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ABSTRACT

The proceedings of the 1980 conference focus on educational implications for mentally retarded children of hemispheric specialization research. Preliminary addresses consider such topics as learning problems of the mentally retarded persons, current educational and training approaches, using hemispheric specialization in the classroom, and an integrative learning approach to education. Work group recommendations for action are presented for applying "right brain approaches" and research priorities and strategies. (CL)

* The New Orleans Conference

INTEGRATIVE LEARNING APPROACHES TO THE EDUCATIONAL NEEDS OF MENTALLY RETARDED PERSONS

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INTRODUCTION

Apparently man has a continuing passion for pat answers — a natural propensity for defining himself into corners. Not too long ago, one philosopher concluded quite logically that the quality of humanhood could be equated with the presence of intelligence. At one time, many professionals in the field of mental retardation were inclined to take this reasoning a step further, noting that individuals who scored below 70 on I.Q. tests could **not** be included in such a definition. Thus, several million persons were "logically" excluded from the human race. The search for eternal Truths is a dangerous business . . .

While there are still doubters about, most contemporary thinkers would agree that knowledge is anything but static — that we cannot afford to close doors that might lead to promising paths or feasible answers. During the last few decades, a great many teachers, psychologists and other individuals who work with mentally retarded persons have challenged old premises and accepted solutions. Today, they question the very nature of mental retardation itself, and the limitations of mentally retarded individuals. Educators working with students who have learning disabilities — and students who don't — have made significant advances. They have shown that children in both areas of concern can increase their learning potential far beyond what was formerly believed. They have introduced new ways to emphasize strengths and overcome weaknesses, and they have also shown teachers how to help students develop self-confidence in their own abilities.

Increased interest in learning potential has led educators and professionals concerned with learning disabilities to delve deeper into the nature of intelligence. How does the brain process information? Can we accelerate learning, and gain higher levels of retention? Can a damaged brain be retrained to function more effectively? Answers to some of these questions may lie in the field of so-called "split brain" research, the study of cerebral dominance and hemispherical specialization. Developments in this field indicate that some approaches may be useful in educating and training mentally retarded students, including the severely and profoundly retarded. However, technology in this area is still in its early stages, and many approaches rely heavily on a few well-established techniques.

Study of the left and right hemispheres of the brain have led to some intriguing speculations on the part of researchers, educators and other professionals concerned with human learning potential. Traditionally, logical, analytical and cognitive functions of the brain have been assigned to the left hemisphere, while spatial, visual and intuitive abilities have been

placed in the right. Such a definition, of course, is an over-simplification of the state of the art. Many researchers believe that "hemispherical domination" merely begins to describe this controversial field of study. Some feel that "split brain" research is itself a misnomer — that the arbitrary separation of right and left brain functions is a less than accurate picture of the intellectual process.

"There are more connectors between the left and right hemispheres than there are between any other parts of the body," stated conference speaker Dr. Barbara Clark, Professor of Special Education at California State University. "Biologically, we are programmed to be integrated. It was evidently never intended that we focus our energies so completely on the left side of the brain . . . ."

Whether or not "split brain" research accurately describes the field of study in question, participants at the New Orleans gathering felt the term "integrative learning approaches" more clearly defined the overall goal of the conference. That goal was broadly described as "an examination of the possible implications of hemispherical specialization research on the educational needs of mentally retarded children."

Further investigation into this subject was the purpose of the New Orleans Conference. Work groups designed along the "think-tank" model of problem solving were charged with identifying approaches relating to "split brain" research which might hold promise for the education of mentally retarded children. Participants were asked to consider how these approaches might be used along with current educational technology and possibly incorporated into regular classrooms. Conferees also concerned themselves with research priorities and strategies. Work group session tasks in this area included the identification of potential research models and avenues for establishing effective studies.

Participants at this conference included professionals from the fields of special education, neurophysiology, educational therapy, psychology, mental health, mental retardation and other areas concerned with integrative learning research and learning disabilities. Conferees were acutely aware of the fact that the nature of the subject at hand would preclude "easy answers or quick solutions." They looked at their task as a beginning, a search for positive directions in a research area that might further the education and training of mentally retarded children. The purpose of this document is to accurately reflect the problems, issues and proposals for future consideration emanating from the New Orleans Conference.

Every Handicapped Child Has The Right To:

- A free public school education . . .
- Placement decisions based on informal and formal evaluations with input from the student's parents . . .
- Programming in the "least restrictive environment" possible for the individual . . .
- An individualized educational program appropriate to the student's needs . . .
- Periodic review of the appropriateness of the educational plan, with parental input . . .

A summary of some of the major requirements of Public Law 94-142, the Education for All Handicapped Children Act.

AN EDUCATIONAL CHALLENGE

Public Law 94-142, the Education for All Handicapped Children Act, has set the stage for the integration of mentally retarded and other handicapped children into regular school settings. The integrative process will vary, according to the individual abilities and needs of the disabled students concerned.

How will schools provide appropriate educational environments to pupils with a wide variety of handicaps? Many regular classroom teachers have had little or no experience in working with such children. Often, even special education teachers are ill-prepared to handle the needs of severely handicapped pupils.

Although educators have developed some excellent technologies for working with severely handicapped persons, it is quite clear that we have much to learn in this area. How do people think? How does the brain **really** work? How can we reach people whose intellectual impairments have largely isolated them from the world? Certainly, the climate is right for creative ideas, innovative thinking and the application of new approaches to learning. The integration of handicapped persons into the educational mainstream calls for the best we have to give . . .

Educational Goals and Standards

Several concepts in the field of mental retardation have set formative guidelines for the lifestyles and educational goals of mentally retarded persons, and handicapped individuals in general. The principle of normalization calls for providing the handicapped with conditions as close as

possible to those enjoyed by the so-called "normal" segment of the population. The principle of individualization sets similar goals: Understanding of the fact that every individual — both handicapped and non-handicapped — must be recognized as a unique human being. Finally, the tenets of self-actualization state that every human being, regardless of his handicap, should be provided with maximum opportunities for determining his own destiny, making his own choices, and participating in those decisions which will affect his life.

"These principles have much in common," stated Dr. Philip Roos, National Executive Director of the Association for Retarded Citizens. "Each recognizes the basic humanity and the legal and ethical rights of the individual. In effect, they declare that every handicapped person should be approached with positive expectations — including the expectation that individuals have the potential to grow, learn and develop. The realization of that development is largely dependent upon the environments we provide for them . . . ."

Many professionals in the field of mental retardation feel that it would be a grave error to place arbitrary limitations on either the learning or adaptive abilities of mentally retarded persons. They believe that the parameters of those limitations are yet to be established; that we are limited only by our own abilities to devise better, more effective means of communication with these individuals. Such a premise underscored the challenge of the New Orleans Conference: To explore learning approaches that might allow mentally retarded persons and other handicapped individuals to more fully participate in the human condition . . .

Learning Problems of Mentally Retarded Persons

Dr. James S. Payne, Associate Professor of Education at the University of Virginia, pointed out some of the educational characteristics of mentally handicapped persons, and noted specific approaches to learning.

Payne told conferees that motivation plays an important role in the educational experience of mentally retarded students. "In this respect, mentally retarded persons share attitudes similar to those of their non-retarded peers."

No single factor motivates a mentally retarded child in the classroom. Children from poor families appear to respond better to tangibles such as candy or tokens, while those from other economic settings may respond more readily to praise and affection. "Regardless of the method, the **need** for motivation is there . . . ."

Payne also noted that mentally retarded persons are often more highly motivated to **avoid** failure than to achieve success, and that they have a tendency to settle for lesser **degrees** of success.

"To avoid this 'failure set,' students must be given the chance to experience and feel success. Teachers must understand and emphasize the difference between 'being told you are successful,' and 'experiencing success.' "

Utilizing this premise greatly enhances the possibility of improving a child's skills. For instance, a remedial reading period will be more productive if the initial activity is one in which the child has previously performed successfully. An initial success motivates the child to challenge more difficult tasks throughout the period. "The goal," added Payne, "is to help students develop a trust in their own abilities."

Clearly, independence and self-reliance foster increased motivation in mentally retarded children — just as they do in their non-retarded peers.

Teachers who reward children for working on their own — as opposed to gaining answers from a neighbor's paper — find students become more highly motivated. They learn that praise and acceptance from the teacher are based more on independent effort than the ability to find a correct answer. Such findings point to the fact that many difficulties encountered by teachers can be traced to motivational problems rather than retardation. The educational implications here are worth noting: Apparently, we often fail to reach mentally retarded children largely because of the rather unique learning experiences to which they are subjected. Most of the techniques for modifying the behavior of non-retarded children can, if properly applied, work for their mentally retarded peers as well.

Much has been written about the attention span of mentally retarded persons. Dr. Payne pointed out that in many cases these individuals exhibit significant attentional deficits when compared to children of the same mental age. There are several methods available to help teachers increase a retarded student's attention span and facilitate the learning experience. Overhead projectors, spotlights and individual work cubicles have been utilized to reduce extraneous stimuli. The use and reinforcement of such techniques can effectively develop a student's attention span and capitalize on his learning abilities.

Clearly, it is more difficult to gain the attention of a mentally retarded child, but the basic principles used to reach that child are not all that different from those applied to his non-retarded peer.

In contrast to strategies which promote the acquisition and retention of specific skills, **incidental** learning techniques focus on information that is seemingly irrelevant to the task at hand. In other words, it is information acquired in addition to instructional tasks. An example of incidental learning techniques is teaching a child to resist distractions. The student is placed in a "learning cubicle" to help him acquire good work habits. Gradually, he is exposed to a more cluttered learning environment, and taught to transfer positive habits learned in the favorable environment to more distracting surroundings.

Dr. Payne also stressed the importance of conceptualistic teaching in the education of mentally retarded students. "We have learned that quite often a child who acquires a particular skill is unable to transfer that skill to another setting. A student who is taught to sweep the floor, for instance, may be unable to perform that task on the job. We discovered that in teaching the child a specific task, we often fail to teach him the concept **behind** it. He knows how to sweep the floor one way, but does not understand that the object is to 'get the dirt from the floor . . . .' "

Learning that there is more than one way to do things is a significant breakthrough for the mentally retarded child. Dr. Payne suggested that training facilities should include a variety of teaching aids that would stress the concept behind the task at hand. "If the student becomes familiar with a number of doors, for example, he will get the idea that going **through** a doorway — any doorway — is the object of the task . . . ."

With few exceptions, noted Dr. Payne, recent research efforts have consistently reinforced an optimistic view of the modifiable aspects of retardation. The incorporation of these educational principles into teaching practices should be encouraged, utilized and continually re-evaluated. In many areas of learning research, retarded children perform in a fashion comparable to their mental-age matched non-retarded peers. Research indicates that often the difficulties experienced by students **reflect more on the ability to develop problem-solving strategies for various tasks than it does on their inherent deficiencies.**

Areas which have been identified as difficult can often be ameliorated through appropriate instructional strategies. Dr. Payne offered several suggestions for effectively teaching handicapped students:

- Emphasize concrete, meaningful content in initial instructional presentations.
- Increase attention initially by highlighting relevant skills and by minimizing extraneous stimuli. As skills develop, gradually increase these stimuli to facilitate the learning of additional complex skills.
- Promote an atmosphere of success as a base for future learning tasks.
- Incorporate incentives into learning programs.
- Sequence instruction from the easy to the difficult.

"We can no longer afford to generally associate learning limitations with the mentally retarded," said Dr. Payne. "Instead, we must emphasize the specific aspects of the learning process which foster individual strengths, and help overcome individual weaknesses . . . ."

Current Educational and Training Approaches for Mentally Retarded Persons

Dr. Richard Hagen, Associate Professor of Psychology at Florida State University, outlined contemporary educational and training models associated with mentally retarded students.

Dr. Hagen reviewed several schools of thought concerning the education of mentally retarded individuals, noting that the various approaches in this field include both commonalities and a wide range of differences.

The sensorimotor approach states that learning must occur in a certain sequence if the individual is to develop to his full potential. "This approach was somewhat more popular ten years ago than it is today," said Hagen, adding that some people feel it has been "pushed too far."

The general humanistic approach to teaching incorporates concepts of humanistic psychology, and stresses that individual differences among children should be both encouraged and accepted. The role of the educator in this model is to provide an environment for growth and development. In the humanistic approach, the student learns primarily through personal discovery within his educational surroundings.

The Swiss psychologist, Jean Piaget, has had a profound influence upon education and psychology, particularly during the last two decades. Only recently, however, have the merits of Piagetian theory relative to the cognitive development of mentally retarded persons gained the attention of the educational community in this country. Piaget postulates intellectual development as a functional adaption to the individual's environment — a process that unfolds quite naturally as a part of the genetic makeup itself.

As Dr. James Payne explained, "Piagetian theory offers a view of the child as an active participant in the experiences of his world. It also carries with it an assumption that development is discontinuous — that both qualitative and quantitative differences can be observed in a child's thinking at different developmental levels . . . . It has become increasingly apparent," added Dr. Payne, "that a conceptualization of retardation reflecting a developmental viewpoint can be beneficial for educational purposes . . . ."

"Piaget feels that children learn more by action than by listening," said Dr. Hagen. "He states that children do not necessarily think like adults."

In this respect, Piaget outlines four distinct stages of development in the child, and offers approximate mental age equivalents for those stages:

(1) **Sensorimotor intelligence;** 0-2 years: Developing an awareness of the environment.

(2) **Preoperational thought;** 2-7 years: Developing imaginative representations of reality.

(3) **Concrete operations;** 7-11 years: Development of cognitive powers for problem solving.

(4) **Formal operations;** 11-12+ years: Development of hypothetical and abstractional powers.

Although Piaget has not directed the implications of his theory toward mental retardation, an examination of the characteristics of his four stages of development may offer additional insight into the thought processes of mentally retarded persons. Inhelder, a researcher in this field, suggested these comparisons of Piagetian stages to levels of retardation:

(1) **Severe:** Sensorimotor intelligence

(2) **Moderate:** Preoperational thought

(3) **Mild:** Concrete operations

(4) **Borderline:** Formal thought

It should be noted that such comparisons can provide only general approximations.

Dr. Hagen urged the continued development of strategies that would help mentally retarded children develop and function in as normal a manner as possible. "I strongly believe that the developmental model and behavorial approaches to educating the mentally retarded have helped us take great steps forward in the past fifteen years. We **must** look to the needs of the individual. What behavior patterns does the child **need** to learn a specific task? What skills does he **need** to attain the ability to feed himself? How can we develop the reinforcers to motivate the child to try?"

During the last few decades, various approaches to the education and training of mentally retarded children have contributed greatly to the state of the art. Still, it is important to realize that even the best of today's technologies offer only interim solutions. Both the ethical and scientific conscience call for a continuing search for better methods of learning — for the exploration of alternatives that will lead to answers only guessed at today.

"We are dealing with a broad range of individuals with a variety of learning disabilities," said Dr. Philip Roos. "Some people, such as the profoundly retarded, may even appear to be beyond our reach — past the limits of effective communication. Yet, we have only begun to test the capabilities of these individuals. And while there are clearly limitations as to what we can accomplish in this area, we do not have the historical perspective to set those limitations . . . ."

Exploring Educational Alternatives

Dr. Barbara Clark noted that certain relaxation techniques can help persons shift their mental states into "different levels of activity" that lessen tension and lead to greater retention of information. She suggested that altered states of consciousness such as those experienced during relaxation, sleep, daydreams and periods of creativity appeared to have useful applications to education. She stressed the importance of encouraging further study in this field, and noted that "while intuition has not been dealt with in our schools, more and more data point to the fact that intuitional areas of the brain may very well be where the real power lies. When children utilize right brain activity in the classroom, they enhance activity in the left hemisphere, and become better learners . . . ."

Dr. Clark described the brain as an "integrative" body, and suggested that while information is being processed throughout the brain, there appears to be a tendency toward specialization on the part of one side or the other. In other words, while both hemispheres are capable of processing data, one tends to be better at specific functions than the other. "When we look for solutions, we evidently turn to these specialized areas of the brain for best results."

"If this is so," Dr. Clark pointed out, "such findings could have interesting implications for both the medical and educational fields."

Dr. Clark noted that changes which occur in the brain are reflected in an increase in synaptic activity between the cells. The electrical charge involved in this operation promotes a biochemical strengthening in the cell. The biochemical component actually becomes more powerful, and, as stimulation increases, the cell's dendrite endings acquire a greater ability to "charge out" into other neural structures. This activity results in an accelerated rate of synaptic exchange, and a higher level of brain activity.

Stressing the importance of understanding how the neural structure can be strengthened and developed, Dr. Clark pointed out that while most children are born with such capabilities, "they do not retain that capability unless it is utilized." Two children born with the same "rich capacity within the neural structure" might grow up with entirely different mental abilities. One, given a stimulating environment, could extend and strengthen his neural structure, and become a gifted child. Another, deprived of positive stimulation, might suffer atrophy of that structure and become retarded.

Right and Left Hemisphere Operations

Dr. Clark noted that so-called "split brain" research has given us some indications of how the two hemispheres appear to interact with one

another. Apparently, "one side has the image; the other has the **word** for the image . . . the two sides have to be linked to be operable . . . ."

The connectors between the left and right hemispheres — or the lack of those connectors — shed a great deal of light on the workings of the brain. Each hemisphere appears capable of solving very different kinds of problems at the same time — with or without a connection. Persons who **have** connectors between their two hemispheres, however, can defer to one side or the other — "moving back and forth in search of a solution." People who can use both sides almost equally seem to have a higher level of intelligence, and greater abilities.

Apparently, individuals without connectors are at a slight disadvantage. They can see and feel an object placed in the left hand, but cannot analyze it or find words for it. And, when given an object in the right hand, they can label it and get the overall feeling of it — but can't understand certain things **about** it.

Thus, research indicates that there is both specialization and interaction in the brain. Studies of stroke victims and other persons afflicted with brain damage tend to validate these findings. Some stroke patients have been able to circumvent damage and use other areas — particularly when the damage occurs in the left side of the brain. In such cases, people seem to utilize "images" from the right hemisphere to substitute for those abilities lost on the left.

Dr. Clark pointed out that persons sustaining brain damage through strokes tend to be able to read, retain language abilities and understand what others are saying — "but they miss the context, the feeling of the message." Normal communications include both verbal and non-verbal messages, and these non-verbal signals "very often carry a great deal of the **power** of the message." Stroke victims apparently miss these non-verbal signals — the intent or feelings behind the words.

"Sometimes we tend to overlook this sort of damage," said Dr. Clark. "We think it is more important to treat the aphasic problems, to bring the individual back to articulation — when in fact persons sustain a tremendous loss when the emotional sense is damaged or missing . . . ."

The study of hemispherical specialization might encourage researchers and educators to change their concepts of what can — and can't — be accomplished. By using the information we have now we may be able to accelerate the learning process and achieve higher levels of retention. Right and left brain integration appears to hold promise for both the normal student and the mentally retarded individual. "It is the **integration** of the two sides of the brain that is important," concluded Dr. Clark, "not the split between them . . . ."

Using Hemispheric Specialization in the Classroom

Science teacher Marjorie King of Sacramento, California, has actively integrated biofeedback techniques, meditation, guided fantasy and other "right brain" activities into her high school science curriculum for a number of years. Students in her classes have included children who exhibit learning disabilities, hyperactivity and lack of motivation — plus gifted children who were unable to adapt to regular classroom programs.

"What we can offer such children is the opportunity to learn more about themselves," noted Ms. King. "We can give them the chance to broaden their perception of the world around them, and how they relate to that world."

Techniques for achieving these goals include relaxation exercises that relieve tension and allow students to better understand themselves and their needs. "Just by counting the breath, children become aware of their own states of tension. This, in turn, helps them to measure their state of relaxation, and teaches them about focus of attention."

Ms. King believes that biofeedback techniques have resulted in increases in academic ability, self-concept and the ability to focus attention more clearly on the subject at hand. She attempts to enhance self-awareness in her students through training exercises that help children understand their own methods of perception. "How do you **really** perceive a particular number? Think of a number. Do you see it? What color is it? Do you hear it? Whose voice? Which side did it appear to come from . . .?"

Sometimes current, as well as long-forgotten, experiences strongly influence our perception. For instance, people who have recently engaged in long periods of writing tend to see or hear the **words** for objects, feelings and even colors. Intense association with one particular activity shifts our imagery in that direction.

Some techniques point out the way students inadvertently withhold information from themselves. For example, if a child is asked "What's 9 times 7? **Quickly!**" tension generated by the command portion of the question may block the answer. On a larger scale, internal conflicts such as this may reflect the cause of "math anxiety" in the classroom.

Ms. King agreed with Dr. Clark that "the differences between the left and right hemispheres are not nearly as important as awareness of those differences. Using the two together is the object. Exercises like the above, using imagery to focus on all modalities, strengthens that awareness."

After working with children with various kinds of problems, including severely disturbed adolescents who have learning disabilities as well as personality disorders, Ms. King feels that biofeedback techniques are definitely beneficial.

"The idea that we might control parts of the body is a powerful idea. If children can become aware that it is possible to control body temperature, skin resistance and muscle tension, their sense of personal power is automatically enhanced. Using these tools, biofeedback and imagery, perhaps we can give mentally retarded persons some ability to expand their own awareness of body/mind connections."

An Integrative Learning Approach to Education

Dr. Don Schuster, Professor of Psychology at Iowa State University, described the use of Suggestive Accelerative Learning Techniques (SALT), in helping children diagnosed as learning disabled.

Basically, the SALT method uses waking state suggestions and a variety of presentational techniques to accelerate learning. The two major factors in the process are the use of suggestion to establish and maintain the expectancy that learning will be easy and efficient, and the involvement of both brain hemispheres in the learning process through several different presentational styles by the teacher.

What makes SALT work? Schuster noted that increased performance factors can be largely attributed to the fact that the teachers involved "expect the children to learn," and let them know that learning will be easy and enjoyable. The teacher begins the program by **proving** to the child that he **can** accomplish such goals.

SALT techniques attempt to incorporate right hemisphere qualities consistently — classroom instruction includes the widespread use of imagery as a teaching aid. For example: One study showed that teaching vocabulary with imagery techniques proved beneficial. Dr. Schuster feels that this type of program appears to work better if the teacher **initially** provides the imagery for the students. Later, children begin to develop their own imagery. "Showing them how to do it the first time helps students to develop significantly better imagery. It's more than just seeing or hearing — it's **feeling** . . . ."

Kinesthetic imagery, for instance, is useful in learning foreign words. The foreign word is shown, and associated with an **active** image representing the meaning of the word itself — e.g., the word "run" would be associated actively with the act of running.

A typical SALT classroom structure begins with physical calming, and progresses to a mentally calm atmosphere through relaxation techniques. The teacher then attempts to create a positive learning atmosphere by recreating a **previous** learning experience the students found pleasant. ("When mother used to read Goldilocks to you — it was fun learning that

story, wasn't it?") This type of exercise reconstructs and positively reinforces the excitement of learning.

Drama, perhaps with a musical background, is a part of the second phase of instruction. Later, during a quieter period, children are asked to review their imagery with the teacher.

Basically, the SALT process entails a four-phase training program: (a) An Introductory Phase, in which a teacher presents students with a variety of motivational projects, (b) Phase Two, a passive component including game situations, relaxation techniques and a variety of activities designed to enhance receptivity for (c) Phase Three, an active component formulated to reinforce the program as a whole, and (d) an Extension Phase, in which students actually participate in experiences outlined as program goals.

Many teachers comment enthusiastically about SALT. One reported the technique was an interesting, relaxed and fun way to get students on the way to learning. Students of this teacher felt they were special, because of the planning and efforts that were made for them. Dr. Schuster suggested that, based on present data, "SALT appears to be a promising technique to help learning-disabled students in the classroom . . . it should be tried out and evaluated more carefully in (other) learning-disabled classrooms . . . ."

WORK GROUP RECOMMENDATIONS FOR ACTION

I. Applying "Right Brain" Approaches

In work group sessions on this topic, conference participants attempted to identify approaches stemming from "split brain" research which held promise for the education of mentally retarded children. Conferees also considered how these approaches might be integrated with current educational technology, and studied avenues for implementing innovative programs, including possible incorporation into regular classroom settings.

- Conferees suggested that while so-called "split brain" research appears to hold valuable prospects for further exploration, interpretation of that research should be carefully evaluated. It was noted that there is a high degree of uncertainty concerning what is — and what is not — known about such topics as localization, or the assignment of different psychological functions of learning to either one side of the brain or the other. For example: Participants felt it was important to distinguish between "split brain" research referring to medical procedures, and data referring to educational and training studies incorporating right and left hemisphere interaction. While some participants felt that a great deal is known about lateralization, others believed such findings are tentative and nebulous. Some stated that the neurophysiological basis for localization, or hemispheric specialization, is modest at best.

- Participants emphasized the importance of recognizing that mental retardation is a global term that refers to a highly heterogeneous population. Failure on the part of the professional community to understand this fact serves to further compound the problem of serving the varied needs of these persons. It is unlikely that any single approach will be effective with all retarded individuals.

- Participants reviewed a broad spectrum of concepts for educating mentally retarded students. Some of the approaches discussed are in common use, or have been utilized in the past. Techniques discussed include: Diagnostic prescriptive teaching, psycholinguistics and sensorimotor approaches. Other approaches were described as more specifically related to holistic, integrative functions often attributed to the right hemisphere. Again, some of these approaches are in current use. Others, suggested as possible new areas of exploration, include: The use of biofeedback techniques to reduce conditions such as hyperactivity and distraction, which interfere with learning . . . . Enhancing confidence and self-esteem in students by allowing them to utilize the minute electrical discharges of their own brains to control electrical devices such as toy trains . . . . Increasing nervous system synchrony so that both halves of the brain are "firing together."

- Several participants suggested that specific procedures might be useful in activating those functions usually attributed to the right brain. Examples of this type of approach include the performance of rhythmic movements such as certain forms of the dance, and the development of clear visual fantasies. These and similar procedures might not only activate intuitive and holistic types of functions, but could also facilitate their integration with individual functions usually attributed to the left hemisphere.

- Conferees discussed various intuitional training methods that might be utilized to help mildly and moderately retarded individuals. Since these persons are typically verbal, it was felt that "question posing" techniques might help open channels of communication and enhance the individual's self-concept. These techniques could include a "narrowing down" process such as: "Which of these do you think is best?" The goal of these procedures is the creation of a climate of acceptance in which retarded persons can freely express their ideas, and utilize their imaginative powers without fear of criticism. Success in this area would tend to reduce the anxiety usually associated with potential failure experiences.

- It was suggested that biofeedback techniques could be useful in helping individuals gain better control of their bodily functions. Biofeedback could also be applied to instructional intervention programs for both "normal" individuals and individuals with learning difficulties and/or handicapping conditions. This technique can be used to reduce the physiological effects of stress, such as the "fight or flight" response. It might also help individuals gain control of special disturbances of mobility such as athetosis in some forms of cerebral palsy. Biofeedback might also be useful in helping improve bodily movement as well as articulation in "severely involved" persons.

- Conferees felt it would be useful to set up instructional strategies in some manner that would allow students to choose those strategies they themselves felt would fit their instructional needs and interests. A productive intuitional training technique might entail giving young people the chance to relate their dreams. This technique would allow children to "verbalize and enjoy their thoughts."

II. Research Priorities and Strategies

During these work group sessions, conferees sought to identify ways to evaluate and refine innovative educational approaches to mental retardation capitalizing on "split brain" research. They also considered priority research questions, potential research models and avenues for establishing effective studies.

- Conferees emphasized the need to develop criteria for quantifying both dependent and independent variables in studies of cognitive, holistic, gestalt and intuitive approaches to learning. Participants stressed the importance of carefully defining the variables in operational terms. In any such study, researchers should be alert to potential experimental bias. Thus, independent replications should be a part of any such research.

- Independent variables should be clearly defined in studies involving nontraditional research methods. Longitudinal studies — including careful analysis of component elements — would be required to answer some of the questions in these areas of research. A multiplicity of components are involved in some of the programs in current use, and the effect of each of these components should be isolated and evaluated.

- Conferees discussed a large scale evaluation of the SALT procedure. Several domains of independent variables were considered, including: Adaptive, cognitive, affective and sensorimotor behaviors and intuition.

With regard to the latter, it was felt that "intuition" might stand as a domain itself — that this quality was somehow differentiated from either the affective or cognitive domains. Efforts should be made to discover methods of testing for intuitive skills in students.

The four steps of the SALT procedure comprised the independent variables, including: (a) the introductory phase, (b) the passive component phase, (c) the active component phase, and (d) the extension phase. Particular attention was given to evaluation of the passive component activities, including relaxation training, the use of music, brainstorming, meditation and the possible use of hypnosis.

- Conferees recommended a study of the possiblity of replication of parapsychological experiments conducted with "normal" individuals, using existing techniques with mildly and moderately retarded subjects.

- Research efforts should focus on the question of whether the academic performance of mildly and moderately retarded students can be enhanced by techniques embodying the use of heart rate, GSR, skin temperature and EMG feedback.

- While there have been a number of attempts to evaluate right brain, or holistic strategies, participants felt that evaluative efforts have apparently been "plagued with problems." It was suggested that there is a need for more rigorous testing in this area. As a step toward alleviating this problem, it was recommended that a series of "single subject design" experiments be initiated to evaluate the individual components of holistic teaching. Initial evaluations should be carried out on a cost-effective basis. These studies could be followed by more formal evaluative approaches.

- Conference participants recommended the study of techniques designed to enhance a student's "readiness and receptivity" to learning. Some applications in this area would focus on reducing an individual's "internal noise" to enable him to become more receptive to concepts that might increase his ability to modify his own behavior. Specific approaches to accomplishing this goal include various forms of meditation, and the use of music and rhythm and guided fantasy. Participants noted the relationship of this concept to Eastern philosophies which entail attempts to calm the mind through internal stimuli. Many conferees felt it would be worthwhile to further explore the value of such methods.

- Conferees noted that productive research has been undertaken which indicates some advantages to achieving altered states of consciousness. Further exploration in this field might include a study of the use of pharmaceutical agents that could affect consciousness and facilitate learning. Additionally, studies might explore both the positive and negative aspects of certain nutritional agents — including unsuspected allergies to common foods.

FUTURE DIRECTIONS

New Orleans Conference participants stressed the hope that their open exchange of ideas would set the stage for additional exploration of integrative learning techniques that might further the education and training of mentally retarded and other handicapped persons. To facilitate such research and study, they urged consideration of action programs that would promote closer ties between individuals and organizations working for the betterment of learning-disabled students. At present, there are significant communication and knowledge gaps between the various disciplines working in this area. This lack of "shared knowledge" makes it difficult to apply the findings of neurophysiology to behavioral psychology —behavioral psychology to education, etc.

Conferees felt that two action strategies in particular would capitalize on ideas and recommendations generated in New Orleans:

(1) Panel discussions and presentations reflecting concepts developed at the meeting could be incorporated within the annual programs of organizations that deal with mentally retarded persons and other disabled individuals. Many persons present at the conference represented professional disciplines that are seldom exposed to such organizations and their members. A multidisciplinary exchange of ideas would be most beneficial in professional arenas of this nature.

(2) Conferees were also urged to publish their findings in journals outside their respective fields. It was suggested that professionals in other areas would benefit from such cross-fertilization. A few organizations mentioned as ideal platforms for presentation or publication efforts were: the Council for Exceptional Children, American Association on Mental Deficiency, American Psychological Association and the American Psychiatric Association.

Roster of Participants

Ms. Odeal Bowman
Classroom Teacher
4700 Werner Drive
New Orleans, LA 70126

Dr. William Bricker
Professor
Department of Special Education
401 White Hall
Kent State University
Kent, OH 44242

Dr. Jennifer Buchwald
Professor
Department of Physiology
Mental Retardation
Research Center
UCLA School of Medicine
Los Angeles, CA 90024

Dr. Nathaniel Buchwald
Mental Retardation
Research Center
NPI 760 Westwood Plaza
Los Angeles, CA 90024

Ms. Philippa Campbell
Coordinator
Outreach Services
Akron Children's Hospital
Akron, OH 44308

Dr. Barbara Clark
Professor
Department of Special Education
California State University
Los Angeles, CA 90032

Dr. Patricia Musick-Carr
School of Human Sciences
& Humanities
University of Houston at
Clearlake City
2700 Bay Area Boulevard
Houston, TX 77058

Dr. M. Ann Dirkes
Associate Professor of Education
Indiana University
Purdue University
at Fort Wayne
2101 Coliseum Boulevard East
Fort Wayne, IN 46805

Ms. Lupe Escamilla
Academic Director
Lozanov Learning Institute
325 West Washington Boulevard
Suite 2
San Diego, CA 92103

Dr. Donna Eyde
Director of Educational Therapy
University of Nebraska
Medical Center
42nd and Dewey Streets
Omaha, NB 68124

Dr. Renee Fuller
Box 592
Stony Brook, NY 11790

Dr. Richard Hagen
Associate Professor of
Psychology
Florida State University
Tallahassee, FL 32306

Dr. Curtis Hardyck
School of Education
University of California
Berkeley, CA 94720

Dr. Dean P. Inman
Director of the
Biofeedback Research Project
Assistant Professor in the
Department of Special Education
and Rehabilitation
Clinical Services Building
University of Oregon
Eugene, OR 97403

Dr. James V. Kahn
Special Education Program
College of Education
University of Illinois at
Chicago Circle
Box 4348
Chicago, IL 60680

Ms. Marjorie King
Classroom Teacher
1921 24th Street, #4
Sacramento, CA 95816

Dr. Samuel A. Kirk
Professor
Department of Special Education
University of Arizona
Tucson, AZ 85721

Dr. Thomas Kline
Biofeedback Research Center
Center on Human Development
University of Oregon
901 East 18th Street
Eugene, OR 97403

Dr. Horace Mann
Professor
Exceptional Children Division
State University College
1300 Elmwood Avenue
Buffalo, NY 14222

Mr. Jack McAllister
Mental Health Association
1800 North Kent Street
Arlington, VA 22209

Dr. Ronald Neman
Associate Director for Research
ARC National Research and
Demonstration Institute
Post Office Box 6109
Arlington, TX 76011

Dr. Ann Nevin
Associate Professor
Department of Special Education
Waterman Building
University of Vermont
Burlington, VT 05401

Dr. Earl J. Ogletree
Professor of Education
Chicago State University
95th Street at King Drive
Chicago, IL 60628

Dr. James S. Payne
Associate Professor of Education
Ruffner Hall, Room 120
University of Virginia
Charlottesville, VA 22901

Dr. Thomas Roberts
Department of Learning and Development
Northern Illinois University
DeKalb, IL 60115

Dr. Philip Roos
National Executive Director
Association for Retarded Citizens
Post Office Box 6109
Arlington, TX 76011

Dr. Don Schuster
Department of Psychology
Iowa State University
Ames, IA 50011

Mrs. Elizabeth Solbach
Classroom Teacher
5027 Hauck Drive
New Orleans, LA 70127

Dr. James Tawney
Professor
Department of Special Education
Pennsylvania State University
306 Cedar Building
University Park, PA 16802

Project Personnel

Mr. Neal Barrett, Jr.
3970 Sherwood Forest Drive
#141 East
Dallas, TX 75220

Dr. Brian M. McCann
Director
ARC National Research and
Demonstration Institute
Post Office Box 6109
Arlington, TX 76011

Ms. Liz Pippin
ARC National Research and
Demonstration Institute
Post Office Box 6109
Arlington, TX 76011

Ms. Joyce Sherman
ARC National Research and
Demonstration Institute
Post Office Box 6109
Arlington, TX 76011