S. HRG. 106–897

REPORT OF THE NATIONAL READING PANEL

HEARING

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

UNITED STATES SENATE

ONE HUNDRED SIXTH CONGRESS

SECOND SESSION

SPECIAL HEARING

APRIL 13, 2000-WASHINGTON, DC

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REPORT OF THE NATIONAL READING PANEL

THURSDAY, APRIL 13, 2000

U.S. SENATE,
SUBCOMMITTEE ON LABOR, HEALTH AND HUMAN SERVICES, AND EDUCATION, AND RELATED AGENCIES,
COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 10:05 a.m., in room SD–124, Dirksen Senate Office Building, Hon. Thad Cochran presiding.

Present: Senator Cochran.

OPENING STATEMENT OF SENATOR THAD COCHRAN

Senator COCHRAN. This subcommittee will please come to order.

I want to welcome everyone here this morning to this hearing of the Appropriations Subcommittee on Labor, Health and Human Services, and Education. This subcommittee is chaired by Senator Arlen Specter of Pennsylvania. He has authorized this hearing to be conducted this morning to receive the report of the National Reading Panel.

The Panel was created after legislation was introduced in 1997 by me, entitled "The Successful Reading Research and Instruction Act." After the legislation was introduced, our Appropriations subcommittee included language in its report for the fiscal year 1998 funding bill, calling on the National Institute of Child Health and Human Development, and the Department of Education to form a panel to evaluate research on teaching of reading to children, identify proven methodologies, and suggest ways for dissemination of this information to teachers, parents, universities, and others.

It was clear to me that we did not really have a clear idea, or understand how children should be taught to read. Statistics showed us that 40 to 60 percent of elementary students were not reading proficiently, but there was no strategy or plan in place to help deal with that problem.

We learned that the Health Research Extension Act of 1985 had mandated research on why children have difficulties learning to read. The National Institute of Child Health and Human Development had conducted this research. And in 1997, they had come up with answers.

Congress had not asked for the results, and the information was literally hidden away in the academic and research world. As a matter of fact, at a hearing reviewing the budget request for the Department of Education that year, I asked the Secretary of Education if he had heard about the research or if his Department had anyone looking at this research that had been done by one of the

national institutes of health. And he said he had not, but he would have somebody look into it.

That sort of gave us the story on whether or not research that had been done, that was maybe the best that had ever been done, was not being analyzed, and there was no plan to use the research to translate it into new methods of teaching or diagnostic procedures for identifying problems of reading among young children.

Today, more people know that reading research does exist, but very few have been able to decipher what it means, and to translate it into meaningful practice.

What most parents simply want to know is: How will my child learn to read? How can my child be taught to read better? Until now, the response has been vague, and the so-called expert or research-based methods were in conflict. So, there is a great deal of confusion among parents, teachers, and school administrators, educators at all levels about improving reading skills of children.

Meanwhile, we have spent nearly $100 million on programs, which one researcher described as "at best, it should not hurt." Well, it is my hope that the report of this panel which we are receiving today will give us guidance in making informed decisions on reading issues.

I commend the efforts of the National Reading Panel, and I hope educators will implement the recommendations and use the new teaching methods and programs outlined in the report.

There is also included in this report, I notice, suggestion for additional research. And if that comes as a shock after you find out that 100,000 research studies have already been done, you wonder, "My goodness. We are going to research this problem to death, or until we are all dead." But I think they make some very interesting points.

While there has been a lot of research, many studies and reports made—and they have analyzed most of them—there is still more that we should learn and can learn. And that is part of this Panel's report as well.

For inclusion into the official record of the hearing, we will place copies of the introductory remarks with the text of the original bill from the Congressional Record, the partial transcripts of discussions in the hearings of this subcommittee on the subject, and a copy of the appropriations report language which authorized the Panel's creation.

[The information follows:]

EXCERPT FROM THE CONGRESSIONAL RECORD, JUNE 19, 1997

SENATE

* * * * * * *

By Mr. COCHRAN:

S. 939. A bill to establish a National Panel on Early Reading Research and Effective Reading Instruction; to the Committee on Labor and Human Resources.

THE SUCCESSFUL READING RESEARCH AND INSTRUCTION ACT

Mr. COCHRAN. Mr. President, today, I am introducing the Successful Reading Research and Instruction Act. It establishes a panel that will include parents, scientists, and educators to conduct a study of the research relevant to reading development and advise the Congress of its recommendations for disseminating its findings and instruction suggestions to those who would like to have them.

Reading is the skill students must master to meet life challenges in a confident and successful manner. For a child, breaking the code of written language not only opens academic opportunities; it is a cornerstone to building high self esteem. Both reading and self esteem affect the knowledge and experiences that form a child's character and future.

Teaching children to read is the highest priority in education today. Many teachers and parents I've talked with are frustrated and confused about what method of reading instruction is best. Every American should be concerned that 40 to 60 percent of elementary school children are not reading proficiently. Even more disturbing is research that shows fewer than one child in eight who is failing to read by the end of first grade ever catches up to grade level.

Success in reading is essential if one is to progress socially and economically. In fact, most of the federally funded literacy programs are targeted to helping adults learn to read because the education system failed them, and more than likely, failed them at an early age.

This indicates that we need to start solving the problem of poor readers at the beginning, instead of working backward. It seems to me that the first step to finding a solution is to seriously analyze sound, rigorous research on the subject.

Mr. President, at a hearing on April 16, of the Senate Appropriations Subcommittee on Labor, Health and Human Services, and Education, I brought to the attention of the Secretary of Education, Richard Riley, research by the National Institute of Child Health and Human Development mandated by the Health Research Extension Act of 1985, and asked that he use such research in the development of federally supported reading programs. This research is ongoing, in a collaborative network with multidisciplinary research programs to study genetics, brain pathology, developmental process and phonetic acquisition. NICHD has spent over $100 million over the past 15 years, and has studied approximately ten thousand children.

On June 11 of this year, when officials from the National Institutes of Health came before the same appropriations subcommittee, I asked Dr. Duane Alexander, the Director of NICHD, about this study. Dr. Alexander's testimony about the research confirmed what I suspect most teachers already know—at least 20 percent of children have difficulty learning to read. But the research also suggests that 90 to 95 percent of these can be brought up to average reading level.

As a result of this research, techniques for early identification of those with reading problems and intervention strategies are now known. But administrators, teachers, tutors and parents are not aware of the key principles of effective reading instruction. The NICHD findings underscore the need to do a better job of teacher training, as researchers found fewer than 10 percent of teachers actually know how to teach reading children who don't learn reading automatically.

I am surprised that the Department of Education hasn't looked to this study and found a way to effectively get the information to teachers, schools, parents, and most importantly, teacher colleges.

What scientists have learned from their studies of reading hasn't been passed on to the teachers who are teaching, so parents are telling us their kids aren't reading. It is time we put all this experience together; come up with suggestions for dealing with the problems and, if schools, teachers, parents or higher education institutions want the information, let's make it available.

This is a proposal to develop answers that are based on scientific, model based research. I think it can be a helpful beginning for successful reading instruction.

I ask unanimous consent that a copy of Dr. Duane Alexander's testimony and a copy of my bill be printed in the Record.

There being no objection, the material was ordered to be printed in the Record, as follows:

S. 939

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Successful Reading Research and Instruction Act".

SEC. 2. FINDINGS AND PURPOSE.

(a) FINDINGS.—Congress makes the following findings:

(1) At least 20 percent, and in some States 50 to 60 percent, of children in elementary school cannot read at basic levels. The children cannot read fluently and do not understand what they read.

(2) Research suggests that the majority of the children, at least 90 to 95 percent, can be brought up to average reading skills if—

(A) children at risk for reading failure are identified during the kindergarten and first grade years; and

(B) early intervention programs that combine instruction in phonological awareness, phonics, and reading comprehension are provided by well-trained teachers.

(3) If the early intervention programs described in paragraph (2)(B) are delayed until the children reach 9 years of age (the time that most children are identified), approximately 75 percent of the children will continue to have reading difficulties through high school.

(4) While older children and adults can be taught to read, the time and expense of doing so is enormous.

(b) PURPOSE.—The purposes of this Act are—

(1) to conduct an assessment of research and knowledge relevant to early reading development, and instruction in early reading, to determine the readiness of the research and knowledge for application in the Nation's classrooms;

(2) if appropriate, to develop a national strategy for the rapid dissemination of the research and knowledge to teachers and schools throughout the United States as a means of facilitating effective early reading instruction; and

(3) to develop a plan for additional research regarding early reading development, and instruction in early reading, if the additional research is warranted.

SEC. 3. NATIONAL PANEL.

(a) IN GENERAL.—The Secretary of Education, or the Secretary's designee, and the Director of the National Institute of Child Health and Human Development, or the Director's designee, jointly shall—

(1) establish a National Panel on Early Reading Research and Effective Reading Instruction;

(2) establish the membership of the panel in accordance with subsection (b);

(3) select a chairperson of the panel;

(4) provide the staff and support necessary for the panel to carry out the panel's duties; and

(5) prepare and submit to Congress a report regarding the findings and recommendations of the panel.

(b) MEMBERSHIP.—The panel shall be composed of 15 individuals, who are not officers or employees of the Federal Government. The panel shall include leading scientists in reading research, representatives of colleges of education, reading teachers, educational administrators, and parents.

(c) DUTIES.—The panel shall—

(1) conduct a thorough study of the research and knowledge relevant to early reading development, and instruction in early reading, including research described in section 9 of the Health Research Extension Act of 1985 (42 U.S.C. 281 note);

(2) determine which research findings and what knowledge are available for application in the Nation's classrooms; and

(3) determine how to disseminate the research findings and knowledge to the Nation's schools and classrooms.

(d) TERMINATION.—The panel shall terminate 9 months after the date of enactment of this Act.

TESTIMONY DR. DUANE ALEXANDER

Thank you Senator Cochran: I think that it is important to point out that our intensive research efforts in reading development and disorders is motivated to a great extent by our seeing difficulties learning to read as not only an educational problem, but also a major public health issue. Simply put, if a youngster does not learn to read, he or she will simply not likely to make it in life. Our longitudinal studies that study children from age five through their high school years have shown us how tender these kids are with respect to their own response to reading failure. By the end of the first grade, we begin to notice substantial decreases in the children's self-esteem, self-concept, and motivation to learn to read if they have not been able to master reading skills and keep up with their age-mates. As we follow them through elementary and middle school these problems compound, and in many cases very bright youngsters are deprived of the wonders of literature, history, science, and mathematics because they can not read the grade-level textbooks. By high school, these children's potential for entering college has decreased to almost

nil, with few choices available to them with respect to occupational and vocational opportunities.

In studying approximately 10 thousand children over the past 15 years, we have learned the following:

(1) At least 20 percent, and in some states 50 to 60 percent, of children in the elementary grades can not read at basic levels. They can not read fluently and they do not understand what they read.

(2) However, the majority of these children—at least 90 to 95 percent—can be brought up to average reading skills IF:

(A) children at-risk for reading failure are identified during the kindergarten and first grade years and,

(B) early intervention programs that combine instruction in phonological awareness, phonics, and reading comprehension are provided by well trained teachers. If we delay intervention until nine-years-of-age (the time that most children are currently identified), approximately 75 percent of the children will continue to have reading difficulties through high school. While older children and adults CAN be taught to read, the time and expense of doing so is enormous.

(3) We have learned that phonological awareness—the understanding that words are made up of sound segments called phonemes—plans a casual role in reading acquisition, and that it is a good predictor because it is a foundational ability underlying basic reading skills.

(4) We have learned how to measure phonological skills as early as the beginning of kindergarten with tasks that take only 15 minutes to administer—and over the past decade we have refined these tasks so that we can predict with 92 percent accuracy who will have difficulties learning to read.

(5) The average cost of assessing each child during kindergarten or first grade with the predictive measures is between $15 to $20 depending upon the skill level of the person conducting the assessment. This includes the costs of the assessment materials. If applied on a larger scale, these costs may be further decreased.

(6) We have learned that just as many girls as boys have difficulties learning to read. The conventional wisdom has been that many more boys than girls have such difficulties.

Now females should have equal access to screening and intervention programs.

(7) We have begun to understand how genetics are involved in learning to read, and this knowledge may ultimately contribute to our prevention efforts through assessment of family reading histories.

(8) We are entering very exciting frontiers in understanding how early brain development can provide us a window on how reading develops. Likewise, we are conducting studies to help us understand how specific teaching methods change reading behavior and how the brain changes as reading develops.

(9) Very importantly, we continue to find that teaching approaches that specifically target the development of a combination of phonological skills, phonics skills, and reading comprehension skills in an integrated format are the most effective ways to improve reading abilities.

At the present time, we have held several meetings with officials from the USDOE and have discussed how these findings can be used across the two agencies. As an example of this collaboration, NICHD and USDOE have been developing a preliminary plan to determine which scientific findings are ready for immediate application in the classroom and how to best disseminate that information to the Nation's schools and teachers.

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EXCERPTS FROM THE FISCAL YEAR 1998 LABOR, HEALTH AND HUMAN SERVICES, AND EDUCATION AND RELATED AGENCIES APPROPRIATIONS BILL, SENATE REPORT 105–58

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Reading development and disability.—The Committee is impressed with the important accomplishments reported from the NICHD research program on reading development and disability, and is eager to have this information brought to the attention of educators, policy makers, and parents. The Committee recommends that the NICHD work with the Department of Education to convene a national panel to assess the current status of research-based knowledge, including the effectiveness of various approaches to teaching children to read.

The Committee commends the Institute for its outreach and public education efforts which have had a significant impact on the health and well-being of our nation's children. The Committee encourages the NICHD to expand this effort to in-

clude the Institute's research on reading development and disability, and to use the expertise of writers, teachers, producers, artists, and academics to bring this information directly to children through the media.

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EXCERPTS FROM THE APRIL 16, 1997 HEARING, SUBCOMMITEE ON LABOR, HEALTH AND HUMAN SERVICES, AND EDUCATION, AND RELATED AGENCIES, COMMITTEE ON APPROPRIATIONS

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PREPARED STATEMENT OF SENATOR THAD COCHRAN

Mr. Chairman, the administration's proposal that every child in America should be able to read well and independently by the end of third grade is laudable. We recognize the necessity of basic reading skills in order to meet life challenges in a more confident and successful manner.

I am disturbed by the data that suggest at least 40 percent of our children are not reading as well as they should by the end of third grade. Additionally, research studies show that fewer than one child in eight who is failing to read by the end of first grade ever catches up to grade level.

In 1985, responding to parents, teachers and other child advocates, the Health Research Extension Act (Public Law 99–158) was passed by Congress and signed into law by the President. As a result of the act, the National Institute of Child Health and Human Development (NICHD) initiated a collaborative research network with multidisciplinary research programs to study genetics, brain pathology, developmental process and phonetic acquisition. NICHD has spent over $100 million to follow about 2,500 young children in rigorous scientific research to understanding not only the causes but the consequences of reading problems and related cognitive difficulties.

The results are in. The bitter debate over "whole language approach" vs. "phonetic drill approach" need not continue.

NICHD's results conclude that both literature and phonics practice are necessary for impaired and unimpaired children alike. Techniques for early identification of problem readers and intervention strategies are now known as a result of this research, but many administrators, teachers, tutors, and parents are not aware of the key principles of effective reading instruction.

The NICHD findings underscore the need to do a better job of teacher training. Researchers found that fewer than 10 percent of teachers actually know how to teach reading to children who don't learn reading automatically.

I hope the administration will include in its reading initiative the NICHD research findings and help ensure they are used in federally supported education programs.

* * * * * * *

AMERICA READS CHALLENGE AND NICHD RESEARCH RESULTS

Senator COCHRAN. Well, we will review them very carefully.

In connection with the administration's reading initiative, I hope that you will look at the results of research that was done by the National Institute of Child Health and Human Development. This was done after a bill was passed in 1985 called the Health Research Extension Act. It resulted in collaborative research to study genetics, brain pathology, developmental processes, and other matters to try to learn more about how young children learn to read and why some of them do not, why some do it better than others; $100 million has been spent on that research and 2,500 young children were studied in a way that no other research has undertaken to do.

But anyway, the point is: techniques for early identification of problem readers and intervention strategies are now known as a result of this research, but many administrators—I would say very few—or teachers or parents or tutors know about these results or are aware of what the key principles are that were developed so that effective reading instruction can occur.

I hope that any effort to push the reading initiative, again a subject which is very important—I hope the administration will include the research findings by the NICHD in any federally supported instruction programs that you support.

Secretary RILEY. Well, thank you, Senator, and that is a solid suggestion. Carol Rasco, I am told, has met with the researchers, and she is very much involved in

that. She is heading up the America Reads Challenge, and she is very much into that and I will be myself. That is a grand suggestion.

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EXCERPTS FROM THE JUNE 11, 1997 HEARING, SUBCOMMITEE ON LABOR, HEALTH AND HUMAN SERVICES, AND EDUCATION, AND RELATED AGENCIES, COMMITTEE ON APPROPRIATIONS

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READING DEVELOPMENT AND DISORDERS

Senator COCHRAN. Mr. Chairman, I appreciate your recognition of me again.

When we had our hearing with Secretary Riley, Secretary of Education, I asked a question about a study that had been done under the provisions of the Health Research Extension Act at the National Institute for Child Health and Human Development into research affecting the capacity of children to learn—particularly to learn to read—and how this affected our efforts to provide education and resources for those who may be difficult to teach or have learning disorders of some kind or another. And it was fascinating to me that we have spent over $100 million on this research now, and nobody at the Department of Education had bothered to read the findings or to find out what had been learned as a result of this important research that we had funded and had been undertaken.

So I had asked Dr. Duane Alexander to give us a report so we could put it in the record at this hearing. And I just want to point out that he has prepared a written response to my inquiry, which I ask that we put in the record.

[The information follows:]

READING DEVELOPMENT AND DISORDERS

I think that it is important to point out that our intensive research efforts in reading development and disorders is motivated to a great extent by our seeing difficulties learning to read as not only an educational problem, but also a major public health issue. Simply put, if a youngster does not learn to read, he or she simply is not likely to make it in life. Our longitudinal studies that look at children from age five though their high school years have shown us how tender these kids are with respect to their own response to reading failure. By the end of the first grade, we begin to notice substantial decreases in the children's self-esteem, self-concept, and motivation to learn to read if they have not been able to master reading skills and keep up with their age-mates. As we follow them through elementary and middle school these problems compound, and in many cases very bright youngsters are deprived of the wonders of literature, history, science, and mathematics because they can not read the grade-level textbooks. By high school, these children's potential for entering college has decreased to almost nil, with few choices available to them with respect to occupational and vocational opportunities.

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However, the majority of these children—at least 90 to 95 percent—can be brought up to average reading skills if:

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We have learned how to measure phonological skills as early as the beginning of kindergarten with tasks that take only 15 minutes to administer—and over the past

decade we have refined these tasks so that we can predict with 92 percent accuracy who will have difficulties learning to read.

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We have begun to understand how genetics are involved in learning to read, and this knowledge may ultimately contribute to our prevention efforts through assessment of family reading histories.

We are entering very exciting frontiers in understanding how early brain development can provide us a window on how reading develops. Likewise, we are conducting studies to help us understand how specific teaching methods change reading behavior and how the brain changes as reading develops.

Very importantly, we continue to find that teaching approaches that specifically target the development of a combination of phonological skills, phonics skills, and reading comprehension skills in an integrated format are the most effective ways to improve reading abilities.

At the present time, we have held several meetings with officials from the USDOE and have discussed how these findings can be used across the two agencies. As an example of this collaboration, NICHD and USDOE have been developing a preliminary plan to determine which scientific findings are ready for immediate application in the classroom and how to best disseminate that information to the Nation's schools and teachers.

SUMMARY STATEMENT OF DR. DUANE ALEXANDER

Senator COCHRAN. And I would like to ask him to make whatever comments that he thinks would be appropriate at this point in connection with that research and the need for continued funding for this kind of inquiry—whether there is a payoff here in terms of improved health and quality of life of our younger generation.

Doctor.

Dr. ALEXANDER. Senator Cochran, I appreciate your interest in this topic. You are quite correct, over the past roughly 15 years, the Institute has invested, at the request of the Congress, approximately $100 million, studying over 10,000 children in a longitudinal way for their reading ability and disability.

What we have learned about this problem that affects not just education, but also the public health and welfare because of the impact on the children and on their ability to learn to read, as evidenced by longer-term problems and limitation of educational opportunity, lifetime skills and increased behavioral and delinquency problems, is that approximately 20 percent of children in the elementary schools overall, are basically not able to read. And in some areas this ranges even higher—50 percent or more. We have done studies that look at this population, in terms of our ability to identify them and intervene.

What we have found is that we are able to identify, by a screening technique in kindergarten age group, this approximately 20 to 25 percent of children who are at high risk for a learning disability, particularly for learning to read. And if we are able to identify them at this age and intervene with a program that is based on phonologic awareness, teaching phonics, and understanding of written text by trained teachers, we are able to achieve normal reading levels in about 90 to 95 percent of these children. This makes an enormous difference in their capabilities, both academically and socially as well.

This screening test is available now. We are able to administer it at a cost of $15 to $20 per child, select out the population at highest risk, focus our intervention on them, and produce pretty impressive results.

What we are trying to do now is demonstrate this on a larger scale in educational systems, and demonstrate whether, in fact, we can apply it in a broader way and show that it will be effective in a classroom setting.

We have been in communication with our colleagues in the Department of Education about the implications of these findings, for training of teachers and teachers in education colleges, as well as the actual application in the classroom of these findings.

GRANT AWARDS TO ALL STATES

Senator COCHRAN. Thank you very much, Dr. Alexander. And let me commend you for the excellent report and the fine work that is being done in this research.

* * * * * * *

STATEMENT OF DUANE ALEXANDER, M.D., DIRECTOR, NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT, NATIONAL INSTITUTES OF HEALTH, DEPARTMENT OF HEALTH AND HUMAN SERVICES

Senator COCHRAN. The witnesses who are here to testify today are joined by the members of the National Reading Panel. And we appreciate very much your hard work, and your attendance, and your effort to make the trip to Washington today.

Let us turn now to our panel of witnesses. I will introduce them. Dr. Duane Alexander, who is Director of the National Institute of Child Health and Human Development; Dr. Kent McGuire, Assistant Secretary of Education, Office of Educational Research and Improvement; and, Dr. Donald N. Langenberg, who is chairman of the National Reading Panel, and chancellor of the University System of Maryland.

We have received copies of your statements which we will put in the record, and make a part of the transcript in their entirety. And we encourage you to proceed to summarize and make any additional comments that you think may be appropriate. We then have an opportunity, after we have heard from each of you, to have questions on the subject.

Dr. Alexander, you may proceed.

Dr. ALEXANDER. Senator Cochran, I would like to begin by thanking you for your longstanding interest in this topic, and for your action in convening this hearing today as the forum for presentation to the Congress of the final report of the National Reading Panel.

As you said, in November of 1997, this committee asked me as Director of the NICHD, to consult with the Secretary of Education and appoint a panel that would critically review the scientific literature reporting the results of research on how children learn to read and the effectiveness of different approaches to teaching reading.

The Panel was then to report to the Congress its findings and its judgment as to what was so clearly effective from existing research evidence that it was ready for implementation in the classroom, and what still needed further research.

To fulfill this directive, the staff of the NICHD and the Department of Education conducted a national solicitation for nominees to the National Reading Panel. We eliminated from consideration those persons who had taken strong stands supporting or opposing any particular approaches to teaching reading, and anyone with financial interest in commercial reading instructional materials.

From those persons remaining, as you directed, we selected 14 individuals, 13 of whom are here before you today; mothers and fathers, themselves. They also represent scientists engaged in reading research, psychologists, education administrators, a pediatrician, a teacher, a principal, and a parent of a child who had difficulty learning to read.

To chair the Panel, I appointed Dr. Donald Langenberg, a physicist by training, with no vested interest in reading instruction approaches other than in his role as Chancellor of the University System of Maryland, which is involved in preparation of teachers to be effective in teaching reading. He skillfully led this Panel and will be presenting its report.

The Panel first met in April of 1998. At that time, I charged the Panel to examine critically the research literature with respect to the basic processes by which children learn to read, and the instructional approaches used in the United States to teach children to learn to read, and to answer the following questions: What assessments have been made of the effectiveness of these instructional methodologies in actual use in helping children develop critical reading skills, and what conclusions can be drawn from these assessments regarding their effectiveness and their readiness for implementation in the classroom? How are teachers trained to teach children to read, and what do studies show about the effectiveness of this training? How can conclusions of the Panel be disseminated most effectively? And, what additional research gaps remain that need to be addressed?

The Panel members took their charge very seriously and went about their work conscientiously and with a high degree of professionalism. They broke new ground in their field in developing the methodology for critical review and analysis of the research literature, and provided valuable service to the nation in preparing their report.

I would like to thank the Panel members for their many hours of hard work in gathering and evaluating data and writing this report, and to thank also the graduate students, many of whom are here today, who worked with them on this project.

I would also like to thank the staff of the Panel, particularly Dr. Bill Dommel, the Executive Director, who is not able to be here today, for the strong support they provided the Panel.

The presentation today of the report of the Panel to you and to your House counterparts, as well as to Secretary of Education Richard Riley and Secretary of Health and Human Services Donna Shalala, fulfills most, but not all, of our charge.

You also asked us to plan to disseminate the report broadly. We plan not only to disseminate it, but to work vigorously for its implementation. Panel members have agreed to continue their work to assist with this effort, so some of that activity will continue as well.

Mr. Chairman, I consider this report to be one of the most significant and important things I have been asked to do in my 14 years as Director of the NICHD. The significance of these findings for the well-being of our children and their mothers, their fathers, and their teachers, and the implications for the future literacy of this nation, and for the economic prosperity and global competitiveness of our people is enormous.

Thank you for your wisdom and foresight in asking that this work be done, and for your confidence in assigning responsibility for carrying it out to the National Institute of Child Health and Human Development.

Senator COCHRAN. Thank you very much, Dr. Alexander.

[The statement follows:]

PREPARED STATEMENT OF HON. DUANE ALEXANDER

Mr. Chairman, I am Duane Alexander, Director of the National Institute of Child Health and Human Development at the National Institutes of Health. Thank you for convening this hearing as the forum for presentation to the Congress of the final report of the National Reading Panel.

In November of 1997 this committee, as part of its report on appropriations for fiscal year 1998 for the Department of Health and Human Services, asked me, as Director of the National Institute of Child Health and Human Development (NICHD), to consult with the Secretary of Education and appoint a panel that would review the scientific literature reporting the results of research on how children learn to read and the effectiveness of various approaches to teaching reading. The Panel was to report to Congress its findings and its judgment as to what was so clearly effective from existing research evidence that it was ready for implementation in the classroom, and what still needed further research.

To fulfill this directive, staff of the NICHD and the Department of Education conducted a national solicitation for nominees for this National Reading Panel. From over 300 persons suggested, we eliminated from consideration those who had taken strong stands supporting or opposing any particular approaches to teaching reading, and anyone with financial interest in commercial reading instructional materials. From those persons remaining, as you directed, we selected 14 individuals, 13 of whom are here before you today. They represent scientists engaged in reading research, psychologists, education administrators, a pediatrician, a teacher, a principal, and a parent of a child who had experienced difficulty learning to read. To chair the panel, I appointed Dr. Donald Langenberg, a physicist by training, with no vested interest in reading instruction approaches other than in his role as Chancellor of the University System of Maryland, which is involved in preparation of teachers to be effective in teaching reading. He skillfully led the Panel and will be presenting its report.

The Panel first met in April 1998. At that time I charged the Panel with answering the following questions:

1. What is known about the basic process by which children learn to read?

2. What are the most common instructional approaches in use in the United States to teach children to learn to read? What are the scientific underpinnings for each of these methodologic approaches, and what assessments have been done to validate their underlying scientific rationale? What conclusions about the scientific basis for these approaches does the Panel draw from these assessments?

3. What assessments have been made of the effectiveness of each of these methodologies in actual use in helping children develop critical reading skills, and what conclusions does the Panel draw from these assessments?

4. Based on answers to the preceding questions, what does the Panel conclude about the readiness for implementation in the classroom of these research results?

5. How are teachers trained to teach children to read, and what do studies show about the effectiveness of this training? How can this knowledge be applied to improve this training?

6. What practical findings from the Panel can be used immediately by parents, teachers, and other educational audiences to help children learn how to read, and how can conclusions of the Panel be disseminated most effectively?

7. What important gaps remain in our knowledge of how children learn to read, the effectiveness of different instructional methods for teaching reading, and improving the preparation of teachers in reading instruction that could be addressed by additional research?

The Panel members took this charge seriously and went about their work conscientiously and with a high degree of professionalism. They broke new ground in their field in developing the methodology for critical review and analysis of research literature, and provided valuable service to the nation in preparing their report. I would like to thank the Panel members for their many hours of hard work in gathering and evaluating data and writing this report, and to thank also the graduate students, many of whom are here today, who worked with them on this project. I would also like to thank the staff of the Panel, particularly Dr. Bill Dommel, the Executive Director, who is not able to be here today, for the strong support they provided for the Panel.

The presentation today of the report of the Panel to you and to your House counterparts, as well as to Secretary of Education Richard Riley and Secretary of Health and Human Services Donna Shalala, fulfills most, but not all, of our charge. You also asked us to plan to disseminate this report broadly. We plan not only to dis-

seminate it but to work vigorously for its implementation. Panel members have agreed to assist with this effort, so some of their work will continue as well.

Mr. Chairman, I consider this report to be one of the most significant and important things I have been asked to do in my 14 years as Director of the NICHD. The significance of these findings for the well-being of our children and their families and teachers, and the implications for the future literacy of this nation and for the economic prosperity and global competitiveness of our people is enormous. Thank you for your wisdom and foresight in asking that this work be done, and for your confidence in assigning responsibility for carrying it out to the National Institute of Child Health and Human Development.

Senator COCHRAN. Dr. McGuire.

STATEMENT OF DR. C. KENT MC GUIRE, ASSISTANT SECRETARY, OFFICE OF EDUCATIONAL RESEARCH AND DEVELOPMENT, DEPARTMENT OF EDUCATION

Dr. MCGUIRE. Mr. Chairman, thanks for the invitation to be here today.

I want to join Dr. Alexander in introducing the Panel and its report to you. I really want to commend Duane for his leadership on this Panel effort. It was a long and not so simple effort, I know.

The Secretary and I see this report as really very important. Reading, as you know, is a central priority for the Department of Education. We look forward to using this report in many ways. I would rather not get in the way of the Chair of the Panel, and think it is best that he get on to speaking about its work and its findings.

Thank you very much.

Senator COCHRAN. Thank you, Dr. McGuire, for being here and for helping.

[The statement follows:]

PREPARED STATEMENT OF DR. HON. C. KENT MCGUIRE

Mr. Chairman and Members of the Subcommittee: I am pleased to be here today, along with Dr. Duane Alexander, the Director of the National Institute of Child Health and Human Development (NICHD), to introduce to you the members of the National Reading Panel. This panel was established by NICHD, in consultation with the Department of Education, in response to a request of the Appropriations Committees that accompanied our fiscal year 1998 appropriation. You asked that a panel be convened to assess what we know from research about how to teach children to read. You also wanted to know what is ready for application in the classroom, how that might be disseminated to facilitate effective reading instruction, and what additional research might be needed.

Although I was not in the Department at the time the panel was established, I know that Department officials collaborated with NICHD in identifying individuals to serve on the panel. Department representatives participated in the initial convening of the panel, and staff attended many of the public meetings. Once established, the panel operated quite independently, with support provided by NICHD.

Members of the panel will share with you today the highlights of their findings. I want to join with Dr. Alexander in commending them for their work. I also want to thank Duane for his leadership. During my tenure as Assistant Secretary, I have been particularly concerned with how to compile and share the knowledge gained through research so that it is used to improve education. This report compiles the knowledge; we must now communicate it to the many audiences who should use it.

I believe this is an important report. It contains a great deal of significant, useful information. We know many things about how children learn to read and about some of the instructional strategies that help to foster certain early reading skills. This information is being used, but can be used much more widely, in appropriate ways, to improve early reading instruction for many children. Just as importantly, however, the report reveals that there are very critical gaps in our knowledge about teaching youngsters to read. If we are to help all children become skilled readers, we must expand what we know. We must see that the additional, well-designed research that is so clearly needed is supported.

In this regard, the report is extremely timely for us in the Office of Educational Research and Improvement, and we are delighted to have it. Several months ago, we initiated a major planning effort to help us outline strategic, 10-year plans for research on improving reading and mathematics education and student learning in these two core areas. This report of the National Reading Panel, together with other reports such as "Preventing Reading Difficulties in Young Children," will serve as a foundation for our planning effort in reading. The Department's Office of Special Education and Rehabilitative Services will also be using the report to aid in its planning for additional research, because the report contains specific recommendations on issues related to students with disabilities that require further investigation and study.

Mr. Chairman, we look forward to continuing to work with NICHD on the dissemination of this report and on planning additional research so that we can learn even more about how to improve the reading achievement of our Nation's young people. In addition, we will continue to work together in a variety of other research endeavors, including our recent initiative on English language learning.

Further, I intend to engage my colleagues in the Department of Education in efforts to follow up on this report. There are many ways that the Department can encourage both policymakers and educators to use the information in the report to promote and to provide better instruction in reading. We intend to pursue them.

Senator COCHRAN. Dr. Langenberg, Chairman of the Panel, welcome.

STATEMENT OF DR. DONALD N. LANGENBERG, CHAIRMAN, NATIONAL READING PANEL

Dr. LANGENBERG. Thank you, Senator Cochran.

I want to join my colleagues here in thanking all of those who have worked so hard to make this report possible today. But, particularly, I want to thank Dr. Alexander and his staff, and NICHD, who were so supportive, and who in many ways helped keep us on track through a long, long journey.

It has been a real privilege for me to have served as chairman of this Panel over the last couple of years. I am just delighted that all but one of the members of the Panel are able to be with us today, along with many of the students that helped them do their work. You have my written testimony, and I would like to summarize just a few highlights as I see them.

The Panel has worked tirelessly since April of 1998, a little longer than you had originally contemplated. And that was necessitated, I have to tell you, by the magnitude of the task that you set before us. As Dr. Alexander pointed out, the Panel is composed of people from a very wide variety of academic disciplines, and occupations in education.

He pointed out that it included parents. I would have to say it includes also at least one grandparent, and you can probably guess which of us are grandparents and which are parents.

I want to hasten to say in the interest of truth in advertising, that unlike most of the members of this Panel, I am not an expert in the teaching and learning of reading. As Dr. Alexander said, I am a physicist by training and by practice, and currently I am chancellor and chief executive officer of the University System of Maryland.

But I think all of us on the Panel shared one common goal, and I think we share it with you, Mr. Chairman, and that is the goal of improving the teaching and learning of reading all across our country.

Just to remind us all of what you charged us to do: You asked us, one, to assess the status of research-based knowledge, including

the effectiveness of various approaches to teaching children to read. You asked us to report an indication of the readiness for application in the classroom of the results of this research. Is it well enough established to use in the classroom?

You asked us to report, if appropriate, a strategy for disseminating this information to facilitate reading instruction in the schools. And that really needs to be the object here, not simply understanding how to learn and teach reading better, but how to get it into operation in the classroom so that our kids perform better.

And finally, you recommend that if we found it warranted, a plan for additional research regarding early reading development and instruction. And I think it will surprise nobody that we have suggested some additional research that needs to be done.

The task that you set before us is enormous for many reasons, but part of it is the fact that the reading literature is very large. It appears to include, just on educational research on reading, well over 100,000 studies, at least since 1966, probably 15,000 or more published before then.

I wish I could tell you that the Panel had read every single one of those studies and analyzed them, but obviously that was impossible. So choices had to be made by the Panel in how to proceed. And I would assert that it is in the wisdom of those choices that the success of this Panel's work lies.

The first thing the Panel did was to identify a set of topics of central importance in teaching children to read. Just about the time we started our work, the National Research Council published a report called "Preventing Reading Difficulties in Young Children." And that report was very helpful in helping judge what topics were the most important for our Panel to address.

We began with the major topics developed or indicated in that report, but then we supplemented the selection with information we received at regional hearings that we held in five cities around the nation. I think altogether we probably heard from several hundred people, teachers, parents, school administrators, and others, about what our fellow citizens really believe is important about the teaching and learning of reading.

The topics that the Panel finally settled on included alphabetics, and this includes phonemic awareness and phonics instruction; fluency; and comprehension, which includes vocabulary instruction as well as the comprehension of text.

We looked at teacher education and reading instruction. And finally, we took a look at computer or information technology and what that might portend for reading instruction.

I think the most important thing the Panel did was what it did next, and that was to develop a set of rigorous methodological standards to help them screen the research literature relevant to each topic. Those standards are essentially those normally used in medical and behavioral research to assess the efficacy of medications, medical procedures, or behavioral interventions.

You will find the findings of each of the Panel's subgroups presented in detail in their reports, and they are bound into that rather thick document that you have. And they are all summarized in what we call the Report of the National Reading Panel. That is this fairly thin document that looks like this.

Let me just touch on four of the highlights that are among those that attracted my attention.

First, the Panel found that, in fact, certain instructional methods are better than others, and that many of the more effective methods really are ready for application in the classroom. For example, there was overwhelming evidence that systematic phonics instruction enhances children's success in learning to read, and that such instruction is significantly more effective than instruction that teaches little or no phonics.

Second, the evidence clearly shows that it is wise to start early. Literacy instruction can and should be provided to all children beginning at least in kindergarten. To become good readers, children must develop phonemic awareness, phonic skills, the ability to read words in text in an accurate and fluent manner, and the ability to apply comprehension strategies consciously and deliberately as they read.

Children at risk for reading failure, particularly, require direct and systematic instruction in these skills. And that instruction should be provided just as early as possible, and it ought to be integrated with the entire kindergarten experience in order to optimize the students' social, emotional development as well as educational development.

Third, we believe that research in this critical subject must stand up to critical scientific scrutiny. No physician would normally subject a patient to a treatment or a drug whose efficacy had not been proven in rigorous scientific testing, and we should expect no less of a teacher subjecting a student to the curricular content or a teaching methodology. Without the proven, the necessary knowledge base, we can expect our schools to continue to be besieged by fads and nostrums.

And finally, and most important, teachers. Teachers are key. Teachers must know how children learn to read. They need to know why some children have more difficulty in learning to read, and they need to know how to identify and to implement effective instructional approaches which may differ for different children. They need to learn to judge the quality of the research literature and use it to develop curricula and teaching methods based on the most scientifically rigorous studies.

And to help them perform their critical role, teachers should be provided extensive pre-service and in-service training in a variety of instruction techniques. And here I must tell you that increasingly my colleagues in higher education are beginning to feel the importance and the burden of that responsibility.

About the need for more research, this report is certainly valuable for identifying what is reliably known about early reading development and instruction, but I think it is equally valuable for identifying what we do not know and thus for what we need to discover through future research. As an example, everybody knows that information technology today is transforming education of all kinds and levels.

If we have a machine at hand that can recognize speech and convert it to text, and vice versa, or analyze and critique grammar, punctuation, syntax, or interact directly with students in other

ways, it is plausible to imagine it might be a useful tool in the teaching and learning of reading.

Quite understandably given the newness of the technology, there is very little solid research that tests that hypothesis. There ought to be much more. This is a virgin and little explored field.

Much of the vast reading literature consists of qualitative, descriptive, and correlational studies. These do have value. They help us to understand the general nature of a problem, and they help us to form scientifically testable hypotheses about learning mechanisms and pedagogical techniques.

But correlation is not causation. We cannot separate truth from conjecture, or distinguish what really works from what might work without scientifically rigorous, experimental, or quasi-experimental research of the kind on which this Panel focused its work.

Let me conclude with just a couple of personal observations. I learned an enormous amount from my fellow Panel members in the course of our work. It is my greatest reward for my work on this Panel. I love to learn, and I have to tell you that my perspective on this subject has changed dramatically.

There is a recent report entitled "Teaching Reading Is Rocket Science." I am here to tell you that is a gross understatement. As an experimental physicist, I spent much of my own career doing things much akin to rocket science, and I believe strongly that the teaching and learning of reading is a whole lot more complex and difficult than rocket science.

Our fundamental understanding of the human brain and the mind it encompasses is quite rudimentary and so is our understanding of how to translate what we do into effective teaching and learning, but I am optimistic about the future.

In my own field of physics, I am reminded of the long slow development of our understanding of the quantum nature of the universe in the early 20th Century, led by people like Einstein, Schrödinger, Bore, Heisenberg, and others. It took a century, but by the end of the 20th Century, application of that understanding had led directly to the information technology revolution that is now explosively transforming everything about our lives.

And I hope, and I expect, that the 21st century, I hope the early 21st century, will bring us some comparable understanding of our own minds and how best to develop them.

Finally, Mr. Chairman, you and your colleagues, in essence, asked our Panel to help save the nation from illiteracy. That was a pretty tall order, but I am proud of this Panel's response to that daunting charge. They did not come up with any simple silver bullet, for the simple reason that no such simple silver bullet exists. But they did create, I think, a landmark contribution to our knowledge about teaching children to read.

And with that, Mr. Chairman, I would like to turn to a brief segment from a video that I think might be helpful in understanding the Panel's findings.

Mr. Chairman, I would be happy to respond to your easy questions. If you ask difficult questions, if you do not mind, I would like to turn to my fellow Panel members.

Senator COCHRAN. Thank you very much, Dr. Langenberg, for your excellent report, and your interesting presentation to our subcommittee.

[The statement follows:]

PREPARED STATEMENT OF DONALD N. LANGENBERG

Good morning, Mr. Chairman and members of the Subcommittee. I am Don Langenberg. I have been privileged to serve as Chairman of the National Reading Panel established by the Congress. I am joined today by many of the members of the Panel and by some members of the Panel staff. These expert and accomplished individuals have worked tirelessly since April 1998 to respond to your charge to the Panel. They come from a wide variety of academic disciplines and occupations in education. The Panel was composed of parents and grandparents, teachers, professors of education and psychology, school and university administrators, a pediatrician, and a school principal. I myself am a professor of physics and the Chancellor of the thirteen-institution University System of Maryland. We all share a common dedication to the improvement of the teaching and learning of reading all across our nation.

WHAT YOU ASKED THE PANEL TO DO

You asked the Panel to:

—Assess the status of research-based knowledge, including the effectiveness of various approaches to teaching children to read.

—Report an indication of the readiness for application in the classroom of the results of this research.

—Report, if appropriate, a strategy for rapidly disseminating this information to facilitate effective reading instruction in schools.

—Recommend, if found warranted, a plan for additional research regarding early reading development and instruction.

The task you set for the Panel is a monumental task! The research literature on reading includes over 100,000 studies published since 1966, and an additional 15,000 or so published before that. I wish I could tell you that the Panel members have read and analyzed every single one of those studies, but I can't, because they couldn't possibly have done so. Choices had to be made about what the Panel did, and how it did it. It is in the wisdom of those choices that the success of the Panel's work lies. Let me now describe them to you.

WHAT THE PANEL DID

The Panel began by identifying a set of topics that are of central importance in teaching children to read. It was aided in this selection by a report of the National Research Council, "Preventing Reading Difficulties in Young Children," published at about the time the Panel began its work. It refined its selection using information from regional public hearings held by the Panel in five major cities across the country.

The final topics the Panel studied intensively were:

—Alphabetics, including phonemic awareness instruction and phonics instruction.

—Fluency

—Comprehension, including vocabulary instruction, text comprehension instruction, and teacher preparation and comprehension strategies instruction.

—Teacher education and reading instruction.

—Computer technology and reading instruction.

Then, in what may be the Panel's most important action, it developed and adopted a set of rigorous methodological standards. These standards are essentially the standards normally used in medical and behavioral research to assess the efficacy of behavioral interventions, medications or medical procedures. They guided the Panel's screening of the research literature relevant to each topic. This process identified a set of experimental or quasi-experimental research studies that were then subjected to detailed analysis by subgroups of the Panel members. I also want to point out that the Panel carried out its deliberations and discussions in public to ensure that all citizens could observe the proceedings and provide input to the Panel at each of their meetings.

WHAT THE PANEL FOUND

The findings of the Panel's subgroups are presented in detail in their reports and are summarized in the "Report of the National Reading Panel." Let me touch on just a few highlights.

The Panel found that certain instructional methods are better than others, and that many of the more effective methods are ready for implementation in the classroom. To become good readers, children must develop phonemic awareness, phonics skills, the ability to read words in text in an accurate and fluent manner, and the ability to apply comprehension strategies consciously and deliberately as they read.

Phonemic awareness is knowledge that spoken words are made up of tiny segments of sound, referred to as phonemes. For example, the words "go" and "she" each consists of two phonemes. Phonemic awareness is often confused with phonics, which refers to the process of linking these sounds to the symbols that stand for them, the letters of the alphabet. Phonemic awareness is critically important in learning how to read because children cannot pronounce unfamiliar words if they do not know the sounds that link to the letters on the page. In fact, the Panel found that many difficulties learning to read were caused by inadequate awareness and that systematic and explicit instruction in phonemic awareness directly caused improvements in children's reading and spelling skills. The evidence for these casual claims is so clear cut that the Panel concluded that systematic and explicit instruction in phonemic awareness should be an important component of classroom reading instruction for children in preschool and beyond who have not been taught phoneme concepts or who have difficulties understanding that the words in oral language are composed of smaller speech sounds—sounds that will be linked to the letters of the alphabet. Importantly, the Panel found that even preschool children responded well to instruction in phonemic awareness when the instruction was presented in an age-appropriate and entertaining manner.

The Panel also concluded that the research literature provides solid evidence that phonics instruction produces significant benefits for children from kindergarten through 6th grade and for children having difficulty learning to read. The greatest improvements were seen from systematic phonics instruction. This type of phonics instruction consists of teaching a planned sequence of phonics elements, rather than highlighting elements as they happen to appear in a text. Here again, the evidence was so strong that the Panel concluded that systematic phonics instruction is appropriate for routine classroom instruction. The Panel noted that, because children vary in reading ability and vary in the skills they bring to the classroom, no single approach to teaching phonics could be used in all cases. For this reason, it is important to train teachers in the different kinds of approaches to teaching phonics and in how to tailor these approaches to particular groups of students.

Children at risk of reading failure especially require direct and systematic instruction in these skills, and that instruction should be provided as early as possible. Children in kindergarten and in the first grade respond well to instruction in phonemic awareness and phonics, provided the instruction is delivered in a vibrant, imaginative, and entertaining fashion. Children who experience early difficulty in reading respond well to phonics instruction through the late elementary school years.

The Panel also concluded that guided oral reading has been clearly documented by research to be important for developing reading fluency—the ability to read with efficiency and ease. In guided oral reading, students read out loud, to a parent, teacher or other student, who corrects their mistakes and provides them with other feedback. Specifically, guided oral reading helped students across a wide range of grade levels to learn to recognize new words, helped them to read accurately and easily, and helped them to comprehend what they read.

By contrast, the Panel was unable to determine from the research whether reading silently to oneself helped to improve reading fluency. Although it makes sense that silent reading would lead to improvements in fluency, and the Panel members did not discourage the practice, sufficient research to conclusively prove this assumption has not been conducted. Literally hundreds of studies have shown that the best readers read silently to themselves more frequently than do poor readers. However, these studies cannot distinguish whether independent silent reading improves reading skills or that good readers simply prefer to read silently to themselves more than do poor readers. The Panel concluded that if silent reading is used in the classroom as a method intended to develop reading skills and fluency, it should be combined with other types of reading instruction, such as guided oral reading. The Panel also recommends that substantial additional research be conducted on the effectiveness of silent independent reading and other instructional procedures to enhance fluency and the ability to read with proper expression.

To determine how children best learn to comprehend what they read, the Panel reviewed studies of three areas regarded as essential to developing reading comprehension: vocabulary development, text comprehension instruction, and teacher preparation and comprehension strategies instruction.

Although the best method or combination of methods for teaching vocabulary has not yet been identified, the Panel review uncovered several important implications for teaching reading. First, vocabulary should be taught both directly—apart from a larger narrative or text—and indirectly—as words are encountered in a larger text. Repetition and multiple exposure to vocabulary words will also assist vocabulary development, as will the use of computer technology. The Panel emphasized that instructors should not rely on single methods for teaching vocabulary, but on a combination of methods.

Likewise, the Panel also found that reading comprehension of text is best facilitated by teaching students a variety of techniques and systematic strategies to assist in recall of information, question generation, and summarizing of information. The Panel also found that teachers must be provided with appropriate and intensive training to ensure that they know when and how to teach specific strategies.

With respect to the overall preparation of teachers, the Panel noted that existing studies showed that training both new and established teachers generally produced higher student achievement, but the research in this area is woefully inadequate to draw clear conclusions about what makes training most effective. More quality research on teacher training is one of the major research needs identified by the Panel.

Finally, the Panel examined the use of computer technology to teach reading. The Panel noted that there are too few definitive studies to draw firm conclusions, but that the available information suggests that it is possible to use computer technology to improve reading instruction. For example, the use of computers as word processors may help students learn to read, as reading instruction is most effective when combined with writing instruction.

Teachers are key! They must know how children learn to read, why some children have difficulty learning to read, and how to identify and implement instructional approaches of proven efficacy for different children. They must know how to judge the quality of the reading research literature and to use it to develop curricula and teaching methods based on the soundest and most scientifically rigorous studies. Literacy instruction can and should be provided to all children beginning in kindergarten. In doing so, teachers must understand that such instruction should be integrated with the entire kindergarten experience in order to optimize their students' social and emotional development.

GETTING THE WORD OUT

The Panel's staff has developed a comprehensive strategy to disseminate its findings. The Panel's report and an accompanying interpretive and illustrative video tape will be provided to every member of Congress, to all governors and state departments of education, to all libraries, to all of the nation's major education and teacher organizations, and to the news media. Communication materials summarizing the major elements of our report will be developed to suit the specific needs of different audiences, including parents, teachers, school administrators, and policy makers. A speakers' bureau is being formed that will send teams—which may include Panel members—to present the Panel's findings and determinations to states and to local school districts. These teams will be prepared to provide teachers with specific examples and activities to help them apply these findings and determinations in their classrooms. A Reading Education Summit to provide a national forum on the findings and determinations of the Panel for leaders of colleges and universities that prepare future teachers and enhance the skills of current teachers is also being discussed.

FUTURE RESEARCH

The Report of the National Reading Panel is certainly valuable for the information it contains about what is reliably known about early reading development and instruction. The Report is also valuable for what it says about what we do not know, and thus for what we need to discover through future research. Let me mention just two examples among many.

The reading research literature is huge. Much of it, however, consists of qualitative, descriptive, and correlational studies. Such studies do have value. They can help us to understand the general nature of a problem and to form scientifically testable hypotheses about learning mechanisms and pedagogical techniques. But correlation is not causation! We cannot separate truth from conjecture, or distin-

guish what really does work from what might work, without scientifically rigorous experimental or quasi-experimental research of the kind on which the Panel focussed its work. Too little such research has been done, and we need more of it. No physician would normally subject a patient to a treatment or a drug whose efficacy had not been proven in rigorous scientific testing. We should expect no less of a teacher subjecting a student to curricular content or a teaching methodology. Until we develop the necessary knowledge base, we can expect our schools to continue to be besieged by education fads and nostrums.

Today, information technology is transforming education of all kinds and at all levels. If we have a machine that can recognize speech and convert it to text—and vice versa, or analyze and critique grammar, punctuation, and syntax, or interact with students in other ways, it is plausible to imagine that it might be a useful tool in the teaching and learning of reading. Understandably, given the newness of the technology, there is very little solid research that tests that hypothesis. There ought to be more—much more—in this virgin and little-explored field.

FINAL OBSERVATIONS

Let me conclude with a couple of personal observations.

I have learned a great deal from my fellow Panel members in the course of our work. They have given me a new perspective on our subject. There is a recent report entitled "'Teaching Reading Is Rocket Science." I think that is a gross underestimate. I spent my career as an experimental physicist doing things akin to rocket science. I now believe that the teaching and learning of reading is much more complex and difficult. Our fundamental understanding of the human brain and the mind it embodies is quite rudimentary. So is our understanding of how to translate what we do know into effective teaching and learning. But I am optimistic about the future. I am reminded of the long, slow development of our understanding of the quantum nature of the universe in the early twentieth century, led by Einstein, Bohr, Schroedinger, Heisenberg, and others. By the end of the twentieth century, application of that understanding had led to the information technology revolution that is now explosively transforming our world and our lives. I hope and expect that the twenty-first century will bring us a comparable understanding of our own minds and of how best to develop them. Let us all do what we can to make that happen.

Finally, Mr. Chairman, you and your colleagues, in essence, asked our Panel to help save our nation from illiteracy. I am proud of the way in which this Panel has responded to your daunting charge. This diverse group of individuals, working together, developed a set of scientific criteria and, for the first time, used them to assess the quality and rigor of research on reading instruction. They identified instructional approaches that are demonstrably effective in teaching reading skills to a wide range of children. They did this in a public forum in a politically charged environment. They did not come up with any simple "silver bullet"—because none exists. But they did create, I believe, a landmark contribution to our knowledge about teaching children to read.

Now, I would be pleased to respond to your questions—your easy questions. I hope you will permit me to refer your hard questions to the real experts of the Panel who are with me today.

Senator COCHRAN. Let me first turn to Dr. Alexander and ask him a question about dissemination. How are you going to get the information about effective ways to teach reading to schools and teachers so that the information is actually used in the classrooms?

Dr. ALEXANDER. The dissemination effort actually begins today, Senator Cochran. Each of your 534 colleagues will receive a copy of the report of the Panel, with the full video tape, in their offices today.

We are having a press conference later this morning where we will interact with members of the media and present the findings of the report for their assistance in disseminating the report.

We also will continue to use our Panel members to present the report at national conferences, meetings, and conventions. And, in addition to a speakers bureau, we will organize workshops and training programs at various places around the country, at school boards, in-service programs for teachers, teacher preparation at colleges, et cetera.

We will interact with the National Education Association, the American Federation of Teachers, the PTAs, and other organizations in making this information available and using their skills and outlets as a way of disseminating the report, along with many other organizations of similar nature.

The American Library Association is working with us. All American libraries will receive copies of this report. They not only will stock it, but will also be implementing its recommendations in their interactions with pre-school children in their reading programs and books that they read to kids in their programs at the libraries.

Copies of the report will go to Governors, to State boards of education, to all colleges of education. And we will also be working with the Department of Education—we have a meeting scheduled for next week—to talk about joint activities and further dissemination and implementation of this report. We intend to be very proactive in getting this information out.

Senator COCHRAN. Thank you very much.

Dr. Langenberg, how did the Panel decide on the research review methods that were used in doing its work?

Dr. LANGENBERG. Well, as I said, the methodology that the Panel used to identify the studies they would examine most carefully was essentially a methodology that was scientific, experimental, or at least quasi-experimental, of the kind that in medicine I would call a clinical field trial or a randomized field test.

And then they went through the literature and identified those papers that were in English, published in a peer reviewed journal, and had relevance to the topic at hand. Then from that set, they screened out those studies that, in fact, met the firm methodological standards that they had developed and thoroughly analyzed each one of those papers and its results, coded the results, and used formal statistical procedures, where possible, to analyze the results.

Senator COCHRAN. Do you think that the failure to use qualitative or descriptive research and concentrating only on quantitative things that could be measured on a scientific basis is a deficiency or a shortcoming of this report? Would there have been a more comprehensive analysis if it had gone beyond assessing quantitative research?

Dr. LANGENBERG. Well, my own view is that there would have been value in going beyond to that enormous part of the body of research literature that is qualitative, but we had to draw the line somewhere.

And the fact is that in our view, if you are looking for the answer to the question, "What do we know reliably actually works?", you have got to do that by following strict scientific methodological rules.

There is an old poster that used to be on the walls at the old National Bureau of Standards that used to say, and this is one of my favorite sayings, "If you cannot measure it, you cannot make it because if you cannot measure it, you cannot tell whether you have got it made."

Senator COCHRAN. You observed that there was some of us who obviously were older than others. One experience that we had was getting to watch Dragnet on television a lot.

Dr. LANGENBERG. Yes, I remember that.

Senator COCHRAN. And Sergeant Friday would say, "I just want the facts, ma'am. Just the facts." And I suppose that is another way of saying that this Panel wanted the facts, and wanted facts that were supported by evidence.

Dr. LANGENBERG. That is right.

Senator COCHRAN. And that is what you did.

Dr. LANGENBERG. That is exactly right.

Senator COCHRAN. Were you able to compare the effectiveness of studies that taught beginning reading skills using explicit instructional approaches and whole language approaches?

Dr. LANGENBERG. That is a question that I would be more comfortable turning to one of my Panel members, if I may.

Would any of you like to take a shot at it? Sally?

Senator COCHRAN. Why not come up and sit here? There is a microphone there.

Dr. LANGENBERG. This is Dr. Sally Shaywitz. She is the physician on the Panel, but also a very distinguished learning and neuroscience researcher.

Dr. SHAYWITZ. Good morning. To address your question, one of the really outstanding features of the process that the Panel used to do its work was to develop a methodology, a process by which individual studies were analyzed and coded so that we could determine what specific procedures were used to teach in a particular way.

So we were able to compare procedures that focused on teaching in a systematic explicit manner. We could compare approaches that used a more implicit or embedded phonics approach. And we can compare procedures that were more implicit, often referred to as whole language.

So using that very specific methodology, we were able to make a very strong determination that methods that focused on systematic explicit synthetic phonics and phonemic awareness, produced the greatest effectiveness in teaching children to read.

We were also able to determine, for example, that in teaching fluency those methods that focused on having children repeatedly read orally, and very importantly having the explicit feedback of their teachers, were the most successful in teaching fluency.

So I am happy to say we do have a very strong response and a very positive response about what works in teaching children to read.

Senator COCHRAN. Did teaching children about phonemic awareness and phonics help them read better?

Dr. SHAYWITZ. Yes, it did. It helped their phonemic awareness and their phonics, but most importantly, it helped their reading. It also helped their spelling; it helped their reading comprehension. So this was very important. And it helped all types of children at different stages and in different ages.

Senator COCHRAN. You had a lot of research to review. And the reports of those findings, I know, are voluminous, and you could

not, as you say, read everything. What could you say about the quality of the research that was reviewed?

Dr. SHAYWITZ. Well, if I may answer that: I think, in general, it is very fair to say that we have a lot of work to do to improve the quality of research in reading.

As in any scientific domain or discipline, the quality of individual studies will vary, but in general and overall, studies in education and, in particular, studies in reading, have not had the kind of scientific rigor or the collection and analysis of objective data, or a formal test of hypothesis that we have in other types of research. And this type of research has not been emphasized in either education or reading research over the last several years.

But on a more positive note, as a result of this extensive and comprehensive process, we now know what areas need more work, where we need more research, and what types of research are needed in these specific areas.

Senator COCHRAN. Do you think that you have been able to identify criteria for reviewing existing qualitative research so that you could make judgments about the quality of existing qualitative research?

Dr. SHAYWITZ. That is a really important and critical question, and the Panel actually has made a very strong recommendation for future research evaluations, and that is we need to be able to spend the time, and the resources necessary to first, develop specific research criteria, to apply them in a systematic manner, and in an open forum, just the same as has been done now for quantitative research.

So once that is accomplished, fulfilling all of these criteria, we would be in a better position to really understand how to implement solid scientific research, and integrate all types of research.

Senator COCHRAN. Has your Panel report taught us anything about how to apply the findings of research to teacher preparation and teaching of our children?

Dr. SHAYWITZ. Well, I think we have a great deal to learn about how best to apply the solid research findings to instructional practices, and really, we need to get up to a new level in our understanding of instructional practices, and how they can be implemented in the complex educational settings that our classrooms represent.

And furthermore, I think what we have learned is that—what is very critical is that the selection and application of instructional practices must be preceded by actual evaluation in a scientific and objective way of the assumptions that those instructional practices are based on, as well as a formal testing of the effectiveness of these particular instructional practices for different children at different stages of development.

And I think it is really important to note that the content of the majority of reading materials that our teachers use to inform their instructional practices, have not gone through a formal test of the assumptions that these practices are based on, nor have they gone through a formal test of whether they are effective or not. So I think there is a lot of work that we have to do.

Dr. LANGENBERG. If I could just add to that, Mr. Chairman: Now on my role as a grandparent, we all have a feeling that because we

have been educated, we all know how education should be done. And that is one of the most complicating factors in trying to do what we are trying to do.

Our schools, as I suggested, are beset with all sorts of fads, nostrums, advice, direction from all sorts of sectors. And one of our most important tasks, I think, is somehow to get imbedded in the culture of education, embedded in the training of our teachers, the notion that what you want to focus on is what has been proven to work. And we have to somehow establish ways to support our teachers in doing that.

Senator COCHRAN. Do you have an additional comment to this?

Dr. SHAYWITZ. Yes, I do. I guess as the only pediatrician or medical person here aside from Dr. Alexander, I just want to say what a landmark event this is. You know, it used to be that what we knew about reading was sort of in the background and we would think that we know so much about medical disorders.

But I think that with this report, with this evidence-based report, what we know about reading and how we can determine what best works for reading, has come into the front. It makes me aware that there are so many areas now in education where I wish we could apply the same rigorous process and really have an evidence-based set of body of evidence to determine what works best.

So I think we all should be very proud and very much looking forward to the implementation of this report. This is a giant step forward, not only in education, but I think for any condition that affects the health and well-being of our children.

Senator COCHRAN. If there were two surprises that I found in reading the executive summary, the smaller version, here it was, first, the enormous amount of research and reporting and conclusions that had already been reached by a lot of researchers in various aspects of this subject; and secondly, how much additional research this Panel recommends still needs to be done.

I am almost stunned by the final words in one section, page 19, under the topic, "Next Steps." I was reading that this morning, and I had to read it twice because I am not sure I understand the technical implications of the words that are being used. I needed some vocabulary training before I read this section of the report. And maybe the general audience out there, if there is anybody who is a member of the general public here today, will sympathize with my problem.

The first next step was this, "Where possible, there should be meta-analyses of existing experimental or quasi-experimental research and topic areas not addressed by the NRP." I do not know what a meta-analyses is, to start with. I have to figure that out.

Then, "Additional experimental research should be conducted on questions unanswered by the Panel's analyses of the topics it did cover." That is clear.

"There should be an exhaustive and objective analysis of correlational, descriptive, and qualitative studies relevant to reading development and reading instruction that is carried out with methodological rigor following pre-established criteria." That is a little difficult for me to get wrapped around and understand.

But I am just challenging the Panel also maybe to have a simplified listing of next steps that even ordinary mortals can understand.

I can understand the fourth one. "Experimental research should be initiated to test those hypotheses derived from existing correlational, descriptive, and qualitative research meeting high methodological standards." But I am afraid that some of this may stun the ordinary person who may have to read this.

If you are going to send it to Members of Congress, for example, they might stumble over that and try to figure out what they are supposed to do next. But I think what we are all supposed to do next is help you advertise what you have found, and what you recommend, because I agree with your conclusions that this is an important area for additional research.

This is an important area where we can translate the things you have learned into new instructional methods in the classrooms of our country, and that we ought to start right now. You have learned enough so that you can provide important, helpful advice to educators around the country.

I am not one to say that Congress ought to write the reading curriculum for all the schools, though. And you will notice that in the legislation, and in the report, and in comments that I have made today, it has been an urging that educators take advantage of this information to translate that into new methods in the classroom, to improve the teaching and learning of reading in American schools.

Congress ought not to write a new law telling everybody how to do it. We would probably mess it up so bad it would be a disservice rather than an improvement to our educational system in the country. So I have a bias there, you will have to understand.

So I am not asking either in the additional follow-up work that is going to be done that you tell Congress what it ought to do, necessarily, but rather tell the educational community how it can take the lead in providing better studies, better teaching methods in the schools of the country.

Well, I did not come here to make a speech either, that is for sure. I came to receive a report. Thank you all for your very hard work and your very effective work in carrying out the wishes of this subcommittee.

It did take a little longer than we thought. You will notice by the original language, I think 9 months or something was given. That showed you how little we knew about it, too, and how much easier we thought it would be than it turned out to be. You all have done a great job. I have taken up too much time talking.

Dr. LANGENBERG. Thank you, Mr. Chairman.

CONCLUSION OF HEARING

Senator COCHRAN. Thank you all very much for being here, that concludes our hearing. The subcommittee will stand in recess subject to the call of the Chair.

[Whereupon, at 10:58 a.m., Thursday, April 13, the hearing was concluded, and the subcommittee was recessed, to reconvene subject to the call of the Chair.]

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