaching of problem solving can lead to significant improvements (Reif, 1981).

> "It is assumed in this study that problem solving skills in mathematics can be acquired, can be taught, and are better learned if explicit instruction is designed."

Problem solving skills are of double significance to teachers. Increasing demands on teachers to produce learning outcomes related to properly constructed objectives necessitate a systematic problem-solving approach. A coherent program must be built within the framework of a society of rapidly increasingly complexity and change. The teacher must also prepare his students for this world and hence must in some way teach problem solving.

Problem Solving

The basis for the approach to problem solving adopted in this study is the following list of questions elaborated by Polya in this dictionary of heuristic (Polya, 1957).

Understanding the Problem

First. You have to understand the problem.

What is the unknown? What are the data? What is the condition?

Is it possible to satisfy the condition? Is the condition sufficient to determine the unknown? Or is it insufficient? Or redundant? Or contradictory?

Draw a figure. Introduce suitable notation.

Separate the various parts of the condition. Can you write them down?

Devising a Plan

Second. Find the connection between the data and the unknown. You may be obliged to consider auxiliary problems if an immediate connection cannot be found. You should obtain eventually a plan of the solution.

Have you seen it before? Or have you seen the same problem in a slightly different form?

Do you know a related problem? Do you know a theorem that could be useful?

Look at the unknown! And try to think of a familiar problem having the same or a similar unknown.

Here is a problem related to yours and solved before. Could you use it? Could you use its result? Could you use its method? Should you introduce some auxiliary element in order to make its use possible?

Could you restate the problem? Could you restate it still differently? Go back to definitions.

If you cannot solve the proposed problem try to solve first some related problem. Could you imagine a more accessible related problem? A more general problem? A more special problem? An analogous problem? Could you solve a part of the problem? Keep only a part of the condition, drop the other part; how far is the unknown then determined, how can it vary? Could you derive something useful from the data? Could you think of other data appropriate to determine the unknown? Could you change the unknown or the data, or both if necessary, so that the new unknown and the new data are nearer to each other?

Did you use all the data? Did you use the whole condition? Have you taken into account all essential notions involved in the problem?

Carrying out the Plan

Third. Carry out your plan.

Carrying out your plan of the solution, check each step. Can you see clearly that the step is correct? Can you prove that it is correct?

Looking Back

Fourth. Examine the solution obtained.

Can you check the result? Can you check the argument?

Can you derive the result differently? Can you see it at a glance? Can you use the result, or the method, for some other problem? (pp. 16-17)

The work of all other authors consulted can be related to some aspect of Polya's model. Adams is concerned primarily with conceptualization. Conceptual blocks are "mental walls which block the problem-solver from correctly perceiving a problem or conceiving its solution" (Adams, 1974, p. 11). He analyses several common types of blocks — perceptual, cultural and environmental, emotional, and intellectual and expressive. These blocks may be overcome through analysis and solution of selected problems. He emphasizes "understanding the problem" and "devising a plan".

According to Reif, the teacher can improve his teaching of problem solving if he studies the nature of the cognitive skills of individual students. Effective problem solving requires three prerequisites (Reif, 1981):

1. an effective strategy for breaking a problem into simpler, readily solvable problems;

2. a suitably selected repertoire of readily solvable problems to serve as building blocks;

3. a carefully organized knowledge base.

To attain the first of these, one should describe the problem in familiar terms. The breakdown of the problem is done most effectively by successive refinement, just as an artist would begin with an outline, add structural details, and end with those refinements which complete and perfect the work. The knowledge base and repertoire of simpler problems should be organized hierarchically for better recall and adaptation. Logical components such as definitions, principles, symbols, and equations must be acquired through wide experience to give them functional value. (This was of great importance in this study). Finally, Reif emphasizes the importance of revising and evaluating any solution.

Often, in spite of systematic effort, the solution falls into place suddenly and unexpectedly. It is as if the subconscious were working on the problem all along and suddenly presented its results. Such reactions are referred to by psychologists as "aha! reactions". Martin Gardner has written a delightful book in the belief that one can develop unconventional nonlinear thinking through practice. He is convinced of the significance of such thought (Gardner, 1978):

There certainly is a close connection between aha! insights and creativity in science, in the arts, business, politics, or any other human endeavor. The great revolutions in science are almost always the result of unexpected intuitive leaps. . . In many cases the solution is not found by exhaustive trial and error. . . . In many cases the solution is a Eureka insight. (p. 7)

Throughout the writing of the authors discussed one can find implications of Gestalt psychology (Wertheimer, 1945). Or-

William J. Egnatoff teaches at North Battleford Comprehensive High School in North Battleford, Saskatchewan.

ganizing knowledge hierarchically, avoiding a blind trial-and-error approach, separating peripheral from essential details, seeking relations between the parts, considering the function of each step, and thinking in steps which lead to structural improvement are all keys to productive thinking. All authors agree that these elements can be developed through practise and good teaching.

Instructional Design

In order to improve his teaching of problem solving, the author elected to use current ideas on instructional design, integrated with his own model for producing a teaching/learning system. A systematic approach was needed to identify, solve, and evaluate instructional problems.

A recently developed model, see Figure 1, offers great flexibility while keeping the whole system in focus (Kemp, 1977).

As each component is developed it may require revision of other components. For this reason, the diagram shows the elements connected in a circle and interconnected through the central feedback circle. The order of development is not determined. No element need be completely developed before proceeding to another.

The influence of systems engineering has begun to find its way into public educational circles but its full application is impractical. For the classroom teacher to specify all the components of the teaching/learning situation and to chart the interconnections would be an unwieldy task. It is more practical to extract key elements from systems analysis to produce a simple model (Gerlach, Ely, and Melnick, 1980). Such a model delineates major activities and their interconnections. It should allow for flexibility in sequencing and should provide for revision of components as the system is developed. The model of Gerlach, Ely, and Melnick is similar to that of Kemp. It is more sequential (a drawback), but gives separate attention to allocation of time and space, and to the organization of student groups (of proven value for teachers).

It often happens that a teacher has the opportunity to teach a course to several groups

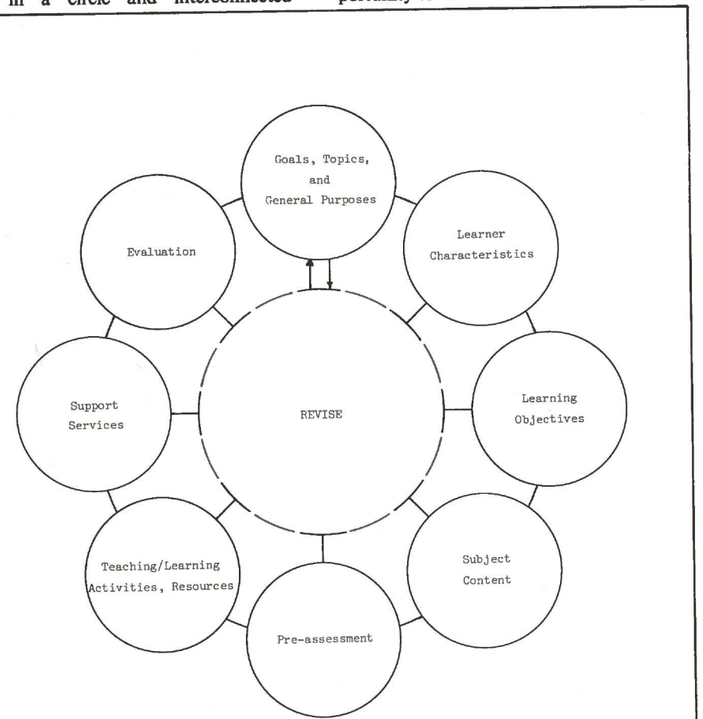

Figure 1. Kemp's model for instructional design. The diagram shows the mode in which goals, topics, and general purposes are being determined. They may need to be changed as a result of learner characteristics, see arrow outward, or may cause changes in subject content, see inward arrow.

of students simultaneously or in succession. Time is then available for modification of the system. The author constructed a model reflecting this developmental process. The model provides for gradual change without damaging the integrity of the system (Egnatoff, 1980). It also provides for simulation which too often takes place in a haphazard fashion. The flow chart model is given in Figure 2.

"Often, in spite of systematic effort, the solution falls into place suddenly and unexpectedly."

Using Kemp's approach, one designs a system which will provide an adequate level of instruction with a modest effort. Although there will be room for improvement in such a system, at least the teacher will be ready to conduct a satisfactory course without undue wear and tear on teacher or students. The first offering of the course, or the first class receiving the course in simultaneous presentation) can serve as prototype for debugging the minimal system. The system can be maintained as is until the teacher is prepared to introduce changes. These can be developed as time permits according to the model of Figure 3. They may then be introduced into the system as shown in Figure 2. Final debugging takes place in the contest of the whole system. In this way the whole system can eventually redefine itself completely.

"The influence of systems engineering has begun to find its way into public educational circles but its full application is impractical."

It should be noted that each new component is designed in relation to the existing system and that at each phase of the development one keeps checking that too much time is not being taken from the mainstream of teaching and that the component under development is still of sufficiently high priority. It should be kept in mind that the models presented here are merely formal descriptions of what many experienced teachers already do as a matter of course.

Course Design

A minimal system was designed to operate the course and to teach formal problem solving skills. Additional components were then designed and integrated into the system as time permitted. Initially a much more elaborate system was envisaged. The minimal system approach served to keep wishful thinking under control. The minimal system was implemented as planned. The extent to which each additional component was implemented is indicated in the following list.

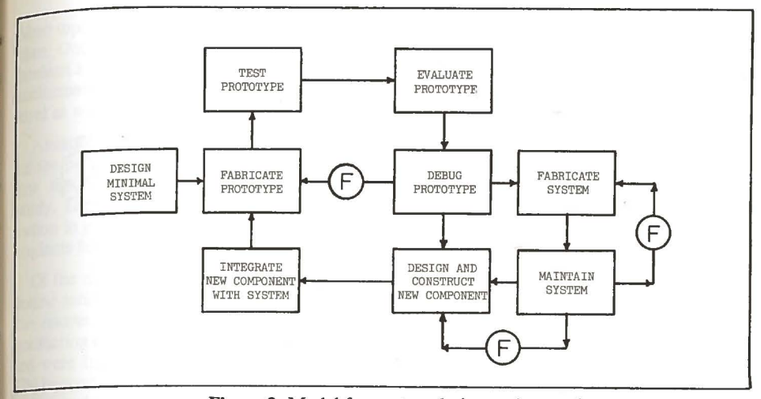

Figure 2. Model for system design and operation.

A. Operating the course Math 205
Minimal system

1. Prepare topical outline and timetable, including test dates.
2. Plan lectures and assignments one or two days in advance. (Pacing of the lectures and assignments was adjusted daily according to difficulties encountered.)
3. Construct tests several days in advance.

Additional components

1. Obtain personal information, relevant to instruction, from each student. (This was done on the first day in written form, and verbally as needed afterwards.)
2. Set up regular optional tutorial periods. (This was done from the beginning, twice a week, in one-and-a-half hour sessions. In response to student requests, additional periods were set up in the morning for those who could not come in the afternoon.)
3. Provide for individual conferences. (The instructor agreed to be available after class and in the afternoon by appointment. A few students took advantage of this and one or two more made use of the telephone. Often brief conferences were held just before or after class, or during break.)
4. Specify instructional objectives and design formative evaluation of learning and teaching accordingly. (This was done informally, but not in written form.)
5. Teach problem solving. (See part B for details.)
6. Provide for individual contracted study projects during the second half of the course. (No student opted for breaking away from the class entirely; however, all students conducted a minor project of their own choice, worth 15 percent of the total mark.)
7. Conduct a written evaluation of the course. (This was done after the midterm exam and resulted in modifications of lectures and assignments.)
8. For each test, construct a sample test and a retest. (The sample tests were given the day before the test and the retest, one or two days afterwards. This was done for the midterm test and the third quiz. All tests were scored by the students immediately after writing them. Sample tests were not always close enough in form and content to the text to provide good guidance. Retests gave students extra opportunity to master content.)

B. Teaching formal problem solving skills
Minimal system

1. Employ Polya's list of questions in lectures, tutorials, and individual conferences.
2. Design a pretest/posttest pair (independent of course content) to measure the learning of problem solving skills. (The pretest was administered on the first day and the posttest one week from the end. There were two comparable sets, A and B, of three problems each. Half of the class used set A as the pretest and set B as the posttest. The sets were switched for the other half of the class. Any significant improvements would thus have to show in both halves of the class.)

Additional Components

1. Keep a journal on lectures and tutorial sessions, including informal feedback.
2. Modify regular (content-oriented) tests to measure the attainment of problem solving objectives. (This was done to a limited extent but the evaluation was obscurred by difficulties in understanding the questions.)
3. Set up individual sessions at the beginning and end of the course with a random sample of five or six students, to observe them in the process of problem solving. Make observations based on self-reporting with some prompting from the experimenter. (This type of clinical observation was begun but abandoned. It could have been a rich source of information.)
4. Simulate each lecture with two or three students, one day in advance. For the actual lecture, these students would serve as catalysts and supervisors. They could also assist with individual instruction. (This was done several times, and served to uncover difficulties which were subsequently avoided in the actual lecture. The classroom dynamics in the lecture were very different from those in the simulation. The simulation thus served primarily to provide extra help for the individuals who participated.)
5. Promote self-knowledge of problem solving skills by:
   i) having students write down everything they know about problem solving and expand on this as the course progresses. (This was done early in the course. Each student handed in a summary on a 5 inch by 8 inch file card. The cards were analyzed vis-a-vis Polya's model.)
   ii) commenting on the significance of student responses and questions in class. (This became an integral part of the instructor's interaction with the students.)
6. Study the literature on problem solving and related topics, and incorporate appropriate ideas into the system. (Books and articles added to the author's library over the past decade were supplemented with recommended articles and references. This search method avoided the distractions of a comprehensive search using reference journals and automated data bases.)

"The pace was adjusted carefully at the beginning so that the students were not swamped with new and abstract ideas."

Course Descriptions

The goals of the course, as specified in the course outline given to the students were:

1. To explore algebraic structures;
2. To use the language of mathematics;
3. To distinguish between proof and conjecture;
4. To develop problem solving skills.

The first goal specifies the subject area. The other three all have to do with solving formal problems. The "language" of mathematics

provides powerful tools for solving problems which would otherwise be intractable. The third concerns a very important logical distinction essential for evaluating the validity of a solution.

The course spanned a six-week period. It met for 29, two-hour sessions consisting of lectures, discussions, and group and individual work on problems. Tests were also held during these sessions. Optional tutorial sessions were held twice weekly for one and a half hours in the afternoon. Extra sessions were set up on the morning to meet the needs of students who couldn't come in the afternoon. The instructor was generally available for consultation throughout the day. There was no lack of opportunity for the students to get help if they so wished.

"Questions were constructed to require thinking at various cognitive levels."

A set of problems was constructed to accompany each lecture. Some of the problems were worked together or individually in the class session. By student request, the instructor gave an introduction to each problem to increase the students' understanding. It often happened that the sessions deviated from the plan. Assignments were adjusted accordingly. The pace was adjusted carefully at the beginning so that the students were not swamped with new and abstract ideas. The prescribed textbook was abandoned early in the course because of the difficulties students had in reading it. Often, a large portion of the class session was spent dealing with the assignment from the previous day. In this way students were provided with a model of what should go into their solutions. Occasionally problems which proved too difficult were simply dropped. Problems were of three types, those asking to find a result not given, those asking to prove a given result, and those asking to explore (i.e. to create and solve problems on a given topic). Students found the latter two types the most difficult.

At the end of major sections a sheet of problems was given out. The first of these was handled quite well. The second and third sheets were largely exploratory in nature. The students were simply not ready for this type of problem after such a short time span. At the request of the students, solutions were placed in the library, but some students had difficulty even following them. The instructor then selected those problems which he felt were most useful to discuss in detail in class. In some cases, the problems were broken down into simpler problems which the students were able to solve as the discussion proceeded.

Formal testing was done weekly. Each test had a strict time limit. Immediate feedback

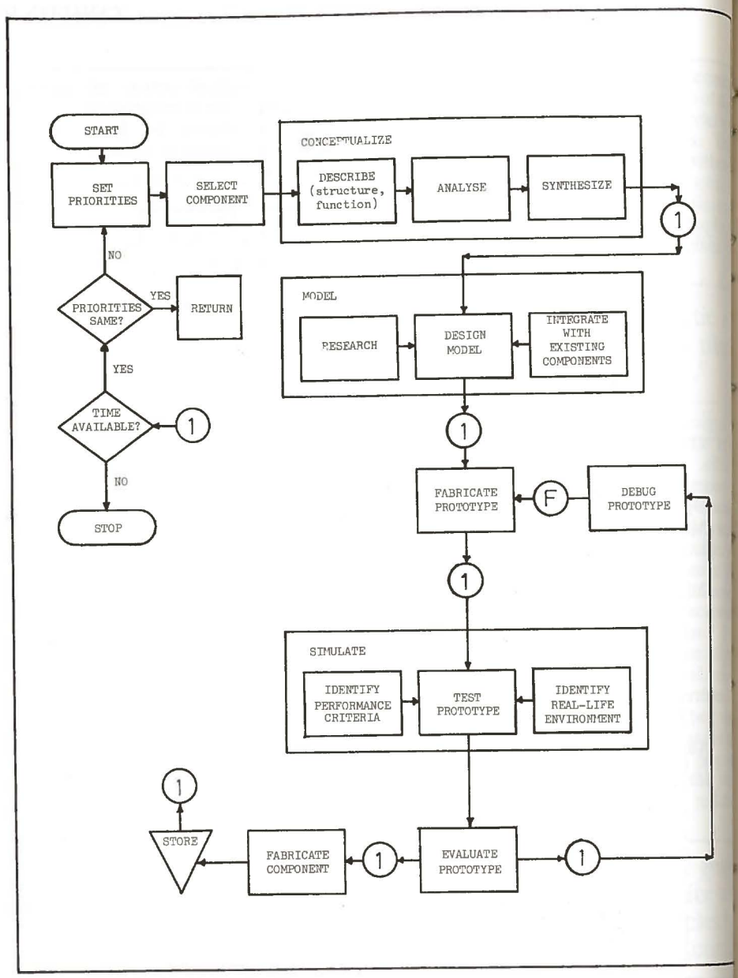

Figure 3. Model for component design and fabrication. The circle containing a 1 indicates branching to check the clock and then appropriate action.

was provided by discussing the solutions after the test was written. Each student scored his own paper. The instructor then conducted his own evaluation and placed the papers in files which were brought to class each day. The files were used in this study to evaluate improvements in problem solving skills. Questions on the tests were similar to

"The greatest work needs to be done in the design of problems."

those of the daily problem assignments. For the midterm test and third quiz, a sample test was given to students one day in advance. Solutions were also provided. The students were advised to use the sample test as a simulation, and to analyse their answers by comparison with those provided. Following the tests, a retest was given for students wh did not do well at first.

The first test was designed by setting o the objectives and criteria for evaluatio Questions were constructed to require thi ing at various cognitive levels. The same a proach was taken informally for subsequen tests. The difficulties students had were n analyzed taxonomically in great depth.

Course topics were chosen from abstra algebra. Basic notions of sets, relations, fun tions, binary operations, groups, rings, an polynomials were studied. Examples we chosen based on familiar concepts. Extensi study was made of modular arithmetic an of symmetry.

At the end of the course students we given free choice of topic for individu study. Assistance was given in finding refe ences and in structuring the study. Som students consulted the instructor frequen and others worked quite independent

Most topics were extensions of work done in class. One student studied the arithmetic of boolean algebra and another did an essay on mathematical literacy appropriate for the level at which she would be teaching.

Assigned readings were intended to broaden the perspective of the students, but were not tightly integrated with topics under study. There was insufficient extrinsic motivation to get students started on them. Some students found them interesting and helpful.

Of the sixteen students, all completed the course satisfactorily except one who dropped the course in the first few days because of conflicting commitments. The marks submitted were high (seven A's, six B's, and two C's) because of the mastery approach to evaluation and the keen interest of the students.

Two students were majoring in statistics, and one in pharmacy. The rest were teachers or were working towards certification. All had positive attitudes towards the course. They were appreciative of the adjustments that were made as the course progressed and were frank and open in providing feedback.

Analysis

The instructional design model of Kemp freed the author from working in a single sequence. The author's model for designing and operating the course also proved effective. The model for component design was too detailed to be applied in depth in such a short period. In order to use it effectively one might first determine to what extent existing components could be understood and improved using the model.

The greatest work needs to be done in the design of problems. Students experienced great difficulties understanding definitions and using symbols. They also lacked experience in exploratory work. This made it difficult to start on many of the problems.

The written feedback obtained at midterm was particularly useful. It provided support for the method of instruction and direct information on required changes. Students felt they were mathematically more literate than at the beginning of the course. The assignments were frustrating but the tutorials were helpful.

The schema for problem solving which the students handed in were analyzed in terms of Polya's model. Those students who had the least detail were the weakest students. Most showed concern with understanding the problem but few gave details on planning or evaluating.

There was noticeable improvement in the way some students organized their written work, but it was more difficult to determine to what extent problem-solving ability improved.

In order to test for improvement in ability to solve formal problems, two sets of three problems each were given at the beginning and near the end of the course. Half of the class was given set A as pretest and set B as posttest. The opposite was done for the other half. There were seven students in each group. According to a cursory evaluation of their written answers, nine students did slightly better the first time, one did about as well, and four did better the second time. Of these four, the improvement was very slight for three. The fourth student made little progress on any of the first three problems, but almost completed all three problems on the posttest.

The problems were matched in type on the two tests. Very few students correctly solved the first problem. Those who got it on one set, failed on the other. Four students added to the given on both sets, in order to obtain a problem which they felt was solvable. Several students thought they had complete, correct solutions; however, they had either erred or had left large gaps in reasoning. (These may have been gaps in reporting but not in thinking.) Most students obtained an answer for the second problem on set A, but none gave an argument proving correctness. In the corresponding problem on set B, those who solved the problem correctly (six students) saw the answer, and saw that it was correct, at a glance. (No other possibilities were written down.) Other students failed to understand one of the conditions. A conceptual block arose from applying the condition to individual parts of the problem separately rather than applying it to the whole. About half the students solved the third problem. One student could not get started on this problem in either set. Apparently he was unable to construct a schema for applying the conditions one at a time to eliminate possibilities. Other students had difficulty in interpreting the conditions even though they made a start in the right direction. Of those students who solved the problem completely some kept a record of eliminated possibilities on a three by three matrix. Others appeared to have no need for such an aid. There was a strong correlation between those who solved the third problem in set A and those who solved it in set B.

The pretest/posttest instrument did not prove useful for the intended purpose of determining whether changes had taken place in ability to solve formal problems. Certainly there was no dramatic change. On the other hand it proved useful in testing the problem-solving models used in this study. The author found little difficulty in analyzing the solutions using Polya's questions and Adam's list of conceptual blocks. An excellent framework for diagnosis of the difficulties has thus been acquired. Much work remains to be done on prognosis.

The author would like to incorporate the following elements into the design for teaching problem solving as part of his Grade 10 science course:

1. Having students complete gaps in given solutions (practice in looking for sensible relationships, similar to Cloze procedures in reading);
2. Having students look for errors in given solutions (practice in looking back);
3. Having students analyze and diagnose their own solutions (development of conceptual schemata for problem solving);
4. Presenting students with pairs of similar problems, some related structurally and others only superficially (used for diagnosis of structural thinking);
5. Having students construct their own problems based on given data, conclusion, or other problems (development of exploratory skills through problem finding).

Conclusion

Through this study the author has developed a manageable approach to instructional design. It was particularly satisfying to be able to conduct practical research and to teach simultaneously. Progress was made on a topic of long standing interest. The author is in a much stronger position to teach problem solving. A realistic idea was gained of what can be accomplished in a short time span.

The course was enjoyable and challenging to teach. The students gained exposure to abstract mathematics and an increased awareness of problem solving strategies. There was good rapport amongst the students and between students and instructor. This made it easy to adjust plans as the course evolved.

The major problem which came into focus was the need to move away from a blind trial-and-error approach to problem solving and towards an approach based on sensible, productive processes.

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Confidence in Media Utilization — Does the Instructional Approach Make a Difference?

Ronald K. Bass and
Wellington C. Morton

This is the report of a study conducted at the University of North Florida to ascertain if confidence in using media equipment and materials varies with the instructional approach utilized to present instruction.

Background

Prominent instructional design programs (Designing Effective Instruction, 1970; Teacher competency development systems, 1973; Criterion referenced instruction, 1974; Learning systems design, 1974) champion, as one of the essential elements of instructional design, the inclusion of interactive instruction (instruction which requires that students "do something" during the teaching/learning process).

"Although it would seem obvious that interactive instruction or "hands on" experience, would have a significant positive influence on students' confidence on the tasks being taught, there is not a large body of literature investigating this instructional approach."

Although it would seem obvious that interactive instruction or "hands-on" experience, would have a significant positive influence on students' confidence on the tasks being taught, there is not a large body of literature investigating this instructional approach. Smith and others (1973) paper on the improvement of instruction concluded that one must have "appropriate learning experience for the attainment of the objectives" (p. 4). Gagne (1970), Popham (1970), Coates (1966), all indicate that learning can be significantly effected by the choice of presentation method.

Harkell (1975) assessed relationships between instructional procedures and student classroom perception and found statistically significant differences in understanding of concepts, attitudes toward the subject matter, and interest in subject. In addition Harkell states the need to "empirically determine which combination of lecture, discussion, highly-structured, loosely structured or direct-indirect oriented teaching produces optimum student growth . . ." (p. 3).

"As stated earlier, this research sought to validate the belief that students who operated equipment or constructed materials in a laboratory using their manipulative skills would possess more positive attitudes toward audio-visual aids in their classroom."

Soar (1966) and Castaneda (1965) indicate that student attitude and/or anxiety significantly affect learning.

Stiltner (1973) examined the difference of responses of students involved in group teaching techniques and those who were not. A major point of interest noted was lecture methods promoted unequal distribution of power in the classroom resulting in psychological withdrawal of the student, and this implies a reduced learning rate. Stahl (1976) identified and defined skills associated for the improvement of student learning. In examining the range of teaching methods from formal lecture to open discussion/commentary, he states that "teacher commentary is one of the pivotal periods of time in a classroom instructional episode" (p. 4). During the commentary period, when the teacher is clarifying information, and providing lesson set, greater learning takes place. A parallel in the present study to the commentary period would be a "hands-on" laboratory period during which the instructor clarifies and provides the lesson set for

Ronald K. Bass is an Associate Professor in the College of Dentistry at the University of Florida.

Wellington C. Morton is an Assistant Professor of Education at the University of North Florida.

Figure 1.
QUESTIONNAIRE

Check the category that best describes your background.

SECTION I

Code _____

Sex: _____ male _____ female

Age: _____ 25 or under _____ 26-35 years _____ 36-45 years _____ 46 and older

Educational Attainment:
_____ Associate Degree (or 60 semester hours)
_____ Bachelor Degree (or 120 semester hours)
_____ other

SECTION II

This section contains a list of general statements which are intended to measure your perceptions of educational media. You are requested to indicate the degree to which you agree or disagree with each statement on the scale beside each statement. The scale appears as follows:

(strongly disagree) 1 2 3 4 5 (strongly agree)

If you believe a statement definitely reflects your belief you should circle numeral 5. If you are undecided, you should circle numeral 3, and so on.

Strongly disagree					Strongly agree	
1	2	3	4	5		If an outstanding instructional film was available in my subject area, I would obtain a projector, thread and operate it for my class.
1	2	3	4	5		If an outstanding film strip was available in my subject area, I would obtain a projector and operate it for my class.
1	2	3	4	5		If an outstanding slide presentation was available in my subject area, I would obtain a slide projector, load and sequence the slides and operate it for my class.
1	2	3	4	5		If an outstanding recorded audio tape was available in my subject area, I would obtain a tape player and operate it for my class.
1	2	3	4	5		If an outstanding transparency was available in my subject area, I would obtain an overhead projector, and operate it for my class.
1	2	3	4	5		If an outstanding video tape was available in my subject area, I would obtain a video tape player, thread and operate it for my class.
1	2	3	4	5		If the preparation of transparencies would significantly enhance my instruction in class, I would produce and present the transparency.
1	2	3	4	5		If the preparation of a video tape would significantly enhance my instruction in class, I would produce and present the video tape program.
1	2	3	4	5		If the preparation of an audio recording would significantly enhance my instruction in class, I would produce and present the audio tape recording.
1	2	3	4	5		If the preparation of ditto materials would significantly enhance my instruction in class, I would produce these handouts for students.
1	2	3	4	5		If the preparation of display materials would significantly enhance my instruction in class, I would produce these materials for observation.

the accomplishment of the manipulative audiovisual skills.

"Interactive instruction is an essential element of instructional design."

The major hypothesis of this study was that student confidence and attitudes toward the utilization of media would be enhanced by "hands-on", or interactive, instruction.

The subjects for this study were 134 students enrolled in a teacher education program at the Univerity of North Florida, Jacksonville, Florida.

The students were randomly assigned to one of two groups. The control group was instructed using a straight forward lecture demonstration approach. Students took notes and discussed each presentation (piece of equipment or constructed material with the instructor). The experimental group covered the same amount of material but instruction was accomplished by assigning students to a piece of equipment on which they duplicated manipulative action or constructed the presented materials. Both the control and the experimental group were given a step-by-step, logical sequence presentation in how to operate each piece of equipment or how to construct each piece of instructional material. While the classroom control group observed and took notes on the presentation, the laboratory experimental group actually had to operate the equipment or construct the material at the same time the instructor made his presentation.

As stated earlier, this research sought to validate the belief that students who operated equipment or constructed materials in a laboratory using their manipulative skills would possess more positive attitudes toward audiovisual aids in their classroom.

After instruction in the two groups, an 11-item questionnaire designed to measure attitudes toward confidence in the 11 areas of instruction identified in previous research as being the most utilized/produced audiovisual aids was administered to all 134 students. The questionnaire is reproduced in Figure 1.

The responses of the two groups were analyzed utilizing a T-test and the contention that "hands-on" or interactive instruction would produce more positive affective responses toward utilization of or production of educational media was supported in all cases.

The difference in attitudes toward operation of: 16 mm projectors, filmstrip projectors, 35 mm slide projectors, audiocassette recorders, overhead projectors, videocassette recorders were all significant beyond .0005 in favor of the "hands-on" group.

The difference in attitudes toward production of: overhead transparencies, videocassettes, audiocassettes, dittos, drymount presentations were all significant beyond .0005 for the "hands-on" group.

It thus appears, even though a literature search didn't support the contention, that the prominent instructional design programs cited earlier in this paper are entirely correct. Interactive instruction is an essential element of instructional design.

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In my Opinion

Why We Need a Canadian Educational Television Channel

Duane B. Starcher

Do we? We AMTEC members naturally think so, but how about the public? At a dinner party this spring, I was mousetrapped into a discussion with a friend over the relative benefits to the Province of the Newfoundland Symphony Orchestra (NSO). The NSO is an amateur orchestra under a professional conductor, bolstered by three full-time professional players, with another dozen or so under contract on a fee-for-service basis. Still and all, it remains a community orchestra, a collecting point for the student and amateur musicians of the area to display their musical skills and bring some live orchestral repertoire before the public.

My friend found little to praise in the orchestra, especially as it was at that time asking for public support through a fund drive, and he suggested that the best way to improve its quality would be to pay all its members, especially the amateurs, who would thereby practice more diligently and become better players. He felt that amateurs, by definition, brought too little personal incentive to play well and that an infusion of money would somehow improve their musicianship.

"It has always been difficult to clarify the processes of culture, or even to defend the processes of education, to those who are themselves not inclined to participate."

As our argument progressed, he finally allowed that Newfoundland really didn't need an orchestra anyway. Why did we not import the Toronto Symphony or the Montreal Symphony or the National Arts Centre Orchestra and scrap the whole impossible idea of marshalling an admittedly third- or fourth-rate orchestra far off the beaten cultural track? Whom were we kidding, anyway?

In other words, he became completely enmeshed in the standard confusion of regarding culture as product, as against also accepting culture as a process. Most consumers (and we are all consumers) — most consumers are indeed confused. It has always been difficult to clarify the processes of culture, or even to defend the processes of education, to those who are themselves not inclined to participate. Too much of education has been taken over by the behaviourists, who prescribe simplified, step-by-step procedures, predict standard outcomes and quantify results and who believe that learning does not in fact take place unless it can be so quantified. This narrow definition of educational television is also enshrined in Canada's broadcasting laws, even though we no longer obey most of them.

"If excellence is our criterion, we should be limited only by what we can afford, not by its geographical location."

The public is far less confused about sports. They can tell the difference, and even their governments can tell the difference, between the Stanley Cup and the PARTICIPaction program. The federal authorities actually make commercials lauding the fact that physical activity can be its own reward and justification. But they are less certain about music and philosophy. And, as the federal government is not officially in the education business, the provinces reign supreme in separate confusion.

Quality in Product

So, if we do actually need a Canadian educational television network, what educational philosophy should it embody? Without sinking to nationalism, chauvinism or isolationism, I would like to parallel my friend's concern for quality in the products of culture. I agree that we should in Newfoundland hear the Toronto Symphony, the Montreal Symphony and the National Arts Centre Orchestra. But if quality of product is our main criterion, why don't we import instead the Philadelphia Orchestra, the London Symphony and the Berlin Philharmonic? They are not only infinitely superior to the Newfoundland Symphony, but are usually adjudged to be well ahead of Toronto, Montreal and Ottawa. If excellence is our criterion, we should be limited only by what we can afford, not by its geographical location. We should all buy Mercedes and

Duane B. Starcher is the Director of the Educational Television Centre at Memorial University of Newfoundland.

Toyotas instead of Fords and Dodges — after the oil begins to flow.

"It is not enough to have culture piped in to us in the same manner as broadcasters pipe in entertainment."

Up until June 12th, 1981 in St. John's and in Corner Brook, the PBS satellite feed was being piped out to cable subscribers. Yes, it was illegal (or, in the current jargon of the CRTC, "unauthorized"). PBS broadcasts many excellent concerts in the performing arts and programmes about nearly every topic of interest to be found in western culture and, by my friend's argument, obviates the need for Canada or Newfoundland to compete in the same product line. Canadian policy in fact permits the overland importation of the best public broadcasting service on the continent, so why would we want to bother with our own poor facsimile? The exisiting local and, by definition, second-rate Canadian services such as Memorial University Television, TVOntario, and ACCESS Alberta, would have no further purpose beyond regional programing specific to their provincial educational and social mandates. To the extent that all of North America partakes of western culture, PBS clearly offers a product both suitable and satisfying to most of our population interested in such topics. Beethoven and Günter Grass, Murray Shaeffer and Margaret Lawrence travel well; they need no borders. As long as we concentrate on the products of culture, we can do no better than buy the best we can afford.

If we extend the product parallel only a little bit farther, it could well be argued that we really don't need Canadian violinists, dancers or actors — we can nicely watch German orchestras, French ballerinas and British comedies — over our American public television channels.

In Opposition

Obviously, I do not favour this future, but I am worried that it is not just a possible future. For many of us, it is the real present. Whether a Canadian television network, educational or cultural, is created through our efforts, those of the CBC-II staff or through the marketing department of TVOntario, I foresee few differences in the look of it if it is based on the product model rather than on a philosophy of national interconnection and local access. It is not enough to have culture piped in to us in the same manner as broadcasters pipe in entertainment. A society needs access not only to the products of culture and education, but also to the means through which it can participate in the processes of education, culture, politics, sports and all the intellectual pursuits that define a society. If Canadians are also to be hewers of sculptures and drawers of etchings, they must inhabit a social milieu in which such activities are judged important, as against a marketplace in which most cultural products are foreign imports. In Canada, as elsewhere, value is measured in money and even our dollar is quoted daily against the American model.

"There is more to Canada, to culture, to education than the CBC."

Nearly all of our standards are comparisons to those held by the United States or to a world standard exemplified by the American version.

Interconnections

So, perhaps we don't need a Canadian educational television network after all, perhaps we need a world educational television network (English Service). Ultimately, I think this will be the likely direction of the future. But, given time, I could bear witness from my own backyard to the many benefits of having our own Newfoundland educational television network service, that sometimes brings even the imperfect Newfoundland Symphony Orchestra to a wider audience. And, I could also tell you how important it is for us to be ready to plug our germinal Newfoundland ETV network into a larger Canadian enterprise when the time is ripe. It is socially and educationally important for Newfoundland to participate in the building process, rather than import either PBS or TVOntario's product line wholesale. Why even bother with TVOntario if we can have PBS and BBC? Well, if TVOntario is a part of a larger national enterprise built around process instead of product distribution, then hooray for TVO. Otherwise they are just a little better version of the Newfoundland Symphony and we might as well go straight to New York and get the Philharmonic. If a network is to be only a technical means to distribute products, we could even contract CBC-II to be the carrier of the imports. But if a network is conceived to be an interconnection of strong, participating regional contributors to educational and cultural programing, engaging local populations, yet consistent with stated national purposes, then, yes, we need a network, and have needed it for a decade.

Alternate Models

What is such an enterprise worth in a country that is not lavish in its support of the arts or education, a country that expends nearly two-thirds of its federal cultural funds in support of one cultural enterprise, the CBC? There is more to Canada, to culture, to education than the CBC. In fact, one thing we clearly do not need is a second CBC, bringing us more products from more foreign distributorships. There are many possible models for a network other than journalism or entertainment. We are actually rather well-served by CBC in both journalism and entertainment, especially in radio. Any new enterprise must build upon those agencies now filling the voids left by CBC, from the small fry such as Memorial University Television, through TVO and Radio Quebec, through the flatlands and the hills to the Knowledge Network in the far West. The new service will obviously have to respond to local educational needs, and so must be in part a joint creation of the existing bureaucracies. But after those dues are paid, we need to approach this new creation with an equally new openness and inventiveness. It should itself be an expression of the ideals of participation in educational and cultural pursuits, more a PARTICIPaction than a Stanley Cup. The Stanley Cup has winners and losers. In PARTICIPaction, in cooperation, we can all be winners.

Resources in Context a Conference of AMTEC

AMTEC '82 1180 Notre Dame Ave.
Winnipeg, Man. R3E 0P2
Phone (204) 772-2474

Welcome to Winnipeg

Winnipeg, Manitoba, a bustling energetic city with a population of 580,000, is situated at the confluence of the Red and Assiniboine rivers, just 60 miles north of the Canada-United States border and almost mid-way between the Atlantic and Pacific shores. It's at the crossroads of Canada's commerce and travel. And we're waiting to greet YOU!

Site

The 1982 conference, June 6-9, will be housed on the University of Manitoba campus in the spacious University Centre. During the regular academic year it accommodates up to 20,000 students comfortably. The park-like campus is peaceful and relaxed, away from the distractions of the downtown environment. University Centre is designed so people can meet, mingle and work in an easy and casual atmosphere. An exciting building, bright and spacious, complemented by excellent university facilities, it's equipped to handle all AMTEC requirements. Plenty of exhibition space is available too. Restful lounges. Conveniently located dining rooms. And never more than a short walk away — two economical and comfortable residences.

Housing

Excellent financial arrangements have been made with the university to use their residence accommodations. Give your pocket book a break, and you'll find them comfortable and convenient.

For those who prefer, Holiday Inn South, Ramada Inn, and Montcalm Hotels are a ten-minute drive or bus ride. There are also numerous motels along the Pembina strip. Accommodation in downtown Winnipeg will be booked with two other conferences.

Theme

This year's theme "Resources in Context" is designed to emphasize the human and material resources of media communications. As inflation and cutbacks threaten budgets across the nation, media professionals must examine the various contexts in which materials are produced, acquired, revised, shared, and utilized. Are we really getting greatest efficiency and effectiveness for our time, energy, and money?

Modern communications calls us to take a broad view. Today's communicator orchestrates people, facilities, equipment, programs, and materials to achieve a pre-determined end in a context of many and varied constraints. Today's communicator is not as concerned with hardware and the other artifacts of technology as with the basic principles of communications, of change in systems, of learning, and of cost-effectiveness.

And still, today's communicator must find the interesting, the intriguing, and the artful way of transferring ideas between persons.

We're planning a program of international personalities to challenge your thinking. We're also trying to focus on what's happening in our own Canadian centres. Let us know if you've got something to share, or if you know of someone who should be asked. This could be the year that AMTEC puts out its first conference proceedings. Wouldn't you like to be included?

Media Festival

The annual Media Festival will again recognize top Canadian educational media programs. The festival will feature all types of recent audiovisual productions: slide — sound, film and video. The programs will be available for viewing continuously throughout the conference.

Exhibits

The latest, up-to-the-minute developments in media technology will be on exhibit with representation from the commercial organizations throughout the four days of the conference.

Social

To help celebrate the 25th anniversary of the founding of the first audiovisual association in Canada, we have a super special planned. A "Folklorama" especially for everyone will start the conference with verve and energy. The momentum will continue through a unique awards evening, and climax with the famous Red River's Paddlewheel Queen cruise. Don't miss this extravaganza. And during the day, the hospitality will be truly western — from the airport, to the Prairie Gophers, to the sessions — until we roll you back on the plane exhausted and ready to go home for a rest.

Spouses

Yes, we've got something terrific here too. The Winnipeg Royal Canadian Mint has booked a special visual presentation, as have the touring personnel at the famous Museum of Man and Nature. Shopping excursions can be arranged for Old Market Square, Osborne Village, St. Vital Shopping Mall, or some specialty shops. Special historic tours are tentatively scheduled, including the Legislative Buildings, Floral Conservatory, Assiniboine Park Zoo and the Planetarium. For the athletically inclined a special all-inclusive pass can be purchased at the U. of M. Physical Education Complex for swimming, tennis, and other related fitness activities.

Children and TV: Piaget's Method Applied

Lois Baron

In Jean Piaget's search for a theory to describe children's acquisition and use of knowledge, he not only developed a hypothesis of cognitive-development, but also revealed a mode or methodology to investigate the problem. Although running counter to the psychometric controls of empirical research, La Méthode Clinique has nevertheless proven to be quite a reliable and valid method of assessment (as demonstrated by more recent efforts to psychometrize his method of investigation). While rejecting what he saw as limitations of the psychometric school with its emphasis on standardized tests, Piaget's main aim was to develop a logical-mathematical model of the growth and development of thought and knowledge.

This paper examines the evolution of Piaget's thinking respective to modes of investigating the thought processes of children. Piaget's Méthode Clinique, its aims, advantages, disadvantages, and present acceptance and use are described with an emphasis toward examining its utility as a means of investigating the nature of the interaction between children and television.This paper is a methodological discussion and in no way a description of Piaget's cognitive-developmental theory. The emphasis here is a description of La Méthode Clinique — its application and benefit to descriptive evaluation in the field of research on children and television. A description of my own and others' adaptation of Piaget's method is to follow this account of Piaget's own motives for adopting such a process-oriented approach to evaluation.

Process Evaluation

Jean Piaget had been considered by many to have been first and foremost a psychologist. This is a mistaken assumption. Piaget identified himself primarily as a genetic-epistemologist. With roots in both the areas of biology and philosophy, the thrust of Piaget's efforts was to establish a theory concerning the evolution of thought processes in children. Taking an embryological perspective to describe the growth of logical thinking in the child, it was not Piaget's intention to present a psychological age-stage theory.

"Concern for process was the catalyst for Piaget's developing a more open-ended approach to investigating the modality and logic of children's thought."

As an epistemologist, Piaget was concerned with answering the following questions:

1. *What are the origins of knowledge?*
2. *Do we acquire knowledge by reasoning or through direct experience with the external world?*
3. *What is the nature of the relation between the person and the environment?*
4. *What is the difference between what things seem to be and what they really are? (Ginsburg & Opper, 1969, p. 207)*

Concerned with a philosophical basis of knowledge, Piaget's "méthode" emphasized the interaction and functions of the 'knower' and the 'known' in the pursuit and expression of knowledge. The individual and the external world were both essential elements involved in the process of thought, and it was Piaget's goal to examine the role these elements played in the evolution of cognition.

"To investigate the evolution of knowledge, Piaget needed an approach which would allow children to verbalize freely and honestly about their conceptions of the world."

Given the task of re-working Binet's scale of intelligence, Piaget reached back into his clinical experience (he had worked in a psychiatric clinic for one year), and discovered that he could best study the reasoning of children through a more open-ended, unstructured interview approach. The incorrect answers rather than the correct responses given by children on standardized tests interested Piaget. How, he thought, did mental structure and the influence of the environment continue to form a representation of the world that became the child's conception of reality? Note the emphasis on "how", for Piaget spent his life investigating the process of mental operations and the acquisition and use of knowledge. He was not interested simply in children's overt responses to questions or how many children could pass his tests, but he examined the how and why behind every response. Concern for process was the catalyst for Piaget's developing a more open-ended approach to investigating the modality and logic of children's thought. Piaget believed that by freeing children from the constraints imposed by the more standardized testing procedures, he could better investigate a child's own "inventions" (Piaget, 1969, p. 13), or as Furth (1980) has described it, the child's "imaginative elaborations" (p. 23) about the world. In Piaget's evaluation, there was no right or wrong, just a concern with revealing the structure and devlopment of thought itself.

Although openly admitting to certain advantages of the more standardized test procedures (Flavell, 1963), in order to satisfy the criteria of his own examination into the nature of cognitive structure, and more in keeping with naturalistic investigation, Piaget rejected the "tests", describing them as restrictive in nature. To Piaget, standardized testing did not allow children to liberate themselves from the rigid questioning procedure imposed upon them by the examiner, nor did it permit children to delve into their store of knowledge to elaborate on and verbalize about the casuality of real world events. Piaget's goal was to describe mental structure, not to test it. His extensive lifework laid the groundwork for others to adopt and modify. Interestingly, standardized diagnosis seems to be the direction Piagetian followers are moving toward re-examining means of psychometrizing his technique.

Aims, Method, and Use

To investigate the evolution of knowledge, Piaget needed an approach which would allow children to verbalize freely and honestly about their conceptions of the world. While meeting his central goal through open dialogue with children, Piaget also left himself and his method open to criticism from those of the more empirical schools of thought.

Piaget's feeling was that to describe the evolutionary process involved in the acquisition of meaning about the world, one had to allow children to freely verbalize and lay bare their hypotheses and problem-solving strategies. La Méthode Clinique allows for open dialogue between the examiner and the child. As Piaget noted, questions evolve from the child's own reasoning and not from some standardized test of measurement. The open-ended, more process-oriented, clinicial approach to questioning a child "reveals something of the spontaneous tendencies of the mind" (Piaget, p. 14).

As Flavell points out, Piaget's clinical method "gets at the heart of the child's cognitive structure and describes it as it really is" (p. 28). Flavell further describes Piaget's approach to the study of the development of cognitive structure as being a quasi-anecdotal rather than quantitative-statistical approach. His main aim being to comprehend and describe the mechanisms of thought and not specifically to determine ages and stages in which certain though occurs, Piaget felt he could best meet this objective using a free conversation format in which changeable questioning strategies did not allow for strict statistical analysis.

"...a cardinal rule of La Methode Clinique — no pre-set questioning strategy, no standardized testing procedure."

Influenced by the clinical tools of psychiatry, Piaget stringently followed a client or child-centered approach to problem solving. The line of questioning used, in the strictest sense of La Méthode Clinique, involved following the flow of the child's thoughts while utilizing the child's own answers to determine the course of questioning. The latter was a cardinal rule of La Méthode Clinique — no pre-set questioning strategy, no standardized testing procedure! Primarily relying on children's verbalizations, Piaget later revised his method of investigation by introducing concrete objects to children. The combination of a child's manipulation of these objects and simultaneous verbalizations revealed the organization of cognitive structure a child brings to the task.

Piaget indicated that it takes much training to become expert at La Méthode Clinique. The free flow mode of interview or conversation required an experimenter to be extremely alert and flexible as each new stimulus situation is set up for the child following each response. The paradigm of questioning followed a stimulus-response-stimulus-response sequence with the experimenter constantly adapting his/her behaviour to the child's mode of reasoning (Flavell, 1963). The method required such diversification of questions across subjects that as Flavell pointed out "no two children will receive exactly the same experimental treatment" (p. 27).

"...the examiner presents tasks to the child, and through observation and interrogation attempts to uncover the mental operations or mode of thought involved in solving a task."

The plan of La Méthode Clinique is to initially engage the child into a conversation about the particular subject of investigation. The examiner formulates questions and presents problems based on the child's previous responses. In the revised Méthode Clinique, the examiner presents tasks to the child, and through observation and interrogation attempts to uncover the mental operations or mode of thought involved in solving a task. This exploratory descriptive approach to examining children's conceptions of the world provides the link and describes the "constructive relationship" (Furth, 1980, p. 23) between the individual and his/her world.

Piaget's systematic approach to investigating children's thought processes is by no means objective. Through probes and prodding, the examiner forces the child to reach the highest levels of thought for which he/she is capable. The key to the process, as pointed out by Cowan (1978), is to understand the world through the child's own perspective.

Piaget's works are filled with anecdotal recordings of the statements made by children. Perhaps, as some have pointed out, this time-consuming approach leaves much to be desired methodologically and statistically. However, as Piaget predicted, and this seems to be confirmed by the more recent work of others, the uniformity of the answers of each average age group in terms of similar conceptions about phenomena is proof of the validity and utility of this mode of investigation.

There are definite advantages to Piaget's approach toward clinical investigation of children's thought processes. However there has also been criticism directed at his Méthode Clinique. It becomes apparent that what may be an advantage according to one school of thought may prove to be the seed for growing criticism from another point of view.

Advantages

The main advantage of the method is that it allows the child freedom to express his point of view without the constraints of a standardized testing procedure. The child's own stream of consciousness is revealed in interaction with tasks and questions which force the child to stretch and expose the fabric of the imagination.

According to Piaget, the child is made to feel comfortable in the relaxed conversation-like atmosphere in which the questioning procedure takes place. The examiner also has more freedom in use and selection of questions (Ginsburg & Opper, 1969).

Finally, the clinical approach allows the child to respond at his/her own rate always encouraged to express an idea in the best way he/she knows how.

"The key to the process...is to understand the world through the child's own perspective."

Disadvantages

The advantages, as seen from the Piagetian point of view, have also led to criticism of La Méthode Clinique by the more empirical schools and even by some neo-Piagetians interested in a more standardized approach to intellectual assessment. The issue of reliability and validity of the technique has predominated the discussions of any weaknesses in the procedure.

Hyde (1970) accurately summarized the critiques of La Méthode Clinique by stating that the main disadvantage of the technique was "lack of precision, controls, and exact repeatability" (p. 66). Not only did Piaget come under attack for varying the procedure from subject to subject, but was criticized for not describing fully what he did in his experiments. The reliability and validity of Piaget's measures were questioned by those leaning more toward quantification of results. These individuals challenged his methodology and data analysis procedures (or lack thereof). Beilin (in Modgil, 1976) even accused Piaget of using the ambiguity of children's respons-

Lois Baron is an assistant professor at Concordia University in Montreal.

es to fit his research purposes.

Piaget himself even stated that "it is so hard not to be suggestive." (in Flavell, 1963, p. 29). Besides the possibility of biasing the child's answers by guiding them along, an examiner may also be at fault by missing the importance of particular verbalizations or behaviors of the subject.

In rebuttal to the above criticism, Tuddenham (in Green, Ford, & Flamer, 1971) cautioned about criticizing Piaget's lack of control by emphasizing that one must also look at what he originally intended to prove. As Tuddenham stated "the nature of our problems places constraints on our method... psychometric considerations must necessarily alter considerably the format of cognitive problems originally approached by the Méthode Clinique" (p. 66).

As a matter of fact, the problems presently being investigated by the neo-Piagetians are different than those which Piaget sought answers to. A shift of direction has necessitated a change in method. With the new emphasis on psychometrizing and standardizing Piaget's technique in search of a diagnostic tool, theorists such as Inhelder, Vinh-Bang, Goldschmid, and Pinard are actually leaning toward the empirical school. Interestingly enough, as reported in the literature, the results of standardization efforts have also exposed a degree of reliability and validity for Piaget's methodology. In essence, as pointed out by Flavell, a positive approach results in using a sound cognitive-developmental theory to establish "good empirical predictions of the sorts of cognitive achievement society is interested in" (p. 417).

"A shift in direction has necessitated a change in method."

Flavell and others see Piaget's work as laying the necessary foundation for further research in the cognitive-developmental area. It is generally felt that the advantages of La Méthode Clinique could be retained in some ways through more quantitative and semi-standardized procedures. Much ongoing cognitive-developmental work in the area of children and television, including my own, has borrowed from Piaget's model to develop more modified version of his "méthode". Unfortunately in some ways this has led to modifications of his technique in favor of a more "test-oriented" approach. However with a sound theoretical Piagetian base to fall back on, the benefits appear to outweigh the disadvantages.

Cognitive-Developmental Area

Developmental theory supports the point of view that it is particularly during the formative years that children develop perceptions and understandings about the world. Television plays such a pervasive role in all children's lives that research must develop and continue in the cognitive domain in relation to both what the child brings to television and how children make sense of its effect of them.

Aimée Dorr (1976) and her research group did a series of studies investigating children's critical evaluation of television content, modes of evaluating the credibility of television content, and knowledge of the television industry. Using semi-clinical interviews she questioned children on such topics as general opinions about television content, knowledge of the television industry, and awareness of stereotyped portrayals on television. Her questions did not directly focus on the specific elements of television (e.g. zooms and edits), but were open in order to assess what elements children of particular ages chose to attend to. Dorr analyzed children's responses by developing a scale related to levels of understanding. Differences in levels of understanding allowed her to make conclusions about developmental shifts in television comprehension.

"...Piagetian philosophy...can serve as a starting point in evaluating children's apprehension of what they see..."

In another study, Hawkins (1977) used a closed Likert-scaled questionnaire to assess children's perceived reality of television. The results of his data on a sample of 153 four, eight and eleven year olds indicated some developmental trends. Reviewing the literature on children's responses to advertising and aggression, Wachman and Wartella (1977) and Wartella (1979) found the results of the more cognitive-developmental studies in this area also demonstrated developmentally-related shifts in children's understanding about television.

There are a number of other studies which have looked at developmental differences in children's conception of television. For example, Salomon (1979) found age level shifts in the analytical skills of children exposed to segments from the program *Sesame Street*. This, and the other research examples of cognitive-developmental investigations into the interaction between children and television illustrate the point that Piagetian philosophy (admittedly perhaps more so than his methodology) can serve as a starting point in evaluating children's apprehension of what they see not only on the tube, but also within the production industry itself — its technology, its relationship to the business of advertising, and most importantly its relationship to themselves. One must keep in mind that it has only been through the efforts of Piaget's extensive research into children's conceptions of the world that we can now take some methodological shortcuts, so to speak, to examine the understandings children may exhibit toward specific stimuli in their environment at particular stages of development. Piaget's having already laid the groundwork, a balance in research design can now be reached which hopefully pleases the empiricists and yet does not lose the essential quality of openness so characteristic of La Méthode Clinique. By developing a media literacy questionnaire which involves closed-ended questions combined with probes intended to force children to reach into and stretch their imaginations, I hope I have achieved this balance.

Research

The work of Hans Furth, who is presently investigating children's conceptions of social institutions, served as the catalyst for my utilizing a semi-clinical approach to examining children's understanding of television-related elements. In his most recent work Furth (1980) describes how he explored the questions of children's understanding of such societal institutions as banks, government, and stores. His general hypothesis is the assumption that children adapt to the environment in which they live in terms of how they conceptualize social stimuli within their environment. The aim of his descriptive, exploratory research is to look at developmental shifts in understanding utilizing a Piagetian framework not only for investigation but also for interpretation. Furth's mode of gathering data genuinely follows that of the Méthode Clinique. He allows children to openly express their thoughts, stretching their imaginations without using a structured approach. His collection of anecdotal recordings are then interpreted for commonalities of "ways of thinking" across age levels and other child-related characteristics. He, like Elkind (1978), who explored children's understanding of religion and prayer (albeit using a far more structured methodology), assigns specific stages in children's transition from global undifferentiated thought to the more highly differentiated mode of thinking characteristic of Piaget's formal stage of mental operations.

"There was room for more research of a cognitive-developmental nature in the children and television area..."

Influenced particularly by Furth's and Elkind's adaptation and use of a Piagetian approach to investigating cognitive-developmental issues, I began to formulate my own thoughts and questions concerning the subject of children's understanding of television. There was room for more research of a cognitive-developmental nature in the children and television area, and the more process-oriented research approach of the Piagetian philosophy served my own needs in terms of examining the relationship between the medium and receiver of its messages.

To examine the concerns of my research program, a thirty-two item questionnaire directed at investigating children's understanding of such television-related elements as fantasy/reality, actors' roles, television technology knowledge, understanding the manipulation of time and space, and television as a learning source was developed. In effect, the nature of the questionnaire which covers a number of areas of understanding only opens the door to more indepth research in each of the areas investigated. However the main focus of the work was to explore the possibility of developmental shifts in understanding. As reported in Baron (1980), preliminary results demonstrated shifts in children's thinking about television while also pinpointing specific areas where certain television-related elements such as technological knowledge are not well developed even into the more formal stages of development.

In terms of the methodology, the questionnaire was designed using forced-choice questions as well as open-ended probes. Pilot work demonstrated that although young children gave responses similar to those made by older children on the forced-choice items, the probes actually revealed differences in levels of understanding or sophistication of thought. This latter finding supported the need for more open-ended probing — perhaps, not as unstructured as La Méthode Clinique, but certainly open enough to allow for individual children to respond as spontaneously as possible to items.

Examples of questions including probes include:

1. How are cartoons made?
   Probe: How do you know? (Why do you say that?)
2. Could the Flintstones move next door to you? Yes____ No____
   Probe: Why do you say that? (Why? Why not?)
3. When your mother or father buys a T.V. set, are the T.V. shows in the T.V. set when they buy it? Yes____ No____
   Probe: (i) Why do you say that? How do you know?
   (ii) How do the T.V. shows get to your T.V. set?
4. What happens to Diana Prince's clothes when she spins into Wonder Woman?
   Probe: (i) How do you know?
   (ii) Where do they disappear?

Measurement of reliability has been built into the instrument as at least two items are designed to question similar knowledge. Validity of the questions is certainly of concern here, for developing a questionnaire of this nature requires that young children in particular understand the items. It appears that conformity of responses over large samples of children at particular age levels is indicative of a certain level of validity. However, as Piaget discovered, verbalizations are not enough. The introduction of more concrete stimuli would certainly add validity to the testing procedure. It is this researcher's intention to develop such stimulus materials for future research of this nature.

Anecdotal recordings of the children's responses were coded in terms of levels of understanding. Using a methodology developed by Dorr (1976), children's understanding was coded on a scale of one to six as follows:

1. No Understanding — Absolutely no information is given.
2. Misconceptions — Subject's response indicates misunderstanding of the concept.
3. Understanding Peripheral Facts — Partially correct knowledge.
4. Understanding Isolated Facts — Subjects had accurate knowledge of certain facts without connecting them together.
5. Partial Understanding — Subject knows either one or another of the possible responses to a question.
6. Full Understanding — Subject knows the answer and possible different reasons are mentioned if there are such reasons.

"Results on most variables seem to indicate that shifts from less to more sophisticated levels of understanding do indeed occur..."

The results of the forced-choice and levels of understanding data have been analyzed and are in the process of further analysis and interpretation as related to developmental trends. Results on most variables seem to indicate that shifts from less to more sophisticated levels of understanding do indeed occur with a definite turning point being the onset of concrete operational thought (approximately age seven or eight).

My experience has lead me to believe that the contribution the Piagetian model has made to this research project is a positive one. Although not following La Méthode Clinique in the strictest sense, utilizing a semi-clinical approach brings children out of the lab and asks them what they think. The more process-oriented method which has been applied to this and other similar work in the field has proven to be a valid method for investigating the area. Most importantly however, it has shown that the work of Piaget has evolved into a reliable model for research. That one man's professional endeavors have laid a framework other researchers can build on is certainly a major contribution to science.

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Teaching Note

Do You Know How Your Kids are Watching?

Some suggestions for teachers and parents about active television viewing and development of critical participation and appreciation.

Jack Livesley

Many teachers tell me they are often asked by parents for advice about home television viewing. The following suggested four-week outline might serve as a basis for teaching units and provide some guidelines for family viewing.

Week One

Keep a simple log. Record the number of hours each member of the family views and the kinds of programs watched.

- Dramas
- Situation Comedies
- Documentaries
- Newscasts
- Sports Events
- Movies
- Specials — education, etc.

Discuss, as a family or class, the kinds of programs watched. Perhaps one person might log the hours and have each person in the group report to him or her their viewing times. Another could keep track of the types of shows. All the family or class should participate and get used to discussing TV habits, likes and dislikes.

Week Two

On the weekend or early in the week, decide, as a group, on one mid-week program that most of the people enjoy and plan to watch it together. Situation comedies or dramas might be the best choice here. Each member, or student, will have a simple assignment. Younger people (below ages seven or eight) might just tell some of the story after the show. Others should pick out one character and discuss him or her along the following guidelines:

Tell why you chose the character (more than one member might choose the same character, but strive for variety)

Is the character believable? Do you know anyone remotely like this person? Is this person a "type," a certain nationality or stereotype?

If you invited this character to your home, what would you serve for dinner?

Make up a little story using this character, a story that did not happen in any of the episodes you've seen, but could happen.

Name another actor or actress who might play the part. Name a friend or acquaintance of yours who might suit the role.

Naturally, you may not have time or inclination to try all of the above. They are suggestions. You may have others. You might want to make them into games of guessing character, stories, actors, and situations.

The whole point is that you will start participating in your TV viewing and doing something with what you see.

Week Three

Let's talk about commercials. Why do we have them? Are there some programs — or networks — that don't have them? Why?

Everyone should choose a commercial he or she likes, and one they can't stand. Discuss the reasons for likes or dislikes with each other.

Discuss the types of products that are advertised, or endorsed, on the programs you like. (What do we mean by an endorsement?) Why are these products advertised at these hours on these programs?

Choose a character or person who appears in the commercial and ask yourself the same questions as you did about the characters you chose in week two. Are they real people? Believable? Would you want to get to know them, or have them over for dinner?

Take a good hard critical look at a commercial that you see over and over and play some games with it to find out more about the elements of a commercial. Listen to the sounds and/or the music. Turn the sound off on your TV set and just watch the picture. What's the effect? Have someone cover the screen and just listen. Many commercials are made so they can be used on both radio and TV. Discover which ones they are.

Again, you may have other ideas. The important thing is to keep discussing and participating as a family, class or group.

Week Four

Let's go back to characters again. Pick a situation comedy, or drama, that has been running for several years. Discuss with each other what changes have occurred. Are any of the characters different kinds of people now from what they were in the early years of the show? (Any of *Barney Miller*'s group? *M.A.S.H.*? e.g., "Hotlips" Hoolihan has certainly changed over the years.) What characters have left the show and been replaced? How and why were the replacements chosen?

You might examine the "family" shows. (*The Waltons, Happy Days, The Jeffersons*, etc.) Discuss the family behaviour and such things as relationships of parents to children. What are the problems of growing up in these families. Are they the same problems we have?

How do persons under 10 years of age in your family think of policemen? Look at a crime show together, and discuss the problems and how they are solved. Do you know any policemen in real life? What do they think of police shows?

This approach could lead to the whole study of violence, problem solving and role stereotyping on TV. Sometimes it helps to see that the roles are played by actors who have played other parts. (e.g. *Quincy*'s Jack Klugman was Oscar in *The Odd Couple*. Your family can find and discuss other examples.)

Perhaps, if your family has had any recent experience with doctors or hospitals, you might like to discuss medical shows (*House Calls, Trapper John, Marcus Welby*, etc.). Again, the whole point is examination of stories, situations, characters, and perhaps most of all relationships, to help us examine our own relationships in family.

Parents and students who become more interested in critical viewing could go on and do some more examination of effects of sound, music, dialogue, sets and scenery, etc., in programs and commercials.

Examine newscasts and documentaries. What arguments are put forth? What are the counter arguments? Perhaps you could prepare a short documentary or biography (even with pictures) on your family or its members or your friends.

What can we learn about language from viewing television? Make up a game about listing the kinds of words that are used over and over again in commercials, for example, new, bigger, better, savings, now, relief, compare, and so on and on.

When it comes to critical evaluation of TV, your local librarian will be able to help you find books and reference materials. TVOntario can provide assistance too.

Jack Livesley is an Educational Design Officer for TVOntario.

AMTEC Membership Records

Guy Leger, Secretary-Treasurer of AMTEC, will supervise the membership records for AMTEC beginning January 1, 1982. Any changes to addresses or renewal information should be sent directly to Mr. Leger.

Gord Jarrell, Coordinator of Learning Materials for the Scarborough Board of Education in Ontario, will initiate a new program when he begins a membership recruitment drive. Mr. Jarrell will personally approach people and agencies in the Toronto area about joining AMTEC.

For further information about the recruitment program, contact:
Mr. Gord Jarrell
AMTEC
P.O. Box 53
Station R
Toronto, Ontario

For membership changes, contact:
Mr. Guy Leger
AMTEC
P.O. Box 53
Station R
Toronto, Ontario

Project Report: Telematics

John H. Syrett

In a well-known essay, Robert Louis Stevenson wrote, "To journey is better than to arrive, and the true success is to labour." If Stevenson was correct, then I put it to you that TVOntario's Telidon project team has already been an outstanding success!

As I look back on the more than two years of activity associated with the Telidon and Education project administered by TVOntario, it seems to me that the distinguishing characteristic of that activity is its frontiersmanship. Like people on a new physical frontier, the project team has sought to make its way using implements not yet fully refined, not yet up to the challenge of performing all the educational tasks that we felt impelled to undertake. It would be somewhat comical to draw a close analogy between the microprocessing apparatus of Telidon and the axes, plows, and hand-saws of the early settlers, but the point should be made that the first page-creation terminals loaned to us by the Department of Communications were a far cry from the Norpak IPS II's with graphics tablets that we now employ. The first decoders posed performance problems that the latest generation of terminals have addressed. The communications hardware and software made linkage between the host computer and the various terminals both inefficient and cumbersome. Systems crashed; work was delayed; tempers were frayed.

Systems Improved

These days, refinements to the technology are still going on, and will doubtless continue on for some time to come, but one is aware that more and more people, especially in the education sector, are talking confidently of Telidon systems that will far exceed the limitations of the pioneering stage. They speak of user terminals that are microcomputers with added Telidon capability, that display Telidon graphics in color, receive Telidon pages via modem linked to the telephone system or by broadcast carriage, or that generate Telidon pages and deposit them in the host computer. They speak of host computers that do far more than respond to requests to ship out pages stored in the data base under a number; that process data supplied from the user terminal; perform calculations; generate random numbers; switch requests to other computers for processing; and accept and store courseware originating at a user terminal fitted with keyboard and capable of carrying on an alphanumeric dialogue with the data base.

Much of this is already here. All of it soon will be. TVOntario hopes to progress with the technology and explore its potential in the field of education. Meanwhile, however, we have proceeded on the assumption that our ability to understand the new medium and its applicability to a variety of educational environments is best approached by direct involvement with the generation of technology currently available. And like some of the ancient Greek philosophers, we have tried to push the basic concepts as far as they will go.

Capabilities

The current situation features efficient generation and display of graphics on a 535-line television screen. Such graphics are not infinitely detailed, but offer enough resolution and variety to support many requirements for illustration and explanation in an educational context.

Similarly, the prevalent form of data base organization of Telidon pages in a tree structure presents certain limitations, but it was apparent from the start of our explorations that it offered more opportunities for computer-assisted learning than is summed up in its ability to supply indexed information upon request from the user terminal. In particular, it offers the user a set of branching pathways. These pathways can of course be employed by the data base designers to offer the user menus that branch to sub-menus and to the information thus indexed. But they can also be employed to offer the user opportunities to weigh options, make choices, and encounter consequences in the form of responses that reinforce or modify the user's knowledge. In short, a form of computer-assisted-learning is possible, even without the use of a full alpha-numeric keyboard and of higher-language programming in the data base.

I am not making a pitch for numbered keypads and information retrieval in preference to keyboards and more complex information processing. Rather, I am drawing attention to some of the opportunities presented by the simpler system. Having in mind the prospect that the videotex terminals that will find their way into people's homes may employ the simpler technology it is important that the potential of this technology for education be explored.

Courseware

All of the "courseware" developed by TVOntario thus far is based upon keypad access of numbered data bases. We have begun to explore other options, especially NATAL, and we are working with some schools that wish to use keyboard-equipped Telidon terminals capable of accessing NATAL data bases. Most participants in our field trial, however, are using the simpler technology.

One advantage in this for the people creating data base materials is that it is not necessary to learn an authoring language. The branching pathways that the user is to follow can be planned on paper, and the sequence entered on the IPS terminal, which can be mastered in a very short time. The principal impediment thus far has not been the level of difficulty associated with creating and recording the pages, but rather the accessibility of the IPS terminals. When more and cheaper terminals become available, that problem should disappear.

In TVOntario's field trial, we have proceeded on the assumption that the simplicity of the page creation process makes it possible for users of the data base materials to be the producers of these materials. Schools and colleges are assumed to want to test materials that have been designed specifically to meet their own curriculum objectives. They create the materials; they use them; they evaluate them. TVOntario participates in the process of creating data base materials in much the same way, having its own courseware objectives, designing and inputting its content, and evaluating the result. In proceeding in this way, we expect to clarify and to lay a foundation for our future role as a designer and distributor of Telidon courseware.

Future Plans

We operate in the field of educational communications, under a mandate to make available educational opportunities to the people of Ontario in whatever part of the province they may reside, and under whatever roof — the school, the home, the plant. Our principal arm has been the TVO network, and our principal service has been educational television. We are therefore particularly interested in exploring broadcast Telidon for its capability of extending the scope of educational opportunities using the existing broadcast facility and its extensions via satellite.

If we are to make considered decisions about the utility of broadcast Telidon, we must learn all that we can about the system. We are therefore studying, and in some degree contributing to, the evolution of the technology itself — its present performance levels with respect to reliability of transmission and ease of levels with respect to reliability of transmission and ease of access by the user to data base content.

Because Telidon can be "piggy-backed" on a television signal, not only can the carriage of Telidon pages be provided free, but a number of other possibilities emerge. We are interested, for example, in exploring the relationship of the Telidon cycle of pages to the television programs that are being transmitted at the same time. Captioning is one possibility, but equally interesting to an educational agency is the prospect of programming the Telidon cycle so that at least some of the content relates to the TV program that is being transmitted or that has just been viewed. Theoretically, the option could be provided for the user to switch from television to Telidon at the time of the broadcast, or alternately, to capture the related Telidon cycle in local memory for follow-up later on. Again in theory, there is no reason why such material could not be received and/or retained in a million homes all at the same time, something that would present important traffic problems on a wired distribution system.

It is possible to argue persuasively that the distribution system of the future will be a mix of broadcast and wired networks. One interesting prospect is the ability to use wired connection to a host computer in order to place requests for information to be transmitted by broadcast. The request would occupy the long-distance line for only a few seconds, but it could release for short term broadcast an entire set of pages that the user may wish to capture in memory and review at leisure.

Content

Whatever the degree of sophistication achieved by the delivery systems of tomorrow, the central question of what content is carried on the system will remain. As modem connection makes possible intercommunication between microcomputers, it is conceivable that the principal content carried on the telephone system will be messages generated for the occasion, whether electronic mail or learning exchanges between individuals, including the professional teacher and the enrolled student.

Even assuming that to be the case, there will still be the requirement for quality data bases that have been developed to serve the educational purposes of the community. Who is to create those data bases is one of the central issues, as is the question of how production is to be funded.

The field trial TVOntario has been conducting has provided one model of a collaborative approach to creating data bases. Schools, colleges, and universities have been invited to participate in an exploration of educational applications of Telidon on a barter basis. TVO provides expertise and facilities such as page-creation and user terminals, and the participant creates a data base sequence and tests it in the field. All of this — training, production, evaluation — takes time. And time is money. Within the time-frame of the field trial, the necessary resources spring from the needs of all parties — the Department of Communications, TVOntario and the participating educational institutions — for reliable information that will help shape development. The immediate return on expenditure is the laying of a foundation on which to build. From the user standpoint, part of that foundation is an educational data base that is emerging from the flowing together of the separate efforts of the participants in the field trial.

I put it to you that in the time-frame that stretches beyond the field trial to the day when educational Telidon services are in place, there is something to be said for a similarly collaborative approach to data base development. I have no recipe for how that might be worked out on a grand scale. But I perceive that there is a need for quality materials that closely reflect the curriculum objectives of Canadian communities — lots of materials, and soon.

John H. Syrett is the manager of the Telidon and Education Project being run by the Ontario Educational Communications Authority in Toronto.

Update

Math Wise Series On Line for Fall

Alberta, Ontario and Quebec are showing a new ninth and tenth grade math series produced by the Agency for Instructional Development to help students recognize the important connection between mathematics and life.

Twelve, 15-minute programs are organized into four modules — measuring, comparing, locating/interpreting and predicting. Each program includes a documentary and a dramatic segment. The documentaries introduce mathematics skills and illustrate their use in everyday situations. The dramas show teenagers using the skills to solve problems.

This new series, called "Math Wise", has been sponsored by a consortium of 25 agencies including EXXON Corporation and the Shell Companies Foundation.

Copyright Update

André Ouellet, Minister of Consumer and Corporate Affairs, and Francis Fox, Minister of Communications, said today that they have requested their departmental officials to work closely together to prepare legislation proposals to revise Canada's Copyright Act within the next 12 months.

The Ministers said they both regard new copyright legislation as an urgent priority, in view of contemporary cultural conditions and technological developments.

The existing Copyright Act came into force in 1924. Although it has been amended several times, it has not been substantially revised since its adoption.

"There has been considerable examination of the issues that need to be addressed by new copyright legislation," Mr. Ouellet and Mr. Fox said in a joint statement. "Creators, users of copyright materials and the general public have had opportunities to present their views through briefs and consultation with federal government officials, and their views have been carefully examined by the Interdepartmental Copyright Committee. Most of the necessary groundwork has been completed, and it is now time to proceed with the task of preparing legislative proposals."

Of Interest

International Association of School Librarianship Annual Conference
Red Deer, Alberta
Aug. 1-6, 1982

This conference provides an opportunity for librarians from around the world to share their experiences. Proposals have already been received from England, Japan, Australia and the United States.

A post conference study tour will begin immediately after the conference and explore the Banff National Park and Lake Louise areas.

For further information contact:
John G. Wright, Chairman
Faculty of Library Science
University of Alberta
Edmonton, Alberta

Resources in Context
Association for Media and Technology in Education in Canada
June 6-9, 1982
Winnipeg, Manitoba

Presentations and papers on the use of materials and resources in education are requested for AMTEC '82. Among the topics to be considered are copyright, television awareness, videotape, computer literacy, etc.

For further information, contact:
Mr. Gerald Brown
AMTEC Conference Chairman
1180 Notre Dame Ave.
Winnipeg, Man.
R3E 0P2

People Like You and Me
International Council for Educational Media
Film/Video Competition

Students are encouraged to participate in an international competition in visual language productions, particularly the production of a film or videotape. The competition is open to all ages from primary students to persons in teacher training institutions. All shows must be contemporary in theme and be understood without words.

For further information, contact:
Hans Kratz
ICEM Project
Alberta Educational Communications Authority
502 - 10053 - 111 St.
Edmonton, Alberta
T5K 2H8

Vancouver Offers Publications for Sale

The Vancouver School Board Library Services has announced that some of their publications will now be available for sale. For five years the VSB Library Services has provided materials on an *exchange* basis with district coordinators and university faculty; this will continue so long as the service is reciprocal. Publications are offered for sale at cost to others. The Vancouver School Board Library Services offers for sale only those publications and services which do not appear to be available commercially.

Subscriptions

The *Curriculum Resources* Series provides annotated lists of recommended materials and services on specific curriculum topics. Approximately 8 times per year. Available for $15 prepaid, September - June only.

Recommended Media summarizes reviews of audiovisual materials appearing in the major reviewing journals. On 3 inch x 5 inch cards arranged by Dewey classification number. Approximately three mailings per year. $20 prepaid for calendar year.

The *KWIOC Index* is an annual computer-produced index to periodicals used in secondary schools but not indexed in the *Canadian Periodical Index, Readers' Guide to Periodical Literature,* or *Index to Free Periodicals.* $10 prepaid for calendar year.

Single Items

Approximately 400 *Cross Reference Cards* are available *in French* for French language collections. $15 prepaid, including periodic updates.

Find Out About Canada! is a resource-based cooperative teaching unit in secondary social studies. A learning stations approach to Canadian reference materials with questions at the easy, average and difficult level for forty titles. Answers and suggestions for grading included. Revised edition, 1980. $4.50.

Finding The Facts offers a learning stations approach to reference materials for senior business education. Developed and taught cooperatively by teacher-librarians and classroom teachers, the unit includes questions at the easy, average and difficult levels for 28 titles. Answers and grading included. 1980. $4.50

To order:
Resource Materials
Program Services
Vancouver School Board
1595 West 10th Avenue
Vancouver, B.C.
V6J 1Z8

Health Videotapes Win U.S. Awards

An Ottawa-based health education company has taken first prize and three honourable mentions in the video competition of the 23rd annual American Film Festival, held recently in New York City.

The prestigious Blue Ribbon Award was presented to executive producer Robert Abelson, president of Take III Health Education, for "The Stomach Story".

Take III Health Education produced the award-winning 14-minute colour video cassette in association with Patrick Lee/Sloth Enterprises of Toronto and independent Toronto directors Jay Sampson, Graham Parker, and Rupert Macnee. "The Stomach Story" was written by Doug Lavender of Toronto and Julie Voyer of Ottawa, and used the talents of Ottawa puppeteer Noreen Young.

Aimed at six-to-ten-year-olds, the production uses puppets — one of which has a stomach ache — to explain the digestive system, digestion, elimination, and the common causes of stomach upsets. The body organs "speak for themselves" from their positions inside the lifesize, if somewhat fanciful, Magnificent Body Model.

In the same Health category, Take III received honourable mentions for "Fitness Fun" and "Good Eatin' ". Honourable mention was also given to "Families: Growing and Changing" in the family relations category. All are 14-minute, broadcast quality color video productions.

"We submitted only these four entries," says Mr. Abelson, "and every one was cited."

The productions are part of Take III's HealthWise library, a series of 13 video cassettes that deal with various aspects of health — from allergies to emotions — for children. The series outlines the general principles of healthy body mechanics and disease states; promotes healthy attitudes and habits; aims to instill confidence in medical staff, adults, and the family; and promotes the concept of the uniqueness of the individual, especially in development.

All the HealthWise productions use a combination of puppets, animation, line drawings, and live action.

For information on obtaining these videotapes:

Communications Consultants
331 Cooper Street
Suite 703
Ottawa, Ont.
K2P 0G5

Computer Helps Media Bookings

Larger collections of resource materials including more films, more slides, and more videotapes have increased the circulation problems of media centres. A variety of commercially made computer programs have been developed to assist in solving circulation tangles. One such program was developed by Gordon Molnar & Associates and is used in many Ontario centres.

Certain basic assumptions have been made when designing computer software for use in media centre bookings. One is that most school boards have a media centre for storing, promoting and distributing films, and that these centres produce catalogues which give a brief synopsis of films/audiovisual equipment available for distribution in local schools. In turn, these schools will book films/audiovisual equipment by various methods (mail, telephone or pick-up) with the responsibility for distributing and controlling the films delegated to one person within the school, frequently a librarian, secretary or teacher.

Using a commercially developed film and booking equipment booking system, a school is able to call in to a board's media centre where an operator with a telephone headset is seated at a terminal on-line to a computer. The operator keys in the booking request and an instant confirmation of that booking, cancellation or denial appears on the screen for instant relay to the caller.

Thus the person calling in knows exactly the status of the material; it is no longer necessary to fill out order forms or wait a period of time before learning whether you are going to get a particular film or piece of equipment you ordered. Instant confirmation, or denial, is the basic key to the success of the new software system.

The set-up of the system requires the initialization of data files; from that point, the software handles the normal day-to-day operation. The three files are (1) film and equipment master file; (2) holiday file; and (3) cost centre file.

The film and equipment master file can contain the following information: film or audiovisual equipment number; title/description (can include model number and serial number); status codes (N - New, S - Sold, P -Used for parts, M - missing, D - damaged, W - withdrawn); purchase date; purchase price; disposal date; selling price; current year code; booking summary (by each week of the year); current year data (bookings, cancellations, denials and negotiations statistics); and subsequent year data.

The system provides the flexibility to allow boards different ways of numbering their films and equipment, and this usually depends on how their media department catalogues are set up. For example, some will have three copies of the same film and may number them 1020, 1020A, and 1020B. Others may have duplicates of the same film with entirely separate numbers — in this case the software is programmed to "point" to the second copy (number) of the film if the first is fully booked.

By entering the purchase price of film and audiovisual equipment a board always has a total value available for insurance purposes.

With the holiday file, a board can enter a maximum of 60 school holidays for a given year, and the system will not allow a booking, return, or pick-up on a school holiday.

The cost centre file simply identifies the schools that come within the board's jurisdiction — school number, address, postal code, etc.

Nigerian Project Seeks Assistance

Arthur Shears, former media specialist at Holland College, Prince Edward Island, has assumed a position with A.R.A. Consultants on a project in Ilorin, Nigeria. This World Bank sponsored project is involved with the establishment of the Agricultural and Rural Management Training Institute (ARMTI); ARTMI will play a key role in the Nigerian Government's overall development strategy. Initially the Institute will concentrate on traditionally delivered, short courses in management but plans do include possible expansion into distance education. In terms of programming, the ARMTI project will be developing courses in agricultural management, project planning and evaluation, financial management and organizational behaviour.

A number of institutions in Canada have developed expertise in program development, packaging and delivery of courses in agricultural and other related areas. ARMTI would like to hear from any of these institutions, with a view to possibly setting up an exchange of information and/or sample materials. Of interest are such items as: research reports, program development reports and evaluations, reviews of various instructional delivery systems, annual reports, printed and audiovisual materials catalogues, price lists, etc.

Please forward all information:
ARMTI-2
A.R.A. Consultants
151 Bloor Street West,
Suite 701,
Toronto, Ontario
M5S 1S4

Reviews

Richard F. Lewis

Serafini, Shirley and Andrieu, Michel *The information revolution and its implications for Canada*, Hull, Quebec: Canadian Government Publishing Centre, 1981, 113 pages, $4.95.

As professionals in the field of communication, we will have to learn more about the field of information, storage and retrieval. The book, written by people at the Communications Economics branch of the Department of Communications in Ottawa, places considerable emphasis on the economic impact of the information revolution. It considers the economic ramifications of the information revolution on a wide range of areas in Canadian society; but implications unrelated to economics are given only minimal coverage.

This book does not give in-depth coverage on why the information revolution is occurring. Although the subject is mentioned, the reader would be wise to consult *Gutenburg 2* by Godfrey and Parkhill (Porcepic Press, 1979) for detailed information. It does, however, contain an excellent chapter on the implications of the information revolution. It also suggests an information plan for Canada. In this review, I would like to deal with the impact of the information revolution on Canadian sovereignty, on the individual, and on the Canadian economy. I would also like to briefly describe the proposed plan for dealing with the effects of the information revolution on Canada.

One principle is repeated frequently in the book: the information revolution is unavoidable, but by planning and concerted action, Canada can realize economic and social benefits and can avoid undesirable effects.

Sovereignty

Canada has been trying to assert its sovereignty in a number of ways, including the development of Canadian learning materials and television content regulations. The authors of this work suggest that the advances in technology wil make Canadian sovereignty more difficult to maintain. Improved telecommunications techniques will increase public access to U.S. television programs, thus decreasing viewing of Canadian materials. In data processing, improved digital transmission techniques mean that Canada could find itself using U.S. central computers for data processing. This means that databanks could be based in the United States under American legal regulations rather than in Canada. The expansion of videotex may mean that U.S. sofware producers could flood the Canaian market making Canadian content less desirable.

How realistic are the authors' perspectives? Canadians now watch more U.S. television than Canadian. In addition there is evidence to suggest that Canadians prefer to watch U.S. television. This point naturally raises the question of whether the global village created by the information revolution will leave room for any single country's culture.

In terms of data processing, we can be reasonably sure that the forecast will be accurate, because of the increasing trend to centralization. Centralized databanks demand much financial backing thus indicating the United States as a site. In the field of videotex, the adoption of the Telidon standard by the U.S. indicates that Canadians could be overwhelmed by American-made Telidon pages. As a result, we could have the latest Canadian technology educating with an American brain.

Effects on the Individual

The individual Canadian is likely to be affected by the changes in a number of ways: threats to privacy and artificially imposed isolation. Increased interconnection of databanks and sharing of information on individuals may mean that a person's records will be accessible to a wide range of users with many interests.

Electronic surveillance of workers using electronic devices such as cash registers could also become a problem. Systems used to control sales and inventory could easily be modified to monitor individuals. Safeguards regarding storage and access to information will have to be developed to avoid invasion of privacy.

People in our society could become electronic hermits, connected to the outside world only through their Telidon terminals. They could learn through distance education, shop through catalogues, write using text processors, and bank through electronic funds transfer systems without ever leaving home. Although this scenario may be appealing for Canadians in February, the implications for social interaction are grave.

The book places too little emphasis on privacy and individual rights. The title leads one to believe that the implications of the information revolution will receive attention. However, it stresses the economic and merely scratches the surface of the personal and social implications.

Effects on the Economy

Most of the book focusses on the effect of the information revolution on the economy. Its effects on workers, design, engineering and production is presented in some detail. Specifically, the information worker will see changes in job tasks and output. Increased productivity will mean that fewer but more highly trained professionals are needed to perform the same tasks. Reduced employment could be counterbalanced by increased demand for information. The authors suggest that increased leisure time may increase the desire for educational materials thus stabilizing the demand for information workers.

One chapter deals with the experience of Japan, Sweden, the United Kingdom, the United States and France in dealing with the information revolution. Each country's production techniques are analyzed and estimates are made on the economic impact of the information revolution. Production of information machines, data processing equipment, information electronics and software are discussed. The authors consider Canada with its advanced technology in satellite communication, cable television and switching and transmission techniques could take a leadership role in transferring technology to other countries.

The topic of economics is the strength of this book. The reader seeking information on the implications of the information revolution on Canadian business will certainly find a great deal of useful information here.

Action Needed

The book calls for action from government and private sources to develop an information plan for Canada. Critical to the whole process is the application and diffusion of information technology throughout every sector of the economy. People will have to use more of the potential of information technology in every phase of their lives from learning to employment and use of leisure time. Diffusion to ever sector of the economy will mean increased employment in design, engineering and production areas of information technology and will also allow for the development of expertise useful in exporting technology. The authors suggest that Canada should encourage applications for information technoloy in areas where Canada has a competitive advantage. New information-producing companies should be nurtured and protected. Workers will need to be retrained while civil liberties are protected.

In the proposed plan of action the authors assume that Canada should adopt the new information technologies because of the potential benefits. However, the economic benefits may mean that a number of undesirable effects on the individual and on the society will result.

Professionals in a variety of fields, especially those of us in communications may need to challenge the assumptions made by the authors. We will need to ensure that civil liberties are protected. We will need to ensure that decisions in the field of communications will benefit individual Canadians and not just established shareholders in business and industry.

The book is well worth its purchase price. We need to know more about the issues raised by the information revolution. Only through knowledge can we deal intelligently and effectively with the inevitable changes in society.

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