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ABSTRACT

Summarized are the proceedings of the Special Study Institute, attended by directors of special education and of educational communications, and by teachers of emotionally handicapped children. Several projects in the fields of special education media were presented and reviewed, illustrating innovative approaches to teaching emotionally handicapped children. Presentations covered computer-based instructional units, use of media by teachers, the talking typewriter, computer-assisted instruction, analysis of student behavior via closed circuit television, and implications of educational television. Also included are the keynote address by Raymond Wyman and a discussion of the Special Education Instructional Materials Centers (SEIMCs). (KW)

CONFERENCE HIGHLIGHTS

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"THE ROLE OF MEDIA IN THE EDUCATION OF EMOTIONALLY HANDICAPPED CHILDREN"

NEW YORK STATE EDUCATION DEPARTMENT
DIVISION FOR HANDICAPPED CHILDREN
In cooperation with the
BOARD OF COOPERATIVE EDUCATIONAL SERVICES
FIRST SUPERVISORY DISTRICT, SUFFOLK COUNTY

APRIL 22-24, 1970
PERKINS INN, RIVERHEAD, NEW YORK

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NEW YORK STATE EDUCATION DEPARTMENT
DIVISION FOR HANDICAPPED CHILDREN

In cooperation with the
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PRESENT CONFERENCE HIGHLIGHTS

"THE ROLE OF MEDIA IN THE EDUCATION OF EMOTIONALLY HANDICAPPED CHILDREN"

APRIL 22-24, 1970

PERKINS INN

RIVERHEAD, NEW YORK

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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FOREWORD

This publication summarizes the Proceedings of a Special Study Institute held in Riverhead, New York - April 22-24, 1970, under the sponsorship of the Division for Handicapped Children, Section for Emotionally Handicapped Children, New York State Education Department, and the Board of Cooperative Educational Services, First Supervisory District of Suffolk County. This Institute was funded through Section 301 P.L. 85-926, as amended, United States Office of Education.

The purpose of this Institute was to bring together directors of special education, directors of educational communications, and teachers of emotionally handicapped children, for the purpose of investigating, "The Role of Media in the Special Education of Emotionally Handicapped Children."

To achieve this purpose, several noteworthy projects in the fields of special education media were presented and reviewed for the entire group. These projects and presentations mainly dealt with new and innovative approaches to teaching emotionally handicapped children. Television and the computer were two of the more predominate "newer media."

Thirty-three participants from Nassau and Suffolk Counties attended this 3-day Institute. These participants had a variety of backgrounds in the area of media. All, however, expressed a keen interest in all of the presentations.

Each individual presentation was evaluated by all participants. A composite of each evaluation is published in this report as well as an overall Institute evaluation.

ACKNOWLEDGEMENTS

We wish to thank AV Communications, Inc., of Farmingdale, New York, for the loan of audiovisual equipment used in various presentations.

We also wish to thank Miss Diane Moshier for her assistance in the preparation of the preprogrammed materials, institute registration, and preparation of these Proceedings.

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OPENING REMARKS

Vincent King, Assistant Superintendent
Board of Cooperative Educational Services

When we were asked by the State Education Department, and especially Charley Matkowski, to cooperate with the Department in arranging this program, we were more than anxious to do so. We saw this conference as a real opportunity to work not only with representatives of the State Education Department, but with people from all over Long Island and other areas in developing and discussing methods of planning new techniques for educating emotionally handicapped children. I would like to compliment Ed Peterson for the great work he has done in planning this Institute. We would like to thank you for your participation in these meetings and we hope that you will find all of them to be a rewarding experience. Once again, it is good to see you here and thank you for coming.

INTRODUCTORY REMARKS

Theodore Kurtz, Associate in Education of Emotionally Handicapped
State Education Department

On behalf of the Division for Handicapped Children of the State Education Department, I welcome you to this Special Study Institute. We appreciate the cooperation you have given us thus far in the planning of the Institute. Your respective superintendents have expressed their confidence in this type of professional development by endorsing your participation. The planning committee has attempted to develop a format which will make the next 2 days worthwhile for all of us.

This conference is about "media." Among several definitions of "media" offered in my dictionary is one which says simply "go-between." And this is how the Education Department views itself in this instance. The Federal Government has allocated money to each state for preparing professional personnel in the education of handicapped children. We are intermediaries in putting available dollars to use. Programs for handicapped children rise or fall on the strength and skills of teachers. Teachers and the skills needed to do the job are the focus of this meeting.

The past decade focused much attention on innovation. We were promised that curriculum was to be infused with new content. Students were to have tailor-made lessons individually scheduled and taught by computers. The 70's are here and where are the promises? Well, the thrust of the new movement has been somewhat blunted by the reality that education - in any form - is a very expensive proposition. Although we have the knowledge, "Our knowin' is way ahead of our doin'."

During this conference, we will be learning more about and discussing some of those tools being used somewhere, by someone with a certain degree of effectiveness. Just how any or all of these fit into your particular situation is for you to decide. We are not making judgments as to what you should or shouldn't be using in terms of hardware or software. Chances are, while this conference is in session, someone, somewhere will be developing something new which may replace things we haven't even had a chance to try. Change is one of the few things we can depend on now-a-days. Being prepared for change; being receptive to new ideas; being ready to try something different are the imperatives for the 70's.

We don't need conferences to provide clues as to what might be coming. A casual reading of the daily press gives us some glimpses. "Walk through walls" were recently mentioned in a press release. By focusing two projectors in a special way in mid-air, images such as walls can be made to appear in space. Hands or objects can pass through such images as if they were not there - but they are as much a barrier for the eye as a real wall. To create an acoustical barrier, experiments with ultrasonics indicate that currents of high-frequency sound waves can be used in conjunction with visual barriers using the principle of holographic projection to shut out sounds. Carpeting has been developed with low voltage wiring woven into it making it possible to plug-in anyplace on its surface. A chair has been developed which makes it possible for blind persons to "see." Images translated into electrical impulses are transmitted through a plate on the back of the chair on which the blind person is seated. The impulses create a picture which the blind person feels and interprets.

These are the kinds of things that may eventually alter our 2 x 4 x 6 way of approaching education. That is, education from between two covers of a book, inside four walls of a classroom, using six prepared lessons per day.

I hope this conference will be a stimulating experience for you. One ingredient I personally consider vital is the opportunity for teacher-to-teacher contact. Your conference director, Ed Peterson, has put together a staff of experts who have many interesting ideas to share with you. My own feeling is that opportunity for teachers to share problems and compare notes is a vital and rewarding part of any conference. The groups will be small. By design, the atmosphere of the Conference will be open and informal.

During a given year, the Division for Handicapped Children runs many conferences like this. We try to improve each one. We depend on the responses of the participants to give us direction for future conferences. While we do appreciate hearing nice things, remember that the most unkind thing you can do is fail to record your dissatisfaction. We are depending on your candid evaluation. This is the only way we can assure that similar mistakes will not be repeated in future conferences. Hopefully, dissatisfactions can be kept to a minimum. Mr. Matkowski and I look forward to being with you during the next 2 days.

Best wishes for a good conference.

KEYNOTE ADDRESS

Raymond Wyman, Director of the Northeast Regional Media Center for the Deaf

Introduction

The Northeast Regional Media Center for the Deaf is one of four regional media centers for the deaf and 14 special education instructional materials centers set up by the Bureau of Education of the Handicapped of the United States Office of Education. The regional media centers operate under the Division of Educational Services and the Special Education Instructional Materials Centers operate under the Division of Research. All of these centers are designed to provide a great variety of media support for the education of handicapped children and youth.

All of the centers are trying to identify and provide for the special needs of handicapped children. The needs of handicapped children are similar to, but differ in degree, from those of "normal" students. The education of normal children requires a curriculum, teacher, classroom, equipment, materials, language, grouping, interaction, timing, and caring. Handicapped children need special kinds and amounts of each one of these parameters. It is the aim of the RMC/SEIMC network to provide for these special needs of handicapped children and youth.

The Northeast Regional Media Center for the Deaf in Amherst, Massachusetts has more or less typical activities and resources. We engage in research, development, demonstrations, evaluation, publication, a summer media institute, teacher training, and consultation, all related to the education of deaf children in our area. Our resources

include a professional staff, a support staff, a network connection, a relationship to the special education resources at our University, a professional library, a media laboratory, equipment, and space, all related to the needs of deaf children in our area.

Teaching and Learning

If teaching is defined as the guidance of learning activities, then we are organized to provide as much support as possible for the improvement of teaching handicapped children and youth.

Who wants good teaching? Apparently good teaching has joined the ranks of motherhood, good weather, and low taxes. Everyone seems to be in favor of it. Taxpayers, school boards, parents, school administrators, and even students have taken an interest in good teaching. It seems as though during much of my career good teaching was completely ignored. This is no longer so. People are not only interested in good teaching, they are demanding good teaching in a way they have never demanded it before. It is now essential that all those involved in the teaching-learning process involve themselves in improving the process. We can no longer blame the students for lack of learning. We must blame ourselves for not providing optimum teaching related to the peculiar handicaps of the students for whom we are responsible.

To have good teaching, we must first start with a good teacher. What makes a good teacher? The teacher must obviously have the skills, attitudes, ideas, appreciations, facts, principles, interests, and concepts that are to be taught. There is no substitute for scholarship or grounding in the subject to be taught. Most of my university colleagues would stop here, but you know better. We all agree that a

good teacher must be able to demonstrate, dramatize, explain, illustrate, listen, observe, evaluate, and question appropriately if an optimum amount of learning is to take place. There are many more teachers who fail in communications skills than fail in the academic skills.

Educational Goals

The typical goals of education have been stated as knowledge, understanding, attitudes, appreciation, values, and skills. These are certainly laudable goals, but they are almost impossible to measure, record, and report accurately. In other words, we do not know when we have attained our goals.

We have made a great deal of progress in recent years by defining learning as behavior modification. We are trying to change our students in desirable and observable ways. We determine the behavior that our students have at the beginning of a unit of work. We then describe the kind of behavior that they can exhibit enroute toward the terminal behavior that we want them to exhibit at the end of a unit of work.

Changing students in desirable and observable ways turns out to be a most difficult job. We fail far more often than we succeed. It is essential that we determine and use the most effective means for changing people that we can find.

Let's look at the teaching-learning process in a little more detail. The teacher already has the behavior that we want the student to have. The teacher must encode his behavior in some form that can be exhibited to the student or group of students. The code used must then be presented to the senses of the students. The students must perceive the presentation prepared by the teacher. The students must then decode the coded

information that has been presented to them. From the decoded information, the student should then react by duplicating the teacher's behavior. The teacher observes the reactions of the student (feedback) and adjusts the next presentation to complement the previous presentation and the reaction of the students to it.

Communication

The code used for so much of the presentation in our classrooms is entirely verbal or based on words. You have perhaps heard teachers referred to as the BTF or Big Talking Face.

Words for communication have many things to recommend them. They are so easy to produce, so easy to store, so easy to transport, so easy to reproduce, and, of course, they have a great deal of academic acceptance. On the other hand, words cause many difficulties for students, particularly if they are handicapped. Words may give no clue to their meaning. They may cause referent confusion. Different words sound exactly alike or almost alike. Words may be taken out of context. Many handicapped children have poor auditory discrimination. Other handicapped children have difficulty in pronouncing words accurately, and we live in a world of idioms and double entendre. Normal people have developed a complex usage of the complex English language that proves most difficult for handicapped students.

Clever teachers for many years have been trying to improve their presentations to students by using communication devices in addition to or as a substitute for purely verbal communication. They have found that such devices increase interest, increase communication, and result in better retention. Good teachers have made wide use of demonstrations

to show a process, drama to show human action and reaction, flannelgraph to develop an idea, bulletin boards to emphasize and remind, chalkboards to combine spoken and written materials, field trips to take children close to reality, and they have suggested all kinds of out-of-class activities to try out skills and ideas.

But all of these traditional teaching methods are inadequate to communicate the complex modern curriculum within the confines of the existing school situation. We must find other ways of communicating with our students. Educational media provide us with a prescription for improving the education of today's students. Medium (singular) or media (plural) can be defined as that which lies between or intervenes or through or by which anything is accomplished, conveyed, or carried on. We think of media as communication devices that help us to transfer the goals of education or the curriculum to the students. Traditionally words have been used almost exclusively in the teaching-learning process. Certainly word usage is essential; but during the learning process, it will prove very advantageous to combine the words with audio and visual devices that will bring meaning to the words.

Role of Media

Today's teachers then must understand the characteristics, capabilities, applications, and implications of media to their particular educational needs. Media are rather rapidly moving from an optional, supplementary, and portable nature to a required, integrated, and permanent nature. Teachers traditionally taught without media. Teachers are now very commonly teaching with media and many experiments are going on in which the teacher is actually within the media. Students outside

of class learn a great deal by means of media. It is long overdue that formal education be as interesting and understandable as out-of-class communication.

The technological revolution has made available to education a great many devices that communicate through the eye and ear. For normal children we have drawn beautiful graphs that indicate about 85 percent of learning takes place through the eye and about 10 percent of learning takes place through the ears. With handicapped children, this division of learning attributed to the senses may be entirely misleading. The teacher of the handicapped must determine how each child can best learn and provide appropriate learning materials.

Many devices are currently available for communication through the visual sense. Horace Mann said a hundred years ago, "Some simple apparatus employing the eye more than the ear will be found." Many new devices fit this criterion.

The overhead projector has become an almost universal device for teaching handicapped children. We can write on a clear sheet of plastic with any of a number of markers so that every child can see everything that is written in a lighted room with little difficulty for either the teacher or students. A variety of easily-used copying machines make it possible for a teacher to convert images on many kinds of flat-paper, printed materials directly to transparencies. These transparencies in turn may be pointed to, marked on, cut up, and used in a great variety of ways. Thousands of commercially-prepared masters are available for conversion to transparencies on the spur of the moment. Commercially-prepared statics and overlay transparencies make it possible to emphasize and explain particular points. Various projects including the Northeast

Regional Media Center have produced a large number of very simple transparencies to be used in education of the handicapped. Our teachers tell us to avoid all unnecessary complexity, show just the essential characteristics of things to be taught, leave us a great deal of space for completion and labeling, give us many examples to show the peculiar characteristics of peculiar things, provide us with visuals that can be manipulated, provide us with visuals that require a response from the children at frequent intervals. Our Center has distributed thousands of transparencies that, hopefully, meet these criteria.

Until recently, all visuals for overhead projection were prepared by the diazo or thermal-copy method. Recently, many commercial printers have learned how to print directly onto acetate with their high-speed presses. Beautiful and durable transparencies are now available at very low cost. There seems little excuse for not flooding the handicapped child with visual impressions today.

Good teachers, of course, must go beyond the mere exposure of visual materials with the hope that learning will take place. Teachers must guide the children as they look so that they will see, perceive, and conceptualize properly.

Opaque projectors permit the reproduction of nontransparent materials on a screen. Unfortunately, opaque projection requires a very dark room compared to the completely-lighted room for overhead projection. With this limitation, teachers of the deaf lose all contact with their students and seldom use opaque projection.

Filmstrips are available by the thousands and provide the least expensive and complex way to include quantities of full color pictures for students to observe and discuss. Filmstrips are so inexpensive that

we can afford individual school libraries of them close to every teacher. Media services and captioned films of U.S.O.E. has contracted for the production of many specially-captioned filmstrips for the deaf. Most of them would be equally useful for other handicapped children.

Every teacher of the handicapped should have a small camera available for the preparation of 2 x 2, colored slides. The complexity of taking high-quality transparencies that many teachers remember is no longer an excuse for not adding 2 x 2 slides to practically every unit taught. Commercially-prepared 2 x 2 slides are also available at every place that tourists frequent. Many experiments have indicated that 2 x 2 slides can also be made by children of all ages and used in student-led reports and discussions.

The old lantern slide type of visual should not be ignored. Much of the material included in newspapers and magazines can be copied with thermal-copy machines and projected for easy viewing with lantern slide projectors. Type that is too large for 2 x 2 projection and too small for overhead projection is just right for lantern slide projection. Continuous tone photographs can be made with polaroid materials.

Children, of course, like materials that move on the screen. Thousands of commercially-prepared motion pictures are available. Media services and captioned films has specially captioned many of them for deaf children to see. The new Super 8, fully-automatic cameras make it possible for any teacher to include locally produced motion picture films in his classroom. There is some confusion about 8mm at the present time. Although Super 8 film has been completely standardized there are a great variety of methods for packaging and projecting it. It appears as if some standardization in 8mm cartridges is in the near future.

Modern television equipment makes it possible for any number of students in any number of locations at any number of times to see a realistic re-creation of what a student in the front row center would normally see. Many experiments indicate that children themselves can carry portable television recording equipment to anything of interest to them and bring back sound and pictures for display and discussion with their peers. One of my doctoral students is creating a new curriculum for urban children based on their own perceptions of the community and its people as recorded on video tape by themselves.

Many devices based on audio alone are also available to the teacher. Most of these are less expensive and less complicated than devices that produce visual images, particularly if they move.

The audio tape cassette system is revolutionizing audio recording. The cassette and its associated recorder-playback system can be very portable. It is easy to record and reproduce any sound associated with the environment. School and classroom libraries of recorded sound can be easily accumulated. Many handicapped children need repeated exposures to learning material. Recordings make this repeated exposure easy and inexpensive. Cards with a strip of audio tape such as the Language Master make it possible to match a great variety of visual materials to the associated sound. Many handicapped children are spending some time each day with audio cards that require a verbal response and permit a comparison between desired sound and imitated sound. Experimentation with binaural or stereo sound is being conducted in several schools. If we can get increased attention and increased learning, the greater expense may be well worthwhile. Wireless listening systems are installed in many rooms so that students will not be tethered

to a system and so that some students can be listening to audio materials without interfering with the learning of children who are doing other things.

Programmed instruction has proved particularly valuable for handicapped children. Lessons prepared in small steps in a planned sequence for individual display and immediate response followed by immediate knowledge of correctness or incorrectness of the response have proved very effective. Handicapped children differ greatly in their rate of learning, and programs permit individual timing. Teaching machines were once associated almost universally with programmed instruction, but now most programing is done on paper materials that are handled by the children directly, rather than inside machines.

Although computer-assisted or managed instruction holds great possibilities for the education of handicapped children, there are large problems concerned with availability of materials in this form and the currently high expense associated with computers and individual terminals. We are all looking with great interest at the currently funded experiments involving computers and handicapped children.

Educational Settings

The great variety of new media that come to us courtesy of the technological revolution are being used in three important and identifiable educational settings called presentation, individual study, and small-group interaction. Education of the handicapped can well consider these three divisions as effective teaching strategies are mapped.

Group instruction has traditionally meant that one person stood up in front of a group of people and gave one-way, verbal presentations or

lectures. To make these presentations far more effective, a variety of audio and visual materials may be easily used. Large-group presentations involving overhead projection, amplified sound, still and moving pictures, filmstrips, and television are often more effective than small-group presentations involving only verbal and chalkboard materials. A usual limitation, however, is the lack of two-way communication or feedback unless special means are used.

Individual study traditionally involved students working by themselves with essentially printed or paper and pencil materials. Individual study has been revolutionized by the "wet" carrel in which individual students can choose any educational material that they wish to use and either read it directly or reproduce it with television, dial access, projection, tape recorder, record player, etc. The carrel has come a long way from its origin as a solitary booth for a medieval monk to meditate in.

Small-group interaction has traditionally meant a small group of students sitting around the teacher in a corner of the room for recitation on or discussion of a lesson previously studied. With older students it has meant a similar room with a group of perhaps a dozen students sitting around the table with their instructor. The Northeast Regional Media Center is revolutionizing small-group interaction with a device called Mediated Interaction-Visual Response or MIVR. We have about eight of these systems operating at various schools for the deaf across the country. In a MIVR classroom each of eight students has his own individual low-power overhead projector focused on the wall behind him. A corner of the room is used with four students on each leg of a "V" so that the teacher with his overhead projector in the center of the

"V" can see the image from each student overhead projector and each student can see the teacher's overhead image. Each student has a ruled-response transparency on his projector. After a lesson has been taught to a group or studied individually, the teacher and students gather at the MIVR system for interaction. The teacher can ask all of the students simultaneously to write, spell, select, match, oppose, identify, restate, simplify, analyze, synthesize, solve, diagram, draw, sketch, compose, color, complete, chart, or map anything related to the lesson. As the students together respond to every demand or query the teacher turns all the eight overhead projectors on simultaneously and scans the individual answers. If they are all correct, a word of praise is in order. Any answer that is not correct can be identified immediately and proper remedial instruction provided. Every student must respond every time so that each student gets approximately eight times the amount of activity that he would normally receive in an interaction session. No student finds out days later that he has learned something incorrectly. Handicapped children particularly need human reinforcement. We are trying a system involving only four of these low-powered projectors in a reading-readiness program with 4-year old, deaf children. It provides a great deal of practice with many variations of the "show me the ball" exercise.

Traditional teacher talents have included speaking, listening, reading, writing, and assigning. Media provided by the technological revolution enable teachers to extend and enhance their talents. With all the demands of the modern curriculum, they can demonstrate, emphasize, document, dramatize, analyze, illustrate, replicate, exemplify, counterpose, and synthesize educational experiences as they desire.

Media Demands

We have spent 30 years trying to add media to education without imposing any demands on the existing system. This has not worked well. The wide and wise use of media imposes conditions on the educational system that must be met. A good media program requires administrative support, professional assistance, technical assistance, community support, parental support, teacher training, time for preparation and rehearsal, a local equipment or hardware shop, a local materials library, a local production center, and room facilities. The last four need a little expansion.

Every school or school system needs a hardware shop that includes projectors, viewers, recorders, phonographs, amplifiers, and television equipment. It must provide such services as acquiring, storing, servicing, transporting, operating, and adapting audiovisual equipment. It probably should be in the charge of a trained technical person.

Every school needs a software library that includes books, films, filmstrips, transparencies, and recordings. It should provide such services as acquiring, cataloging, storing, maintaining, and retrieving all manner of educational materials that have been either commercially or locally produced. All materials should be in a single card catalog. A teacher looking for presentation material or a student looking for study material should not have to first determine in what form the information might appear. Some schools are calling their expanded software libraries a resourceteria, which seems to describe it very well.

Every school needs a local production shop for the production of specially-tailored materials to be used for unique purposes. The shop should contain cameras, recorders, duplicators, graphic devices, and a

hot press or laminator. It should have such services as photographing, recording, duplicating, drawing, and mounting materials. It should have the services of a trained graphics person.

Facilities are needed for the use of media in large-group, and individual study areas. Attention needs to be paid to outside light control, inside light control, electrical outlets, display area, projectors to be normally located in the area, conduit, audio equipment to be included, air conditioning, chalkboard, screens, and acoustics. Teachers need to be just as involved in designing the space they will use as housewives are in the kitchens designed or redesigned for their use. One of the projects that our summer media institute participants get involved in is the design or redesign of an ideal teaching and learning setting. They come up with some very interesting classrooms quite unlike some of the boxes that have been built for them by architects and lay building committees. Certainly every new classroom that we build for handicapped children must permit and encourage the use of a variety of media.

The best teachers of handicapped children are clever weavers of educational experiences. They have the resources and know-how necessary to put together educational experiences involving a wide variety of appropriate audio and visual materials strung together with their personal comments and questions. They consider the contributions that media can make when they are developing their curriculum rather than simply implementing a curriculum. They have demanded and obtained the support necessary to do an effective teaching job.

Climate for Innovation

Many old traditions in education are breaking down. Where once we

used primarily verbal symbols, we are now using a great variety of audio and visual symbols. Where once eight children was considered the magic number we are now teaching children individually and in a variety of groups. Where once we had a universal teacher who did everything for everyone, we now have a team of people; and machines are sometimes used as teaching devices. The universal room has given way to special rooms for special purposes. Media are moving from the periphery of education into an area of central concern. We just cannot accomplish acceptable results with the education of handicapped children unless we make use of the most powerful teaching devices that we can find.

At this point many educators wonder if we can really afford to provide all of the conditions for wide and wise use of media. Do we have an option? It might be well to consider what has been happening in practically every other area of human endeavor. There has been a revolution in equipment, materials, and settings. Education can be no different. We just cannot go on using yesterday's tools today and expect to have an acceptable product tomorrow.

Can we afford to teach handicapped children as well as we know how? The trouble with a cheap education is that we never stop paying for it.

Philosophy and Development of the National Network of Special Educational Materials Centers and Program - a taped presentation introduced by John D'Antonio, Director of Project TEACH

Mr. D'Antonio is involved in establishing an associate center in East Northport which will serve Suffolk County.

The Instructional Materials Network for handicapped children and youth may seem to be a complicated organization, which suddenly has sprung full-blown from the impersonal counsel of the Federal Government and which really has little practical value for teachers. Nothing could be further from the truth. The Instructional Materials Center Network is designed to become a permanent organization locally controlled and locally funded. It shall be guided by special educators to help them better serve the handicapped children. Network services are or will be available to every special educator in the United States. In 1964, two pilot IMC were funded by the U.S. Office of Education, one at the University of Wisconsin and one at the University of Southern California. These were supplemented 2 years later by another eight centers. In 1968 the Network consisted of 14 regional centers. In 1969, the four regional media centers for the deaf, which had been initiated by the captioned film for the deaf program in 1958, were included in the Network. These IMC collect existing IMC materials pertinent to special education. They catalog, retrieve, store, and loan such materials, publish acquisition lists and informational pamphlets, consult with teachers and student teachers, hold inservice meetings, help others initiate their own centers, and even attempt to produce items for instructional use. They promise to attempt materials evaluation and design. The media centers for the deaf

provide distribution of educational films and other media for the deaf, engage in film and filmstrip production and research, and train in use of media and programmed instruction for the deaf. These services were expanded in 1968 to include all areas of the handicapped. Early in the development of the IMC network it became obvious that each Regional Center could not adequately and efficiently serve everyone in its region because of the distances involved and limited numbers of staff. Nationally, it was determined that the problem could be efficiently met by developing affiliate centers readily accessible to the potential user. By 1969, 80 affiliate centers had been established and 300 to 400 professional staff persons were devoting their time to this program. Affiliate centers are viewed as extensions of the Regional Centers but are autonomous in nature and ultimately capable of operating independently. The Regional Center serves as a resource for the affiliate in a consultative, supportive, and training capacity. It is important to understand that the teacher is the primary client and that a broad range of services are available. A teacher may ask for a novel type of assistance and the Center may decide to incorporate such service into its routine. Thus the Network needs the teachers' help to grow and diversify. Teachers need the Network's help to serve handicapped students.

The unavailability of adequate instructional materials for use by the teacher in the special classroom has been a major barrier to the education of the handicapped. For the most part, the materials available to the teachers of the handicapped are those which have been developed for children with no perceptual learning or behavioral handicaps. These are available through the libraries of the instructional materials centers as well as materials designed with the handicapped child in mind. Lend-

ing materials is seen as an important function of an IMC, since it is the most immediate benefit to special class teachers and answers one of the persisting needs in a special class. The general policy of the centers is to lend books and other materials on a short term basis. IMC's do not supply materials for total school-year classroom use but give the teacher the opportunity to use materials and make judgments about future purchases. Because of the increasing variety of materials, methods, and pertinent research studies and an increasing attention to the concept of diagnostic precision or prescriptive teaching, computer search and retrieval will undoubtedly gain importance in IMC service. At the present time, the principal purpose of search and retrieval is to supply teachers, administrators, or classroom researchers with lists of shelved or cataloged materials, relevant to a particular need or problem.

The Centers, using three independently developed computer programs and compatible cataloging systems, perform search and retrieval operations by author, title, grade level, subject matter, activity level, and numerous combinations thereof. In place of traditional library card files, computers now print browser's catalogs making available listings directly applicable to the user's immediate interests. Research consultation is an available, but little used service offered by a number of Centers to special education teachers and administrators. This type of service is based on the fact that the special education classrooms and teachers are potential sources of needed practical information. The teacher as a researcher, is one of the concepts advocated by the Network to assist the teacher entering into some type of research activity or commitment. Centers will offer consultant services on basic elements of experimental design, measurement, statistics, and evaluation

of results. The classroom teacher is in a prime position to initiate materials development and design. The purpose of this type of service is to help and encourage the special class teacher to design and develop materials for his own particular situation. The Centers can help in the experimental creation of instructional materials which, if successful, would be available to all. As special funds become available to State departments and local districts, commercial producers adjust themselves to the production of materials for exceptional children. In some instances, instructional materials prove to be useful in teaching specific types and levels of handicapped youngsters the necessary concepts and skills to help make them productive individuals. Sometimes the results are less satisfactory. One basic responsibility of the special education instructional materials center is to act as an intermediary between the classroom teacher and the commercial producer. The IMC's serve as clearing houses and depositories of information in special education and make meaningful translation of this research to the classroom teacher and the commercial producer alike. The IMC's bring the producer of instructional materials and the special educator together on a common ground to exchange ideas, attitudes, data, and opinions about specific instructional tools. Through IMC's sponsorship of instructional materials demonstrations and workshops, teachers will be continually appraised about trends in materials development and the effective use of new and revised instructional material. All Centers in the Network recognize evaluation of instructional material as one of their services to special educators. Independent efforts of several centers have suggested approaches to the critical but difficult evaluative process. To date, most materials evaluation involves teacher groups, which use and discuss materials, to

arrive at a consensus on their effectiveness. Also being explored are empirical methods of using teachers' judgments and ratings and comparing these with the pattern of evaluation by supervisory or curriculum specialists staff. A significant portion of the direct services offered by all Centers in the Network relates to demonstration and display of material. Demonstrations are most often conducted either by Center personnel or by master special education teachers enlisted for that purpose. Video tapes are expected to further enhance the distribution of these services which is presently limited by the number of materials available for display and the amount of professional time for preparation and demonstration. Particularly effective video tapes will be reproduced and made available to all Network Centers for distribution throughout their Regions. All Centers are involved in an active program of offering conferences, special institutes, and inservice programs. Many inservice programs are related to preparation and use of materials as well as to application of learning principles, reinforcement contingencies, and other research fundings. An increasing number of administrators are involving IMC's in their inservice training activities. Institutes and conferences are another means of offering services to current and potential users of the IMC. All Centers have supplied speakers for a significant number of programs sponsored by other professional, public, and private agencies on local, regional, and national levels. Centers have developed publications for teachers within their region. They usually contain articles on special education, informative and educative articles, and discussions of materials. A national publication "Teaching Exceptional Children" devoted to instructional methods and materials for the special educator is published by CEC and the IMC Network. This

quarterly journal for teachers contains descriptions of instructional materials for exceptional children, articles on methods and materials in the special education classroom, evaluation reports of instructional materials, articles translating research results into classroom methods and procedures, reports of instructional materials developed by teachers, special bibliography, new product listings, and many more features for the practical-minded teacher. Two national programs, the Educational Resources Information Center (ERIC) and the Instructional Materials Center Network for Handicapped Children and Youth (IMC) in conjunction with the Professional Association of the Council for Exceptional Children (CEC), offer unique coordinated information dissemination to special education. Each of three programs (ERIC, IMC, and the CEC) contains operations which implement a cooperative plan for the identification, collection, packaging, and dissemination of research results and information on educational methods and materials. The ERIC Network, a program of the Bureau of Research, U.S. Office of Education, is a national information system which collects, stores, and disseminates information on education. Through a network of 19 specialized clearing houses, each responsible for a particular educational area, literature is acquired, evaluated, abstracted, indexed, and processed into the central ERIC collection. The ERIC Clearing House for Exceptional Children established at the Council for Exceptional Children, is a major operation within CEC's information center program. Central ERIC announces its holdings, through its monthly abstract journal, are reproduced on microfiche or hard copy and made available through ERIC's Document Reproduction Service. The CEC Clearing House processes special education items into central ERIC, thus the ERIC program provides an in[illegible]on

service for special education documents to general education as well as for the specific field. The IMC's have the responsibility of abstracting and writing descriptions of instructional materials and special education literature. In addition to the abstract for themselves, the IMC's produce new information for dissemination through their evaluation studies and product development activities.

In every field of endeavor we find people whose wisdom and knowledge mark them as being ahead of their own time. We have a major problem in the field of education in dispensing and disseminating new knowledge more effectively. This is the major purpose and function of the Instructional Materials Center. As dissemination agents, the Centers take a big step beyond the college classroom, the textbook, the professional journal, or convention. The basic objective of the Centers is to shorten the communication lag between those who have the necessary knowledge and skills, and those who need and wish to use them. This is an experimental effort. Those involved hope to learn from these experiences and thus improve the educational system, including the Instructional Materials Center. A major breakthrough has been accomplished in the dissemination of knowledge which hopefully will carry us progressively forward in the field of special education. The Instructional Materials Center's approach deserves the attention of special educators, not as something to blindly emulate but rather as a meaningful methodology from which they can learn and on which they can build to produce even more and better systems of disseminating new knowledge and skill.

SEIMC COMPUTER BASED RESOURCE UNITS

Ken Cross

Most educators are familiar with the concept of resource units. Typically, a resource unit consists of instructional objectives, content items (facts and concepts), instructional materials, learning activities, and criterion references or measuring techniques for assessing achievement of objectives grouped about some organizing center. To illustrate, a resource unit concerning the second world war might be developed; it would include a large number of possible instructional objectives to be achieved from the study of the occurrence, and related content items, materials, activities, and assessment techniques. Such a unit might well include several hundred objectives and several thousand items in each of the other categories.

In practice, a teacher wishing to individualize instruction would use such a unit by first selecting objectives to be achieved by the class as a whole and by the individual members of the class. Hopefully, the teacher would allow some individual scope for each student, so that, in a typical situation, the teacher might select 10 class objectives and at least two objectives, either from that 10 or from the composite list, for achievement by each individual. Ideally, after these objectives had been selected, the teacher would look through the other lists -- content items, activities, and materials -- to select those most appropriate for the achievement of each objective. Since most teachers use a number of different units yearly, this high degree of familiarity with the relevant instructional possibilities is highly unlikely.

Even if it were possible for the teacher to make judgments about

materials relative to instructional objectives as indicated above, there would still remain a task of considerable difficulty; it is not enough that materials be suited for specific objectives, they must also be appropriate for the specific learner with whom materials will be used. Materials should be at the appropriate reading level, presenting information of concern to the child at his chronological age, within the scope of the child's interests, and understandable to a child at about the learner's mental age. In short, the teacher must screen all materials, activities, content items, and measuring techniques not only for the objectives to be achieved in the instructional process, but also for the characteristics of the learners involved.

Historically, most teachers have been unable to use resource units with the sophistication indicated in the above discussion. Either the range of possibilities available in instruction has had to be considerably prescribed, by limiting selections to possibilities familiar to the teacher, or the teacher has faced a tremendous preplanning endeavor consuming weeks of preparation time. Neither alternative is acceptable if educational possibilities are to be optimized. Research into the impact of resource units on learning indicates, not surprisingly, that resource units are valuable tools to those teachers who have participated in their development but are of little or no use to other teachers.

In 1964, Professor Robert Harnack of the State University of New York at Buffalo developed a means of using a computer to assist in the preplanning process required for optimal use of resource units. Essentially, this process consisted of a technique for storing judgments of teachers relating to the use of content, materials, activities, and devices for the achievement of specified objectives with learners having

specified characteristics. In 1965, teachers began to develop computer-based resource units under funds provided by Title III of E.S.E.A. to the Board of Cooperative Educational Services, First Supervisory District of Erie County, New York. The teachers participating in the development of units were asked to develop traditional resource units, then to relate, through a process of computer coding, each content item, instructional activity, material, and measuring device to all objectives it might achieve and to the characteristics of learners for whom it might be appropriate. Simultaneous with the development of units, formats were developed for retrieving information in the most usable form for teaching.

Briefly, the data retrieval procedures thus developed are based on a teacher's request of a tailor-made resource unit including five to 10 class objectives with appropriate large group activities, materials, and content for use with the total class, and two to four objectives for each individual, followed by appropriate procedures and materials for independent study or small group work. Techniques were also developed for enabling teachers who had used existing units to update units by correcting initial estimates about appropriate contexts for use of specific instructional suggestions or for the addition of new suggestions or suggestions which had been overlooked by those who initially developed units. Teachers were encouraged to use the units in planning instruction but were cautioned not to regard the units they received as prescriptions; in practice, only a fraction of the suggested approaches should be used, and a teacher should never disregard a procedure of his own simply because it is not mentioned in his printout.

Extensive research since 1965 has indicated that the use of resource units has a considerable impact on teacher-planning activities and a

positive effect on learning outcomes, though in most research to date, learning gains, though in a positive direction, have seldom been sufficient for use as statistical exceptional evidence. Based on this evidence obtained from students without exceptional learning problems, it was decided to consider computer-based resource units as a vehicle for meeting the needs of exceptional children.

Studies to consider computer units in such contexts were initiated in 1968 at the Special Education Instructional Materials Center, State University College at Buffalo. Existing units were studied to determine whether the range of materials included was appropriate for exceptional education students; where the range of materials was insufficient, additional items were added. New units were developed to meet specific needs of exceptional children, such as a unit based on the Illinois Test of Psycholinguistic Abilities, where each of the subtest scores is, in essence, an objective. Under the auspices of the Center, operating under additional Title III funds, units were disseminated to more than 2,500 teachers of exceptional children during 1969-70. These units were provided after an inservice program to acquaint teachers with the underlying concept and with procedures for requesting information. Based on the results of followup studies, new directions in Instructional Materials Center services and development have been formulated.

In addition to the CBRU project, two other projects are being implemented at the IMC - a materials evaluation system and a union catalogue. In the remainder of this paper these other two systems will be outlined and plans will be discussed for unifying the three separate projects into an educational data system with vastly expanded capabilities.

A brief description of the three systems should clarify a number of

relationships existing among them.

Described operationally, the intention in developing a computerized union catalogue and library retrieval system is that stored data might be retrieved on the basis of a number of factors such as the network facility where a book might be obtained, books relating to specific topics, books at specific reading levels, materials particularly relevant to some handicapping conditions or learning disability, the materials in the network by a specific author. In addition, the system will printout, on demand, either a compilation of all materials in the network or a compilation of the materials in any one of the centers within the network. Provision would have to be made within the system for frequent, rapid, economical updating and, in the long run, for retrieval at terminals which might be located at each network associate center.

The purpose of developing a computer file of materials evaluation forms is to preserve teacher comments regarding the effectiveness of materials in achieving specific objectives with groups having specific characteristics. Operationally, given the name of a material, all teacher comments regarding situations in which the material was used ought to be retrievable. Further, given significant student information such as chronological and mental age, reading level, handicap, student interest, or teacher concern, a list of materials found to fit such a description should also be retrievable. For greatest efficiency, updates would have to be made on almost a daily basis to incorporate most recent and relevant teacher comments and to provide the type of evaluation most likely to be needed, i.e., information on newly available material. To facilitate such entry, a number of terminals should be available providing direct access to the computer memory system.

Computer-based resource units, like the traditional resource units, are collections of content items, instructional materials, learning activities, and evaluation devices. These items are retrieved on the basis of their relationships to specific and related instructional objectives as well as student and professional variables. Professional variables, in this context, provide a basis for sorting suggestions in accordance with their use in large group, small group, or individual situations; their use in the achievement of objectives within Bloom's taxonomy; their use as introductory, developmental, or culminating activities and materials; and their use in assisting the students with the development of major social functions or developmental tasks which are constant concerns of the school despite the curriculum area under investigation at any given moment. Student variables are general interest, occupational interests, social class, sex, developmental tasks, reading level, mental age, chronological age, physical handicaps, body area, and learning environment. Since resource units are thought to be tools in the preplanning process and consequently a type of computer material which would be requested some time in advance of its actual need, it is thought feasible to have computer units retrieved through gatch processes at remote terminals. Optimally, a number of requests from teachers for such units will be processed by high-speed techniques, probably also at a remote location.

No aspect of our systems guides the teacher in the actual planning phase. Rather, the three systems have their primary value in the preplanning process, i.e., in helping teachers to identify available resources for the achievement of possible goals. The instructional

decisions must be based on the materials and procedures which have been identified as available in the preplanning process; in the end, all decisions are based on consideration by the professional teacher.

The above is an extremely important point and one which distinguishes our project from any other computer undertakings throughout the country. In any computer-assisted instruction program, for example, the teacher is provided with little assistance during the preplanning phase but the planning phase, once decisions have been made about goals and resources, is completely in the hands of the computer. Professional decisions are active at the beginning of the program but are of marginal importance during the actual instructional phase. In the systems just described the professional is provided data on which to base decisions, but decisions are not made for him during any phase of the preplanning and planning operations.

It is useful to analyze the nature of the data provided in each of the micro-systems. In the first system (the union catalogue) teachers are given information about the wide variety of materials available throughout the network based on specific restrictions such as location, type of material, subject of material, and area of exceptionality for which the material was designed. The second system (evaluation data bank) gives information about judgments made by teachers with respect to material, whether that material is or is not owned by the Network. In the third system (CBRU), information is provided about very specific ways in which some instructional materials, along with other phases of the instructional program, can be useful. Having any one system of information is useful, but, there is an interrelationship between the items which makes their amalgamation into a comprehensive system seem

superior to their being handled separately. Below are some of the possibilities inherent in combining the three systems:

(1) Simultaneously a teacher might ask for a list of IMC holdings related to a specific topic, reading level, or type of exceptionality for which the material is designed and obtain the comments of teachers who have used such materials along with a description of the reasons for using such materials.

(2) When resource units are printed out for teachers, those items available from centers throughout the network might be identified and the teacher comments made about such materials in other contexts might also be provided. Thus teachers would make optimal use of the network holdings when implementing computer-based resource units. Further, the judgments of those teachers regarding materials would be improved by the knowledge of what other teachers had found to be true of the same material.

(3) When material evaluations are provided by teachers, their experience can be integrated into resource units in such a way as to provide the means for checking and evaluating the initial coding as well as up-dating the content of the data banks.

(4) Items identified by teachers on evaluation forms as good for specific purposes and items written into computer-based resource units could readily be segregated in terms of the lack of availability in the network so that these items could be purchased with the first available money. Thus, a computer would provide a means for developing lists of desirable materials for purchase.

(5) As the system expands, it should be possible to relate specific series of activities to specific pieces of material. Thus, materials appropriate to a specific objective might be expanded to include optimal activities to use for developing instructional procedures concomitant with the material.

The most important aspect of systems development, and one not present in any one of the microsystems, is the cybernetics feedback inherent in combining the microsystems. To illustrate, a materials evaluation system developed in parallel with a union catalogue and library retrieval system can provide teachers with a technique not only for evaluating materials within the network, but also for helping network personnel determine what new acquisitions should be purchased. Similarly, the materials evaluation system can provide an evaluation technique for determining the merit of suggestions made in computer-based resource units and as a tool for updating resource units. Again, resource units can be expanded by coding into them newly acquired materials purchased by centers throughout the network. Within the microsystems, this constant feedback is nonexistent and there is a need for evaluating each system independently.

Admittedly, there are important aspects of the system which cannot yet be described. It is difficult to see, for example, just what use would be made of various types of teacher-requisitioned information. It is clear, however, that by keeping a continuous record of the types of acquisition, conclusions might be projected regarding teacher behavior and the development of probability statements regarding the effectiveness of certain techniques in developing student learning. It is not contended, since admittedly the use is not clear, that acquisition data

might be used by each of the microsystems. But it is clear that the collection of three distinct forms of data is likely to result in less effective use of that data than with the acquisition of the same data within a unified system.

Another interesting aspect of combining microsystems into a larger system is that important economies can be derived. To illustrate, in a single system of the type outlined here, data entry would have to take place only once, rather than the three distinct times necessitated by the microsystems. Further, since in two of the microsystems a remote terminal is the preferred method of operation, it seems preferable to have one remote terminal to accomplish both purposes instead of two separate remote terminals, one for each purpose. Only when both items are available easily, rapidly, and cheaply will teachers use materials to the fullest extent. This long range goal suggests the need for a computerized system for actually retrieving the material or a number for dialing to obtain immediate showing of the material. For example, all audio and visual materials can be shown over closed circuit TV. Linked to a dial access system, a teacher might dial a number provided by the computer and view or have students view or hear material at any time. If such a system were coupled to a duplicator, books could be shown over closed circuit TV and those portions needed by the students could be immediately duplicated. But such an access system is sufficient for materials retrieval only if the teacher has adequate information available or is provided with adequate computer assistance to decide which of the possible materials will be used. In the long run, a union catalogue and library retrieval system, a materials evaluation system, computer-based resource units, dial access, and immediate duplication, constitute a

maximum utility system.

Although the dial access and immediate duplication aspects of amalgamated computer operation are relatively distant projections, amalgamations of the union catalogue and library retrieval system, materials evaluation and computer-based resource units, are distinct realities within the capabilities of the Buffalo Instructional Materials Center. Such service will provide optimum efficiency in the teaching-learning situation for special education students.

THE TEACHER USES MEDIA

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In considering the approach and techniques of operant conditioning, we must first discuss the structured environment. The structured environment in the classroom provides a certain setting in which students can work at their own pace and can work without interruptions from classmates. The actual physical structure consists of cubicles and special work areas. The students are provided with all classroom tools and the necessary materials for each subject are within reach. Each student has an individual time schedule which shows where he should be and when he should be there. The teacher has a master schedule which allows him to check each student's movements.

My program is essentially based on language skills. The primary program centers around the Sullivan Programmed Workbook Series. The workbooks are kept in a particular area of the room and each child, as he is scheduled to use them must pick up his workbook and return it to that same area. Each child keeps his own record showing the book number he is working in and the page he last worked on. The teacher maintains a chart which indicates the books completed by each child and the tests which have also been completed. It is strictly up to the child as to how fast he wants to progress. Each workbook has a vocabulary list containing all the new words in that book. Upon completing a workbook the student will have also completed a series of programmed spelling tests. These tests are comprised of words taken directly from the vocabulary list of new words for that book.

One of the necessary teaching machines in my program is the Language Master. It is utilized to reinforce each facet of the total program. To begin with, a linguistics word-attack program is introduced to the child. This program, on language master cards, involves beginning consonant sounds, coupled with vowels. Only those sounds pertinent to the Sullivan Workbook vocabulary are used. The vocabulary list for each book is also printed on language master cards and utilized on the language master. This allows the child to be exposed to the new words before meeting them in text. There are also language master cards for the vocabulary in S.R.A. Workbooks, the Dolch 220 Word List, the arithmetic 100 facts in addition, subtraction, multiplication, and division, and cards for learning time-telling.

Another language skill program utilized is the S.R.A. Reading Laboratory I.A. It is a very simple program for students to use, and is completely self-evaluating, thus allowing freedom from teacher control pressure. Each student is responsible for keeping a record of where he is and how he is doing in his individual folder. At this point, we stress the importance of each child keeping his own records, for this is one way the child learns independent study habits, hence, academic behavior is modified.

The tape recorder is an essential item in any program of this nature. The student utilizes it as an instructor for programmed materials. The S.R.A. Workbooks are completely programmed on tape as are various other materials. The Dolch vocabulary unit check is taped for the student's use. During free time the student may use the tape recorder for listening to stories or he may read into it, then listen to himself. This provides an immediate feedback of an ente-taining nature, plus the skill

of oral reading.

At this point I should point out that my entire program is presented through the use of programmed materials and teaching machines. In order for a machine to qualify as a teaching machine within the confines of my room, it must do three things:

1. Present information and require frequent responses by the student.
2. Provide immediate feedback to the student by informing him whether his response is appropriate.
3. Allow the student to work individually and to adjust his rate of progress to his own needs and capabilities.

To keep my program functioning I constantly strive to do three things; first, make learning possible; second, reward it for happening; and third, let it happen without getting involved.

These things are accomplished through the use of operant conditioning with a primary emphasis on behavior modification and a secondary emphasis on academic achievement. In short, for appropriate behavior, an appropriate reward consistent with the child's operant level is provided.

THE TALKING TYPEWRITER

Thelma Kant, Gladys Ramos, and Ruthanne Shanks

Rockland State Hospital, Orangeburg, New York

Description of the Talking Typewriter

The Talking Typewriter, a teaching device produced by the Thomas A. Edison Laboratories, consists of a computerized electric typewriter, a tape recorder, speaker, viewing screen, and slide projector. The machine is enclosed in a plywood booth with a one-way glass for close observation and a telephone/intercom for verbal contact with the student.

The machine can operate in three phases. It can be used as an almost standard electric typewriter with large type. Each row of keys in the normal typing position is color coded for proper fingering. In the second phase, the machine tells the name of the key struck. The programer has the option of encoding the letter, name, the color of the key, a phonetic symbol, or any other clue that may be preferred.

The third stage is the programmed phase. The program card has a backing of magnetic tape which records two types of information. First are the recorded verbal instructions to the child, such as, "Type the name of the picture on the screen." The second are actual machine instructions such as Projector On, Upper Case, and other codes to actuate the machine. The card contains 15 lines, each capable of containing 62 bits of information, including eight 10-second recordings.

The visual clues consist of material typed on the front of the card, and/or slides projected on a small screen in the booth. We assemble slides from sheets of clear plastic and super-slide frames for approximately 3¢ per slide, on which we draw and write. To complement

the programs, we also photograph real life situations or printed materials.

The control panel outside the booth allows the teacher to keep track of the number of times the student has struck the typewriter keys, and the amount of time he spends in the booth. Some teacher-controlled variables are delays in clues, type of clues (letter, color, phonetic sound of the key pressed), frequency of clue repetition, area of the card to be seen by the child, and the portion of the program to be done by the child.

Principles and Content Used in Programing

This discussion will deal with programing for our emotionally disturbed, disadvantaged children with hard-core reading disabilities, rather than for those with autism.

Our children have been exposed to many conventional and modern approaches to reading, yet have failed consistently. One of our primary concerns is to motivate them. However, to interest emotionally disturbed children in reading when they have so often experienced failure, is not an easy task; particularly when that pattern of failure is frequently intensified by the learning environment. To plan, write, and program for adolescents who do not know how to read and who are hostile to books and learning, presents a challenge. We have found that it is to our advantage to have the Talking Typewriter to motivate them. The machine makes this task a little easier because it is an attraction in itself. A typewriter that talks naturally arouses curiosity. How does it work? What is it going to say? What does it want me to do? These are typical reactions stimulated by this sophisticated and glamorous machine. But the attractiveness of the machine is not enough. The subject content, its

presentation, and the flexibility of the programs play a most important part.

The content may deal with topics in current events, like rockets or hippies. It may include concept building and speech patterns, especially for the benefit of those who are Spanish speaking, and who have a language difficulty. Although most of the children we select are adolescents, they are nonreaders. Therefore, we have a program for primary reading, but we attempt to keep the content on a high level to interest these older children.

We found it necessary to create our own programs for many reasons. Commercial programs are designed for normal teaching situations, not for emotionally disturbed classes. The programs may be good but they are not appropriate in our setting. Similarly, although most of the materials purchased by our school for classroom use are high interest, low vocabulary books with mature content, we find they are not really accurately graded for our special educational needs.

Secondly, commercial programs are expensive, and our school operates on a limited budget.

A third and very important reason is the fact that we must program for individual needs. Our programing is based on a diagnostic analysis. We use the machine mainly for prescriptive teaching. Since we were given a free hand from the inception of the program, we decided to use this tool innovatively. To make optimum use of it, we made the decision to write prescriptive programs, to remedy the child's difficulties and to provide work on the skills that he lacks. We program to increase knowledge in subject matter areas such as current events, various phases of social studies, science, spelling, and writing. Special material is

presented to help perceptual development and also give the child a sense of social awareness.

While a child is helped to overcome his block to learning, he moves ahead at his own rate. Should a child's behavior indicate that one step of a problem is too obscure or complicated, it is broken into smaller steps or units to insure his success.

The selection of children for this program is based on their abilities, potentials, and deficits. We select children who have failed to make academic progress and social adjustments in the classroom. To evaluate the child's academic performance, the CAT, Roswell-Chall Test, and the Dolch 95 Common Noun list are used. This is where careful diagnosis of difficulty plays an important role. As part of the diagnosis for prescriptive programing, we observe the child for visual motor deficits, reversals, letter confusion, stumbling, hesitancy, omissions, left to right direction, and substitutions. We also observe social and emotional factors involved in learning, such as hyperactivity, somatic complaints, posture, hostility, and shyness. The anecdotal school record of every child is examined and teacher conferences are held by the programers, for best possible placement in a related classroom.

All this precedes any programing. As a result of these tests and observations, prescriptive programs are developed. Our two-fold goal is to program for a child's weaknesses and to motivate him. The specification of which skills need to be developed is the most basic requisite for our programing. Material is chosen on the basis of its relevancy to the instructional objective. Programing is done to best meet the needs of each child, and at the same time make learning enjoyable. Then the child can proceed at his own rate to develop those skills in which he is weak or

deficient.

Some of our prescriptive programs provide training in overcoming reversal tendencies and letter confusion. Others stress a steady left to right direction.

Additional readiness activities programmed for our children stress socialization. These are especially helpful for shy children who are reticent about entering the booth and the planned programs. Blackboard activities are also employed to interest them.

Tasks drilling similarity in the sounds of rhyming words are prescribed for auditory readiness. We programmed the names of most alphabet letters and colors, and some common word families with initial consonant substitution. The poor word recognition level of the children lead us to create programs in mastering sight words. In some cases, names were individually programmed for personal identification.

Language growth is stimulated in many ways, including listening to poems and rhymes; discussing experiences such as home visits, trips, ward activities; and identifying pictures.

Through all our programs, following directions is emphasized.

The inability to blend sounds into whole words has always been one of our great concerns. We recognize the great deficit in this skill among the children involved in the Talking Typewriter program. For that reason, phonics programs will be produced in the near future. At present, the teacher uses the intercom to supply the blends when needed.

Programs provide vocabulary pertaining to things with which most of our city children are familiar, such as traffic and subway signs and place names. We have also created some practical programs on job applications, general personal information (Where do you live? How old

are you? etc.).

At Rockland State Hospital, we have been programing for the past 1½ years. To this date, we have been concentrating our efforts on readiness through second grade reading level. Each card or program introduces a specific objective. The child is made aware of that aim. It is a program to help his individual needs so he ought to know what he should accomplish. A program might say, for example, "Today you are going to learn to write the word 'rocket'." That is the specific aim, and he knows that at the end of the program he should be able to write the word "rocket!" The presentation and development of different programs will vary. A variety of activities will reinforce and apply what is taught. Activities may be typing; writing; reading poems, songs, or stories; and the completion of phrases, sentences, or rhymes.

The content in a simple program must be a carefully organized sequence of material to assure the most comfortable learning conditions for the child. Directions are stated simply and clearly. Steps increase gradually in difficulty. After a step is introduced, it is reinforced, reviewed, and practiced until the child feels comfortable and happy. Because of the nature of the Talking Typewriter and the structure of the program, he will have experienced success. We have found that it is essential to plan small, independent units of learning to make practical the ideal of prescriptive teaching.

One of the desirable characteristics of the Talking Typewriter is its capacity to involve more than one sense. The multisensory features are employed extensively in our programs. The projector is used constantly; the voice of the machine is used; and the child is required to type or respond verbally.

The booth provides isolation, thereby eliminating distractions and peer competition. The impersonal machine presents the stimuli and the child interacts with the machine. The Talking Typewriter can repeat material as long as necessary, patiently and consistently. A good name for this concept of teaching might be, "the remote teaching approach."

When a child is in the card phase, the visual material is presented either on the screen or on the card face. We rarely use the card face because the plastic lid over the typewriter compounds the visual difficulties that many of our children have. The material is introduced. The child sees it, hears it, and must respond to it. Depending on the programmed instructions, he will respond orally or by typing. He receives immediate reinforcement or correction. Another feature of the Talking Typewriter is that the child records and hears a playback of his own speech, which he can compare with the correct answer. This also aids the teacher in identifying and diagnosing speech and hearing distortions, which can then be remedied.

The instructions for completion of tasks must be simple so that the specific learning objective is not obscured. For example, we easily employ the word "word" in such contexts as, "Give me another word for (blank)" or, "Tell me a word that means (blank)." For many disadvantaged children, the stream of verbal expression with which they react to their environment has not been recognized as consisting of smaller significant units of speech - words. Thus, at times we find that what seems to be an inability to learn is a misunderstanding of the nature of the task. Once a pattern of instruction is comprehended, we work in that context to present new material.

A similar problem is that of phrasing. What is intended as a

positive reinforcement is sometimes interpreted as a negative comment. For example, the activity in which a child can make a mistake is reading and recording the material he has just typed. In programing, we must consider either a correct or incorrect answer in the verbal commentary that follows his response. In several instances, we had recorded the following: "Did you say....? You should have because...." This usually served as an immediate correction for a wrong answer or a positive reinforcement for a correct answer. However, for some children, the very phrase, "You should have...." was a completely negative reinforcement of their disabilities. When the answer they gave was correct, they became indignant with the machine's comment. In this type of situation, the child can become abusive to the machine without fear of retaliation. However, this is not a desirable condition. Only constant observation of the child as he works can reveal his reaction to such inappropriate instruction. Usually the negativistic clues are subtle signs which are extremely difficult to perceive if the teacher is personally interacting with him.

We noted early in our programing experience that some children could memorize the verbal material for short periods of time and would merely repeat it when asked to read. This served to compensate for their inability to read, and for a time, hid the fact that they were not really reading. We became aware of this when several children began to perseverate on the sentence to be read and introduced more distortions on each succeeding rendition. Since then, we have tried to program activities between the programmed material and the child's attempt to read it. This then became a real testing situation.

The free typing phase of the Talking Typewriter allows for testing

and provides time for free expression within the structured program. The child may type what he has just learned, he may react to the material, he may reject the opportunity to type freely by returning to the programmed material. Simply, he is free to type whatever he wants, whether or not it is relevant to the program. The teacher observes and can guide the child by means of the intercom and, if necessary, by physical intrusion. At times, the free typing can be used as a reward.

Free typing is not always desirable, however. One of our autistic children had progressed to where he could tolerate the programmed material. Previously, he would type only numbers. After several months, he was slowly weaned from that fixation. However, when given the opportunity to type freely, he reverted immediately to his earlier behavior. His insistence on typing only numbers became so severe (including biting, scratching, and screaming), that we could not allow him to work in any program that had the free typing phase. In other cases, children cannot tolerate lack of specific direction and are at a loss when allowed free expression. The teacher decides when free typing might benefit the child.

One of the features of the Talking Typewriter that the teacher can control as the child is working in the program is the keyvoice. The machine can call the name of the letter to be typed, its color, or whatever clue the teacher deems helpful. Usually, when a child is in the early stages of working on the Talking Typewriter, he needs the keyvoice to locate the right keys. As long as it is supportive, the keyvoice is utilized. However, at a certain point it may impede the child's progress because he begins to recognize larger units, such as words or short phrases. Then, the interruption of the voice breaks his train of

thought. The teacher must recognize this hazard and silence the key-voice when necessary.

We have found that the repetition of certain functional words and phrases in the program has served to reinforce acceptable language usage. For example, the programmed instructions are explicit and demand specific action in order to proceed. Therefore, the child must punctuate properly and leave spaces between words. Without actually stressing points of grammar, we note that they seem to be learned by habitual use.

Conclusions

Before presenting conclusions, we wish to reiterate our position on recordkeeping. Our records are anecdotal and our analyses subjective because the programing team is composed of teachers. Our backgrounds did not include intensive training in statistics or research design, nor did we have such services available. Acknowledging these limitations, our evaluation of 1½ years of intensive programing utilizing the Talking Typewriter follows.

In our work with autistic children, we found that their attention span has improved and has been sustained for increasingly longer periods of time. In most cases, focus has been transferred from the machine to the people working with them. Their behavior has improved - hyper-activity has decreased, bizarre behavior such as babbling, screaming, nonsensical talk, or echolalia has diminished and in some cases disappeared. They seem to be more alert, less manneristic, and more relaxed. Communication and speech has improved and relationship with adults continues to develop. In some cases, learning has been possible through careful, prescriptive programing.

The use of the intercom feature has helped make them aware of their

speech. The booth permits the employment of carefully selected stimuli, such as that made available by the slide projector, and isolates the child from extraneous, irrelevant material. This restricted stimulation has promoted communication and participation through directed activities.

We have noted that nondirective free typing with these autistic children seems nonproductive. David is a good case in point. He would type only numbers, constantly, never tiring of them nor voluntarily switching to words. He screamed, scratched, and bit if attempts were made to guide him away from numbers. After several months of consistent commands, there was a gradual withdrawal from numbers to more reality-related content. His tolerance for completing academic tasks increased, accompanied by decreasing reliance on numbers for gratification. This withdrawal was achieved by allowing him to return to typing numbers as a reward for completing sections of lessons in beginning reading. The need for long periods of reward decreased to the point that it could be delayed to the end of the 20-minute work period.

The autistic child may very well need to return to the familiar at times to reassure him, but he perseverates in his particular idiosyncratic behavior when he is not coaxed, cajoled, and guided into other activities.

We would emphasize that a combined use of the booth and good educational techniques tailored to the particular child is most effective. We consider the Talking Typewriter just one of the tools by which it may be possible to reach children who have not been able to respond before.

With reference to children with learning disabilities, again we find that behavior has been modified.

Although standardized tests do not always reveal advances in academic achievement, observation and analysis of individual children

indicates that learning has taken place.

Specific perceptual and cognitive deficiencies can be identified through close observation. The interaction of the child and the machine permits the teacher to concentrate on recognizing disabilities without the need to be involved personally in the learning situation. Material can be programmed to help correct disabilities such as confusion in reasoning skills and methods of attack, poor motor control, and visual and auditory discrimination.

There has been good ego enhancement. Children are proud to be using such a sophisticated machine. They comprehend that this is their machine and that the work they do is prepared just for them. The minimizing of errors increases their self-confidence. Most have built a good relationship with their teacher-programer, having been accepted by a warm adult who is highly skilled in dealing with emotionally disturbed children. Their peer relationships have improved as their self-image is strengthened.

Positive changes in attitude toward learning have occurred. Reading is not as threatening and success comes more readily because of the nature of the operation of the Talking Typewriter. As in any case of individualized instruction, the stigma of failure is minimized. A child's peers have no knowledge of his failings; learning takes place in private. The Talking Typewriter insures that he cannot make a mistake in the program. Self-confidence replaces hesitancy in learning. Hyperactivity decreases as a child finds his random responses and frequent errors are inappropriate. Because he is not able to type mistakes, he soon develops a suitable method of attack. Through observation, the teacher-programmer can pinpoint the misunderstandings that have been hidden in a flurry of

random activity and can adapt programs to correct the specific error.

In conclusion, the programing team at Rockland State Hospital is convinced that the Talking Typewriter can be an effective teaching tool when used prescriptively with emotionally disturbed children in an institutional setting.

COMPUTER ASSISTED INSTRUCTION FOR THE HANDICAPPED

Jimmer M. Leonard, Westchester County BOCES #1

The Putnam-Northern Westchester BOCES is currently experimenting with the use of computers in the instruction of children with learning disabilities. The present study, funded by Title III of the Elementary and Secondary Education Act, is being conducted by the Curriculum Research Department as a continuation of earlier studies done with public school children in regular classes in Northern Westchester.

Computer-assisted instruction (CAI) was first used at BOCES in the summer of 1962 as part of a summer workshop cosponsored by IBM. In the winter of 1963, the U.S. Office of Education began funding further research for the study of simulations in the areas of art, biology, chemistry, economics, elementary physics, French, and music. The projects continued during 1965 and 1966 with support for the development of several computerized economics games.

It was felt at that time that one way to get the students more involved in the learning process would be through use of computerized games. The game mode was intended to be an improvement over the common teaching methods of lecture, textbook study, and recitation. The hypothesis was that by placing a pupil in a role as a participant in a simulated situation and letting him solve problems: (1) He would be more interested in learning about economics, (2) He would learn as much as students taught by usual methods, (3) The quality and depth of concepts learned would be greater, and (4) He would learn faster.

In the Consumer Game, the student was taught about the problems and economics of installment buying. Another game, Free Enterprise, consists

of two parts, the Toy Store Game and the Surfboard Game. This game puts the student in charge of a toy store and later a surfboard factory to give him simulated experience with economic problems and decisions which occur in retail and manufacturing operations. The Sumerian Game was the first game developed at the Westchester BOCES, and has received the most publicity. In the Sumerian Game the student assumes the role of a priest-king in a Sumerian city-state in the year 3500 B.C. The pupil is given an opportunity to manage his economic resources (grain, land, manpower) during the course of the game. In the Sierra Leone game the pupil plays the role of an AID Officer in modern Sierra Leone. In each of the three provinces to which he is successively assigned, he is placed in a position of giving advice to the local administrators about their economic problems. If he is successful in advising the country on these problems, he is promoted within AID and finally rotated back to Washington.

All of these games are based upon the principal that the student, in his simulated role; has resources (whether grain, money, time, or labor) that he must manage wisely. He is expected to learn, through a method of "discovery," the relationships between variables in the simulated environment.

Due to the success of earlier studies with individualized Computer-Assisted Instruction, it was felt that the computer could possibly aid the handicapped student in the areas of both remedial and specialized instruction. Application for funding was made to the U.S. Office of Education and the current project, "CAI for the Handicapped" was initiated on June 1, 1969. Five typewriter-like terminals have been installed in Special Education classrooms; students are provided

additional assistance in many of the programs through the use of a computer-controlled slide projector and tape recorder attached to the terminal. This provides additional reinforcement through audio and visual presentations. The number of computer terminals to be made available for student use will be expanded over the next 3 years.

BOCES has had an operating CAI network since May 1969, using IBM's Coursewriter programming language. This system utilizes an IBM 360/Model 40. The CAI network operates while school administrative data processing operations are simultaneously being conducted. Having a CAI network running results in an increase in time of no more than 10 percent to execute the administrative data processing tasks. The Coursewriter CAI network is available for use between 9 a.m. and 5 p.m., 5 days a week.

To connect into the system, a terminal user need only dial the main phone number from any terminal location. Once connected, it is necessary to enter a student number for identification purposes, as well as the name of the course sought. At that point, the CAI course either starts at the beginning or continues wherever the student left off, whichever is appropriate.

Users may each be using different programs, or several users may be working on the same program. The performance and position of one student in a program does not affect in any way the performance or placement of another student who may be simultaneously using the same program.

Our objectives fell into three levels. Fundamentally we were interested in producing a method of improved, individualized, instruction applicable to all handicapped students including our own. Secondarily we wanted to demonstrate the method to other districts so that they

would adopt it and assist in the proliferation of CAI in the schools. Finally, we wanted to examine the long-term outlook for the economic feasibility of using Computer-Assisted Instruction.

Three types of CAI program materials were used:

1. Programs that were constructed locally during the course of the project and programmed for the first time in Coursewriter.
2. Programs developed elsewhere and available for use on our machine.
3. CAI programs such as the economics games that had been previously developed at BOCES. These were converted to the Coursewriter programing language.

Programs were developed specifically for use with special education students. These programs were designed by inservice course participants, interested special education teachers, interested teachers from local schools, CAI staff members, and paid consultants.

One of the most promising programs devised utilizes the computer terminal to teach elementary reading. The student is taught letter sounds, syllable sounds, and taught to form and spell words and syllables. Messages are presented to the student by a computer-controlled random-access tape recorder attached to the terminal. Slides are presented to the students at appropriate points in many of the lessons in the program. The typewriter is used for shortprinted output, and records all student input at the keyboard.

This reading program was devised by one of the special education teachers who has a terminal in her classroom. The student is first introduced to the alphabet through listening to recorded selections which give him, "names of objects" corresponding to each of the capital letters

that the student enters on the keyboard. After this lesson, the student is shown a letter on a slide and again hears the, "object name" corresponding to that letter via audio tape. He is asked to identify the letter by typing it on the keyboard; a taped message indicates whether or not the student was successful in typing the letter named. When the student has become familiar with the shape and associated "object name" of the letters he is given the short sound, or "nickname" of each letter he types on the keyboard. The student learns the sounds of the letters in much the same way he learns to identify the "names" of the letters. Once the student learns to identify the shapes and sounds of both capital and lower case letters, he has subsequent lessons which combine the sounds to form simple basic sight words. This program appears to be a valuable tool in helping these students develop better and more effective basic reading skills. Students have shown a great deal of interest in the use of the terminal and the programs. These students have been taught to dial from the terminal into the computer. When the connection is completed, they proceed to sign-on to a program according to a preassigned student number and course name.

Another program developed for use with younger students is one which teaches elementary mathematical principles and operations. It also uses audio tapes and slides to present and reinforce concepts. The student is expected to learn numbers and how to use them in performing basic addition and subtraction operations. This program is then followed by programs which present a series of carefully structured addition and subtraction problems to the students. For example, an arithmetic program used early in the year by the students presents all possible combinations of addition problems in which 1's and 2's are added to other

single-digit numbers to produce a sum of 10 or less. These problems are presented horizontally and are arranged in random order. The next program presents addition problems in which 10 is added to the numbers 1-10, providing sums from 11-20. These problems are also arranged in a random manner. The student answers on the same line containing the problem.

In the initial subtraction lessons, two types of problems appear:

Problems in which 10 is subtracted from the numbers 11-20, with the resulting answer in the range 1-10.

Problems in which the numbers 1-10 are subtracted from their counterparts in the 11-20 range, giving an answer of 10 for each problem.

In these initial math lessons, the reward for a correct answer is simply the word "yes" being printed. The students react extremely favorably to this type of reinforcement. The later series of math problems are presented both vertically and horizontally, and involves sums and differences as great as 99. To date, no lessons have been constructed that require either carrying or borrowing. Initially, the number of math problems completed correctly by students averaged approximately 50 percent. Through use of the program that figure has risen to almost 90 percent. A perfect terminal session is not uncommon for some students.

Another set of programs available for student use includes a group of spelling programs based on the recognition of basic sight words. The spelling words are presented to the student through the use of slides and the student goes through a series of steps in which he types the correct spelling for each word. At first the student essentially copies and types the missing letters from the slide. Finally, the student must type

the entire word from memory.

A word-guessing program has been developed for use in conjunction with a spelling program which will be described shortly. After the student has completed several lessons in the spelling program, he is allowed to play the word game as a reward for working on the spelling program. The program provides reinforcement in vocabulary and spelling. This game could best be described as a computerized version of the game Hangman. The student is given the first letter of the word and is told the total number of letters it contains. By guessing at individual letters, he attempts to guess or complete the word before he runs out of tries.

This word game has been found to be a vehicle for encouraging students to use their verbal skills, however primitive they may be. Students who normally do not demonstrate that they have the ability to spell a two-letter word have spent time using this program, for periods as long as an hour. They have demonstrated their ability to interact with the program through relatively intelligent guesses of entire words or missing letters.

New programs being developed include a game which is an adaptation of a board game developed by Readers Digest illustrating the progress of the American Civil Rights movement since 1954. A reading program being developed by one of the special education reading consultants is based on the use of the ITA alphabet. Another program is designed to give students experience in completing job applications, utilizing the computer to provide immediate analysis of errors in personal data entered by the student. Also, several programs are being developed for use by special education students enrolled in exploratory vocational activities. These

CAI programs are basically simulations, which are designed to teach the systems analysis approach in such areas as automotive and television repair.

Two CAI programs developed at other locations have been used by students in the special education program. One program was developed at a private school (Poughkeepsie Day School) and the other is a commercial product developed by Science Research Associates, Inc. (SRA), a subsidiary of IBM. Installation and use of these programs provided valuable experience in the procedures to follow when using CAI materials produced at other sites. The SRA math program is one of two programs that are currently commercially available for use on an IBM 360.

The Poughkeepsie Day School Spelling Program is a nongraded spelling program that was developed on the basis of an analysis of spelling errors actually made on papers by regular school students in grades 2-9. The program deals with most of the "classes" of errors that were observed in analyzing the student papers. The program does not teach spelling rules, but rather conditions the student to respond to certain kinds of patterns in English spelling. The program was based on the hypothesis that English spelling is highly regular if you examine the right factors. It was felt that the learning of rules would seldom effect behavior that must eventually become automatic.

The program begins with an optional typing drill. The two initial teaching units deal with a simplified form of phonetic writing used throughout the program. In these two units the fields of syllabification and stress are covered. Two optional units cover an assortment of spelling demons.

The commercially available arithmetic drill program, SRA's Arithmetic Proficiency Training Program, is being used by older Special Education students. Only five segments of the program are being used: keyboard practice, and addition, subtraction, multiplication, and division of whole numbers.

The APTP program operates in the following manner:

1. After keyboard training, the student is given a series of diagnostic tests in an arithmetic operation to find his level of achievement. The program quickly finds the level at which he has not demonstrated mastery.
2. Next, the computer program presents him with problems that are appropriate to that skill level, and he responds to each problem.
3. With each answer the student gives, he gets an immediate message telling him whether his answer was right or wrong, and how much time he took. The computer is programmed to keep track of his performance and to end the practice session if he is no longer showing any improvement in practice.
4. The program keeps detailed records of the performance and progress of each student, and each session at the terminal ends with a typed performance summary for that session.

The program allows a student to advance to a higher level of complexity within an operation only when a student has mastered the skills of lower complexity. "Mastery" is defined as obtaining a specified percentage of problems of a certain type correct, and doing so within an appropriate response time limit. One of the major difficulties encountered when first using this program was that the conditions for mastery were

set too stringently for an average special education student. The students became frustrated at their inability to proceed to more complex problems.

When the program became available for use on our own computer it was possible to experiment with the results of changes in various program parameters. Success was achieved by relaxing allowable response times, decreasing the percentage needed correct to advance to a higher skill, and eliminating the most complex skills from consideration by the student either in diagnostic mode or practice mode.

The four computerized economics games developed at BOCES during earlier projects were modified for use with special education students in the following ways:

1) Additional visual materials (slides) and recorded tapes were prepared to provide supplementary material.
2) Changes were made in the vocabulary of printed messages to make the reading level appropriate to the target population.
3) Provision was made to give the student more hints and provide him with the correct answer sooner on questions of a factual nature.
4) Ratios in the mathematical formulas were changed to make the consequences of numerical decisions more dramatic to the student.
5) Provision was made to allow the student to stabilize important variables before any complicating situations were introduced.
6) Events that were formerly introduced on a random basis are now introduced on a systematic basis, and their introduction has become contingent on the player's performance record.

7) Information summarizing the student's performance in earlier sessions at the terminal is presented to the student, for the purpose of review, upon resuming play of a game.

Despite the extent of these changes, it is my personal feeling that the majority of students in this population simply do not perceive the nature of the relationships existing between variables in the simulated environment. Thus, use of these programs has resulted in providing students with a reason for reading: primarily, to keep abreast of the situation, pertaining to the simulated environment in which he is a participant, in the role to which he has been assigned.

The instruments used for evaluation include:

1. Case studies made by the clinical staff of the special education department;
2. Depth interviews employed to determine the kind and degree of learning achieved. The interviewer uses a fixed list of concepts and a scale for each concept to represent the quality of understanding on the part of the student.
3. A questionnaire has been prepared for teachers to permit them to gauge and interpret the effects of the instruction during and after time spent at the terminals.
4. Standardized tests covering some of the subject matter taught in the programs are being administered before and after usage of the programs.

Student and teacher reactions to CAI have been very favorable. Students have exhibited a great deal of enthusiasm for continued terminal usage. The Computer-Assisted-Instruction program was introduced to the special education students with a great deal of uncertainty as to what

their reactions would be. Since these students did not have previous experience at a computer terminal, and in some cases had never worked with a typewriter, their ability to work at the terminal on an individual basis was a source of concern. In the case of the younger students, it was felt that much would be accomplished if they could simply be taught to operate the keyboard.

Another area of concern was that of their acceptance of the terminal as an instructional device. Students in the special education program have often experienced failures in other areas of their life and are often somewhat reluctant to cooperate in trying a new instructional technique. It was felt that it would be an important accomplishment if any existing fear of working on a terminal could be overcome.

After 6 months of CAI usage, it has been found that the elementary level students have been able to perform operations which far exceeded original expectations. The younger students have not only been able to operate the keyboard without any difficulty, but have also learned to dial into the system, recognize the signal for connecting the dataphone, and complete the connection to the computer. The younger students have also learned to change the audio tapes, check for proper switch settings on the terminal, and sign on to the correct program.

The use of CAI terminals has not only been useful as a teaching device but in some cases has had a tranquilizing effect in reducing antisocial behavior exhibited by some of the children. The consulting psychiatrist noted that one socially maladjusted student who completely rejected books and was somewhat withdrawn seemed at ease while working at the terminal. CAI usage is nonthreatening to the students and is not too demanding. It was also observed that students who continually suffer

physical abuse by parents or other adults are very accepting of terminal use.

For the elementary students, use of the CAI terminal has become an integral part of their school activities each day. This fact is never more evident than when the terminal is in need of repair, or when the CAI system cannot be used due to mechanical or other problems that arise at the BOCES Computer Center. Use is made of weekly "elections" to determine which students will be responsible for dialing in and signing on all students to the CAI programs. Also, the responsibility of mounting the proper tapes on the tape recorder, a task requiring a number of complex consecutive operations and an amount of manual dexterity, has been delegated to selected students.

One very important phase of this project has been testing. Students in the younger classes were tested twice this year through the use of the Wide Range Achievement Test. The test was administered by the school psychologist who is well aware of the problems and limitations of the children who have learning disabilities.

The latest test results show a significant rate of progress in reading, spelling, and arithmetic for these special education students. Clinical staff members and teachers who have reviewed the latest test scores have be quite impressed with the rate of progress.

For the 5-month period, the nine students showed an overall increase of .46 grade levels in reading, .6 grade levels in spelling, and .5 in arithmetic. For students enrolled in special education programs, increases of this magnitude are phenomenal. A substantial increase in spelling scores is extremely unusual for special education students in this age group, as spelling is not specifically taught to the students.

We cannot directly attribute this increase in test scores to student use of the CAI programs at the terminal. However, the classroom teacher, who has been working with special education students for 9 years, claims that she has never had a class that progressed as rapidly as this one. The average increase in scores over 5 months is twice the amount that would be expected for a comparable group of special education students. The teacher felt that the presence of the terminal is a vital factor affecting the rate of student progress.

The elementary reading and math programs provide a summary of daily student performance. These summaries are studied by the teacher to determine the rate of progress a student is making when using the same lesson over a period of time. The summaries also provide a means to detect persistent problems that a student may have, such as certain letter-reversal patterns.

The arithmetic drill program has provision for internal testing of student performance. Students do not advance to a higher skill level until they have mastered the problems at the current level. For example, one student using the multiplication segment of the program took an initial diagnostic test (at the computer) which placed him in skill level one (multiplication of two one-digit numbers with products less than 10). He has since progressed through, and demonstrated mastery of additional skill levels, and is currently working at the level 24 (multiplication of two-digit numbers with all columns carrying).

Overall, we are pleased with the progress made in the first year of the project. Admittedly, CAI is an expensive instructional tool. On the basis of preliminary results, it would seem that the investment may pay high dividends.

ANALYZING STUDENT BEHAVIOR VIA CLOSED CIRCUIT TELEVISION

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The Board of Cooperative Educational Services' Special Education Department, 2 years ago initiated a unique Closed Circuit Television project.

The project endeavors to help teachers improve their classroom teaching by placing on video tape classroom sessions of between 15 to 50 minutes in length. In its first year, the project involved taping six experienced teachers twice a week for 10 weeks. Now the project involves taping only first year teachers six to nine times during the school year. The project is divided into three phases: video taping, analyzing the lesson based on the Flanders' System of Interaction Analysis, and a conference between the coordinator and the teacher.

In the first phase, the video taping, an extremely sensitive microphone and a camera with either a wide angle or zoom lens is installed in the classroom. The video and audio cables are then connected to a video tape recorder located in another room. All installation of equipment is completed by the coordinator prior to the students entering the classroom. Removal of equipment is also accomplished when students are not in the room. This is done to insure a minimum of classroom disruption.

At an agreed upon signal by the teacher the video tape recorder is set in motion by the coordinator. When the teacher feels the lesson has concluded, usually 15 to 30 minutes in length, another signal is given and the tape is stopped. Thus we have an audio and visual record of the

lesson that may quickly, easily, and inexpensively be replayed as many times as desired.

Once the taping is completed the second phase of the project begins. This phase is designed to help the teacher look closely at himself by having the coordinator score the tape using the Flanders' System of Interaction Analysis. This system developed by Ned Flanders and Paul Amidon is a tool for giving the teacher a dispassionate, theoretical view of the total interactions that have taken place in the classroom between himself and his students.

Flanders has established 10 categories of interactions (types of behavior) that may occur in the classroom and each type has been given an identifying number. All statements that occur in the classroom are thus divided into three categories: teacher talk, which is 1-7, student talk, which is 8-9, and silence or confusion, number 10. Categories one through seven are further subdivided into direct and indirect influences. This is done to ascertain the type of influence the teacher is exerting on the student during a lesson.

At approximately 3-second intervals during observation of the classroom tape, the coordinator records the number of the type of interaction or behavior he has just witnessed. Thus, at the end of an observation the coordinator has several long columns of numbers representing the interaction during the lesson. These columns of numbers are then paired. Tabulation of these paired numbers are then made on a 10 by 10 matrix sheet. This matrix represents an interaction followed by another interaction. After all the pairs have been properly plotted, a completed matrix is developed by adding the number of hash marks in each cell and adding each column. The final matrix represents a two-dimensioned

graphic record of the lesson.

In the project, the video tape and the Flanders' matrix of the teacher's lesson are used to initiate a private conference between the teacher and the coordinator.

It is during the conference that the teacher can begin to think not only about her own teaching techniques, but about behavioral patterns in the classroom, and methods to deal with them effectively. To meet these ends the teacher might deem it necessary to have the students view the tape either in a group situation or individually. Here the teacher is concerned with allowing the students to see themselves and see how they act in a group situation. This technique has been found to be extremely effective in changing student behavioral patterns.

Many times the viewing of the video tape has revealed the need for changing classroom organization and patterns to one which will more likely meet students needs. Individualized instruction could be the answer and the video tape can point this out. Students in the special education program many times work better independently than in a group situation. Conversely the teacher might find that a need exists for the class to work together on a common project. For example, the area of dramatics or the development of attitudes and behavior.

The video tape often exhibited the need for additional student remediation in the area of reading. Through the use of our reading laboratory or the BOCES Rolling Reader the student can receive this assistance.

Resource people are made available to the teacher to view the tape and discuss behavioral patterns. Moderate use has been made of the

services of staff psychologists, psychiatrists, social workers, reading consultants, and supervisors attached to the Special Education Department. Often when these specialists meet, suggestions and recommendations are rendered concerning special help that a student should receive. This could mean working with a speech therapist, school nurse, or individual counseling. Changing the student from one class to another might be needed to alter the student's behavioral patterns.

Wider use of media in the classroom has been found to be needed as a result of the teacher watching the video tape. Time devoted to preparing media or attendance at one of the several media inservice courses offered by the BOCES can be pursued by the teacher.

More emphasis on teaching concrete concepts has proven an extremely important area for the special education student. The review of a video tape by the teacher has shown where this is lacking and how it should be integrated into the classroom work.

If teachers are going to better understand students' behavioral patterns in the classroom, and deal more effectively with students on an individual basis, serious consideration should be given to the use of CCTV to aid the teacher in this determination.

ERIC

IMPLICATIONS OF EDUCATIONAL TELEVISION FOR THE HANDICAPPED CHILD

Charles Nadovich

1. Greater efforts should be made to share findings relative to what is being done and what can be done to improve the use of educational television in classroom settings.
2. ETV is only a tool - not a program unto itself
3. When using ETV the teacher must specify to the students the goals and purposes involved in using the program
4. The teachers using ETV must have specific predetermined plans for following up and following through after viewing the program
5. Some possible uses of ETV are:
   a. To introduce new topics
   b. For review
   c. For reinforcement
   d. For enrichment
   e. To aid in developing more adequate auditory and visual discrimination
6. It is imperative that the decision to use ETV be accompanied by a commitment from administration to assure that:
   a. The television sets are adequate and appropriate
   b. They are appropriately installed and have an adequate antenna
   c. There is a guarantee of prompt repair service
   d. Time is allocated to prepare for the use of ETV
   e. There is professional assistance available which can be used in the selection and preparation for the use of ETV programs

KODAK'S CONCEPTS IN COMMUNICATION

This multimedia presentation promotes the idea that "a picture is worth a thousand words," using three attached screens, three carousel slide projectors, a 16mm motion picture projector, and a tape recorder. A panorama of rapidly changing pictures and motion illustrated better than words how visualization of one's thoughts can better convey the message. This commercial demonstration, although not aimed specifically at teachers of emotionally handicapped children, served as a fitting conclusion to an Institute on Media.

RESULTS OF EVALUATIONS

Thursday, 9:00 a.m.

"SEIMC OVERVIEW"

1. Rate the following aspects of the presentation:

	GOOD	FAIR	POOR
A. Content	90%	10%	0%
B. Organization	79%	18%	3%
C. Appropriateness of Concepts and Materials	79%	21%	0%
D. Pacing, Variety, Timing	65%	35%	0%
E. Audience Interaction	90%	10%	0%

2. Identify the most valuable aspects of the presentation:

   Information regarding availability of materials

   The prognosis for the future

   Information about SEIMC

3. Identify any suggestions you might have to improve or add to the presentation:

   A visual display

   More choice selection of slides

Thursday, 10:30 a.m.

"SEIMC COMPUTER BASED RESOURCE UNITS"

1. Rate the following aspects of the presentation:

	GOOD	FAIR	POOR
A. Content	84%	16%	0%
B. Organization of Material	71%	23%	6%
C. Appropriateness of Concepts and Materials	78%	16%	6%
D. Pacing, Variety, Timing	78%	16%	6%
E. Audience Interaction	67%	30%	3%

2. Identify the most valuable aspects of the presentation

Information on availability of materials

Provision for individual differences among students

3. Identify any suggestions you might have to improve or add to the presentation:

More information on how to set up program

Actual printout sheets should be made available

Thursday, 11:30 a.m.

"THE TEACHER USES MEDIA"

1. Rate the following aspects of the presentation:

		GOOD	FAIR	POOR
A.	Content	97%	3%	0%
B.	Organization of Material	67%	30%	3%
C.	Appropriateness of Concepts and Materials	94%	6%	0%
D.	Pacing, Variety, Timing	71%	23%	6%
E.	Audience Interaction	81%	16%	3%

2. Identify the most valuable aspects of the presentation:

   How to use machines and rewards with emotionally handicapped in group situations

   Material brought directly from the classroom

3. Identify any suggestions you might have to improve or add to the presentation:

   More demonstration

   More information on how to handle disruptive episodes in class

Thursday, 1:30 p.m.

"THE TALKING TYPEWRITER"

1. Rate the following aspects of the presentation:

	GOOD	FAIR	POOR
A. Content	46%	31%	23%
B. Organization of Material	30%	46%	24%
C. Appropriateness of Concepts and Materials	52%	24%	24%
D. Pacing, Variety, Timing	16%	28%	56%
E. Audience Interaction	39%	17%	44%

2. Identify the most valuable aspects of the presentation:

   Cost

   Removal of threat of failure in use of Talking Typewriter

3. Identify any suggestions you might have to improve or add to the presentation:

   Use of media

   More effective presentation

Thursday, 3:00 p.m.

"COMPUTER ASSISTED INSTRUCTION FOR THE HANDICAPPED"

1. Rate the following aspects of the presentation:

	GOOD	FAIR	POOR
A. Content	89%	11%	0%
B. Organization of Material	84%	16%	0%
C. Appropriateness of Concepts and Materials	68%	32%	0%
D. Pacing, Variety, Timing	46%	52%	2%
E. Audience Interaction	56%	37%	7%

2. Identify the most valuable aspects of the presentation:

   Potential of the computer

   Cost

3. Identify any suggestions you mgith have to improve or add to the presentation:

   More visuals

   Actual demonstration

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Friday, 9:00 a.m.

"ANALYZING STUDENT BEHAVIOR VIA CLOSED CIRCUIT TELEVISION"

1. Rate the following aspects of the presentation:

	GOOD	FAIR	POOR
A. Content	70%	30%	0%
B. Organization of Material	65%	26%	9%
C. Appropriateness of Concepts and Materials	77%	23%	0%
D. Pacing, Variety, Timing	73%	25%	2%
E. Audience Interaction	88%	12%	0%

2. Identify the most valuable aspects of the presentation:

   How television equipment is used in an actual classroom setting

   The actual taping

3. Identify and suggestions you might have to improve or add to the presentation:

   More time

   Longer and more organized tape presentation

Friday, 10:30 a.m.

"IMPLICATIONS OF EDUCATIONAL TELEVISION ON THE HANDICAPPED CHILD"

1. Rate the following aspects of the presentation:

	GOOD	FAIR	POOR
A. Content	41%	54%	5%
B. Organization of Material	45%	55%	0%
C. Appropriateness of Concepts and Materials	52%	41%	7%
D. Pacing, Variety, Timing	45%	50%	5%
E. Audience Interaction	54%	41%	5%

2. Identify the most valuable aspects of the presentation:

Discussion of the needs of the handicapped

Information on Channel 13's Consultation service

3. Identify any suggestions you might have to improve or add to the presentation:

More suggestions and demonstration of uses

Sample lessons

Friday, 11:15 a.m.

"KODAK'S 'CONCEPTS IN COMMUNICATION'"

1. Rate the following aspects of the presentation:

	GOOD	FAIR	POOR
A. Content	96%	4%	0%
B. Organization of Material	96%	4%	0%
C. Appropriateness of Concepts and Materials	57%	26%	17%
D. Pacing, Variety, Timing	92%	8%	0%
E. Audience Interaction	47%	29%	24%

2. Identify the most valuable aspects of the presentation:

   Value of pictures

   Reinforced importance of communication

3. Identify any suggestions you might have to improve or add to the presentation:

   Needed question and answer period

   More material aimed at the handicapped

OVERALL EVALUATION

1. Rate the degree of application to classroom situations the presentations might offer:

   GOOD 55% FAIR 40% POOR 5%

2. Rate the effectiveness of the group sessions:

   GOOD 74% FAIR 26% POOR 0%

3. Evaluate the entire Institute:

   Content: GOOD 93% FAIR 7% POOR 0%

   Practicality: GOOD 43% FAIR 50% POOR 7%

4. Identify the most helpful aspect of the Institute:

   Learning about new media

   Discussions with colleagues

   Information regarding materials available

   Visual display of materials and actual classroom application

   Exposure to the equipment

5. Identify suggestions to improve future Institutes of this nature:

   More time

   Fewer speakers and more workshops

   An opportunity for all to actually use and handle the equipment

   More teacher presentations

   More practical aspects to everyday needs in classroom

   Comments:

   Good overall coverage

   Interaction with other teachers was informative

   Too much material not of practical nature