

Child and Adolescent Development Research and Teacher Education: Evidence-based Pedagogy, Policy, and Practice

Summary of Roundtable Meetings

December 1-2, 2005

March 20-21, 2006

Co-Sponsored by:

National Institute of Child Health and Human Development (NICHD)

National Institutes of Health

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

and

**National Council for the Accreditation
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Reflections from the Roundtable Chair

The opportunity to participate in the deliberations of this task force was a dream that came true for me. The experience gave me hope.

Shortly after our Yale Child Study Center School Development Program (SDP) began work in schools in 1969, I had an occasion to mention that a frightened 8-year-old transfer who kicked his newly introduced teacher in the leg and ran out was displaying “fright-fight or flight” behavior. The staff looked at me as if I was speaking a foreign language. The concept was basic knowledge to child development, social, and behavioral science professionals. It struck me as unfair to teachers that, through no fault of their own, they had not received the pre-service or in-service preparation that would enable them to understand why children do what they do, and how to manage it in a way that would aid their development and learning.

Over the years, the number of teachers I encountered who had taken child and adolescent development courses in their pre-service training increased to almost all. But even now, few have had applied child development courses or experiences. The most powerful moment of our roundtable time together for me occurred when the teachers of teachers identified this major continuing problem—We teach them the theory, but not enough about how to apply it. It was this kind of insight that I had long hoped that discussions between child development scientists and educators would bring about.

Our SDP work was designed to apply child and adolescent development knowledge and skills to practice through a collaborative effort that reduces the vulnerability of the students and the adult stakeholders through guidelines such as no fault problem solving and consensus decision making. The resultant positive building and classroom culture facilitates the achievement of a desirable level of development, teaching and learning. I was delighted by the agreement among panelists that a good school culture or context is essential. This suggests that an important part of teacher and administrator preparation should be learning how to work with colleagues, parents, and the community to create a good school culture.

The reality, however, is that human beings and human systems resist change even when the benefits are clear. Thus, the concern for me has been how we can create strong motivation and powerful incentives to prepare pre-service educators so that they can support child and adolescent development in practice; and how to support similar change among existing practitioners where necessary. Knowledge and sanctions can promote change. Our NICHD/NCATE-sponsored roundtable was an important step in the right direction. It provided theory and knowledge, evidence from practice, and considered the possible benefits of child and adolescent development accreditation standards and sanctions.

This report is a sure-footed beginning toward moving child and adolescent development from the periphery of education thinking to the center; as one participant suggested, as the tree trunk rather than the limbs. Standards, advocacy, accreditation work and the translation of knowledge and skills through demonstration and practice, and more will be needed. But the excitement generated among our roundtable participants make me hopeful that this goal can be accomplished in a reasonable period of time.

James P. Comer, M.D., M.P.H.

Founder, Yale Child Study Center School Development Program

A Dean's Perspective

First of all, I just want to say what a privilege and a pleasure it was to participate in this roundtable. Clearly, the groups represented on the roundtable have significant overlapping interests (conceptual, programmatic, ulterior, and altruistic). Yet it is an all too rare occurrence for us to have opportunities to sit together to analyze and explore those interests. Just on a personal level, it was the best “professional development” I have had in decades.

Secondly, I want to emphasize the *huge* potential for this report in the debate about whether teachers need subject-matter knowledge—or—knowledge of children, their families and communities—or—knowledge of pedagogy. Clearly, they need all of the above. It is not an “either-or” situation (despite the way the debate too often gets framed) but rather a “both-and” situation. This report lays out, eloquently and powerfully, what teachers need to know about kids, their families, and their communities and why they need to know this.

The report helps us make the “both-and” argument from an authoritative, respected, and powerful voice. We need, all of us, to find multiple avenues to “use” the authority, respect, and power behind this really quite remarkable set of principles. For instance, I have already used this report with our Board of Directors, and I am asking that it be shared as background reading for a New York State Teacher Education Round Table, sponsored by the Carnegie Corporation of New York, and I will then use these principles as a frame for what we do and why in our programs at Bank Street.

I urge you to read and use the report.

I want to share two “take-aways” that I had from my participation in the roundtable and mention just a couple of possible implications of those “take-aways.” The two take-aways are closely related. The first came from a comment that Bob Pianta made as we were making a list of everything we wanted teachers to know about human development—theories, research, and practices. We were rapidly generating the kind of massive list that always gets generated in such activities because teachers have to know everything. He said that, ultimately, what he wanted teachers to know is that children do things for a reason and to understand that a teacher’s job is to figure out those reasons and to use that knowledge to create contexts that support the growth and development of their students. That is a simply stated (but difficult to do) definition of one of the core functions of teacher education.

The second take-away came from Margaret Beale Spencer’s description of her research. She said all human beings are vulnerable and bring with them both risk and protective factors. The teacher’s job is to create contexts that alleviate the risks and enrich the protective factors to support the growth and development of their students. Again, a simply stated (but difficult to do) definition of one of the core functions of teacher education.

I want to highlight the incredible basic and inviolable respect for the child that underlies both these comments. “Children do things for a reason.” “All human beings are vulnerable.” Secondly, I want to highlight the earlier point that knowledge of children and the multiple ways in which they develop is necessary but not sufficient. The next, and absolutely essential, goal is help teachers learn *how to use* their knowledge of the reasons children do what they do, and their knowledge of the vulnerabilities and risk and protective factors that all children bring with them.

Let me just briefly give two implications in this regard. A programmatic implication is that one cannot learn “how to use something without practicing it.” This creates an important lens through which to view field experiences. Field experiences and the support provided within them need to consciously support both the growth of knowledge about children (their families and communities) *and* a strengthened capacity to use that knowledge. This is difficult and complex work and it simply is not going to be achieved in a class or even multiple classes alone. Equally important to note, this is not going to be achieved with a simplistic translation of research into a prescribed set of behaviors. The notion that “to every complex problem there is always one, (usually wrong), simple answer” is antithetical to the principles laid out in this report and the respect for children that underlies those principles.

A conceptual implication can be seen from the serendipitous approach to Bank Street from a publishing company to write an introductory textbook for prospective early childhood educators (that just happened to coincide with the work of this roundtable). We are writing a textbook that will, more or less, be organized around my “take-away core function” of teacher education. What does one need to know about kids, their families and communities in order to understand why they do what they do and what one as an educator can do when growing a classroom environment to alleviate the risk factors and enrich the protective factors that support the growth and development of the children and families in one’s care. Thank you.

Jon Snyder
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(Remarks presented at the annual meeting of the American Association of Colleges of Teacher Education Meeting, February 26, 2007)

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Executive Summary

The National Institute of Child Health and Human Development (NICHD) and the National Council for Accreditation of Teacher Education (NCATE) collaborated to produce a summary of two roundtable discussions on the critical relevance of child and adolescent development research to teacher preparation practices. The participants in the roundtable discussions were not formal advisors charged with making policy recommendations but rather a group of experts in teacher training and child and adolescent development research. Their discussions provided important guidance to the NICHD/NCATE collaborative effort.

This summary report discusses major issues faced by teachers and schools, the resources needed to address them—such as translating child and adolescent development literature into a user-friendly format for delivery in courses and links to the accreditation process. The underlying premise guiding the roundtable discussions: *If educators are to empower all individuals to learn, they must know and be able to apply information from human development and cognitive science within their own professional practice.*

NCATE, a coalition of 33 national professional and discipline-specific organizations including teacher unions and professional societies of different levels of school personnel, must know the state-of-the-art and science in teacher education practices. NCATE also understands that research is important for teacher preparation and must identify critical gaps in the knowledge and experience base of its constituents. Similarly, if teacher preparation programs are to effectively incorporate cutting-edge research and transmit this knowledge to pre-service teachers, agencies such as the NICHD must identify the state of the science and translate relevant findings into terms readily accessible to lay users.

Thus, this collaborative effort—linking NCATE, an accreditation agency that can bring about structural change, with the NICHD, an Institute that focuses on research and the translation of research—holds particular promise for opening the channels of communication between researchers and practitioners and, as a result, bridging the gap between these disciplines.

This report captures only a portion of the discussions and presentations during the two roundtable meetings and reflects merely a starting point for this collaboration. The following are highlighted in this summary:

- The state of practice in teacher education highlighting the ways in which child and adolescent development research is currently integrated into teacher preparation curricula;
- Ongoing investigations of child and adolescent development from selected research studies, and how aspects of these studies may be applicable to teacher preparation;
- Issues and challenges in translating research to practice; and
- Applications and action steps for linking child development research with teacher preparation practices.

These statements reflect eight essential areas that participants felt mattered most in integrating child and adolescent development research into teacher preparation and practice:

- **Application Matters.** Application of the research and knowledge base about child and adolescent development is the missing element in most teacher preparation programs. It cannot be assumed that teacher candidates will automatically be able to transfer information to classroom practice; they must be shown how. Teacher preparation programs need additional modules on child and adolescent development that are embedded longitudinally in the course of a teacher development program, including emphasis on diversity in learners and risks to positive development.
- **Experience Matters.** Knowledge about child and adolescent development must be presented according to the developmental stage of the adult learner. While all teacher candidates need a deep understanding of child and adolescent development research, novice teachers in particular need basic information, connected to case studies first and practicum experiences later, with concrete examples of how real children and adolescents actually respond to various instructional strategies.
- **Time, Resources, and Support Matter.** The “carrying capacity” of institutions is the most critical barrier to supporting and sustaining the integration of child and adolescent development research into preparation programs. State and institutional policies need to be modified to give teacher candidates additional time with actual students, through both an internship and a period of residency.
- **Access Matters.** The field of child and adolescent development lacks mechanisms for disseminating research findings and information to sources readily available to teachers, administrators, and other school personnel. Educators as well as policy-makers, parents, and other lay stakeholders need objective and informative overviews of current research in child and adolescent development and appropriate application in classrooms, with clear rationales for those applications.
- **Relationships Matter.** Classrooms are active social systems, and children with positive relationships demonstrate positive behaviors. The teacher-student relationship is central in this system. Teacher education programs that draw upon the data showing that emotional support and attention to the student-teacher relationship, in fact, enhance children’s capacities to learn could prove quite significant.
- **Context Matters.** Development resides in the interaction between context and the individual. Classroom processes and overall school context can serve a protective, stabilizing function, particularly when parenting processes in the home environment are compromised. Moreover, well-organized classrooms and responsive adults in the school promote self-regulatory skills that facilitate academic performance. Thus, achievement and school context go hand-in-hand.
- **Affect Matters.** In children especially, affect drives cognition. Children of all ages function better when they have confidence in a secure base to which they can turn for support if needed. When children have the support they need, they explore more competently, are less fearful, and are able to give more focused attention to cognitive tasks.
- **The Child Matters.** It is important for teachers to focus on the child, not just the skill. Research in developmental neuroscience has demonstrated that children grow cognitively at different rates and may not achieve the same stage at the same time. Because children’s capabilities develop over time, a teacher needs to understand what is developing and tailor the instruction to the learner. This approach grows naturally from an understanding of human development.

Participants expect that these statements will be translated into action steps, which will help NCATE chart a course toward new approaches in teacher preparation and practices.

The preliminary questions guiding the roundtable discussions were modified as the meetings progressed to reflect the roundtable participants' diverse ideas and perspectives. This report does not review or survey the vast literature in child and adolescent development, but highlights principles and theories derived from ongoing research studies and investigations presented at the roundtable meetings. The focus of the discussions centered largely on the social and emotional domains of development with the expectation that other domains will be explored at future meetings. The researchers consulting on this project were funded by the NICHD or conducted studies relevant to the goals of this roundtable.

Specific policy recommendations based on of the ideas presented in this report are beyond the scope of this collaboration; however, the summaries of research and the corresponding questions raised in this report may help NCATE frame their standards and set their agenda for improving practice at the all levels of the education system.

Introduction

The National Institute of Child Health and Human Development (NICHD) and the National Council for Accreditation of Teacher Education (NCATE) collaborated to examine child and adolescent development research and its relevance to teacher preparation programs.

The NICHD is one of 27 Institutes and Centers of the National Institutes of Health. Created by congress in 1962, the NICHD supports and conducts research on topics related to the health of children, adults, families, and populations. For decades, people have turned to the NICHD for important health research advances and information on such topics as the phases and functions of human growth and development throughout the lifespan. The NICHD also identifies the state of the knowledge and the existing gaps in research through workshops, conferences, roundtables, and other forums. These processes often culminate in a meeting summary, special journal issues, or books describing the state of the knowledge in a particular area and what work remains.

NCATE is an alliance of more than 30 national professional organizations of the teaching profession and education policy community committed to quality teaching. It is recognized by the U.S. Department of Education and the Council on Higher Education Accreditation as a professional accrediting body for teacher preparation. NCATE currently accredits 625 institutions and is working with approximately 100 institutions pursuing accreditation. To date, 48 states and two jurisdictions have chosen to enter partnerships with NCATE to increase the rigor of their preparation programs.

As collaborators, the NICHD and NCATE are uniquely positioned to bring together the science of child and adolescent development with the science of pedagogy and practice to examine the state of evidence-based knowledge of child and adolescent development in teacher education programs, and to identify important applications of this knowledge. To this end, these organizations held two roundtable discussions to allow experts in the fields of teacher education and child/adolescent development research to share their knowledge and insights, and to discuss ways in which evidence-based knowledge of child/adolescent development could shape teacher preparation and practices.

This is an important undertaking. Efforts to decrease or eliminate the educational achievement gap and to promote quality teachers rest upon the availability of scientific knowledge about the factors that make teaching effective. Currently, teacher training emphasizes mastery of academic *content* as the necessary base of knowledge for providing quality education. However, the changing demographics in school communities and the persistent disparities in educational achievement and attainment call for integrating new knowledge bases in teacher preparation programs. Teachers need a working knowledge of the principles of child and adolescent development in order to master the techniques that enable students to learn to high standards.

Moreover, teacher retention is currently in crisis due, in part, to the expressed need for skills, tools, and resources to address the needs of students who are challenged to meet educational standards. Specialized training in the application of child and adolescent development research might improve teacher skills and, thereby, increase teacher retention.

Historically, policy makers have not regarded child development research as an essential component of teacher preparation pedagogy. The policies have largely focused on the extent to which teachers deliver content through locally prescribed curricula. While no one argues the necessity of enriched curriculum content as a foundation for academic success, current research points to the fact that aspects of development—neural, cognitive, social, psychological, physical, and ethical have far-reaching effects on children’s ability to learn. Teachers and administrators need access to the scientifically based knowledge of these aspects to optimize students’ ability to engage with and learn from the curriculum. Although many of these issues have already been examined by commissioned panels and reported in the literature (Handoff & Phillips, 2000; Bransford, Brown, & Cocking, 2002), a goal of this effort is to discuss relevant principles and themes that can be applied to teacher preparation programs. An additional goal of this collaboration is to pose the essential questions that need to be explored beyond the scope of the roundtable discussions. The following questions constituted the starting point for roundtable participants in determining some of the most important areas of knowledge and practice that may need to be examined in greater depth:

1. The State of Practice in Teacher Education

- What are the current best practices in teacher education and preparation, and to what extent are these practices supported by scientific evidence?
- What new standards regarding child development and adolescent development need to be developed and incorporated into the current standards of practice for teacher education programs?

2. The State of the Science in Child and Adolescent Development

- What is the state of the science regarding child and adolescent development as related to teaching and learning?
- What are the gaps in the research base?
- Where are the areas of convergence in the research base?

3. Implications for Policy

- What are the current policies (local, state, federal) that support or hinder the integration of child and adolescent development research into teacher education curricula and fieldwork assignments?
- What new policies need to be developed?

These preliminary questions were modified as the meetings progressed to reflect the roundtable participants’ diverse ideas and perspectives. This report does not review or survey the vast literature in child and adolescent development, but highlights principles and theories derived from ongoing research studies and investigations presented at the roundtable meetings. The focus of the discussions centered primarily on social and emotional aspects of development, with a view toward addressing other aspects of development at future meetings. To the extent possible, the roundtable participants discussed the domains of development in an integrative fashion to raise new questions and facilitate in depth, holistic discussions. The researchers consulting on this project were either funded by the NICHD or have conducted studies relevant to the goals of this collaborative effort.

Specific policy recommendations based on of the ideas presented in this report are beyond the scope of this collaboration; however, the summaries of research and the corresponding questions raised in this report may help NCATE frame their standards and set their agenda for improving practice at the all levels of the education system.

Section I: Stating the Problem: Examining the State of Practice in Teacher Preparation Programs

What is the state of practice? How do schools of education currently integrate child and adolescent development research and theories into their preparation programs?

Too often, knowledge about child and adolescent development is presented to pre-service teachers in de-contextualized ways, so that its classroom application is not apparent. As a consequence, most beginning teachers and other educators do not adequately understand the scientific knowledge base or its applications in child and adolescent development. Current NCATE standards state that “new teachers should acquire the knowledge and skills that will enable them to teach so that all children can learn.” This standard is the expectation for the more than 700 institutions connected to NCATE. To enable preparation programs at these institutions to rise to the challenge, pre-service teachers need to understand the factors that contribute to children’s ability to learn. Findings from research on child and adolescent development have the potential to promote these understandings.

Toward this end, NCATE conducted a survey of its institutions to determine how knowledge of child and adolescent development is transmitted; what primary texts are used most frequently; and what knowledge bases in child and adolescent development are applied in teacher-preparation programs (See Appendix A). A Web-based survey was sent to unit heads of 595 institutions accredited by NCATE (and to 20 more accredited soon thereafter); 283 responded. Key findings indicate that:

- Approximately 80 percent of responding colleges of education offer courses in child and adolescent development.
- Nearly 70 percent of responders indicated that courses in child and adolescent development are also offered through their psychology department.
- At 90 percent of the institutions, teacher candidates are required to take at least one child and adolescent development course.
- In most of these institutions, knowledge in the area of child and adolescent development is assessed through projects involving P-12 students, end-of-course exams, and case studies/vignettes.

About three-fourths of early childhood and elementary preparation programs said that the knowledge base in their programs is codified in professional standards; only 61 percent of middle-level childhood and adolescent programs said the same. In addition, 72 percent said that the knowledge of child and adolescent development of their teacher candidates is informed equally by research and practice, whereas only 25 percent said that it is informed mainly by research.

About half of the responding institutions thought that additional coursework was needed in adolescent development and middle level childhood.

Textbooks. The institutions responding to the survey use a wide range of textbooks that focus on child and adolescent development in their programs. There appears to be little consensus on textbooks, but many of the books contain very similar information. Four authors were mentioned as authoritative sources on child and adolescent development most frequently across programs. Books by Laura Berk were most frequently mentioned by early childhood and elementary education programs (among almost 30 texts focusing on child/adolescent development mentioned by early childhood programs and more than 40 mentioned by elementary education programs); whereas books by J.W. Santrock were most frequently mentioned by middle-level and secondary education programs. Steinberg was also mentioned several times among the authors mentioned at the secondary level. There were fewer mentions of any particular text in the area of middle-level childhood education than in the other program areas.

The NCATE survey revealed that many texts present *virtually no application*; thus, education professors have to create their own examples. Textbooks by Laura E. Berk (*Child Development and Infants, Children, and Adolescents*) are the most frequently used books in child and adolescent development. A review of these texts reveals that Berk's are classic textbooks on child development that cover the stages from infancy through adolescence. They cover physical, cognitive, and social/emotional growth, referring to Jean Piaget for cognitive development and to Erik Erikson and Lev Vygotsky for social/emotional development. However, these books, which are the most frequently used by the early childhood and elementary education programs responding to this survey, do not discuss how to use this information in the classroom and contain no application prompts, such as "How can a teacher help children regulate themselves in a classroom?" Survey respondents commented that both education students and their professors would benefit from a text that made more explicit connections between the research and its application.

In contrast, a text by Anita Woolfolk, *Educational Psychology*, does include applications for the classroom, although it is a text geared to a course in educational psychology, and not a course in child and adolescent development. It is possible that, due to limits on the number of credits in teacher preparation programs in some states, the course in educational psychology serves as a proxy for an additional course in child and/or adolescent development. Each chapter in Woolfolk's work starts with a case study and asks, "What would you do?" At the end of each chapter, four real teachers explain what they would do. The text includes information on cognitive functioning and gaining attention as well as motivation strategies for teachers to get and retain a child's attention. Some special education faculty listed Woolfolk's *Educational Psychology* as the most authoritative text used in their program. Fewer special education faculty

said they use the same texts as in other programs, such as early childhood. One respondent said that all students take a lifespan psychology course in the psychology department; that special education courses address developmental issues in most courses; and that students also take educational psychology. Another respondent noted that special education majors take the same child development courses as the early childhood and/or education majors.

Although a few of the texts may do an adequate job, these texts do not appear to be used by a majority of programs. Two texts that appear to have more application are *Child and Adolescent Development for Educators*, by Judith Meece, and *Child Development: Educating and Working with Children and Adolescents*, by McDevitt and Ormrod.

Course Syllabi. Jane Leibbrand, NCATE Vice-President of Communications, presented a comparison of two syllabi from a college course in adolescent development. The course was taught by two different professors and separated by a year—a year during which NCATE implemented performance-based standards focusing on outcomes. In the first syllabus, the instructor used only certain parts of the text (John W. Santrock, *Adolescence*) and did not appear to include classroom applications. In the syllabus from the following year, the professor had introduced a focus on classroom intervention.

One issue noted is that, in large programs, there may be 25 sections of a course may be offered for which each professor selects his/her own book. NCATE's new program review system, which expects program faculty to develop and implement common assessments for all candidates in the program, may facilitate greater consistency within programs in schools of education.

What knowledge bases and experiences do teacher educators feel would be valuable in pre-service education? What are the obstacles to providing this knowledge and experience?

Survey respondents indicated that a clearer connection between knowledge of development and clinical experiences is needed. Faculty in special education programs indicated that more coursework in special education and children with disabilities would be very useful. One respondent summed up a goal of the roundtable with the comment: The need is not for more coursework—the need is for better defined courses that produce a consistent and important knowledge base that students can apply to classroom situations.

When asked to identify the obstacles, 65 percent of the respondents cited lack of time during the program. The next most frequently mentioned item was state law or policy that constrains additional coursework in teacher preparation (cited by 33 percent of the respondents). One-quarter of the respondents noted a lack of agreement among teacher educators about how to apply knowledge of child and adolescent development to teacher preparation.

Open-ended comments from the respondents highlight additional obstacles:

The research base of developmental psychology has not been sufficiently embraced by teacher education professionals.

There is a lack of agreement about the need to revisit the content of development from the perspective of an expert. The inclusion of a developmental psychologist in the evaluation of student teachers might be an interesting addition to the student teacher team, including the participation of this person in student teaching seminars.

[There is] lack of agreement on how much time should be devoted to understanding developmental knowledge versus teaching pedagogy. It seems more time is devoted to training students to teach without the same amount of time devoted to understanding developmental concepts which form the bases for why teachers should teach as they do. State requirements need to be adjusted.

[We need more] time to work more collaboratively with the faculty in the Psychology Department to align child and adolescent development and pedagogical content knowledge on how children emerge in learning specific content.

It isn't that there is explicit disagreement [among researchers and teacher educators]. Rather, there has not been much opportunity for the connections to be made explicit and disseminated.

What is the essential knowledge base in child and adolescent development research? What do teachers need and want to know? What should they be able to do, and why?

Ramey and his colleagues (in press) use the term “development” to capture an ongoing set of biological, psychological, and social processes that result in measurable changes at the individual level. Thus, development is purposive, contributing to the individual’s increased adaptability and effectiveness of thought and behavior, including social transactions which, in turn, promote the individual’s ability to understand the world and successfully contribute in an ethically principled and constructive manner to his or her society and its future. These developmental tasks are consistent with the goals of education and call for more focused attention in teacher preparation programs.

Children and adolescents pass through a rich variety of developmental stages and opportunities on the way to becoming adults. Teachers must be empowered as problem solvers to understand these important developmental tasks and incorporate these understandings into grade-appropriate content in their courses. Numerous panels and discussions have addressed the importance of applying child and adolescent development to classroom practice. However, it has not been clearly stated what this concept means or what aspects of development are important to apply. Tomes of information, both anecdotal and empirical, relate to child and adolescent development,

but where does a teacher begin? How do preparation programs narrow the scope of research, theories, and ideas about development in such a way that they are accessible for use in pre-service programs and ultimately in pre-K through grade 12 classroom settings?

There are as many variations of developmental content and experiences offered in pre-service programs as there are faculty who teach them. As a consequence, teachers entering the profession from different training programs bring a diverse set of skills, knowledge, and dispositions to their work. However, the participants expressed concern about the extent to which school culture provides opportunities for teachers to share their ideas and work together to solve problems, noting that these issues will determine whether students benefit from the diverse perspectives teachers bring to their work. Dr. James Comer offered a useful framework for teacher education programs to provide pre-service teachers with both the content and experiences to promote optimal student development. His field-based intervention research emphasizes six critical domains along which children develop—physical, cognitive, language, social, psychological, and ethical. These domains serve as an organizing framework for providing the didactic and experiential opportunities pre-service programs can offer to help teachers acquire the attitudes, skills, and knowledge bases needed to promote development.

Table 1.

Domain	Teacher Training Goal
Physical	<i>Provide opportunities for teachers to learn to support healthy physical functioning of students such that academic learning and classroom interaction are optimal.</i>
Cognitive	<i>Provide opportunities for teachers to learn to increase students' capacity to think, plan, solve problems, set goals, and work with focused attention.</i>
Language	<i>Provide opportunities for teachers to learn to increase youth's capacity to develop receptive and expressive skills.</i>
Social	<i>Provide opportunities for teachers to learn to increase youth's capacity to build healthy relationships across the range of human diversity.</i>
Psychological	<i>Provide opportunities for teachers to learn to increase youth's capacity for self-acceptance, self-reliance, self-confidence, and identity formation.</i>
Ethical	<i>Provide opportunities for teachers to learn to increase youth's capacity to understand the importance of integrity and respect for self and others.</i>

By using this framework, pre-service programs can tailor the experiences to the needs of the target communities within which pre-service teachers will be assigned to work. In doing so, the content and experiences can be modified to keep pace with ongoing research and to keep the training programs relevant to the changing needs of the school communities served by the program. Teachers can use this framework in the classroom as well to facilitate problem-solving and curriculum development.

Similarly Dr. Robert Pianta's research suggests that in-practice teachers are confronted daily with new challenges and demands. They need constructive and knowledgeable answers to the following questions in order to produce positive social and achievement outcomes in their schools:

- How do I keep children's **engagement and attention** in learning activities?
- How do I handle children's **relationships with peers** in the classroom?
- How can I form a **positive relationship** with a student?
- How can I be sure that **children know the concepts** that I am teaching?
- How can I **arrange instruction** to promote children's learning?
- How do I understand the **differences between children**?
- How can I **teach basic skills** in a conceptually rich way?
- How do I **manage my classroom** effectively and positively?
- How do I **motivate children**?
- How do I **choose appropriate materials** and activities?
- How do **children's families affect their behavior** in my classroom?

Pre-service programs can help teachers learn to utilize research from child and adolescent development to provide answers to these questions. The intersection of these questions with Comer's framework provides a dynamic set of problem-solving approaches analogous to the inquiry processes that researchers apply to studying new phenomena and raising new questions. For example, teachers might be trained to ask: *Given what I know about language development, how can I teach basic literacy skills in a conceptually rich way?*

Frameworks such as these provide expanded opportunities for teacher education programs to design training experiences that enhance teachers' attitudes, skills, and knowledge about child and adolescent development. As a result, the teachers are in a better position to more effectively address the diverse needs of children served by the school community.

In addition, teacher training needs to be adaptive and flexible because of the various risks and vulnerabilities students possess. Teachers need to be aware of the various ways in which students' coping strategies either exacerbate the risks or mask their vulnerabilities. Dr. Margaret Spencer presented a framework that she and her colleagues developed for examining the interactions between risk and protective factors (Table 2).

Table 2.

Risk Factor High-----Low	<u>Quadrant I</u> High risk/Low Protective Factor <i>Children identified as special needs</i>	<u>Quadrant III</u> High Risk/High Protective Factor <i>Unacknowledged resilience</i>
	<u>Quadrant II</u> Low Risk/Low Protective Factor <i>Masked vulnerability</i>	<u>Quadrant IV</u> Low Risk/High Protective Factor <i>“Standard” children/ undetermined vulnerability</i>
	Protective Factor Low ----- High	

This framework suggests that all children are vulnerable even when the factors which place children at risk are low. It is especially important to point out, reported Spencer, that children who fall in Quadrant IV may appear to live in “optimal” conditions for healthy development. However, these children may have undetermined vulnerabilities that may put them at an even greater risk for school failure, because we assume these children already have the support mechanisms in place.

Spencer stressed the importance of care and competence in teacher education and practice. Her work underscores the interaction of the students’ affective state and their availability for learning. Spencer contends that adolescents are often able to discern when teachers do not behave in ways that communicate real equity. Sensing the teacher’s attitude may consequently diminish the students’ confidence and motivation to learn.

As an example of this phenomenon, Spencer pointed out that the hyper-masculine bravado shown by young boys on their way to school is a type of coping behavior that enables them to arrive at school safely. When it persists during school time, it is deemed maladaptive and elicits a negative reaction (even fear) from the teacher. This bravado behavior may also reflect the boys’ discomfort with the classroom or school climate and, as a result, helps them deal with their own frustration in a way that teachers may find uncomfortable. Teachers, in turn, may overestimate what that the bravado behavior means, creating a dissonance between what each infers about the other’s views. Consequently, these boys psychologically move further and further away from the possibility of learning. These events are driven by cognition-dependent awareness of people and their contexts.

Having a developmental understanding of these and other behaviors is critical, particularly if schools are to address the compelling issues related to the educational achievement gap and other disparities that have an impact on a students’ school learning experience.

To that end, Dr. Spencer offered a sample of principles important to teacher education:

- Care and competence should be an integral part of educational training and practice. Teachers should learn to understand the variety of experiences from which children come.
- There should be a common, non-stigmatizing vocabulary that teachers learn to adopt to help them understand and process student behavior. These include such critical terms as:
 - o *Vulnerability*: A characteristic common to all people
 - o *Phenomenology*: The notion that perception is a part of cognition; along with learning, there is awareness throughout the life span of feelings and thoughts. Thus, children in a learning context may also be receiving inputs that make them feel “bad” or incapable.
 - o *Protective factors*: involve the perception of caring—both emotional and intellectual
 - o *Resiliency*: achievement of positive outcomes despite significant risks and challenges
- Deterministic thinking is problematic and often contributes to stereotyping. All children have some level of risk and some protective factors.
- Teacher preparation should include systems thinking to facilitate adaptive classroom strategies. Culture and context should be emphasized in understanding the achievement process. Teachers have multiple roles, including mediating and moderating the processes that link students’ risks and protective factors their educational outcomes.
- Simplistic two-group analyses of achievement patterns are typical of deterministic thinking—e.g., certain students have high achievement needs, while others fit the “standard” and can take advantage of all opportunities. This two-group analysis is inadequate and does not allow for the dynamism of human vulnerability.
- Insights into human vulnerability are needed from multiple perspectives—those of policy makers, teachers, parents, and students. Rather than thinking of some children as highly vulnerable and others as “standard,” teachers, policy makers, and others should think of the “standard” children as having undetermined vulnerability, including supports that may be interpreted emotionally as stressors.

Section II: Making the Case: Examining Principles from Child and Adolescent Development Research

What is the knowledge base in the science of child and adolescent development? What principles and perspectives have application to teacher preparation? What still needs to be done?

The available knowledge base in child and adolescent development is vast. The following summary is not intended to reflect the broad scope of research on this topic; rather a sampling is presented, primarily in the social and emotional domains, to stimulate discussion and to shed light on principles of development and their application to teacher preparation. The NICHD surveyed 11 experts in the field to obtain their input on the state of child and adolescent developmental research as related to teacher education practices and preparation (See

Appendix B). Researchers invited to consult with this project were asked to discuss contemporary understandings of child and adolescent development by identifying principles from their research or from the extant literature they deemed applicable to teacher education practices. They also discussed where gaps exist and where future research is needed. Four broad themes arose from the survey responses. These are summarized, along with commentary from roundtable participants, and presented below.

Social Ecologies and the Importance of Relationships

Classrooms are active social systems, involving a wide range of complex interactions between and among peers and most especially between the students and teachers. Since the time when ecological approaches¹ (theories supporting the relationship between people and their environments) were first used to broaden the understanding of social processes within educational settings,² several findings have attempted to explain the notion of classrooms as active social systems. For example, with respect to student behavior, Chang (2004) found that classroom norms or classroom characteristics and shared beliefs related to prosociality (nonviolent social messages designed to be helpful or beneficial) and leadership have a significant effect on students' behavior. Likewise norms that give rise to aggression and social withdrawal also affect students' behavior.³ Thus, the social structure of classrooms affects individual characteristics. This idea is underscored by Schafer and his colleagues (2005), who found that the social hierarchy of classrooms mediates the experience of bullying and being victimized.⁴ The same may be true for different interpersonal and social processes, in that peer norms and behaviors are "naturalized"; in other words, the behaviors become normal and valid within a particular group of children.⁵ In this sense, an individual's social/behavioral characteristics, more than just relevant individual characteristics, are socially functional and refer to the position or role that each individual plays in the social network.

It is a popular misconception, for example, that all aggressive youth live on the fringes of peer networks. To the contrary, some hold central positions within peer ecologies, exerting considerable influence on the social norms and attitudes of their classrooms. Farmer, Leung, Pearl, Rodkin, Cadwallar and Van Acker (2002) discerned that "rather than having a single group on the periphery of the social structure, it is possible that some classrooms have two or more distinct groups that include aggressive boys" (p. 619).⁶ Rodkin et al. concluded that tough kids and bullies may sometimes be at the core of popular cliques and have significant social centrality.⁷ Aggressors have substantial effects on their peers and on the classroom climate, especially because some male aggressors seem to have a high, if possibly distorted, self-perception of their popularity. Peers, who have been assumed to be neutral or uninvolved in bullying situations, are really part of the social context when acting as reinforcers (also to a lesser extent as defenders) in these situations.^{8,9} These concepts are particularly relevant for teachers and other adults participating in classroom social networks because they are part of the ecological niche and have a responsibility to appropriately manage classroom social dynamics. For example, some researchers have found that the average rate of aggression in first-grade classrooms varied markedly and that first graders in high-aggression classrooms were more likely to be aggressive later in elementary school.^{10,11} Chang (2003) found that teachers' beliefs about aggression and withdrawn behaviors affect their students' self-perceptions and behaviors as much as teachers' caring and support.¹²

Thus, Rodkin suggested to the roundtable that educators should revisit the use of sociometric testing for regular preventive use. Apart from intense ethnography, there is no better way (to assess the underlying structure of peer ecologies than through sociometric technology) and from there to situate bullies, victims, and their relationships to one another.¹³ The relevance of sociometric methodologies to educators lies in how school service providers think about the peer ecology of bullying—the questions they ask, the curricula and prevention programs they purchase, and the classroom and school practices they adopt. As Swearer and Doll (2001) note, examining bullying in schools from an ecological standpoint is directly linked to intervention and practice (see also O’Connell et al., 2001).^{14,15} On this note, Farmer’s implications for intervention are particularly instructive; researchers and educators have historically overlooked the variety of ways that children who aggress integrate into, manipulate, and rely on their social networks.¹⁶ Faced with concrete instances of bullying, school service providers can usefully ask the kinds of ecologically minded questions that Farmer examines in depth, such as: Is the bully a member of a group? Has the bully’s group formed a coalition with other groups? Is the bully a group leader or a wannabe? School service providers should keep in mind Farmer’s questions when evaluating the sensitivity of potential anti-bullying curricula to peer ecological contexts.

It is important to point out that racial differences may exist in classrooms according to peer and teacher perceptions of aggressive behaviors in children. Rodkin et al. found that peers disproportionately labeled popular African American boys in racially pluralistic classrooms as “tough.”¹⁷ This finding is especially disturbing if it points to racially segregated social roles in the classroom that underlie a surface integration.¹⁸ Thus, a better understanding of the classroom should address it as a “social ecology” system, acknowledging its norms, structure, and levels (individual, dyadic, group, institution) and recognizing that the teacher is a part of, and not removed from, that system.

These findings have important implications for developing teacher training, especially as teachers consider how to foster prosocial classroom environments and optimize intellectual and social development in children. The well-being of children depends on teachers precluding and intervening against undesirable aggressive behavior and promoting a caring, healthy social atmosphere in their classrooms.

Psycho-Emotional Development: The Role of Emotion- and Self-regulation in School Achievement

Increasingly, the capacity to regulate emotions has come to be recognized as a core capacity for children and adults (Cassidy, 1994). The failure to regulate emotions underlies much psychopathology (depression can be viewed as a failure to regulate sadness, anxiety as a failure to regulate fear, conduct disorder as a failure to regulate anger). Moreover, new clinical perspectives suggest that much of children’s problematic behavior, which interferes with learning, results from failure in emotion regulation capacities. Thinking about behavior problems as *failures in emotion regulation* has implications for how teachers respond to disruptive behavior. The capacity to regulate emotions develops, in part, through social experiences with adults. Evidence indicates that much of emotion regulation is learned within families, yet surely teachers can play a role as well.

According to attachment theory, reported Cassidy, children of all ages function better when they have confidence in a secure base to which they can turn for support if needed; considerable empirical evidence supports this assertion.^{19, 20} When children have the support they need, they explore more competently and are less fearful. Research with young high risk students provides powerful evidence that, when teachers provide emotional support, the later functioning of these children in a variety of domains (e.g., achievement, social relations) is at the level of their low-risk peers.²¹

Cassidy's research addressed the influence of a child's attachment history on his or her emotion regulation.²² Infants who experienced rejection may minimize negative affect to avoid the risk of further rejection, while those whose mothers were unavailable may maximize negative affect to increase the likelihood of gaining the caregiver's attention. Both of these patterns of emotion regulation ensure that the child will stay close to the parent in order to be protected. In addition, an ambivalent infant's heightened negative emotionality signals to the mother that the infant needs her and helps maintain a state of mind that emphasizes attachment.

A study of attachment relationships by Cassidy and colleagues²³ showed that:

- Family and peer systems are linked.
- The quality of parents' caregiving behavior initiates a process linked to the quality of peer relationships throughout childhood and early adolescence.
- A child's daily experience with parents affects self-image and relationships with others.
- Children with more positive relationships with peers demonstrate more positive behaviors.
- More positive behaviors result in being better liked by peers.

These findings also have application to the teacher-student relationship. Teachers can convey to their students their supportive availability. They should not underestimate the extent to which they can serve as attachment figures for their students, and how powerful the teacher-student relationship can be.

Similarly, Brody reported that classroom processes contribute uniquely to children's adjustment through children's development of self-regulation. These processes can serve a protective-stabilizing function when parenting processes are compromised, and vice versa.²⁴ Brody also pointed out that supportive parents who are involved in their children's lives, establish predictable routines, monitor their children, and participate actively in their children's schooling help children develop the self-regulatory skills that enhance academic performance and motivation. In the same way, well-organized classrooms with predictable routines and responsive teachers predict children's development of skills for setting goals and formulating plans to attain them. These self-regulatory skills facilitate academic performance.

Bradley confirmed that strong evidence supports the value of exploration and the role of questions and answers in enhancing learning. By exploring, children develop self-regulatory abilities that lead to other types of problem solving. He enumerated seven principles that should be provided by all caregivers, including teachers:

- **Safety and Sustenance** – provision of adequate nutrients, shelter, and health care to promote physical and psychological development
- **Stimulation** – provision of sensory data that engage and provide information
- **Support** – helping children cope with basic anxieties, fears, and feelings of emotional insecurity
- **Structure** – configuring a child’s encounters with direct inputs so that “fit” is achieved
- **Surveillance** – monitoring the child and environmental conditions to which the child is exposed to protect from harm
- **Social integration** – connecting the child to social networks and groups in which the child is likely to thrive

Emotion regulation predicts academic achievement. Two studies cited by Izard and Trentacosta, one with preschool children and the other with middle school children, show that children’s ability to manage their emotions predicts their academic performance.^{25,26} In the study with preschoolers, behavioral regulation was a mediator in that emotion regulation in preschool predicted behavioral regulation in kindergarten and, in turn, behavioral regulation predicted academic achievement. Izard and Trentacosta also evaluated the efficacy of their Emotions Course, a program based on emotion theory and research that is implemented by teachers, to promote children’s emotional competence. For children in the Head Start Program, the Emotions Course increased emotion knowledge and reduced their level of behavior problems.^{27,28} These findings suggest that early childhood education programs can successfully implement a prevention program to enhance emotional competence—the awareness of and ability to manage one’s emotions in a healthy and productive manner. An adaptation of the Emotions Course could also prove useful in kindergarten classrooms because kindergarten children exhibit a range of emotional competence.

Emotion knowledge—understanding or labeling one’s own emotions and accurately identifying the emotions of others—also predicts academic achievement. In a study conducted by Izard and colleagues, emotion knowledge for students in Head Start predicted academic competence in third grade.²⁹ Furthermore, emotion knowledge mediated the relation between verbal ability and academic competence.

Another study which examined emotion knowledge and emotion regulation in kindergarten as predictors of first grade academic achievement in a sample of minority children, found that emotion knowledge predicted academic achievement, although it did not mediate the relationship between verbal ability and academic achievement. Emotion regulation did not directly predict academic achievement, but it had an indirect effect on academic achievement through attention in the classroom. However, attention in the classroom was a robust predictor of children’s academic achievement in first grade.³⁰ Thus, findings from both of these areas—emotion regulation and emotion knowledge—suggest that teachers should be made aware of children’s emotional competence and the role that it can play in academic performance.

Variability in children's self-regulation skills is as important as differences in literacy skills for predicting early school success. Teachers who spend more time doing activities that orient and organize children's behavior during the fall of the school year produce classrooms with fewer disruptive transitions during the year and yield children who spend more time doing independent child-managed activities during the spring. Here, too, teacher preparation that aims at early classroom management knowledge and techniques could be highly effective.³¹

The above research suggests that teachers can, and should, address children's attention problems as they start elementary school. In addition, efforts to enhance children's emotion regulation and knowledge should begin before elementary school to help promote school adjustment and academic achievement. These early interventions may be especially important for at-risk children. Ramey offered seven principles derived from an extensive review of the literature that suggest how these capacities can be fostered. Each principle is based on evidence from multiple studies and affects the course of development through biological changes associated with behavior:

- **Encourage** exploration with all the senses, in familiar and new places, with others and alone, safely and with joy.
- **Mentor** in basic skills, showing the whats and whens, the ins and outs, of how things and people work.
- **Celebrate** developmental advances for learning new skills, little and big, and for becoming a unique individual.
- **Rehearse** and extend new skills, showing the child how to practice again and again, in the same and different ways, with new people and new things.
- **Protect** the child from inappropriate disapproval, teasing, neglect, or punishment.
- **Communicate** richly and responsively with sounds, songs, gestures, and words.
- **Guide** and limit behavior to keep the child safe, to teach what is acceptable and what is not, and teach the rules of being a cooperative, responsive, and caring person.

Socio-Cultural Development: Understanding the Diverse Needs of Students

Most of what is known about development, especially during adolescence, is based on research involving white, middle-class youth and based on the assumption that these psychosocial tasks are universal. However, some research suggests that adolescence is not a distinct life stage for youth from different cultural backgrounds or low-income households. Instead, these children assume adult responsibilities at an early age, and generational boundaries between child and parent are often blurred in age-condensed family structures. Family expectations for assuming adult roles and responsibilities at home are often misunderstood by teachers and school administrators, who view and interact with these students as if they were children rather than adults. These conflicting expectations for behavior—adult at home and child at school—are often troubling to students who want to be acknowledged and respected for the adult responsibilities they have.

Mekos reported findings from her longitudinal study which addresses the impact of parents' transitions from welfare to work on adolescents' school achievement and engagement, as students move from junior high to high school. The study combines annual surveys of 215 urban,

low-income parents and their middle-school child followed over four years, with multiple in-depth interviews and participant observations, at home and school, of a subsample of eighth-graders during a single school year. Several key findings from this study of students attending an urban, public middle school are relevant to teacher preparation and middle school teaching. Two relevant findings are presented below:

- Despite differences in the social class backgrounds of teachers and students, effective teachers are able to strike a delicate balance between exercising authority in the classroom and engaging and interacting with students as peers.
- Classroom management practices that are individually tailored to students' needs and backgrounds are most effective.

Research Presentation: The Role of Families in Academic Development and Career Aspirations—Dr. Nancy Hill

Dr. Nancy Hill described her research in middle schools as an area underrepresented in the literature. She studies the role of families in relation to schools, academic development, and career aspirations. She examines the roles of the parent's beliefs and expectations; factors of economic and social stratification; and effects of ethnic factors. Her studies focus on elementary and middle-school children and look across ethnicity and socioeconomic status (SES).

Hill's K through 4 longitudinal study examines school readiness and the role of parents. In this study, she tries to equate socioeconomic factors between African American and white samples in order to de-confound the effects of ethnicity and SES. The incomes in each group ranged from less than \$5000 to more than \$90,000 annually; parental education ranged from less than high school to graduate degrees. The study looked at parental involvement in education at home and at school, and also at parenting strategies. Parenting strategies—discipline, warmth, affection—varied with economic differences, but not with ethnic differences. For families of lower SES, the relationship between parenting strategies and academic performance was stronger. Less adaptive, harsh parenting strategies were more detrimental at lower income levels than in upper income families. No ethnic differences were found in these interactions.

In the school context, socioeconomic differences were insignificant, but ethnic differences were significant. Teachers (both African American and white) perceived that African American parents valued education less. For African American parents, volunteering and being involved at school was positively related to their students' academic success; for white students, parental involvement at home was more strongly related to student success. Hill hypothesized that if teachers had the bias that African American parents valued education less, the presence of these parents in the school may counteract that impression. Parental involvement was associated with teachers' reports of higher academic skills for these African American students. For white students, higher achievement was related to the home involvement.

These differences were due, in part, to teachers' perception of how much the parents valued education, not necessarily how much the parents actually valued education. The presence of the parents in the classroom may have counteracted that bias.

Other studies have shown that teachers rate African American students as having more behavior problems. In a follow-up study of police records and delinquency, sixth grade teacher assessments were not predictive of whether the African American kids got into trouble, but were predictive of whether the white children got into trouble.

Hill also looked at parenting and SES in a small sample (120 children) coupled with a high-risk neighborhood. In the white sample, families of lower SES had less-adaptive parenting strategies; in African American families, low SES was not related to less-effective parenting strategies unless low-income status was coupled with other indicators of serious family risk, such as death of a parent, incarceration of a parent, or drug abuse.

Hill observed that part of the problem was reaching out to parents in the communities. Parents are expected to collaborate but often work non-standard schedules and many hours, making it difficult to connect with teachers in the classroom. Dr. Suzanne Bouffard, a former graduate student in Dr. Hill's lab, conducted a study on the use of the Internet to facilitate parental involvement among parents who work non-standard hours. Using a nationally representative sample, she found that, even among the low-income sample, parents who e-mailed the teacher a few times a year were associated with lower levels of student dropout and higher standardized test scores. Just having access made a difference and allowed low-income, low-resource groups to have parental involvement and be informed about their children (Bouffard, 2006).

A second set of Hill's studies (Hill et al., 2004) on ethnic and SES differences dealt with aspirations of students in grades 7 through 11. For college-educated parents, the positive

relation between 7th grade involvement and aspirations was explained by improvements in school behavior and school achievement. In contrast, for parents without college degrees, there was a strong direct link between parental involvement in 7th grade and 11th grade aspirations, but involvement was unrelated to the prerequisites of achievement of one's goals (i.e., improved school behavior and school achievement). Apparently non-college educated parents could communicate a high level of aspiration but could not effectively change their child's behaviors in ways that would prepare students to achieve their aspirations. Their children may have the desire to achieve at high levels, but these aspirations are not associated with how well the children are doing in school. Dr. Hill believes that the college-educated parents were doing something different, based on what they knew would help their children succeed (i.e., choosing the right courses, utilizing social capital to provide children with meaningful extra curricular experiences). Learning how to prepare for college and linking what the students did at school to their aspirations were positively related to success. The college-educated parents knew what their children needed to do, whereas the non-college educated parents may not have had as much information. Parents need to be given the knowledge base that will enable them to be helpfully involved in their children's education.

Rogoff has studied children's approaches to learning in different cultural communities. She found that, in some communities in which schooling has not been prevalent for many generations (e.g., indigenous-heritage communities of North America, Mexico, and Guatemala), children seem to be more keenly observant of events around them, facilitating learning through observation. More often, these children have the opportunity to learn by observing important events of their community because they have more access to the range of these activities and because such attentiveness is expected of them. This situation is in comparison to children from middle-class communities, in which several generations have experienced extensive schooling and segregation from many community activities. Rogoff also found that children from communities in which schooling has not been prevalent for many generations may be accustomed to and skilled at pitching in to help their elders, peers, and younger children. They

may be adept at working in groups larger than two and in coordinating skillfully with each other—skills needed for such educational practices as cooperative learning.

Cognitive Development: Promoting Competence and Motivation for Learning

Although we now understand somewhat better how cognition and behavior are related to brain function, reported Waber, the significance of these variations is always context-dependent. The fact that a behavior has a biological or genetic basis does not mean that the behavior is fixed and determined. Cognition and behavior are always a function of complex interactions with experience, and the nature of that interaction may vary with the environment.

It has been suggested in the literature that an enriched environment with abundant opportunities for learning results in structural adaptations that potentiate the brain for learning. According to Waber, the development of brain functions is always a continual process of differentiation and integration. The adult model, which is “modular,” that is, where functions (e.g., reading, language, visuospatial abilities) are distinct and segregated from one another, does not fit the child model. Genes, for example, may code for relatively modest predispositions that are played out in the course of development, and these then become integrated into the developmental process. Over the course of development, the brain establishes networks that must be integrated to work efficiently; these networks can become “entrenched” with repeated experience, leading to the typical adult model.

Children who experience school difficulties show relatively similar cognitive profiles, but the level of difficulty is context-dependent. Efficiency of processing is a relatively consistent finding across all students who encounter difficulty, although the specific content areas in which greatest difficulty occurs can vary.

Children who have academic difficulties often have difficulties in a variety of domains, even though it is the academic difficulties (e.g., reading) that bring them to clinical attention and can entitle them to services. Neuropsychological studies have documented the association between particular domains (e.g., reading and motor timing control), and neuroimaging studies have further documented differences in these non-linguistic functions in children who are poor readers. Children with problems acquiring specific skills are likely to experience other legitimate problems that interfere with their academic and social effectiveness; thus, it is important to focus on the child, not just on the skill.

The achievement gap between minority and non-minority (including Asian) children from urban schools can be accounted for, to a great extent, by neurocognitive and neurobehavioral factors; yet neurodevelopmental factors rarely figure into the discussion about this gap.

**Research Presentation: Neuropsychology and the Learning Environment—
Dr. Deborah Waber**

Dr. Waber regards a “learning disability” not as a “disability” but as a failure of an interaction between a child’s cognitive profile and the socially determined demands of schooling. Because the only mechanism available to the educational system for identifying and treating learning disabilities is a system of diagnoses and legal entitlements, children whose individual profiles do not fit well with these demands are designated for “special education.”

The prevailing neuropsychological models for understanding learning disabilities are modular. These models, derived largely from observations of adults, assume that the brain is organized in terms of discrete functional modules. Thus, when we look at reading or math, we expect to be able to “pull it out, fix it, and put it back.” Models from developmental cognitive neuroscience, however, point toward a more constructivist approach, in which the brain is constantly constructing itself in interaction with environmental experience. Thus, there are constant interactions among different parts of the brain (rather than one part for reading, one part for math, one for the playground), shaped by their relationship to the environment. Outcomes will reflect these complex interactions and will cut across functions rather than being seen discretely in one skill with others preserved. Indeed, clinically Dr. Waber has never seen a child with just a reading disability. Other issues are always present, some actually documented by functional neuroimaging. For example, children who can’t read often have trouble with rhythmic finger tapping. In functional neuroimaging studies, it turns out that children who are poor readers show dramatic differences in brain activation from their peers who can read when they are performing rhythmic finger tapping.

Thus, learning disabilities may be understood not as a defect in one functional module, but as a failure to construct these interactive networks

efficiently. In practical terms, in children with learning problems, the problem typically affects many functional domains, and the focus therefore should be on the child as much as on the skill.

The context is always important as well. Children who “qualify” legally for special education often have the same problems as those who do not qualify, but designation may depend on other factors, often the social context of the school. Recently, Dr. Waber used neuropsychological tests to investigate sources of the “achievement gap” in performance on high-stakes testing. Using one questionnaire and 20 minutes of testing (not including tests of reading or language), the researchers were able to identify many of the children at risk for failure. The tests dealt with efficiency of brain function which affects the children in many areas. Behavioral and cognitive regulation were clearly associated with achievement on these tests. Whether children failed the tests because they were dysregulated, or were dysregulated because they had cognitive issues was difficult to ascertain, but, in either event, the results argued for a developmental approach to identify the neurodevelopmental considerations that may prevent certain children from learning.

Further, some teachers may think that genetics is destiny. However, research in behavior genetics shows that risk may be based on a child’s genetic make-up but, environment determines how this make-up is expressed. For example, the environment has a stronger influence on IQ for low-income children than it does for higher income children.

Finally, Dr. Waber reported on an innovative approach to bringing a more developmental perspective into the schools. In the Children’s Hospital Boston Neighborhood Partnership, psychologists and social workers use a relational approach to provide children with access to mental health services and to build

capacity in schools. If staffers receive many referrals from one teacher's class, they may take a more systemic approach to determine why children are having problems. One goal of the intervention is to assist school personnel and students in handling similar problems on their own. At one selective and high-pressure school, many students were being admitted to the emergency room for suicidality; the Partnership

helped teachers and students recognize the signs of depression and better deal with it. Within two years, the emergency room admissions had ceased. The school climate was a major factor—children cannot learn if they are highly stressed or distracted. Thus, achievement, school climate, and capacity building go hand in hand.

According to Morrison, the most effective instruction in reading depends on the entering skill levels of the child. Thus, high-quality instruction for one child may be low-quality for another. The goal of early instruction should therefore be to individualize instruction based on the child's skill level. Teacher preparation would benefit tremendously from recognizing and acting on these findings.^{32,33}

Rodkin pointed out that student motivation is essential for learning and social behavior. Goal-orientation theory should be applied to teacher education. Two types of goals have received attention: *Mastery* (learning a goal or task goal [how to do a task]) and *performance* (ego goal [demonstrating ability by comparing one's performance with that of others] or relative ability). Mastery goals that focus on "interest" rather than "result" (e.g., final grade) enhance intrinsic motivation and are related to positive outcomes. Children who have a mastery goal orientation tend to have long-term academic efficacy, high self-esteem, and robust peer relationships. Performance goal orientation is less adaptive than mastery goal orientation, especially for children who have low perceived competence (the view of one's ability to successfully carry out an activity). How teachers could help children to have mastery goal orientation would be a crucial topic in teacher education.^{34,35,36}

***Research Presentation: Literacy and Language Development—
Dr. Elizabeth Moje***

Dr. Moje and her team examine adolescent literacy development within and outside of the school context, focusing on adolescents' motivations in order to understand where their skills in a given content area may break down. She also looks at what adolescents say they read outside of school—for instance novels and magazines—to determine how to motivate adolescents to transfer their skills and interests from one context to another. Moje's early findings reflect the way adolescents think of themselves as readers and writers: 77 percent of approximately 300 young people in an early sample named and described a book they had found compelling in their life. When asked the

question, Are you a writer?, 86 percent identified themselves as writers. These results contradict the idea held by many pre-service teachers that young people prefer television watching to reading and writing.

Moje's reading diagnostic assesses students in at least two content areas, and a Spanish reading passage is included on the assessment. The tests are computer administered, and the reading diagnostic involves reading a passage aloud. These tests can compute fluency and hesitations and assess the students' comprehension through a series of questions. The assessment also looks at metacognition by

prompting students to think about their experience with the passage: If you were asking someone to rewrite this passage, what would make it easier to read? Researchers have followed a subset of 30 to 50 students into their homes, malls, and bowling alleys to see how they read or write in different contexts. Many times, things the subjects will not say or do not understand on the survey can be documented by these on-site observations.

In a study of a large, ethnically diverse, urban sample, Moje found that the way students identify themselves ethnically and racially affected their reading behavior. Her survey asks, How much do any of the following things affect your choice of reading material? The items listed include ethnicity, family, political beliefs, religion, etc. The African American children in the sample were very explicit about how ethnicity and race shape their reading choices. The Latino students in the sample identified family and religion as equally strong influences. A follow-up analysis will help illuminate how ethnicity shapes the reading choices of the African American children in this sample because they are a minority in the school setting but a majority in the city setting. It may be that the school curriculum also influences the role of ethnicity in the reading choices.

Dr. Moje has also collected writing samples to document how young people approach a particular writing task as a discipline. Her findings on these scored writing samples offer many possibilities for teacher education and professional development. She notes that writing tasks should be developed to get students engaged and interested. For instance, students were to respond to the question, Should security cameras be used in your schools? The students tended to choose data that supported their opinion and ignored the overwhelming data suggesting that surveillance is a good idea. These findings suggest that the writing prompt touched on something important to adolescents, probably because adolescence is a stage of development at which privacy and self-

consciousness are prime concerns. These observations can help teachers work with the students to help them write like social scientists and learn to use all the data at their disposal rather than only those supporting their own opinions.

Dr. Moje also works with science learning in 20 middle schools in the city of Detroit to develop a literacy-teaching strategy within the science curricula that will teach students to write strong scientific explanations. In this project, students carry out investigations, then Moje's research group teaches them how to write up their research using evidence to support a claim. Some of the most profound work involves asking the teachers to score the write-ups and identify what is missing from the explanations. Findings suggest that students have difficulty citing evidence. Having this information allows teachers to integrate into their curriculum strategies to promote better use of evidence. Students from classrooms in which this curriculum is used have shown gains on their state science test scores.

Overall, findings from the broad scope of Moje's work with adolescents elucidate factors that motivate children to choose particular books. They are often drawn in by things that seem real to them but also have a fantasy aspect with age-related, urban, relational themes in which they can see themselves. Although many enjoy fantasy and science fiction, the characters have a quality of reality. Students talk about how important it is for them to make that connection. Surprisingly, Harry Potter is quite popular, challenging a commonly held belief that children need texts that reflect who they are ethnically and racially. Moje's studies reveal that the texts bring together multiple themes, and one of the most important being exploring relationships. Books that broker relationships with peers, parents, and teachers may be as powerful as other themes that are discussed in teacher education.

Where are the gaps in the research? What questions need to be asked? What remains to be done?

Future Research in Cognition and Behavior

The development and application of regulatory capacities, in terms of both cognition and behavior, are fundamental to school success. With these as a broad umbrella, the following specific areas of interest could be explored in future research studies:

- Sources of individual differences in cognitive and social functions, and how these differences interdigitate with curricular demands
- How to mentor teachers to be problem solvers by learning how, within the classroom context, developmental considerations impact school performance and behavior
- The impact of increasing demands on children and how the increasingly complex information environment affects functions such as self-regulation
- A more systemic understanding of cognitive development, for example learning to appreciate how language capabilities play out in executive capacities and regulation, or how the ability to integrate multiple considerations plays out in reading comprehension
- Research related to emotion regulation; specifically studies that involve research on the role that teachers can play in helping students learn to regulate emotions, and that test the effectiveness of interventions designed to help teachers respond to problematic behavior as a failure of emotion regulation
- Randomized controlled trial intervention studies focusing on efforts to individualize instruction targeted to children’s skill levels, and intervention studies on developing self-regulation skills starting in the preschool years
- Studies addressing the ways in which targeted interventions (e.g., special education) can play an important role in facilitating a child’s comfort level in school thereby improving behavior, and in helping the child to be more engaged in the school environment and available for learning
- Evaluations of programs that bring mental health services into the schools—especially those in which children have a great many stressors in their lives and little access to mental health providers; programs using a relational framework (rather than a “service delivery” model) have the potential to enhance school climate and teacher satisfaction, but this topic needs to be explored in more depth

Future Research on Relationships and Academic Achievement

A special research emphasis should be placed on the impact of social relationships in the emergence of both emotional and academic competence. It may be that healthy, supportive relationships with teachers and peers can promote both emotional competence and, contemporaneously or subsequently, academic engagement in the classroom. This enhancing effect of relationships may be especially important for children from lower socioeconomic backgrounds in which family and neighborhood stressors may be greater. However, teachers who experience their own emotion regulation problems and have poor understanding of emotions may produce an unstable and unpredictable classroom environment that is harmful to children’s emotional development and to academic performance. Thus more research is needed in the following areas:

- Studies that highlight the connections between adult emotion regulation, classroom environment, and student behavior and achievement
- Parent-teacher relationships that promote academic achievement; research is needed that will enable classroom teachers to provide parents with developmentally appropriate information about ways in which parents can promote their children's academic performance. Such research must address the specific parenting behaviors that enhance a child's ability in reading, writing, and mathematics. The research should be longitudinal, following students at various levels (preschool, elementary school, middle school, and high school) over time to gather the needed in-depth information.
- More research is needed to determine how emotional competence translates into academic success during the transition to elementary school. In particular, research should examine mediators and moderators of the established relations between emotion knowledge and regulation and academic performance.
- More applied research is needed to investigate prevention programs targeting both socioemotional and academic competence. Previous research has focused almost entirely on a single area of competence, with little attempt to integrate the other, equally important facets of development in early and middle childhood.

Future Research on Culture, Development, and Achievement

Because 75 percent of the children in the 100 largest school districts in the United States are African American, Latino, or Native American, it is crucial to broaden understanding of child and adolescent development to include cultural processes, and to widen the study populations to include these children. Most research is still narrowly based on European American middle-class children, and the field has been slow to realize that it is inappropriate to assume that these findings can be generalized to "the child." This issue is essential for scientific reasons, but also crucial for improving teacher preparation and K through 12 teaching and learning, especially because most teachers are still European American and middle-class, but many of their students are not. Future research should include:

- How teachers working in urban school districts could benefit from a deeper understanding of low-income students' experiences and responsibilities at home, and how these constrain students' behavior and achievement in school
- Studies that highlight variations in student experiences and outcomes within urban public schools, and how teachers can best be prepared to work effectively with diverse groups of students who have diverse needs and strengths
- Studies focusing on the importance of parental involvement in children's learning and in efforts to improve schools, and that place more attention on the processes by which parents, teachers, and children can work together as a community and learn together

Section III:

Issues and Challenges for Integrating Child and Adolescent Development Research into Teacher Preparation Programs

Child and adolescent development research has potential for translation into practical application for educational practice and could vastly improve educational outcomes for children. Therefore, the science of *educating adults* to implement science-based techniques should be part of efforts to integrate research into practice. Too often, however, schools of education encounter institutional barriers that challenge efforts to restructure their programs. Likewise, the field of child and adolescent development lacks mechanisms for disseminating research findings and information to sources readily available to teachers, administrators, and other school personnel. These challenges are akin to the agricultural extension programs in place during the first half of the 20th century, when researchers knew a great deal about agriculture but lacked the mechanisms to get the information to where it was needed most. This meant that farmers still worked in traditional ways because they lacked access to state-of-the-art techniques. Even when information was available, the capacity of farmers to put the research into practice was also limited. Similarly, a great deal is known about child and adolescent development, but the challenges of access to current research, institutional flexibility to allow for program adaptation, and issues with respect to the assessment of teacher attitudes, skills, and knowledge are impediments to taking full advantage of this knowledge.

Scientific research is not always accessible to teachers. How can scientific knowledge about child and adolescent development be translated into a “user-friendly” form for use in preparation programs?

Because developmental research is not necessarily published in the journals or materials that teachers frequently access, most beginning teachers do not know what information is available and lack the time to acquire the resources for personal use. A few journals examine how curricular development affects children across the developmental age span, including the *Journal of Education Research*, the *Journal of Educational Psychology*, and the *American Education Research Journal*, to name a few. Here too, the problem lies in the application of reported research findings to actual classroom practice. Scholarly articles are often difficult for non-scientists to follow and needs to be translated into language that pre-service teachers find meaningful, and into a knowledge base that practicing teachers and administrators can put into action. Web sites can be useful for primary research; however, many scientific journals do not want to publish research that has been published through other outlets, such as personal web sites. When information is first published in a peer-reviewed journal and then made accessible to the public, it has more credibility than a web site posting, giving the information a dual focus and a dual audience. The following dissemination strategies are recommended:

- **Form working collaborations among educators and researchers.** Teachers and administrators must work with researchers to produce resources that have the greatest utility for classroom practice.

- **Publish and disseminate lay versions of scientific articles in educational newsletters.**
This practice would foster unique partnerships among publishers, educators, and researchers to ensure that the most important information and accurate scientific knowledge is conveyed in the most accessible format.
- **Increase awareness of child and adolescent development research to the broader public.**
Through information segments on public television, the development of user-friendly research pamphlets, and interdisciplinary clearinghouses, child and adolescent development research could be made available to a broader base of consumers.

Will the introduction of child and adolescent development research into current teacher preparation and practices strain the carrying capacity of teacher education programs? If so, what are the constraints?

“Carrying capacity” refers to the boundaries within which a system must operate to maintain efficiency and carry out its requisite activities. New requirements, initiatives, or activities that extend the system beyond its established limits can strain its carrying capacity. The extent to which a school of education can carry or sustain new teacher preparation curricula, as well as field-and lab-based applications depends on availability and flexibility of time, resources, and institutional support. For example, state and institutional policies that guide the curricular programming may set limits on what a school or department can do to shift its focus on child and adolescent development or to add experiences and opportunities for more relevant applications of the research into classroom practice. Most states limit the number of credit hours allowed for teacher preparation in the curriculum. In Virginia, state regulations only allow for 18 hours of teacher preparation. In addition, most states require a content major, and many undergraduate education programs have a cap of 120 hours for teacher preparation. To operate within the school’s carrying capacity, decision makers need to determine how to better use the available time in the programs as they currently exist and identify creative ways to modify their programs within the current capacity of the system.

One critically important area of consideration is the differential readiness of undergraduate pre-service teachers versus experienced or master’s level teachers for participating in expanded programs. To introduce child and adolescent development curricula into preparation programs in a meaningful way, schools of education may have to consider offering course content and relevant experiences based on the candidate’s developmental readiness. The typical undergraduate pre-service teacher candidate is a late adolescent learner, entering at approximately age 18 and leaving at about age 21 with very little personal or professional experiences to solidify their interests in teaching. In contrast, a master’s level candidate may have a wider range of experiences from which to draw and may have a clearer focus on his/her career interests than their undergraduate counterpart. Thus, the ability to assign meaning to and apply child and adolescent research may differ significantly for prospective teacher candidates. Although this may have an impact on the carrying capacity of schools of education, it is critically important for guidelines to be formulated about course sequencing, using knowledge about the stages of adult development and the science of adult education, to determine how and when the research-based information on child and adolescent development should be incorporated into teacher education programs. For example, programs could move their survey course to the

graduate program, and focus undergraduate courses on the prevention, detection, and resolution of classroom problems. In doing so, pre-service teachers could receive instruction on how to influence the learning climate and how to obtain the valuable experiences that will help them link what they have learned to what they will see in their future classrooms.

Because child and adolescent development courses are often taken in the freshman or sophomore year, the topics need to be raised again and again throughout the undergraduate candidate's years in college. The introductory child development course provides a foundation of knowledge, while later courses give more information on how to use that knowledge. Master's level candidates can continue to take courses, but their focus should be more on learning to read, interpret, and apply research findings as well as implement action research techniques based on these findings.

Finally, additional coursework, field, and lab-based experiences are needed for candidates to really understand adolescent and middle-level childhood development. There are gaps in the knowledge base about adolescent development and how teachers might apply what is known into classroom practice. Most of the research on adolescent development comes from psychologists working one-on-one with clients; however, teachers work with large groups of 20 to 30 children or more. Although the knowledge base is similar, the applications are very different. Textbooks and resource materials are needed to connect the school structure and the realities of teaching. Dr. Pianta's questions, cited previously, model a classroom orientation that is rarely found in textbooks. Consequently, very little information about adolescents is found in the usual child development texts, and even methods courses may not focus on child and adolescent development as related to pedagogy. NCATE representatives noted that their organization also falls short in this area. Content standards are defined for elementary ages, but NCATE currently lacks content standards for adolescent development. Departments of psychology and education should work together to adapt course materials for an educational setting, to show teacher candidates how to apply the findings of developmental research in the classroom, and to help inform the development of appropriate content standards. Such an approach may work within the carrying capacity of a preparation program and holds the promise of preparing candidates for the realities of teaching in the school context.

How can preparation programs better prepare teachers for the conditions of practice?

Even when evidence-based knowledge of child and adolescent development is included in teacher education programs, its classroom applications are subject to the conditions of practice. Pre-service teachers may have learned what the practice *should* be, but environmental constraints in an assigned school may prevent them from implementing this knowledge. Schools structured on "industrial" models set uniform and, often restrictive policies for the ways in which school personnel and students interact. This situation often results in candidates experiencing some dissonance and dissatisfaction with what is taught and what is actually experienced, and may ultimately lead to candidate's deciding not to pursue a teaching career upon completion of the program or may contribute to teacher attrition once in practice.

School climate and achievement go hand in hand, and applying developmental principles is fundamental to creating a positive classroom environment. Many of the academic and behavioral problems presented earlier in this paper can be addressed by having teachers and administrators working together to create a different climate in the schools so that teachers can teach and students can learn. In doing so, pre-service teachers will have tangible models and tangible experiences to help them understand the ways in which school context affects normative patterns of behavior as well as variations from these norms. Whether in individual treatment or in whole group instruction, a teacher can promote the conditions that enable students to learn. Pre-service teachers, along with their supervisors, need to talk about these conditions and about how to apply this knowledge on an ongoing basis, drawing upon social, psycho-emotional, and ecological research. Preparation programs should communicate to school-based teachers and administrators regularly, so that they form a team that works together to promote and sustain environments in which students and teachers can thrive.

Section IV:

Bringing It All Together: Applications and Action Steps for Linking Child Development Research with Teacher Preparation

The pedagogical focus for teacher preparation has been primarily directed toward understanding the research on child and adolescent development in order to *program the behavior of teachers*. Now, given the changing landscape of schooling, the current focus should shift to increasing teachers' knowledge and understanding to *inform their decisions about particular children, classes, and schools*. This change of emphasis reflects the move away from deterministic thinking and toward acknowledging the impact of interacting classroom processes on diverse student outcomes.

Training teachers in child and adolescent development should not be a one-course solution. Although coursework is required to provide the necessary background information, according to NCATE candidates in the strongest programs do a year or more of student teaching, going back and forth between theory and practice. Observational methods are important in their training—forcing teachers to step back and think about their preconceptions (for instance, the assumption that boys push and shove and girls do not—an assumption not borne out by observation). The scaffolding model would be as valuable for novice teachers as it is for their students, providing support that slowly fades away.

Training approaches should be different for pre-service teachers at the elementary, middle- and high-school levels. The nature of their classroom responsibilities requires elementary teachers to have a stronger interest and need to understand the whole child. Thus, preparation programs for these grade levels could draw upon the latest research focusing on the neural, physical, cognitive, social, emotional, and language development of the child. In doing so, these understandings of development could be translated into appropriate academic and extra curricular activities, targeted prevention programs, and behavioral and psycho-social intervention strategies. Preparation programs could provide pre-service teachers with a variety of experiences in developing, piloting, and implementing such strategies in both laboratory and field-based settings.

Teachers at the middle- and high-school levels, on the other hand, are generally committed to their content areas. Preparation programs typically focus on preparing pre-service teachers to deliver high-quality content to their students. However, it has long been argued that teachers need to first understand students from a developmental perspective in order to teach to high standards. The requirements of classroom practice at these grade levels call for a better grounding in the application of child and adolescent development research; however, the structure and organization of most secondary schools lend themselves to more content-centered versus student-centered approaches to teaching and learning. To prepare teachers to meet the challenges of secondary level teaching, preparation programs could draw upon middle childhood and adolescent development research, rather than focus attention on life span development. Field- and lab-based pre-services experiences could draw upon what is known about development at these stages to help candidates deliver instruction, organize classrooms, and develop instructional and behavioral interventions. These experiences could be provided in conjunction with departments that prepare psychologists, social workers, and others to deliver services in schools. Such preparation experiences are equally, if not more important, for administrative aspirants to undergo because their leadership establishes the policies and sets the tone for the school building. Opportunities for cross-training individuals who plan to take on these roles may promote the emergence of new instructional paradigms and classroom processes that lead to better performance outcomes, fewer behavioral problems, lower drop-out rates, and greater teacher satisfaction.

Emphasize the centrality of *development* rather than the centrality of *passing on information*. A teacher's main role involves more than helping students merely acquire content and information. Rather, it involves helping students develop the social, emotional, and ethical qualities that will enable them to have success in school and success in later life. Healthy development does not happen magically, nor is it limited to those who are "predisposed" to positive outcomes. Teachers need to have experiences to understand the importance of their role as a secure base of attachment. Teacher education programs that draw upon the data showing that emotional support and attention to the student-teacher relationship enhance children's capacities to learn could prove quite significant.

Assess teachers on knowledge of child and adolescent development content as well as on attitudes and behaviors toward children in their classroom. Teachers should be able to use the information in context and apply it to children in different communities. Teachers who report more training in child development tend to be less authoritarian. Some evidence indicates that a higher degree of non-authoritarian beliefs is associated with better classroom practices and benefits for children.

As a body that sets standards for teacher education, NCATE considers what teachers need to know, as well as the qualifications of those who instruct teacher candidates. Assessment in a teacher education program occurs at several levels:

- Assessment of the qualifications of those who instruct the teacher candidates
- Assessment of what is being taught in the teacher education program
- Assessment of what individuals know as they enter and exit the training program
- Assessment of how teachers behave in the classroom
- Assessment of how various measures affect their students' learning

Although NCATE sets standards for what *should* be taught, it is also necessary for the organization to assess what *is* being taught and to identify gaps. Teacher-assessment strategies developed as a version of the National Board for Professional Teaching Standards portfolio includes videotapes and planning documents and are very developmentally informed. Teachers should also know how to assess their students as well as the curriculum that is best for their students. Some school systems develop teachers' sensitivity in this area and provide tools for this kind of work so that teachers can see children and their development unfolding. The orientation of student assessment tools may be unintentionally biased. For instance, children at many urban schools are very facile with expressive language but are assessed on receptive language skills. Thus, a valuable area to address would be the lack of objective assessment methods that can link achievement outcomes to specific cultural, social, and emotional aspects of development.

Conclusion

The preceding sections of this summary have set the stage for initiating a process that will examine and change the way teacher education programs prepare students for service in schools. Beginning with a consideration of the state of practice in teacher preparation and the state-of-the-science in child and adolescent development research, the roundtable members reviewed both the obstacles to and opportunities for fully integrating evidence-based knowledge of development into teacher preparation and practices.

In school, most teachers learned that they were successful because they were smart and worked hard. Reinforced by schools of education, these assumptions have led to the belief that children who do not do well have intellectual, social, or emotional challenges. The harm in such a perspective is demonstrated in Dr. Spencer's work, which showed how a teacher's negative assumptions and misinterpretations of children's behavior negatively affect the learning environment. Allowing children to show their resilience and recognizing their vulnerabilities produces positive outcomes.

How can knowledge of child and adolescent development influence a teacher's expectations for a child? Research in developmental neuroscience has demonstrated that children grow cognitively at different rates and may not achieve the same stage at the same time. Because children's capabilities develop over time, a teacher needs to understand what skills are developing and tailor the instruction to the learner. The brain continues to "construct itself" into adulthood. In fact, developmental neuroscience has shown that the frontal and prefrontal lobes undergo major changes throughout adolescence and into early adulthood. These brain areas are associated with metacognition and executive functioning. The brain's physical development cannot be separated from the emotional, social, and cognitive changes that accompany it. Often, a cognitive "piece" of the developmental puzzle will help a teacher interpret a child's social conduct. A large body of literature is available on the social bases of this type of cognitive development and should inform the development of classroom activities that help students to master skills and become independent. Teaching from a developmental perspective inevitably transforms teachers into problem solvers who adapt and modify instructional approaches based on knowledge of factors that promote optimal development.

The statements below represent eight principles that participants felt mattered most in integrating child and adolescent development research into teacher preparation programs and practices. These statements can be translated into action steps that will help NCATE chart a course toward new approaches in teacher preparation and practices:

- **Application Matters:** Application of research and knowledge about child and adolescent development is the missing element in most teacher preparation programs. Even when teachers and administrators know something about child and adolescent development at a foundational level, this knowledge should be moved to the application level. Research should be presented in a de-contextualized way, so that its applicability to the classroom is apparent. Thus, textbooks and course syllabi in child and adolescent development need relevant, research-based applications, which will provide pre-service students with opportunities to reflect on and practice skills necessary for becoming successful classroom teachers. It is

equally important for those who supervise student teachers in the classroom setting to be developmentally informed and skilled in the application of the child and adolescent development research to classroom practice.

- **Experience Matters:** Knowledge about child and adolescent development should be presented according to the developmental stage of the adult learner. Experts and novices differ in the way they draw upon knowledge bases to inform their practice. Teachers with more experience tend to acquire, organize, and apply information in more skillful ways than their less-experienced counterparts. Information deemed meaningful to an expert's practice may appear abstract and intangible to the novice. Therefore, preparation programs need to take into account the developmental stage of the pre-service teacher and provide appropriate content and experiences at points in time most relevant for the learner. Expanding the length of programs over a six-year period to include graduate study or in-service residency may help strengthen the novice's ability to apply child and adolescent research to practice.
- **Time, Resources, and Support Matter:** The "carrying capacity" of institutions is the most critical barrier to supporting and sustaining the integration of child and adolescent development research into preparation programs. The successful application of child and adolescent development research into educational practice depends largely on the availability and flexibility of time, resources, and institutional support. State, local, and institutional policies that set limits on what a school or department can do to shift its focus on child and adolescent development should be revisited so that teachers are prepared to address the 21st century challenges of educational practice.
- **Access Matters:** The field of child and adolescent development lacks mechanisms for disseminating research findings and information to sources readily available to teachers, administrators, and other school personnel. Scholarly articles are often difficult for non-scientists to follow and require translation into language that pre-service teachers find meaningful, and that practicing teachers and administrators can put into action. Policy makers, parents, and other lay stakeholders need objective and informative overviews of current research in child and adolescent development and appropriate application in classrooms with clear rationales for those applications.
- **Relationships Matter:** Classrooms are active social systems, and children with positive relationships demonstrate positive behaviors. Healthy supportive relationships with teachers and peers can promote both emotional competence and academic engagement in the classroom. The teacher is a central part of the social ecology of the classroom and must be skillful in promoting a prosocial and culturally responsive environment. This enhancing effect of relationships may be especially important for children with both evident and masked vulnerabilities.
- **Context Matters:** Development resides in the interaction between context and the individual. Specifically, cognitive development is supported by a rich and varied environment. Such an environment can help overcome deterministic notions about students' behavior and capacity to learn. Cognition and behavior are always a function of complex interactions with experience, and the nature of those interactions may vary in different environments. Classroom processes and overall school context can serve a protective, stabilizing function particularly when parenting processes in the home environment are compromised. Moreover, well-organized classrooms and responsive adults in the school promote self-regulatory skills that facilitate academic performance. Thus, achievement and school context go hand-in-hand.

- **Affect Matters:** In children especially, affect drives cognition. Children’s affective state influences how available they will be for learning. Children and adolescents have difficulty learning if they are highly stressed or distracted. Knowing about the physiological as well as the sociological aspects of development and how these domains interact is critically important because they have implications for addressing the compelling issues related to the educational achievement gap and other disparities brought to bear on the learning experience.
- **The Child Matters:** It is important to focus on the child, not just on the skill. Two siblings from the same home, of the same parents, experiencing the same tensions may respond to their environments very differently—one may thrive, while the other is barely able to cope with stressors. Similarly, children from various backgrounds and with different experiences may respond to academic content differently. A teacher needs to provide an instructional approach suitable to the make-up, developmental stage, and characteristics of the child. This approach grows naturally from an understanding of human development. Children who have problems acquiring specific skills are likely to experience other legitimate problems that interfere with their academic and social effectiveness. Having the knowledge and skill to understand the whole child will facilitate the teacher’s ability to identify and develop effective learning strategies.

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Appendix A: The Integration of Child/Adolescent Development in Teacher Preparation Programs at NCATE-Accredited Institutions: Survey Results

In preparation for the work of the NICHD/NCATE roundtable on child/adolescent development, NCATE conducted a survey of its accredited institutions. The purpose of the survey was threefold: (1) to gather information on how knowledge of child/adolescent development is transmitted; (2) to discover what primary sources are used most frequently in the programs; and (3) to obtain the judgment of a knowledgeable teacher education faculty member about the current state of research and practice in child/adolescent development.

The first section of the report briefly describes the results of the survey. The second section describes the methodology used in conducting the survey. The third section chronicles the findings of the survey in detail following the format of the survey instrument.

Summary of Results

Requirement for Course in Child/Adolescent Development/Unit Where Courses are Given

- Overall, 80 percent of the respondents indicated that the education unit (usually the school, college, or department of education) offers courses in child/adolescent development; 68 percent of the respondents indicated that the psychology department also offered these courses.
- 90 percent of the respondents indicated that teacher candidates are required to take at least one course in child/adolescent development.
- Education units usually offer separate courses in child/adolescent development as well as integrate knowledge of it within other courses (early childhood—89 percent; elementary education—75 percent, middle level education—78 percent; secondary education—64 percent, and special education—76 percent).

Knowledge of Texts Used in Institution

- Roughly half of the respondents knew whether the text they considered the most authoritative on child/adolescent development was the text most often used at their institution.

Common Ways that Knowledge, Skill, and Dispositions are Assessed

- Over 75 percent of the respondents used the three methods specified in the survey to assess candidate knowledge of child/adolescent development within their programs: Projects/clinical experiences involving P-12 students; end of course exams; and case studies/vignettes. Thirty-five percent of respondents also indicated other methods/examples.

- Over 80 percent of the respondents used the four methods specified in the survey to judge candidate skills in applying knowledge of child/adolescent development within their programs: Supervising faculty using observation instruments with criteria for judging work with P-12 students; cooperating teachers using observation instruments with criteria for judging work with P-12 students; candidate portfolios with a scoring guide documenting classroom work, and use of assignments with a scoring guide/rubric. Fifteen percent of respondents checked “other” methods and included examples.
- Over 75 percent of the respondents used the following methods of judging candidate dispositions in applying knowledge of child/adolescent development within their programs: supervising faculty using observation instruments with criteria for judging work with P-12 students; cooperating teachers using observation instruments with criteria for judging work with P-12 students; and candidate portfolios with a scoring guide that documents classroom work. Twenty-one percent of respondents checked “other” methods and included examples.

View of Whether Knowledge Base in Child/Adolescent Development is Codified in Standards

- 75 percent of respondents indicated that the knowledge base for early childhood development is codified in national/professional specialized association standards.
- 77 percent of respondents indicated that the knowledge base for elementary childhood development is codified in such standards.
- 61 percent of respondents indicated that the knowledge base for middle level childhood development is codified in these types of standards.
- 61 percent of respondents indicated that the knowledge base for adolescent development is codified in these types of standards.

View of Role of Research and Practice

- Over 70 percent of the respondents thought that knowledge about child/adolescent development is informed equally by research and the wisdom of practice; 25 percent thought that such knowledge was informed mainly by research.

View of Additional Coursework and Obstacles to Integrating Coursework in Child/Adolescent Development

- 59 percent of respondents believed that more coursework in child/adolescent development would be valuable to candidates.
- When asked in what areas of child/adolescent development would more coursework be valuable, respondents could check multiple levels. The level checked most frequently was adolescent development, with 50 percent of respondents who felt that more coursework would be valuable checking that item. Adolescent development was followed very closely by middle level

childhood development, with 47 percent of respondents who felt that more coursework would be valuable checking that item.

- A major obstacle to integrating coursework and experiences in child/adolescent development into teacher preparation is lack of time during the program, the item checked by 65 percent of those who responded to this question. The next most frequently checked item was state law or policy that constrains the pedagogy portion of teacher preparation.
- In the “other” category of the question on obstacles to integrating coursework and experiences in child/adolescent development into teacher preparation, several comments converged into one general observation. Respondents’ comments indicated that more opportunities need to be created for explicit connections between research and teacher education and dissemination of these connections between child and adolescent development and pedagogical knowledge; and that the research base of developmental psychology has not been integrated into teacher preparation curriculum.

Methodology

In October 2005, NCATE sent an online survey to unit heads at accredited institutions and asked them to forward the survey to the faculty member most knowledgeable in the area of child/adolescent development. NCATE sent one reminder email to unit heads. Institutions were given three weeks to complete the thirty-three question survey online. Out of 595 institutions, 283 responses were received, for a response rate of 48 percent. All respondents, however, did not answer all of the questions posed. Sixty four percent of respondents were from public institutions; 36 percent were from private institutions, mirroring the ratio of public to private institutions that are actually NCATE accredited.

Selected Findings

The findings are recorded in the survey format. Both quantitative and qualitative responses are discussed. Many respondents took the opportunity to respond to the open ended questions.

Requirement for Course in Child/Adolescent Development/Unit Where Courses are Given

- Overall, 80 percent of the respondents indicated that the education unit (usually the school, college, or department of education) offers courses in child/adolescent development; 68 percent of the respondents indicated that the psychology department also offered these courses.
- 90 percent of the accredited institutions require teacher candidates to take at least one course in child/adolescent development.
- Education units usually offer separate courses in child/adolescent development as well as integrate knowledge of it within other courses (early childhood—89 percent; elementary education—75 percent, middle level education—78 percent; secondary education—64 percent, and special education—76 percent).

Early Childhood Education Programs

In your informed opinion, what is the most authoritative text/source which focuses on child/adolescent development used in the Early Childhood Education Program?

Sixty three percent of those who responded to this question listed a source that they consider the most authoritative source focusing on child/adolescent development used in the early childhood education program. Approximately half of those who responded said that the source they listed was the most frequently used at their institution.

One hundred twenty-three people responded to this question. Most listed a source they considered most authoritative in the area; a few said that they use articles and a few were off-topic. The most frequently mentioned author was Laura Berk; two textbooks by her were both the most frequently mentioned books, with 30 mentions. J. W. Santrock was the next most frequently mentioned source; four of Santrock's books were mentioned for a total of 13 mentions. One of the single mentions (Bukatko and Baehler) is noteworthy because the respondent said that, although the book does not focus specifically on early childhood, the institution uses it because texts that focus on early childhood do not contain enough empirical research.

Selected texts are noted below. The frequency with which they are mentioned are in parentheses.

- Berk, Laura E. *Infants, Children, and Adolescents*. Allyn & Bacon. (16)
- Berk, Laura E. *Child Development*. Allyn & Bacon. (14)
- Santrock, J.W. *Children* 8th ed. Santrock. *Child Development*. Santrock. *Adolescence*. (9)
- Santrock, J.W. *Lifespan Development*. McGraw Hill. (4)
- McDevitt, T. M. & Ormrod, J.E. (2004). *Child Development: Educating and Working with Children and Adolescents*. Pearson. (8)
- Trawick-Smith, J. *Early Childhood Development: A Multicultural Perspective*. Merrill Prentice Hall. (7)
- Berger, Kathleen S. *The Developing Person*. (6)
- Bee, H. & Boyd, D. (2002). *Lifespan Development*. Allyn & Bacon. (5)

Elementary Education Programs

In your informed opinion, what is the most authoritative text/source which focuses on child/adolescent development used in the Elementary Education Program?

Sixty-five percent of those who responded to this question listed a source that they consider the most authoritative source focusing on child/adolescent development used in the elementary education program. Fifty-four percent of those who responded said the text is the most often used at the institution.

One hundred fifty eight people responded to this question. Most listed a source they considered the most authoritative that focuses on child/adolescent development used in their elementary education program. A few said that they use articles and one or two were off-topic.

The most frequently mentioned text was *Educational Psychology* by Anita Woolfolk, with 15 mentions. The most frequently mentioned author was Laura Berk, with three texts and 24 mentions. Santrock was the second most frequently mentioned author, with four books and a total of 17 mentions. McDevitt and Ormrod's text was the third most frequently mentioned.

Selected texts are noted below. The frequency with which they are mentioned are in parentheses.

- Woolfolk, A. *Educational Psychology*. (15)
- Berk, Laura. *Child Development*. Allyn & Bacon. (11)
- Berk, Laura. *Infants, Children and Adolescents*. Allyn & Bacon. (12)
- Berk, Laura. *Development through the Lifespan*. (1)
- McDevitt, T. M. & Ormrod, J.E. *Child Development: Educating and Working with Children and Adolescents*. Pearson/Merrill Prentice Hall. (13)
- Santrock, J. *Child Development*. (8)
- Santrock, J. *Children*. (3)
- Santrock, J. *Lifespan Development*. (5)
- Santrock, J. *Educational Psychology*. (1)

Middle Childhood Education Programs

In your informed opinion, what is the most authoritative text/source which focuses on child/adolescent development in the Middle Childhood Education Program?

Fifty-four percent of those who responded to this question listed a source that they consider the most authoritative source focusing on child/adolescent development used in the middle childhood education program. Forty-six percent of those who responded said that the source they listed was the most frequently used at their institution.

Ninety-three people responded to this question. Most listed a source they considered most authoritative in the area; a few said they use the same text as in the early childhood education program, a few said that they use articles, and a few were off-topic. The most frequently mentioned author was J.W. Santrock. His book *Adolescence* published by McGraw Hill was the most frequently mentioned text. The next most frequently mentioned texts were *Adolescent[ce]s* by L. Steinberg, with six mentions, and Anita Woolfolk's *Educational Psychology* with five. There were fewer mentions of any particular text in the area of middle level childhood education than in the other program areas.

Selected texts are noted below. The frequency with which they are mentioned are in parentheses.

- Santrock, J.W. *Adolescence*. McGraw Hill. (9). Santrock, J.W. *Children/Child Development*. (3)
Santrock, J.W. *Educational Psychology*. (1)
- Steinberg, L. *Adolescence*. (6)
- Woolfolk, A. *Educational Psychology*. (5)
- Berger, Kathleen S. *The Developing Person*. (4)
- Feldman, Robert S. (2004). *Child Development*. 3rd ed. Prentice Hall. (4)

- Ormrod, J. *Educational Psychology*. Merrill-Prentice Hall. (4)
- Eggen, Kauchak. *Educational Psychology*. Merrill Prentice Hall. (3)
- Comer, J. *Six Pathways...* (3)
- Arnett, J. *Adolescence and Emerging Adulthood*. Prentice Hall. (3)
- Berk, Laura. *Infants, Children and Adolescents*. (2)
- Santrock, J.W. *Lifespan Development*. (2)
- Cole, M and Cole. *The Development of Children*. (2)

Secondary Education Program

In the Secondary Education Program, what is the most authoritative text/source which focuses on child/adolescent development used in the Secondary Education Program?

Fifty-two percent of those who responded to this question listed a source that they consider the most authoritative source focusing on child/adolescent development used in the secondary education program. Forty-eight percent of those who responded said the text is the most often used at the institution.

One hundred thirty-two people responded to this question. Most respondents listed a source they considered the most authoritative that focuses on child/adolescent development used in their secondary education program. A few said that they use articles/primary sources and one or two were off-topic.

The most frequently mentioned text was *Educational Psychology* by Anita Woolfolk, with 17 mentions. The most frequently mentioned author was J.W. Santrock, with six texts and 25 mentions. *Educational Psychology* by Woolfolk was the most frequently mentioned text, with 17 mentions, and the second most frequently mentioned author, followed by Steinberg.

Selected texts are noted below. The frequency with which they are mentioned are in parentheses.

- Santrock, J.W. *Adolescence*. (14); Santrock, J.W. *Child Development*. (2); Santrock, J.W. *Children*. (4); Santrock, J. W. *Lifespan Development*. (3); Santrock, J.W. *Educational psychology*. (1); Santrock, J.W. *Developmental Psychology*. (1)
- Woolfolk, Anita. *Educational Psychology* (17)
- Steinberg, L. *Adolescence*. McGraw Hill. (9)
- McDevitt, T.M. and Ormrod, J.E. (2004). *Child Development Education and Working with Children and Adolescents*. Dallas: Houghton Mifflin. (7)
- Berk, Laura. *Infants, children, and adolescents*. (5)
- Arnett, *Adolescence and Emerging Adulthood*. (4)
- Eggen, P. and Kauchak, D. *Educational Psychology: Windows on Classrooms*. Pearson Merrill Prentice Hall. (1)
- Ormrod, J.E. (2002). *Educational Psychology*. (4)
- Slavin, R. *Educational Psychology*. (3)
- Feldman, R. *Child Development*. (2)
- Meece, J. L. (2002). *Child and Adolescent Development for Educators*. 2nd ed. McGraw Hill. (2)

Special Education Programs

In your informed opinion, what is the most authoritative text/source which focuses on child/adolescent development used in the Special Education Program?

Forty-nine percent of those who responded to this question listed a source that they consider the most authoritative source focusing on child/adolescent development used in the special education program. Forty-two percent of those who responded said the text is the most often used at the institution.

One hundred one people responded to this question. Most listed a source they considered the most authoritative that focuses on child/adolescent development used in their special education program. A few said that they use articles/primary sources, a few said they use the same texts as in the other programs (i.e. early childhood) and one or two were off-topic. One respondent said that all students take a lifespan psychology course in the psychology department, that special education courses address developmental issues in most courses, and students also take educational psychology. Another respondent noted that the special education majors take the same child development courses as the early childhood and/or elementary majors.

- J. W. Santrock was the author most often mentioned (17 mentions); while Anita Woolfolk's Educational Psychology text was the most often mentioned, with 7 mentions.
- Santrock, J. W. *Children*, 8th ed. McGraw Hill (6); *Lifespan Development*. (3); *Children*. (3); *Child Development*. (2); *Educational Psychology and Adolescent Psychology*. (1); *Adolescence*. (1); *Developmental Psychology*. (1)
- McDevitt, T.M. and Ormrod, J.E. (2004). *Child Development: Educating and Working with Children and Adolescence*. 2nd ed. Pearson. (5)
- Berger, Kathleen. *The Developing Person*. (3)
- Berk, Laura. *Infants, Children and Adolescents*. (4); *Child Development*. (1)
- Meece, J. *Child and Adolescent Development for Educators*. McGraw Hill. (4)
- Dacey/Travers. *Human Development across the Lifespan*. McGraw Hill. (1)
- Ormrod. *Educational Psychology*. Merrill Prentice Hall. (for ed psych courses)
- Owens. *Child and Adolescent Development*. Wadsworth.
- Papalia, Olds, and Feldman. *Human Development*. 9th ed. McGraw Hill. (2)

Appendix B: Child and Adolescent Development Research and Teacher Education: Evidence-based Pedagogy, Policy, and Practice— Research Questionnaire

The National Institute of Child Health and Human Development (NICHD), in collaboration with the National Council for Accreditation of Teacher Education (NCATE) will be examining child and adolescent development research in relation to teacher preparation programs to reach consensus on what evidence-based knowledge of child-development leads us to conclude about appropriate teacher practices and teacher preparation.

This information is important because efforts to decrease and eliminate the educational achievement gap and to promote quality teachers rest upon the availability of scientific knowledge of what makes teaching effective. A great deal of effort has already been put forth to ensure that practitioners can teach to high content area standards. Now it is time to ensure that teachers can teach *students so that they can learn* to high standards. While child development is a focus of many preparation programs, we are not confident that what is being taught always reflects state-of-the-art. Moreover, child development research as translated into teacher preparation pedagogy is not seen by the policymaking community as an essential component of teacher preparation. Bringing communities of interest together to evaluate child development research would crystallize work that has been ongoing and bring new research to the attention of teacher educators and policymakers

Toward this end, we have identified a set of questions that we would like to address through a series of meetings and roundtable discussions. As a first step in this project, we want to make sure we're moving in the right direction and that the questions we're posing will lead toward our goal; or determine whether there are more relevant questions we need to address. We value the contributions you have made in the fields of child development and education. Our efforts would be greatly enriched if you would lend your expertise to this project by taking the time to complete the questionnaire below. Information obtained from the questionnaire will be used to guide our efforts and to serve as a catalyst for further discussion among researchers and teacher educators.

Research Questionnaire

BACKGROUND INFORMATION:

Name:

Institution:

Area of Expertise (Please check one):

- Cognitive Development
- Social Development
- Language Development
- Emotional Development

(1) STATE OF THE SCIENCE:

Please summarize two important findings from current theories, basic or applied research in child and adolescent development that might have implications for teacher preparation (If appropriate, please cite references, attach papers or indicate web addresses where this information may be obtained).

(2) APPLICATION OF RESEARCH FINDINGS TO TEACHER EDUCATION:

Please summarize two important findings **from your specific research** that can be applied to teacher preparation and K-12 teaching and learning (if appropriate, please cite references, attach papers or indicate web addresses where this information may be obtained).

(3) FUTURE RESEARCH

Based on your area of expertise, please summarize in what areas you believe additional child and adolescent development research is needed to inform teacher education and K-12 and learning.