

U.S. DEPARTMENT OF EDUCATION

NATIONAL MATHEMATICS ADVISORY PANEL MEETING

WEDNESDAY,
JUNE 28, 2006

KENAN CENTER, UNIVERSITY OF NORTH CAROLINA
CHAPEL HILL, NORTH CAROLINA

9:00 AM

PANEL AND EX OFFICIO MEMBERS PRESENT:

LARRY R. FAULKNER	Chair
CAMILLA BENBOW	Vice Chair
DEBORAH LOEWENBERG BALL	Member
A. WADE BOYKIN	Member
FRANCIS FENNELL	Member
DAVID GEARY	Member
RUSSELL GERSTEN	Member
TOM LOVELESS	Member
LIPING MA	Member
VALERIE REYNA	Member
WILFRIED SCHMID	Member
SANDRA STOTSKY	Member
VERN WILLIAMS	Member
HUNG-HSI WU	Member
DIANE JONES	Ex Officio Member
GROVER WHITEHURST	Ex Officio Member

PANEL AND EX OFFICIO MEMBERS NOT PRESENT:

NANCY ICHINAGA	Member
ROBERT SEIGLER	Member
JIM SIMONS	Member
DAN BERCH	Ex Officio Member
TOM LUCE	Ex Officio Member
KATIE OLSEN	Ex Officio Member
RAY SIMON	Ex Officio Member

STAFF MEMBERS PRESENT:

TYRRELL FLAWN	Executive Director
DIANE MCCAULEY	
IDA EBLINGER KELLEY	
JENNIFER GRABAN	
ALYSON KNAPP	

I-N-D-E-X

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P-R-O-C-E-E-D-I-N-G-S

1
2 DR. FAULKNER: My microphone has a bell so
3 that I can get your attention. It's, I guess, a
4 technological virtual gathering, but let me welcome
5 the members of the panel and guests around the room to
6 this second gathering of the National Mathematics
7 Advisory Panel. We are here to do our work. And we
8 have nearly everyone who was expected to come. We've
9 lost Tom Luce to illness, and we've lost Dan Berch to
10 weather related travel. Tom Loveless is in town and
11 will be with us momentarily. I think that takes care
12 of everyone. We have some members who are not
13 expected to be here due to assignments, Nancy
14 Ichinaga, and Bob Siegler is by telephone. We're
15 missing three who could not make this date. We've had
16 two drop out, because of problems at the last minute,
17 but everyone else is here and, I think, we can go
18 ahead and pursue our goals.

19 We are in an open session, which will be
20 largely dedicated to discussing standards of evidence
21 methods. We'll get to that momentarily, but let me
22 begin this session by first of all, thanking the
23 University of North Carolina for allowing us to be on
24 campus and for providing us with the space that we'll
25 be using today and tomorrow. The University of North
26 Carolina is a premier institution of higher education

1 in this country, and we're glad to be able to avail
2 ourselves of their hospitality.

3 Actually, there's method in what we're
4 doing with our sites. When Tyrrell asked me about
5 sites, I said that I thought it would be good, in
6 addition to our covering different parts of the
7 country with our meetings, also holding our meetings,
8 consistently, in locations that symbolize a very high
9 level of aspiration in education in the United States.
10 The first meeting, of course you know, was in the Hall
11 of the National Academies. This meeting is in a
12 premier university on the east coast. The third
13 meeting will be in Boston and we will be in Boston
14 schools and MIT as we have the events of the September
15 meeting. Then November we'll be in California.
16 Stanford has agreed to host us, and we're looking into
17 also having part of that meeting hosted by one of the
18 prominent corporate enterprises in the Silicon
19 Valley. So we are trying to speak, not just with our
20 conclusions and our report, but also in the locations
21 where we are holding these panel sessions.

22 Let's go ahead and talk about the question
23 of standards of evidence and methodology. I sent you
24 all an e-mail message yesterday that kind of outlined
25 how we'll proceed here. My part of this is not
26 complicated. I would simply like to reiterate that

1 the President's Executive Order calls for us in two
2 phrases: one is calling for us to address results of
3 research related proven effective and evidence based
4 mathematics instruction; and another phrase, calling
5 on us to marshal the best available scientific
6 evidence. Because of that I have said that I will
7 feel the obligation to make sure that whatever we
8 assert, or whatever facts that we place before the
9 public in our report, have a basis in evidence.

10 The purpose that I think we need to
11 address in the discussion that we'll be having here
12 and, probably, in the follow-up and later stage, most
13 likely Boston, we need to address really how far we
14 want to carry the question of standards of evidence.

15 As I look at it, what we could do as we
16 put our report together, there are several levels that
17 we could insist on with regard to evidence. At the
18 very minimum, I, as Chairman, can insist that whatever
19 facts we cite, whatever assertions we make, have at
20 least a citation associated with it. That's what I
21 can do, but we all know that citations don't equate to
22 truth. We all know that there's stronger and weaker
23 evidence for anything. And we need to address, I
24 think, as a panel before we start to break into task
25 groups, what are our expectations. How far do we want
26 to try to carry our demand for evidence as we try to

1 place material before the President or the Secretary
2 of Education and before the public, and what form will
3 that take? Is there a way for us to write down what
4 those principles are? All of those issues are what
5 this discussion is about.

6 Now, what we've done is to put together a
7 subcommittee of standards of evidence. Valerie Reyna
8 will chair it and the other members will be Wade
9 Boykin and Russ Whitehurst and Camilla Benbow. That
10 group's job will be to try to keep momentum in this
11 discussion. It's been my experience that as a
12 discussion takes place, eventually we need to get to
13 the point of actually writing something down and
14 putting that back in front of the whole panel and
15 seeing, inadvertently if we can't get to the product
16 of the whole panel will represent us. That's what the
17 subcommittee's job is about. And I think we're about
18 ready to go. So I want to start by inviting members
19 of that subcommittee to come in any way they would
20 like about this subject. And with that I'll turn it
21 over to Camilla.

22 MS. BENBOW: I'll just be very brief so
23 that we'll have plenty of time in discussion. I think
24 what our hope is, is that this panel will be viewed as
25 being driven by the evidence, rather than being seen
26 as simply a consensus panel where the consensus

1 depends on who was sitting around the table, and
2 obviously that seems a little bit more political
3 versus being driven by evidence. It's a little bit
4 more of a scientific process. And we're hoping that
5 we're going to have impact down the road, that people
6 will see that the recommendations by this panel are
7 all evidence-based and it's based on good, quality
8 evidence. So, when I sent an email, or decided to
9 draft an email, it was, as I said in my email, a
10 sacrificial draft to get this session going to put
11 some issues on the table in terms of how do we want to
12 evaluate the quality of the evidence that is available
13 out there. And I know that not everybody's going to -
14 - we're going to have to have some discussion. In the
15 final analysis, I'm just hoping that we'll come to
16 some principles and general principles to guide us;
17 and that each sub-group will, probably, have a
18 somewhat different take on it because the tasks are
19 different. So the content group will have a different
20 set of standards for them than, say, for example, the
21 instructional practices group because you're using
22 different kinds of formulas.

23 But anyway, we can start up front, before
24 we discuss any issues, with some general principles to
25 guide us in terms of how we will look at the evidence,
26 how will we use the evidence, and what we think is

1 good quality evidence versus not so good. I think
2 that could help us down the road. We all might all
3 have some points where we might get some
4 disagreements, but at this point that's all I need to
5 say. I'll turn it over to Valerie as the Chair.

6 DR. REYNA: Good morning everyone. This
7 is Valerie Reyna and good morning, everyone.

8 I am going to mention a few ideas. They
9 are tentative at this stage, because we really haven't
10 had a chance, as a group, to discuss all of them, but
11 I'd like to initiate that process and begin to talk
12 about some concrete ideas about the quality of
13 evidence.

14 And to echo what Camilla said, I know that
15 my concern is that we base what we say on the highest
16 quality scientific evidence, but we also have the
17 charge of thinking about what might be promising or
18 suggestive that might be the subject of future
19 research, and I think the important thing is to make
20 that distinction. The things that we know now that
21 can be said at the highest standards of scientific
22 evidence and things that maybe there's some evidence
23 for, but that are a little bit weaker and need further
24 investigation, and then there are things that are
25 unfounded claims that we really can't say are more
26 than opinion. And to echo what the Chair said, those

1 things are things that I would suggest be marked as
2 opinions.

3 So just to throw out some type of
4 suggestions reacting to some of the communications
5 we've already had. I'm building on some of the
6 concrete suggestions that Camilla made -(thank you
7 very much, by the way, those were very helpful) as
8 well as an email that Russ Whitehurst has sent and
9 some comments by members of the panel like Russell
10 Gersten and Sandra. So, in trying to put those
11 together, let me give a couple of concrete
12 suggestions.

13 First of all there is a concept called the
14 hierarchy of evidence and this is a concept that is
15 used in many guidelines ranging from Cochrane criteria
16 used in medicine to the camel collaboration to NIH
17 consensus documents and a variety of other kinds of
18 evidence based summaries of evidence. And those
19 include things such as experimental or random
20 assignment, techniques being used to be able to refer
21 causation. They include correlational designs as a
22 somewhat less strong evidence of causation, but still,
23 nevertheless, evidence and going down the line. So
24 that's one thing I would throw out that design for our
25 studies would be an important consideration,
26 especially with respect to the nature of the inference

1 we would want to make. So, in other words, there are
2 different kinds of methodologies and they address
3 different kinds of questions and this echoes,
4 essentially, what the National Academy of Science had
5 said several years ago. And these are all important
6 and valuable sources of evidence, but if our question
7 is one for example, effectiveness of practice, then a
8 certain kind of methodology or design is required to
9 make that kind of inference. So that would be my
10 first consideration I'm going to throw out. There
11 will be other things too, for example, like adequate
12 sample size, and this panel has the charge of thinking
13 in a broad manner, generalizing to more than a few
14 people. So because of that, we have to think about
15 inference and appropriate inference and so the sample
16 size is a consideration. And there are things like,
17 and I'm not going to go into all of them, but that
18 dependent measures be reliable and valid and
19 sensitive. That if we're looking at an intervention,
20 that it was done sufficiently long that there's an
21 opportunity to observe an effect. So, for example,
22 even the best practice or intervention, if it is not
23 done long enough, will not necessarily show an effect,
24 so that there have to be certain basic conditions that
25 have to apply in order to be able to be in a position
26 to observe that something is affected to begin with.

1 Also, I think there are a number of issues that would
2 apply, not to the randomized assignment experiment,
3 but to what I would consider second tier evidence. So
4 for example, we might summarize smaller scale studies
5 that are tightly designed, but that are not multi-
6 centered trials. They're not large scale, they
7 haven't been done with, you know, an array of
8 populations, and we might consider such evidence as
9 not absolutely conclusive, but suggestive and worthy
10 of further investigation. So, in other words, what
11 the argument I'm making is that we, it's not that we
12 ignore lesser forms of evidence, but that we
13 distinguish them explicitly and make our strong
14 recommendations based on the highest quality of
15 evidence, and then think about being a new vistas for
16 future research as a result of that.

17 DR. FAULKNER: Thank you Valerie. Wade, I
18 might ask for your comments.

19 DR. BOYKIN: Well, let me say, I pretty
20 much concur with what's already been said, and I
21 jotted some notes down here to share a few comments,
22 perhaps, a few complexifiers for our discussion.

23 I think that it is certainly the case that
24 there are conventional principles for a good research
25 design, a good research methodology that we should
26 adhere to. Principles around reliability for example,

1 around internal validity, around external validity.
2 With regards to reliability, we're talking about
3 manners of replication, a replication of findings as
4 opposed to one shot results. We're also talking about
5 internal reliability of measures, of observations and
6 other data gathering tools.

7 When we come to internal validity, we're
8 talking about whether outcomes that we obtained
9 actually occurred or resulted from the practice of
10 being engaged in the treatments or the programs that
11 had been deployed. And then with regard to external
12 validity, we're talking about issues and generalized
13 ability -- can other sites get the same results that
14 we did. But beyond that, the question is, do the
15 results in our tightly, sometimes controlled
16 experiments, do they apply, for example, to the real
17 world complexities of classrooms?

18 One caveat I throw out here to the panel
19 to kind of stir the pot here is that we sometimes get
20 so narrow in our quest to achieve internal validity
21 that we sacrifice principles of external validity or
22 generalized ability. I think that's going to come up
23 for discussion. We just need to reach some kind of
24 happy medium here. We should also be, I think, aware
25 that evidence is not always absolute. It certainly
26 can be conditionalized. So in our efforts to discern,

1 for example, what works or best practices, we should
2 not lose sight of why some things work, or how things
3 work, for whom do some things work or not work, where
4 does it work, under what conditions does it work or
5 not work. So, clearly, the issue of conditionalizing
6 results is important for us to consider.

7 We should also worry -- this issue of
8 evidence -- about the narrow evidence of what as well
9 as evidence for what. In terms of the issue of
10 evidence, we certainly should focus on, obviously,
11 math learning, math performance, achievement outcomes
12 in math. But there are also, well, let's say proximal
13 outcomes, process outcomes that are likely to be
14 precursors for math performance outcomes that we
15 should also pay attention to, things like task
16 engaging, persistence, efficacy, motivation, effort,
17 attention. These are issues that are evidence that we
18 need to pay attention to as well. And then evidence
19 for what. Certainly, a crucial goal of our efforts is
20 to discern ways to enhance math learning, math
21 achievement for K-12 students, but we must be mindful
22 of the insistent achievement gaps that exist between
23 certain groups in our schooling populations, gaps
24 that, simply, must be closed. To look, for example,
25 at the 2005 math data, 47 percent of white 4th graders
26 were at or above proficiency in math. It was only

1 true of the 13 percent African Americans and nine
2 percent Hispanics. When we put that against the
3 reality that one out of every three that will enter
4 into the American labor force is black or brown, this
5 becomes a sizable consideration that we cannot shy
6 away from in our deliberations. So we must focus
7 certainly as an important objective on raising
8 achievement for our students in general, but also
9 simultaneously closing achievement gaps. So sound and
10 solid evidence you must gather to be sure, but
11 evidence, in particular, that leads to the goals of
12 raising achievement and simultaneously closing gaps.
13 That must be a priority of ours.

14 DR. FAULKNER: Russ.

15 MR. WHITEHURST: Thank you, Mr. Chairman.

16 Almost everything worth saying has already been said
17 on this topic, but that's no reason to not say it or
18 repeat it again. I agree with, I think, everything
19 that's been said. There is, however, something I
20 think we need to attend to that is, perhaps, not a
21 nuance, and that is the instructions with regarding
22 the President's Charge to the panel. I draw your
23 attention to the statement that the reports that the
24 panel issues, at a minimum, contain recommendations on
25 and then it lists a series of topics. It doesn't give
26 us the option of saying: well, in the absence of

1 strong evidence, we shall remain silent. Rather, we
2 are required to give recommendations. So I think
3 there's a tension between what some people that have
4 spoken already have said with respect to we're going
5 to use the strongest quality evidence as the basis for
6 our recommendations, and the requirement to make
7 recommendations in areas in which there may not be
8 strong evidence or the evidence may be variable in
9 terms of quality and quantity. That, I think, leads
10 back to a point that Valerie made and that's necessity
11 to commit to a hierarchy of evidence, at least a loose
12 hierarchy, and be able to use and have access to and
13 be willing to consider a wide range of evidence within
14 that hierarchy. And I think a way of bridging the
15 tension between the commitment to the highest quality
16 evidence and the requirement of recommendations on
17 each of these subjects, is to just be very clear about
18 the quality of the evidence we're using. So this is
19 the panel's recommendation and in some cases that
20 recommendation will be based on high quality evidence.

21 In some cases that recommendation will be based on
22 lower quality evidence.

23 My opinion is that as long as we're
24 faithful in labeling the quality of evidence we're
25 carrying our job responsibly. I think that will not
26 be easy even in established areas. By established, I

1 mean the areas in which there's a long tradition of
2 using evidence for decision making and set ups of
3 mechanisms and processes set up for vetting evidence
4 even in those areas that are, for example, vetting the
5 results in medical trials. There are still
6 substantial disagreements once you lift up as to
7 exactly what evidence should be considered under what
8 circumstances. Certainly the terrain is more
9 unsettled in education. And when people look at
10 evidence in, and very systematically, it's time
11 consuming to do that. You can take a particular topic
12 and it's not unusual for people who are vetting the
13 evidence on that topic, to take at least a couple of
14 years to synthesize the evidence that generates
15 conclusions. We don't have that sort of time frame
16 available to us here. So, I think, we're going to
17 struggle with how to label evidence and what
18 represents higher quality versus medium level versus
19 lower quality evidence, but I think we have to do that
20 and be transparent about the decisions we make and the
21 basis for those decisions. So we are open to
22 corrections and feedback we're going to get from the
23 field on how those processes are made.

24 I want to come back to -- to make a
25 premise here. I think it's been unstated and implicit
26 in what we're doing and that is that, we have a choice

1 between evidence-based process and one that is,
2 instead, based on faith, hope, and high expectations.

3 And no matter the prominence of the membership of
4 this panel, we are all subject to the human frailties
5 in interpreting information, and if all we are is a
6 consensus panel trying to come together around a set
7 of opinions we could all agree to, I think we will do
8 far less than we otherwise might have done in
9 advancing the agenda.

10 So I hope we will all commit ourselves to
11 the struggle to identify the evidence behind our
12 conclusions and to label it accurately. Thank you.

13 DR. FAULKNER: Thank you, Russ. Let me
14 just follow up the comments that have been made by
15 saying that I'd like to underscore the last point made
16 by Russ that we've been asked to try to formulate an
17 agenda, a set of recommendations based on the best of
18 what is known. In some cases we're going to find that
19 the best of what is known is not rock solid and we're
20 going to have to do our best to formulate whatever
21 recommendations we want to make from them.

22 I, personally, don't believe that we can
23 escape a way of going forward where we admit and
24 address issues where there are variable levels of
25 confidence in what we know and what we can recommend,
26 and that the key to addressing it is to be just

1 forthright about what is known about how we labeled
2 results. But I think that each of the task groups, as
3 we move forward, need to keep in mind that as they're
4 addressing materials that understanding and
5 comprehending -- a stronger word sometimes than an
6 understanding -- that the basis of what is known is a
7 very important part of the task group. With that, let
8 me open this for general discussion. Let's see what
9 you have in mind, what your reactions are to Camilla's
10 summary, to anything that's been said here so far.

11 DR. FAULKNER: Sandra.

12 DR. STOTSKY: Sandra Stotsky. I would
13 just like to raise, for discussion, the question of
14 the relationship of evidence to the question at hand,
15 and in order to fulfill some of the expectations for
16 recommendations, or some of the items that we are
17 being asked to consider, the kind of evidence that
18 would not be related to experimental research, but
19 would be textual or supportive for, say, social policy
20 questions. Let me just give a couple of examples.
21 For example, if one wanted to relate to learning
22 processes the question of the length of the school day
23 or the length of the school year, which we know in
24 this country is about the shortest of any country in
25 the world, this is an important variable in relating
26 to learning, but in order to posit this question in

1 support for a longer school day, support for a longer
2 school year in this country, we're going to have
3 experimental evidence from this country to use and I
4 doubt that we could ever really get good experimental
5 evidence -- not that you couldn't get contextual or
6 descriptive data. So the question is, for questions
7 like that, for some of the issues that we might want
8 to consider, are we going to be able to create
9 rationales -- basically what you want are rationales -
10 - to address whatever might appear as a consensus
11 question that you've seen based on, to some extent,
12 common sense and I've mentioned this before as
13 something that's desirable?

14 DR. FAULKNER: Do you want that question
15 answered?

16 DR. REYNA: I'd be happy to talk about
17 that question. It's a really important question. You
18 know, there are some suggestive data in this area that
19 have to do with time on task that have been strongly
20 replicated and, you know, appear again and again that
21 would bear on this. They don't bear as directly as if
22 there had been a randomized trial in which we took,
23 you know, a population of students and randomized half
24 of them to a longer school day and a longer school
25 year intervention and the other half to, you know, a
26 lesser school day -- fewer -- shorter school year

1 intervention. That would be the strongest form of
2 evidence. In fact, I think it's possible that at some
3 date in the future that we will pilot interventions
4 like that when we have something that we think is very
5 important, as you say it is. I agree with that. I
6 think that it is important. So, it's not that it's
7 impossible in principle to do a pilot study in which
8 you randomize. However, there are other forms of
9 evidence. There's the time on task evidence I
10 mentioned, but also there's correlational, econometric
11 kinds of approaches to questions such as that. You
12 mentioned other countries. You can look at data in
13 which this varies across countries in an attempt to
14 control for a variety of differences that exist as we
15 know across the country and look at a kind of quasi-
16 experimental analysis of how a school day affects
17 achievement. So I think that's actually a good
18 example of a question that's acceptable to analysis
19 and evidence.

20 DR. SIEGLER: Could I make some comments?

21 DR. FAULKNER: Yes, please.

22 DR. SIEGLER: Sorry I can't be with you.

23 DR. FAULKNER: Is this Bob Siegler?

24 DR. SIEGLER: Yes, it is.

25 DR. FAULKNER: Okay, Bob, go ahead.

26 DR. SIEGLER: The question that I'd like

1 to ask has to do with the scope of the panel's
2 mission. There are a whole bunch of questions, of
3 which the one that Sandra raised is one, that are
4 relevant to math, but are relevant to policies
5 regarding education more broadly, so teacher pay is
6 another one. If we pay teachers twice as much or make
7 their pay contingent on student achievement, we might
8 be able to improve education in general. Now, these
9 questions aren't about math in particular, they're
10 about broader social policies, and the question is,
11 should we be considering these broader social policy
12 issues or should we focus, exclusively, on the issues
13 directly relevant to math and not necessarily to other
14 aspects of education?

15 DR. FAULKNER: As chair, let me comment --
16 Camilla might want to add comments, too -- but, I
17 think, we have to attend to our charge first. Our
18 charge is about math and it may be that we will
19 conclude that one or more of these broader, social
20 policy questions is important for us to bring up and
21 to make a recommendation on in the course of this
22 report, but I'd like for us not to spend most of our
23 time dealing with things that are global so that we
24 never get to the particulars that we were constituted
25 to address. So I'd like to stay close to the
26 particulars. With respect to Sandra's comments -- or

1 question -- let me just say that, I think, we could,
2 if we wanted to, make a recommendation of the type
3 that you've suggested, Sandra, but, I think, we would
4 also have to say -- it would be our obligation to say
5 -- that this rests largely on instinct or common
6 sense, or whatever else we can marshal that relates to
7 it, that it's not grounded in -- you know, in
8 experimental results. Russell.

9 DR. GERSTEN: I'd just like to ground some
10 of the -- I mean, Sandra raised some very important
11 points, but I think what Russ said and Wade and
12 Valerie talked about at the beginning is excellent.
13 It's very thoughtful, it reminds us all of mechanics
14 of social science research, but what we're faced with
15 is two things and as we chat on the bus or over coffee
16 -- you know, before the session -- is, number one,
17 there is a -- there is, definitely, some interesting
18 and important case study research, some interesting,
19 descriptive research, some high quality work on the
20 nature of math disabilities, but there is not a lot
21 for us to draw on that to any of these upper tiers,
22 which, you know, what Russ Whitehurst shared with us -
23 - this B to A level. And where we run into problems
24 and what each of us is grappling with, I think, in our
25 own head is when we start to get into these weaker
26 levels, expert opinion, looking at descriptive

1 studies, what inferences can we draw from
2 international comparisons or from comparison of
3 different states, because there are so many other
4 explanations that are there. And that, to me, is the
5 frightening part of our charge. When do you just get
6 overwhelmed and say, okay, common sense tells us that,
7 you know, based on this descriptive data, we can say
8 that the curriculum used in these two countries is
9 better for us, or that it's more important that math
10 teachers know more math than our average American
11 teachers. That is -- we have so many gray areas to
12 deal with and I think very little to guide us with.
13 So that is, I think, something we're all going to have
14 to grapple with and be candid with, because at some
15 point if we say, although the evidence as we infer
16 such as the curriculum is the most important thing.
17 We have to make our thinking explicit at least, or
18 just say we are -- there are just two views on why
19 this happens, because that is a lot of where our
20 work's going to be. I also -- after Deborah's speech,
21 a very important part of our conversation, I think it
22 fits our charge for the first hour about maybe giving
23 some coherence and some -- some way for us to think
24 about our charge and the kind of overwhelming nature
25 of the recommendations we have to make.

26 DR. FAULKNER: Deborah.

1 DR. BALL: I want to comment on the last
2 several comments we've made and link them to the
3 earlier remarks. The history of research in our
4 field, over the last several decades, has been one of
5 the subject matter that we think is probably one of
6 the variables. So, for example, the time on task
7 literature didn't consider adequately the differences
8 across content areas and generalizations were held to
9 be true about what seems to be common sense about the
10 amount of time kids spend learning, relates to their
11 achievement. That's common sense, but the ways in
12 which that may differ across subjects or for a
13 particular construction in subjects, particular goals,
14 particular treatments hasn't been studied. So if one
15 of the things given our charge to ourselves to be
16 careful, is that as we move forward, we're going to
17 have to take a common effect. We are, as you said,
18 and we know about mathematics and the evidence often
19 will lead us to -- we need to be cautious to
20 understand that claims that people walk around
21 claiming to be based on evidence, actually come out of
22 a period of research in which subject matter was
23 almost vacant. It, basically, didn't appear in the
24 educational research literature. It's only really in
25 the last -- I would say -- depending on which of our
26 subjects we're talking about, it's only in the last

1 couple of decades that there's begun to be a serious
2 treatment about the differences across disciplines and
3 that really begins to lay out the problem, because
4 within that we know that there are differences of
5 goals, differences of treatment, so, for example,
6 conclusions that could be drawn about mathematics
7 instruction one have to examine what the goals of that
8 instruction and the methods of that were. So when
9 you're talking about what are sometimes called higher
10 order learning goals, that might not be generalizable
11 from studies that. So I just want us to be very
12 careful.

13 And the main headline of my comment is
14 that generalized ability in our field is treacherous
15 given that often subject matter didn't figure in. And
16 a minor second point that I'd like to make is on the
17 international comparisons. We're vulnerable to
18 something that I haven't heard any of the first few
19 speakers comment on, which is, the time to draw
20 conclusions where many of the variables that most
21 people who have thought carefully about these issues
22 are simply not measured. So, for example,
23 international comparisons of instruction is almost
24 never studied at all -- never measured, never studied.
25 Conclusions, therefore, drawn by international
26 comparisons that don't know differences in instruction

1 are only dealing with extremely weak measures of
2 instructions, such as teachers' reports about what
3 they do on a once a year basis, simply can't count, in
4 my view, for adequate or valid measures of
5 instruction. So here I want us to notice that when we
6 examine conclusions that we look inside of these
7 studies to consider what was measured and what that
8 means for the degree to which the models were actually
9 specified for finding the conclusions.

10 DR. FAULKNER: Wu.

11 DR. WU: What I want to say reinforces a
12 part of what Deborah just said a moment ago, it's good
13 that you ask for evidence, but we're talking about -
14 not evidence of sociology, sociological research in
15 general, but evidence for mathematics education. I
16 think this problem has not been properly recognized.
17 One clear-cut example is how students learn fractions.
18 The research on that as what works, what doesn't
19 work, why students don't learn, why students do learn
20 -- all that -- I think, most of it would be
21 fundamentally flawed for the simple reason that, from
22 my knowledge, except for a very brief period when
23 people make experiments, the last several decades
24 they're teaching the fractions is fundamentally
25 flawed. I don't want to go into details about that,
26 but that's mathematically flawed. This is a judgment

1 based upon professional expertise and I don't know if
2 that figures into research. So, flawed teaching,
3 which often includes conclusions of what works and
4 what doesn't work, why people learn, why people don't
5 learn and then ask. When asked what is that based on
6 they say we will teach it that way. Do people learn
7 or do people don't learn on the basis of flawed
8 teaching. Is that in terms of mathematics education?

9 It's something. It's not one of the easiest examples
10 to convey, but I think as we go on discussing various
11 things, especially in our small task groups, I think,
12 mathematics education would have to be taken into
13 account.

14 DR. FAULKNER: Thank you. Yes, Wilfried.

15 DR. SCHMID: Something that has not been
16 mentioned this morning, although in some of the
17 changes has been mentioned that, of course, that there
18 will be questions that we cannot resolve by scientific
19 evidence. For example, what is and what isn't
20 algebra, what is advanced mathematics, what are the
21 skills that are necessary to succeed in those.
22 There's a lot of disagreement, I think, but
23 nonetheless, I think, we will not be able to fulfill
24 our charge unless we speak to those issues. Let me
25 just say, hypothetically, some might say why teach
26 fractions so we can define some of these difficulties

1 of existence, but that's, obviously, not a solution.
2 I mean, we need to spell out what are the critical
3 skills that cannot be based on scientific evidence.

4 DR. FAULKNER: There will be some things
5 that are measured in definition, of course. Matters
6 of definition don't require evidence. Yes. Okay.
7 Skip.

8 DR. FENNEL: Yes. Skip Fennell. I'd
9 like to sort of disagree with Wu in one sense in that
10 it depends on how one looks at research. There has
11 been a fair amount of research from what was then
12 called the Rational Numbers Project that looked at
13 fractions. One might not agree with that work, -but
14 it is a body of work and, I think, we look at that as
15 we make recommendations. I would agree with Wilfried
16 that there will be issues that we will encounter --
17 and then I'll go back to Russell's statement, which
18 really summarized it as for me -- when we make
19 recommendations. Our charge is to identify the
20 evidence and label it accurately; and if we do that,
21 there will be times when we reach the highest level as
22 suggested by Valerie earlier and other times when what
23 we'll be looking at are things that we might recommend
24 and/or things that are literature.

25 DR. FAULKNER: Diane.

26 MS. JONES: I think really I just wanted

1 to remind everybody that the Executive Order does have
2 some flexibility; that it is okay if one of the
3 recommendations is that the research doesn't show
4 conclusively, the recommendation is that a body of
5 research needs to be commissioned, developed,
6 encouraged in this area. Now, we wouldn't want a
7 report for everything to simply say we need to do more
8 research, but it is, you know, when we wrote the
9 Executive Order, we did consider that there will be
10 areas for which there is not enough evidence to
11 actually make a constructive recommendation other than
12 -- needs considerable additional study. So, I think,
13 we do need to make some recommendations, but we do
14 also have a flexibility to encourage additional
15 research in a particular area.

16 DR. FAULKNER: Thank you, Diane. I think
17 that it's highly likely that this whole project is
18 going to emerge with a list of things that need to be
19 followed up. Sandra.

20 DR. STOTSKY: I was going to elaborate on
21 that just a little bit. I agree with that. I
22 certainly agree with that we have to be cautious in
23 looking at any of the older bodies of research for
24 their omissions and deficiencies, but, I think, it
25 would be extremely valuable for us to be looking at
26 them and to be noting their deficiencies in order to

1 point out what it is we need to recommend for research
2 in these areas. Time on task is one. I'm thinking of
3 a particular study that came out, maybe, about twenty
4 years ago by the U.S. Department of Ed that looked at
5 several countries in great detail; whether it looked
6 at subject areas, specifically, I don't recall. I
7 have to look at the study again, which I have at home.
8 I did not bring it with me; but the point was, there
9 was careful examination of differences between the
10 amount of time devoted to instruction in these
11 countries and the time for recess, and the time for
12 socialization in passing between subject areas. The
13 point was, some of this was very high level, meaning
14 it wasn't specific to a subject and one might be able
15 to, at least, generalize at a lower level that they
16 are.- There are some important variables here that
17 are being tapped; and, therefore, here is what we need
18 to hone in on for specific research on math and
19 science. There may be some quality studies in their
20 day that simply need to be critiqued. I'm thinking of
21 areas, particularly, in relation to teacher licensure
22 and so forth. Here we have some very serious
23 omissions that, nevertheless, the studies looking at
24 some aspect of it have interesting areas to suggest to
25 us. How we define and carefully lay out what we see
26 as the omissions in these studies, in other words,

1 under critical examinations of some of these
2 literatures. I think that may be one of the most
3 useful parts of what we do.

4 DR. FAULKNER: Deborah.

5 DR. BALL: If I could just make a brief
6 comment about that --

7 DR. FAULKNER: Turn your thing up.

8 DR. BALL: (equipment failure -- break in
9 transcription) I've actually been very interested in
10 research on time and have completed a rather large
11 study about time in instruction and achievement so I'm
12 familiar with many of these studies. I just want to
13 underscore again that one of the things that we didn't
14 talk about yet very much, and is complicated, is the
15 question of specification of the models. So whenever
16 you try to draw relationships of some kind, you've got
17 to be sure that the things that you put in the model
18 measure validly with things that you think could be
19 associated. So we could have very high quality, which
20 is part of the problem with time literature -- I'm
21 using this just as an illustration -- but there are
22 different ways time is used. To draw a conclusion
23 that related student achievement requires you to have
24 (equipment failure -- break in transcription)
25 carefully to other things that could impact
26 differences, variations in student achievement and

1 (equipment failure -- break in transcription) that
2 study envision those. That's the problem that we're
3 going to run into that (equipment failure -- break in
4 transcription) expertise (equipment failure -- break
5 in transcription) and that may mean that we can talk
6 about them in a way that several have said by saying
7 here's the kind of evidence that is and here's what's
8 missing. I just want to be careful and standard about
9 specifying (equipment failure -- break in
10 transcription) being careful (equipment failure --
11 break in transcription) variable (equipment failure --
12 break in transcription) takes too much technical
13 language (equipment failure -- break in transcription)
14 that the variables have played that any (equipment
15 failure -- break in transcription) any of us,
16 actually, might hypothesize are actually (equipment
17 failure -- break in transcription) because we have
18 these data and we thought they were associated with
19 achievement (equipment failure -- break in
20 transcription) that allows us to conclude that. I
21 just want to underscore that, because that's one of
22 the biggest problems we run into in our research; so
23 many things having (equipment failure -- break in
24 transcription) measured (equipment failure -- break in
25 transcription) I just think that's going to be a
26 cautionary (equipment failure -- break in

1 transcription) but the solution that Russ (equipment
2 failure -- break in transcription) proposed that we be
3 able to transparently say the nature of the evidence
4 does permit us to venture into territories. I just
5 want to be careful about how causally (equipment
6 failure -- break in transcription) or strongly we
7 think the evidence allows us to make (equipment
8 failure -- break in transcription) claims.

9 DR. FAULKNER: Russell.

10 DR. GERSTEN: Just a follow up. Deborah's
11 point, one advantage of going back to primary sources
12 is -- for example, the time on task. The people who
13 put the research together (equipment failure -- break
14 in transcription) and Gage and (equipment failure --
15 break in transcription) and others, cut across reading
16 and math and this was their insight. When we,
17 actually, look at the studies, there are specific
18 studies of math instruction only with their warts and
19 all on the work that followed through Tom Good's work.
20 By going back to the primary sources, I think, we can
21 better achieve Deborah's charge here.

22 DR. FAULKNER: You've brought it to a
23 natural end for ten o'clock. Okay, I think what I've
24 heard -- what we've all heard a lot of things today,
25 but the beginning point is that we didn't hear a
26 rebellion against Camilla's summary, so I think that's

1 a starting point. But we are going to have, I think,
2 to elaborate what we've heard here into a document.
3 The sub-committee will do that before we meet again.
4 You'll have a chance to study it and maybe even react
5 to it by e-mail a bit before we get together. I'm
6 hearing us beginning to converge. Russell made an
7 interesting comment. He referred to how frightening
8 our charge is. I'd like to just bring it to the
9 attention of this panel how frightening the role is
10 for a public officer who is charged with marshaling
11 the nation's resources in some direction toward the
12 education of our young people. Everyone of those
13 public officers, in those questions of public policy,
14 as well as all other questions of public policy,
15 always have to work with an imperfect background of
16 knowledge. The picture is never complete. In fact,
17 it's often extremely fragmented, as we are going to
18 find this one to be. And finding the best path -- or
19 recommending the best path -- through that, is going
20 to involve matters of judgment that we are charged
21 with. Providing advice we aren't charged with making
22 final decisions. The people who receive our work are
23 charged with making the final decision. We need to do
24 the best work we can. That means that we owe it to
25 them to evaluate the evidence and be forthright about
26 what is -- as well as we can judge -- what is our

1 opinion about the things that work. As the task
2 groups begin with their work, I hope they'll keep that
3 in mind. I know that there are ranges of methods that
4 are used to cross the areas of the task groups
5 representing; and what types of data or types of
6 results can be found varies quite a lot. We just have
7 to remember. I think we are leaning toward an
8 agreement that we will be forthright in what we label
9 things and how we label things initially. Let me
10 mention a couple other things; one is that we are
11 working on a contract to get some help in filtering
12 the literature for the task groups. Some of us have
13 already been involved in looking at that contract and
14 taking a look at its provisions and so forth. The
15 task group chairs all need to look at it, but we think
16 you should look at it after you have your first
17 meeting of the task groups and see where we go. What
18 we want to do is produce a contract that is going to
19 get us the results that we need. I think that we want
20 to be sure that the task groups' chairs -- contracts
21 -- and that will be looked at a little bit later.
22 Tyrrell will see that they get to each of the chairs.
23 The contract provisions, statement of work, actually,
24 calls for this to be done in August and that's pretty
25 quick execution, but the idea is to get -- to be able
26 to put the literature in a filtered way -- filtered by

1 your principles and in front of you in time for the
2 Boston meeting. With that, I think we're about ready
3 to break up. Let me open the floor just a moment for
4 any questions about where we go next.

5 DR. BALL: Could you say two or three more
6 sentences about what you were just talking about
7 filtering literature. I don't think I understood that
8 very well and it sounds important.

9 DR. FAULKNER: It's literature search.

10 DR. BALL: What do you mean a contract and
11 what do you mean by filtering?

12 DR. FAULKNER: We're going to hire people
13 to do literature searches. They will have to do it on
14 some basis that you will have to find.

15 DR. BALL: That's very good. I'm glad to
16 hear it.

17 DR. GERSTEN: Is it more search than
18 filter? I think the word filter was a concern. It's
19 what they'll search through.

20 DR. FAULKNER: I assume you'll take out the
21 organic chemistry?

22 DR. GERSTEN: The politics of filtering.

23 DR. FAULKNER: Yes, Dr. Wu.

24 DR. WU: I think I should put on the
25 record that the (equipment failure -- break in
26 transcription) literature (equipment failure -- break

1 in transcription) NRC panel looking at the teacher
2 preparation, which is identical to what (equipment
3 failure -- break in transcription) they are in the
4 process of looking for what we call (equipment failure
5 -- break in transcription) literature. For example,
6 (equipment failure -- break in transcription) the same
7 thing. Obviously (equipment failure -- break in
8 transcription) this is a good idea (equipment failure
9 -- break in transcription).

10 DR. FAULKNER: Valerie.

11 DR. REYNA: Just on the word *filtering*,
12 let me add. One of the reasons, I think, it is
13 important for us to discuss these criteria up front,
14 is to make them explicit and transparent so that
15 anyone who applies these criteria would come up with
16 the same set of resources for us.

17 DR. FAULKNER: Thank you. Okay, I think
18 we're ready to break into task groups. The four task
19 groups are going to be meeting upstairs and so this
20 will conclude the open session and the task groups
21 will be meeting and we'll come back in open session
22 this afternoon in order to report on the progress of
23 those task groups. Again, thank you for being here at
24 this open meeting and we look forward to seeing to
25 seeing you all this afternoon.

26 (Session I concluded at 10:01 a.m.)

1 DR. FAULKNER: I call this panel back into
2 open session. There are a couple of things that I'd
3 like to say before we go on into our main purpose
4 here. First of all, let me welcome the guests around
5 the room to the open session here and remind everyone
6 that we have a time tomorrow for public comment in the
7 afternoon. I don't know if we have space left or not.
8 Session 2 started at 3:01 p.m. Space may be left for
9 comment tomorrow, but you need to sign up. See
10 Jennifer Graban, over -there -- stand up. Okay, and
11 Tyrrell tells me there will be room for walk in
12 comment, if we have time, tomorrow. Second, the
13 question has been raised about Congressional
14 developments on the Math Now initiative -- as to
15 whether they have changed our timetable to any degree
16 and we've gotten word back from Tom Luce on that. His
17 comment was, while the discussions are going on with
18 Congress, there is no resolution. That the debate --
19 in his mind anyway -- is whether it would be funded in
20 this cycle or the next cycle and that our timetable is
21 unaffected. That is, we still owe a report -- an
22 interim report by January 31st and a final report by
23 February 28, 2008. There was one other thing and that
24 is that we have a signer here. I want to ask in the
25 audience if there are folks who need that service. If
26 not, we will discontinue it. If we do need the

1 service we will be glad to continue it. So is there
2 anyone who requires signing services? Seeing no call
3 for that, we'll discontinue it, thank you. Okay,
4 we're convened in this open session mainly to allow
5 the four task groups, who have been convened
6 separately for the last several hours, to come back
7 together to talk about what they've been about and to
8 allow for more information across the task groups
9 allowing the whole panel to hear what each group is
10 doing. I want to begin by going through the Chairs
11 and ask each Chair to make a report of what you're --
12 what you've done, where you're headed, what you think
13 your agenda is, what you think you need to get done,
14 issues that you may believe have an intersection with
15 other task groups. - Just any form of communication
16 that gives this panel an idea of where you're headed
17 and gives the other task groups a chance to see if
18 there are points of intersection. I'll start with
19 Skip Fennell who is running task group one, conceptual
20 knowledge and skills.

21 DR. FENNEL: Thanks Larry. My task force
22 included Wilfried Schmid, Liping Ma, Larry and myself.

23 Our goal would be to suggest critical concepts and
24 skills, which would lead to algebra. We would see
25 this as a fairly tight list of important mathematics
26 concepts of ideas that would then underneath that have

1 a pretty deep description of the ideas that would
2 support such mathematical knowledge. We would also
3 get to the point, in addition to sort of defining
4 those outlets leading toward algebra, we will take a
5 crack at defining algebra. That definition will
6 probably not be as deep in terms of all of the major
7 aspects of algebra. It may at some point be sliced,
8 as we might conveniently slice algebra into -- as we
9 often do in this country -- one and two; but for the
10 moment that's a description, a definition of algebra.
11 Relative to the sort of cross ideas where we would
12 need support - or burning issues for consideration -
13 so to the group on instructional practices we would
14 probably lobby in direction the issue of the role of
15 the calculator in instruction. I'm told that you
16 probably talked about that a bit or whatever. To the
17 group that is working in the area of learning, we
18 would ask consideration for, as we would frame sort of
19 grade level descriptions of topics, notions about the
20 learning of those topics at particular levels of
21 development. To the teacher background, teacher group
22 - not so much the need to connect with what you're
23 doing, but the awareness that, as we more and more
24 think about algebra as an initial course in
25 mathematics that tends to occur at the middle school
26 level, the preparation of teachers at that level in

1 terms of their own mathematical knowledge and
2 background. The concern that is -- that actually
3 reported -- in this country, but again as more and
4 more kids encounter this course even earlier than
5 grade 8, the mathematical background of those who
6 teach it is important.

7 DR. FAULKNER: Okay, that, I think, is a
8 summary of where we're going -- went through its
9 agenda. Do you want to comment a little bit on the
10 kinds of information that we're going to be looking
11 through, Skip, and then I want to invite anyone to ask
12 questions.

13 DR. FENNELL: We've actually done some of
14 that. We're looking at information from the
15 Curriculum Center Project supported by the National
16 Science Foundation located cooperatively at the
17 University of Missouri, Michigan State University, and
18 Western Michigan University where they utilize
19 learning expectations across state curriculum. We're
20 looking at -- actually, we have several reports from
21 that project that we have right now and will examine
22 more deeply. We're looking at the document that is
23 currently published by the Mathematical Association,
24 the Common Ground Document, that actually Wilfried and
25 Deborah were involved with; and we're also going to
26 have access to the 19 states that have course level

1 expectations for high school mathematics -- that is
2 Algebra I expectations and so forth -- to see what
3 commonality there is across other states, particularly
4 in Algebra I. We will also be looking at curricula
5 from other cultures, particularly Asian cultures, with
6 regards to not only Pre-K through 8 but also high
7 school mathematics. We are also looking at -- we're
8 going to look at a draft of the Curriculum Focal
9 Points that are a series of three major focus topics
10 of instruction, Pre-K through 8 -- published by the
11 National Council of Teachers of Mathematics. If I'm
12 forgetting something --

13 DR. FAULKNER: I just wanted them to get
14 the general idea.

15 DR. LOVELESS: Just a question. Will you
16 be looking at any historical documents to see how K-8
17 curriculum has been defined in the past or how algebra
18 has been defined in the past?

19 DR. FENNELL: That's a great question and
20 in all candor we certainly should. So I'll certainly
21 take another look.

22 DR. SCHMID: (equipment failure -- break in
23 transcription)

24 DR. FENNELL: Yes, sir. We do have Vern's
25 book.

26 DR. FAULKNER: Tyrrell's asked me if you

1 would not mind identifying yourselves -- That was an
2 exchange between Wilfried Schmid and Skip.

3 DR. FENNELL: This is Skip Fennell. We
4 have had many exchanges across the couple of hours.

5 DR. FAULKNER: Any other questions or
6 comments regarding Group One? Okay, let's go to Group
7 Two. Group Two is learning processes and Dave Geary
8 is the Chair.

9 DR. GEARY: All right. Thank you. Group
10 Two was Valerie, Wade, myself, and then Dan Berch and Bob
11 Siegler through the teleconferencing. I'll give you an
12 outline of what we discussed and how we're going to
13 proceed from here. Of course we want to make links with
14 the other groups, but we also thought it was important to
15 try to link some the experimental work to some of the
16 national surveys. So we're thinking an initial step might
17 be to begin looking at some of the large-scale studies
18 made these and others. Looking, asking the pertinent data
19 of the folks in the factor analyses and other analyses.
20 Other types of things to look at how these items are
21 clustering together. What is predicting long-term
22 learning in particular areas? By clustering these items
23 together we may be able to forge links with the
24 experimental stuff. With the experimental literature,
25 I'll just read you some of our basic criteria - will be
26 English language, empirical studies, three years of age to

1 college, peer review journals that will discriminate
2 experimental studies, project experimental studies,
3 correlational studies. We have three to four phases of
4 how we are thinking we will proceed with the literature
5 review in the content areas that we'll focus on and I'll
6 spare you those details. We will include in the review
7 all articles that are explicitly addressing diversity
8 issues; and those include race, ethnicity, sex, gender,
9 social economic status, learning disabilities, giftedness,
10 and social cultural backgrounds. So we'll have somewhat
11 different criteria for that. Content domains will range
12 from Pre-K to algebra and these will be modified with the
13 first group seeing which areas are of more critical
14 importance than others. Within each of these areas, we're
15 going to try to get an understanding of children's
16 conceptual understanding domain, procedural skills
17 associated with it, skill acquisition in both of these
18 domains as well as the declarative knowledge - that may be
19 knowing facts, numbers, whatever the case might be, that
20 might contribute to the ability to solve problems in that
21 area and to move on and to learn. We're going to do
22 reviews of Pre-K, kindergarten, and spatial mathematics
23 relationships. We may look at elementary arithmetic,
24 operations, base 10, fractions, so forth, word problems,
25 algebraic procedures and concepts and will need the first
26 group's input, specifically, the types of things we may

1 look at. Pre-algebra, we weren't sure whether to put this
2 in arithmetic or -- things like exponents, radicals,
3 sets, so forth -- Other areas are probability judgments,
4 measurements, ratios, and so forth. We were also hoping
5 to maybe tie all the areas together or, at least, provide
6 a tutorial towards the end, or at the beginning, wherever
7 it fits best, on some general principles of learning. The
8 importance of -- how working memory's involved in problem
9 solving, mechanisms of learning transfer and so forth. So
10 there are many of these things that are common --
11 although the ways in which they are -- both provide both
12 general principles as well as examples within the specific
13 content areas and that's by September.

14 DR. FAULKNER: Other comments on panel two.
15 Skip.

16 DR. FENNELL: Skip Fennell. Following that
17 -- as you indicated a couple times, the closer we get to
18 the kind of framing of the mathematics to the levels that
19 -- back and forth between your works, best judgment about
20 the readiness and ability for kids to learn particular
21 things at certain levels and in our best judgment as to
22 what mathematics might be of more interest than other
23 mathematics.

24 DR. GEARY: Right.

25 DR. FENNELL: For instance, we had a
26 discussion sort of arguing against calling anything pre-

1 algebra and that we would work toward the essential
2 mathematics that would lead to algebra; and in that would
3 be probably things that were historically, or some people
4 label as pre-algebra, we were careful about not wanting to
5 do such labeling.

6 DR. GEARY: Okay.

7 DR. FENNEL: Just as one for instance.

8 DR. GEARY: Right, right. So that's the
9 type of information we'll be framing our review.

10 DR. FAULKNER: Tom.

11 DR. LOVELESS: The role of practice and
12 memorization, would that be under the topic of how to
13 achieve or not?

14 DR. GEARY: That would be part of the topic
15 of automaticity -- and certainly that's how we would view
16 automaticity as a general principle, but also if we're
17 looking at fluency, say, in solving a multi-column
18 arithmetic problem or the fluency in simple arithmetic is
19 predictive of that. We're trying to be as precise as the
20 literature allows us.

21 DR. FAULKNER: Anyone else? I want you to
22 know that I'm a richer man today having learned the word
23 automaticity. All right, let's go to task group three,
24 that's Russell Gersten, instructional practices issues.

25 DR. GERSTEN: I definitely missed the
26 discussion in Valerie's group about -- thought about that

1 for 35 years. Interpret coordination with other groups.
2 We think it's important with all, but in terms of our
3 charge, which is curriculum and practice that according to
4 Skip's group is essential, because curriculum and what you
5 want the students to learn are obviously the linkage so we
6 need to always be in touch there. We also thought that
7 the criteria that Russ shared this morning are reasonable
8 for us to use as we go through whatever we go through.
9 I'd say probably, given advancements of both curriculum
10 practice, it'd be better to say we surveyed the landscape
11 than developed a clear and firm plan, which isn't bad for
12 a half a day, and we do have some issues that we thought
13 we'd throw out in terms of the whole group towards the
14 end. One document for the curriculum that we'd definitely
15 start with would be the recent, National Research Council
16 book on evaluating curriculum, because it's very germane.
17 It's a bit of a bleak read in that it says there's
18 basically no evidence to support the use of any
19 curriculum, but it certainly raises issues and we'll
20 consider that a key part of what we do. Another thing,
21 and we may need to work things out a little bit with Russ'
22 group, the clearing house is currently reviewing studies
23 in both elementary and middle school math curriculum,
24 which would be relevant to our charge and it's a part that
25 we can share resources there. There may also be studies,
26 maybe not of the A, A- level, that would be appropriate

1 for us to look at rather than spending another 15 months
2 starting from scratch and going through old studies and
3 curriculum. Another source we, I think, we agreed to use
4 is the meta analysis I've been working on for five years
5 on instructional methods for students with LD in term --
6 in a couple of ways -- one is a possible framework for
7 looking at instruction in general; including areas that
8 are left out by the basically special education research.

9 The other thing we'd like to do with it, which my team
10 has not done, is use some of the criteria that Deborah and
11 Wu mentioned this morning; looking a little more at the
12 study in terms of some of the details that are relevant.
13 We could look for trends and effect sizes, but looking
14 back at the context kind of issues. The other point that
15 Wu made which seems so important is to separate getting
16 kids to function with whole numbers as sort of basic
17 arithmetic towards seeing if there's any evidence of how
18 we can teach kids, especially kids who are struggling, to
19 deal with rational numbers, proportion, fractions, et
20 cetera, which in Wu's phrase, is when real mathematics
21 kicks in. I mean it can be introduced before, so we will
22 look -- you know, look at that research that way. We'd
23 use books, such as *Adding It Up* and *Learning and*
24 *Understanding* as frameworks to help guide what we do.
25 Other things that we thought we should look at were -
26 well, we thought we should look at, I'm not sure if we

1 were all enthusiastic about them -- was the evaluation of
2 the systematic SSI -- State Initiatives. That in a sense
3 is -- Yeah, yeah, yeah and the BPI studies that the press
4 has been quite interested in, in different states, have
5 been interested in the promising practices analysis. So
6 we will look at those and see if there is anything
7 accessible; and this is where the resource issue comes up
8 on effectiveness of tutoring programs that might help
9 inform the department in terms of No Child Left Behind.
10 Are there any options that there's some evidence to
11 support them. The practice area is a little tougher. We
12 do have the meta analysis, we also have various meta
13 analogies where we look at the whole population, looking
14 at accelerations, skipping, looking at whatever research
15 there is on grouping and peer assistant learning
16 strategies which seem useful. Some of the other practices
17 there -- I don't want to go through and read the laundry
18 lists, but some of the issues we want to at least explore
19 is, is there evidence and what does it really mean to talk
20 about something like real world problems. The idea of
21 what we know about practices that facilitate automaticity
22 and retrieval of facts would also be useful. We have a
23 whole long laundry list -- I mean, it's not a lot of
24 things, but the issue becomes whether we can and should
25 ask the contractor to go through -- because in curriculum
26 we have the resources -- but in practice whether we should

1 ask the contractor to go through and scour since 1985 all
2 potential studies - experimental, quasi-experimental --
3 that deal with aspects of practice. Is that a feasible
4 task? Is that only feasible for the 18 months? I mean
5 that's an issue I wonder if others are also dealing with
6 that. It just could become a huge amount of work and when
7 I've done these with the Clearinghouse and on my own it
8 just -- two years go by like nothing to just access the
9 material and weed through things that are of little value.
10 We have some sources we can use to get us started but
11 there are some holes. The other hole is what to do about
12 qualitative studies. We again, there are hundreds and
13 hundreds and one thing we can do is those that are
14 frequently cited or that other panels bring to our
15 attention, to look at those; but we're in a little bit a
16 quandary in terms of what to do with this literature or
17 should we rely only on secondary sources. The last bear
18 of an issue is the TIMSS. We have there three parts that
19 are relevant just the comparisons across nations with all
20 the problems of why the inferences, if any, can we draw
21 from those. The second is the video analysis. We really
22 want to seriously look at that and the work that's been
23 done on that and see what the implications are for
24 practice. The third would be the more prosaic - but the
25 summaries in the TIMSS of practice recorded different
26 schools and see if there's anything we can glean out of

1 that, which is much going to inform later research. So
2 there is a sense where terrain is very, very vast. We've
3 made some strides towards pulling out future directions,
4 but the idea of how we productively we use the contractor
5 to seek resources and how to set limits to this that
6 expand us beyond what we knew five years ago; but also
7 don't get us going out around in so many directions that
8 we make no discernible progress is still something I think
9 we need to continue to grapple with. I don't feel any of
10 us feel at peace with that as of right this afternoon.

11 DR. FAULKNER: Wilfried.

12 DR. SCHMID: Two questions about
13 instructional practice are calculator use and tracking
14 your decimals.

15 DR. GERSTEN: Yes, they both are.
16 Calculator use is definitely there and we will do some
17 things about ability grouping and fractions.

18 DR. FAULKNER: Other questions or comments?

19 Wade.

20 DR. BOYKIN: To what extent did your group
21 consider this across the line from practice into the
22 actual learning processes that go inside classrooms?

23 DR. GERSTEN: I see --

24 DR. BOYKIN: -- impact upon, in terms of
25 learning processes and outcomes in kids in the classrooms.

26 DR. GERSTEN: That's something, I see -- I

1 see the two as there being an integral relationship
2 between the two. We didn't explicitly discuss that, but
3 it was implicit in much of our discussion here today.
4 That's a good thing to bring to our attention.

5 DR. BOYKIN: Well, certainly that's going
6 to be a convergence between our panel and yours.

7 DR. GERSTEN: Yeah, yeah.

8 DR. FAULKNER: Skip.

9 DR. FENNELL: I can almost argue, Wade, that
10 it's really convergence certainly of three groups
11 (equipment failure -- break in transcription) here's the
12 mathematics, how's that impacted by learning and how is
13 that mathematics to be taught (equipment failure -- break
14 in transcription) background of the teacher (equipment
15 failure -- break in transcription) So there may be an
16 opportunity. I'm not sure how to pull this off
17 (equipment failure -- break in transcription)
18 simultaneously. (equipment failure -- break in
19 transcription) Certainly not the (equipment failure --
20 break in transcription) process.

21 DR. GERSTEN: What's that?

22 DR. FENNELL: Certainly not for this
23 process.

24 DR. GERSTEN: No, no. I think the idea --
25 and that's one thing I think we have to grapple as a whole
26 panel with -- is how to have coordination that is

1 productive; because, I think, we've all teamed up in cases
2 where you spend more time finding out what others haven't
3 accomplished and you can't get your own work done, but the
4 linkages are critical. One thing that is also, I think,
5 critical to us -- and it would be great if we can move
6 that way even it takes through the September meeting is
7 that insofar as there can be some coherence to what we
8 present. My sense is the National Reading Panel -- the
9 fact there was a coherent organization to the material,
10 increased its ability to be disseminated by a huge factor.
11 I'm sure it was a lot of work to get to that point and I
12 think any advances we connect there would be excellent so
13 that there's some synergy, and we help people think
14 through that. And that could be an incredibly important
15 contribution.

16 DR. FAULKNER: Relative to the comment you
17 just made, Russell, I think we talked, in effect, in our
18 task group, which was number one, about our strategy and
19 the number of topics that we want to deal with. I think
20 that your group is particularly challenged by having so
21 many sectors and so many elements to examine. We did, I
22 think, have a consensus that we were going to try to focus
23 on a small number of very important messages; and I'd urge
24 people across this group, or this panel, to do the same
25 thing. That means that you may end up having to leave
26 some things, but you're not dissipating. Make those

1 choices as to what would be your most important message,
2 but that could be a more difficult and more important
3 problem for your task group than -- Russell is about to
4 speak.

5 DR. GERSTEN: I just had a quick - you know,
6 I think that's some good guidance to us. I'm definitely
7 that school, but I think within the panel there will be
8 great different perspectives and all and some topics are
9 down indifference to me and high interest to others and
10 trying to balance that is a real challenge given
11 curriculum and practice.

12 DR. FAULKNER: I just - the likelihood of
13 our having an impact, I think is increased if we could
14 focus on what we're recommending very strongly. Wilfried
15 and then Sandra.

16 DR. SCHMID: Of course I fully agree that we
17 have to limit ourselves to a small number of crucial
18 topics, but some how it's a choice of what -- what those
19 topics are must be made by the panel as a whole. Consider
20 how much of that decision should not be made just by Russ'
21 group.

22 DR. GERSTEN: I think we'd be okay with it.
23 We have to discuss that internally. I wonder why --
24 Larry, what your sense is and Larry if you want --

25 DR. FAULKNER: I think right now it's too
26 early to talk about that. I think all I'd really like to

1 do is just sort of highlight to the panel as a whole that
2 -- if we can, I'd like for us to have a small number of
3 recommendations. It's probably too early to decide what
4 those are and how we're going to actually get there, but,
5 I think, if we look at this tremendous range of stuff,
6 keeping that idea in mind -- Sandra.

7 DR. STOTSKY: I may have missed some of the
8 things you mentioned. I just wonder whether you were
9 going to be looking at the research base for the emphasis
10 on what are called real world or practical activities as
11 part of the mathematics class, however you would define
12 it. I'm just sort of tossing out some buzz words now, but
13 this is a well used and important buzz word that's one.
14 Use of manipulatives, I'm not sure if you mentioned, but
15 perhaps you could think about whether your panel's going
16 to look at the research base and how that differentiates
17 among the different groups of learners; and then, finally,
18 a topic that's only recently been drawn to my attention,
19 because of its impact on both special education as well as
20 ESL students; and that is the emphasis on reading and
21 writing activities, per se, as part of your mathematics
22 class, and this relates to both standards and assessments.
23 There has been a contrast to earlier ways of teaching
24 particular mathematics. Current ways of teaching
25 emphasize a lot of reading and writing activities and the
26 question is, is there any - it's just my hypothesis to

1 explore - any necessary trade off with time spent on
2 symbolic activities in math. Are there penalties for
3 those students who have problems in reading and writing,
4 which are certainly ESL students if we're talking about
5 the English class, as well as the SPED student. So I'm
6 just wondering whether these are going to be, in some way,
7 considered, explored, or, at least, raised as questions
8 for further research?

9 DR. GERSTEN: Okay. How about if I answer
10 it, then Deborah can go on to the next one. The first
11 one, real world problems and what they mean, I had
12 mentioned this one as the topics. The manipulatives, it's
13 on our list. I didn't want to bore people with the whole
14 list.

15 DR. LOVELESS: I think they're going to ask
16 about each one of the items eventually.

17 DR. GERSTEN: Yeah, so manipulatives is
18 there. It's a topic of no particular interest of mine,
19 but it's something that's there if we have to narrow. And
20 then the third one is your question about -- that was on
21 our list. Yeah, the language issue about expressing ideas
22 is definitely -- basically expressing ideas in terms of
23 mathematics. It's definitely on our list. Yeah, I just
24 didn't mention all of them. So the answer is yes, yes,
25 and yes.

26 DR. LOVELESS: I think you should read the

1 list.

2 Yeah, because I think otherwise it's
3 possible for every member of the group to say is this on
4 the list.

5 DR. BALL: I think your voice is going to
6 get filtered by the research base. I wanted to ask you a
7 question and that is, how you're thinking of sorting out
8 when something is instruction and when something is a
9 goal. So take Sandra's example about reading and writing
10 in the context of symbolic activity. Depending on how you
11 would want and one thinks of what the goals are of what it
12 means to be confident -- writing explanations might be
13 considered part of the goal -- I'm curious how you are
14 sorting that out is my first question. The long list of
15 things you did read us, it reminds, again, of my question
16 from this morning, because I know from that research base
17 we know it doesn't probe subject matter or extend to
18 subject matter and I wondered - really my question here
19 just is, how far do we go in worrying about the sort of
20 extent of the evidentiary basis. So the first has to do
21 with the conflation of goals and means in mathematics,
22 because some things that some people hold to be means are
23 actually goals. That is, mathematical practices of all
24 kinds seem to be instruction, but they may, in fact, be
25 the goal. In mathematics this might be instruction; t may
26 be a goal. Second is how have you -- how far do you get

1 in worrying yourselves about this content specificity in a
2 research base.

3 DR. GERSTEN: I'll answer. I'll start with
4 the second question, which is how much did our group worry
5 about the limits of the evidence base and probably in two
6 ways. Just simply, there may not be much information
7 there. My fear is to come up with a report - well,
8 there's not much information on this and this and this.
9 It's not going to be particularly compelling or useful.
10 So I worry a lot about it. I think there's - we allow
11 people to raise topics regardless of whether my prediction
12 - or our prediction is there will be evidence of that
13 quality there, at least for now. I think at some point
14 that process does need to stop, as you say, the nature of
15 the evidence will influence it. In terms of making
16 generalizations like saying such and such a practice is
17 not good based on a 1981 study on whatever cooperative
18 groups or having kids write explanations. I would be
19 extremely cautious about that. My sense is we're going to
20 need to be extremely cautious about most everything we
21 say; and in the area of practice I think we have to err on
22 the cautious side. I use the example with the group, what
23 I won't allow - and I don't think any of us want to allow
24 - is what I won't mention this particular report, it
25 basically trashed all the studies - there are two reports.
26 They said these studies are not - these are the limits of

1 them and then when you got to summary and conclusions,
2 they said, therefore, these two things benefit kids. I
3 will not do that -- I mean, I will not do that -- we will
4 not do that. So the limits of these and the limits of
5 what we're going to find in studies are definitely
6 something we worry about and makes the task pretty
7 awesome.

8 DR. FAULKNER: Any further comment on the
9 awesome task?

10 DR. LOVELESS: Just upon the issue of
11 conflating the means and the ends, I think that's a very
12 good point, but it also comes back to the intersection of
13 our group, with the skills and knowledge group; and the
14 fact that all of us at some point are going to have to
15 wrestle with the question of what do we mean by
16 mathematics. If we decide that reading and writing about
17 algebra constitutes a critical component of what it means
18 to be proficient in algebra, that will lead us in another
19 direction.

20 DR. FAULKNER: Okay, let's go to Deborah who
21 has the fourth task group on teachers.

22 DR. BALL: If group three has an awesome
23 task, I really don't know what adjective to use for ours,
24 because ours is the last one so it seems to catch
25 everything that hasn't already shown somewhere else. So
26 we spend our time working on a task that helped us to

1 answer the question, what should be the scope of the sub-
2 group's task and what would be our basis of deciding to
3 restrict or specify it as we propose to do and had a
4 chance to feedback to all or you so you could comment.
5 The two questions we were trying to figure out is, what
6 are the domains of this group that says sort of roughly,
7 teachers and then you go to teacher education, all kinds
8 of teacher knowledge. So we wanted to ask ourselves: what
9 should be the domains; and how do we define those; and
10 what will be the questions we will be asking? So what I
11 want to try to show you is on a set of six potential
12 recommendations we could imagine ourselves making. Not
13 the full content of those, but kind of the domains in
14 which they would be and say a little bit about the
15 differences among them and then we have a couple of
16 comments and questions for all of you. So these will come
17 in the form of, we think we would be making a
18 recommendation that something about "x". Okay, so I'm
19 going to tell you six of those. You'll get a little sense
20 of how we've begun to think what the scope might be. I
21 suspect that the scope is larger than we would be able to
22 take up for a couple of reasons; one, because we want to
23 be able to be focused; and second, because the research
24 base, or the evidentiary base will be wildly different and
25 I think you'll see that as you hear them. Even though
26 you'll be not surprised to hear most of these things as

1 potential demands of this group. So, clearly, there will
2 be something about teachers' mathematical content
3 knowledge and something about the importance of teachers'
4 mathematical knowledge and its relationship to student
5 gains. It's clear we're going to want to make some kind
6 of recommendation about that so that it generates the
7 least sort of agitation in our group. We spent some time
8 there beginning to detail what we thought would be the
9 resources we would use to fill the specific nature of that
10 recommendation that we would make. So I can answer
11 questions about that if you want, but I'm going to go on
12 to the second one. The second one we explored was, we
13 thought - and we didn't explore this in great deal of
14 detail, but we thought we might be wanting to make some
15 recommendation about entry requirements to both
16 undergraduate and graduate teacher education programs. In
17 other words, admissions requirements; and for that we
18 would want to investigate what's known about the
19 relationship between the sorts of evidence that's
20 currently gathered and whether we know anything about the
21 relationship between entry requirements and teachers'
22 success in their professional preparation and their
23 subsequent success as teachers. So that has to do with
24 entry two, teacher training. The third area, which we
25 thought we might want to be making some kind of
26 recommendation, would be something about -- and I'm going

1 to state this with a qualification that occupied a lot of
2 our discussion. Perhaps we would want to make some kind
3 of recommendation, not only about the mathematical content
4 that teachers need to teach, but something about the
5 intersection of mathematical content and teaching. So I
6 guess that intersects the third group, but, for instance,
7 do we think we'd be making recommendations about the
8 nature of what are sometimes called content pedagogy
9 courses or methods courses. Do we have something to say
10 about that which really is more about, you know, what is
11 known about the interplay content knowledge and skill in
12 teaching? We found ourselves arguing a bit about whether
13 we should be trying to make recommendations at all about
14 the curriculum of teacher education - that is, what
15 programs offer, whether they're alternative programs or
16 campus-based programs. Should we be specifying the nature
17 of the courses or should we instead - and I think we spend
18 more of our time thinking we might end up instead - trying
19 to make recommendations about the nature of what teachers
20 need to know and how that could be demonstrated, rather
21 than, specifically, how different programs might deliver
22 that. We, in part, we're trying to sort out how our
23 panels work, in particular our sub-groups work, intersects
24 the work of the NRC panel that we mentioned this morning.
25 So there's currently an NRC panel on teacher education
26 that's also a result of a Congressional mandate and we,

1 fortunately, have one in our panel and that we thought it
2 important to try to consider what's smart about the way
3 this panel ought to work and even if there's another panel
4 on the way right now on teacher education. This is a
5 topic, I think, for the whole group to talk about. The
6 fourth area then, moving on from content pedagogy was, we
7 thought that we should be able to make some kind of
8 statement based on the research on what are sometimes
9 referred to as alternative routes to certification, or,
10 uncertified teachers versus certified teachers. In other
11 words this would be a claim in the area of what's known
12 about the traditional requirements to become a teacher;
13 and whether there are alternatives about which we know
14 something that we might make a recommendation about that
15 have to do with what's responsible to require people to
16 know and what are the ways that people could be qualified
17 to teach, but might not work the same as the traditional
18 ways given what do we know about that. This was more
19 thinking that we should get on top of that literature and
20 that this report should be able to say something about
21 that. A fifth area was that we thought we might want to
22 be able to say something about the - because the Executive
23 Order mentions it - something about the retention and
24 tenure of teachers. For instance, should we be able to
25 claim that districts should be able to associate teachers'
26 promotion, compensation, tenuring, and so on with their

1 ability to produce student achievement. Would we know
2 anything about that? Do we think we want to make some
3 kind of claim about the condition of teachers' ongoing
4 work and the relationship of that and the expectation that
5 they help kids learn? The sixth area was, one you would
6 predict, something about we think we want to be making
7 claims about effective professional development. What
8 features of professional development are most likely to
9 equip teachers with the capacities to predict student
10 gains; and we talked in some detail about what's known
11 about the importance of teachers having opportunities to
12 learn, what we ended up referring to today, in quotes, as
13 "instructional development in mathematical content
14 knowledge"; that is, mathematically intensive
15 opportunities to learn, but on mathematics that is
16 directly related to the mathematics that teachers have to
17 look for. We talked about that, and we began to probe
18 what sort of research there be for that. Finally, we
19 thought about whether our group thought we should have
20 something to say about certification requirements for
21 entry to the profession, which is a slightly different
22 point than the alternative routes question. So what's
23 known about entry requirements and their relationship to
24 student achievements, different kinds of certification or
25 licensure requirements? Here we began to find ourselves
26 in one of the - I think many come under that arbor they'll

1 find their selves in, which is - if you think about the
2 six that I've mentioned -- different kinds of intentional
3 evidentiary basis, this last one might be one that one of
4 our group members referred to as common sense plus the
5 dire need for intelligent social policy. At the same time
6 what is actually known about the relationship between the
7 professional relevance or lack thereof of current
8 certification requirements. Do any of the requirements
9 that teachers currently demonstrate to become teachers; do
10 we know anything about the relationship of those and their
11 capacity to teach well? So we thought that was the
12 literature we needed to investigate. We also noticed that
13 this was one, unlike the mathematical content knowledge
14 claim where what we'll have to refer to will be a whole
15 mix of things, and it's one which people have lots of
16 opinion. So I think that our group finds itself with a
17 set of six potential areas in which to make
18 recommendations, but we've only really probed two or three
19 of those to see what sort of research there is, what other
20 sorts of evidence there might be; for example, when and
21 how might international evidence on international practice
22 be helpful to this group; when would just descriptions of
23 the variety of practices that exist in this country with
24 teacher licensure, when would those be helpful to us, and
25 how we'll relate those to being able to make intelligent
26 recommendations. So that may be a little sketchbook of

1 the efforts we've made to kind of sketch the domains and
2 also maybe you can see something about the difficulty we
3 will probably run into about what sources we'll have, if
4 we in fact want to make any recommendations. I think one
5 thing that I would like to say as the Chair of this group
6 and see if any of my good members want to add anything or
7 if you have questions for us is, I really worry listening
8 to these four reports about the following thing, I and
9 several other members of this panel have sat on a number
10 of panels over the last five to ten years that have
11 produced very nice looking reports that all of us own.
12 I'm really concerned that we answer the question early in
13 this work. How this report is going to differ from --
14 and I'm not going to name them all -- the various reports
15 and other kinds of documents that already exist that have
16 attempted to do exactly what it appears we're doing -- to
17 make recommendations about teacher preparation or
18 instruction or the content that teachers ought to be
19 teaching. If we're not going to do something that is
20 going to have an impact and differs in any significant way
21 from what's already been produced, I think we really have
22 to ask ourselves some questions before we continue down
23 this path; because a lot of what we're saying right now --
24 including our own group -- my own group -- sounds a great
25 deal like things that have been done without a huge amount
26 of impact I might say and without some of the foundation

1 that we're all craving. So, whether it's at this moment
2 or some time, I really would like us to talk about that
3 before we continue making these lists and thinking about
4 what's out there. Does any member want to correct or add
5 to my report?

6 DR. FAULKNER: Comments? Tom.

7 DR. LOVELESS: Well, this goes to your last
8 point. One of the problems that we discussed and Russell
9 pointed out - I just want to underscore it once again - is
10 that in a sense we really don't have enough time to
11 conduct meta analyses on all of the various documents that
12 we are going to be considering, which means that we are
13 then going to be leaning very heavily on meta analyses
14 that have already been conducted. When you look at
15 Deborah's topics for instance -- content knowledge and
16 student gains -- there has been some meta work on that
17 topic. Some of the others like alternative routes to
18 certificate, actually there is a growing body of research,
19 but there's no good solid meta analysis of that work out
20 there. So that puts us in the position, it seems to me,
21 the following: If we rely on meta analysis for our work,
22 chances are we're not going to really produce anything
23 new. That knowledge is already out there; and yet we
24 don't have time to produce new meta analysis that may shed
25 light on topics that we don't know yet what the evidence
26 generally states. That's a conundrum I think we need to

1 somehow crack here today if we're going to make a
2 subsequent contribution.

3 DR. FAULKNER: Russell.

4 DR. GERSTEN: I think the last question
5 Deborah raised is something that has been a concern of
6 mine; is how is this -- or how can this be different --
7 more of a contribution than these earlier reports of the
8 last five, six years. With the National Reading Panel,
9 they grappled with that early on, because there had been
10 an NRC report about five years earlier -- four or five
11 years earlier. How could they do something that is
12 different and I think that is very, very important,
13 because it's so easy to drown in either the details of,
14 you know, collecting these things: which things do we
15 reread; how do we reinterpret; why do we reinterpret; but,
16 also, I think, the idea what should we focus on needs to
17 be determined by that. This is part of a conceptual issue
18 as well as methodological and it's -- I think it's just
19 something we need to really, really try to address. I
20 can't think of an easy way to address it directly, but
21 it's all -- the whole panel needs to look at it.

22 DR. FAULKNER: Other discussion? Wade, do
23 you -- or that's Deborah's light. Were you about to say
24 something?

25 DR. BOYKIN: I was but I'm slightly at an
26 angle.

1 DR. FAULKNER: Turn your microphone toward
2 you.

3 DR. BOYKIN: To what extent did your sub-
4 committee consider the issue of different forms of
5 preparation for elementary level versus secondary level
6 teachers? I mean, secondary level teachers in terms of
7 math specialists. Elementary, they have to be jacks-of-
8 all-trades and the whole class self-contained instruction
9 going on. So I'm just wondering did you definitely tackle
10 this?

11 DR. BALL: Thank you for mentioning that.
12 We realize many times that as we began to look at what
13 evidence there is and what sorts of studies that those
14 were either elementary or secondary and that the kinds of
15 studies that have done are pretty different, and, in fact,
16 the literature is stronger for elementary teachers, than
17 it is -- that is there's more done -- not done, done as in
18 finished, but there have been more studies at that level
19 than at the secondary level and that is an important thing
20 to keep in mind. We did playfully explore, or maybe not
21 so playfully, the possibility of making recommendations
22 that were related to really different structures of
23 elementary school teaching so that didn't continue to be
24 the case that, in fact, teachers could concentrate on the
25 subject more. We haven't pursued that further yet, but
26 that is another thing that came up, and I wanted to

1 mention it's very important to us.

2 DR. FAULKNER: Sandra.

3 DR. STOTSKY: In relation to what Tom was
4 just saying before, which I think is very important, he
5 emphasized we do have these meta analyses to rely on and I
6 don't see that we just want to be repeating them -- their
7 summaries. In addition to the charge, which we do have to
8 answer, and I recognize that we have an obligation to
9 respond to the Executive Order and its mission, there is
10 one of the objectives which asks about research and here
11 it says -- I may be repeating what I said this morning,
12 but some incisive ways of looking at the gaps or problems
13 in the research literature could be the contribution for
14 us to make. I know that other groups have also made
15 recommendations for further research. There probably
16 isn't any document that doesn't have that as it's final
17 paragraph, but most of them are fairly vague and can apply
18 to a whole range of ways to spending money. I think it
19 would be useful for us to think about, and with full panel
20 approval, some more concise and insightful statements
21 about what we might see as fruitful policies that need
22 some evidence and where there is a need for some specific
23 kinds of research that would make this particular panel
24 come up with some things that maybe haven't been said or
25 could be said in a different way.

26 DR. FAULKNER: Liping.

1 DR. MA: I see a difference between this
2 panel and other recent ones. We have a clearer goal - a
3 specific goal of preparing students to learn algebra.
4 That is pretty clear so if we all work to this goal, that
5 may make the difference between this panel than the other
6 reports, but I don't know whether I am correct or not.

7 DR. FAULKNER: Diane.

8 MS. JONES: I think the other place where we
9 hope there is a significant difference is some of these
10 documents have been consensus documents based on expert
11 opinion or maybe practice and I think the difference here
12 is we're not necessarily striving for consensus, we're
13 actually looking to review where the research is robust
14 and where it's not and where it is, what that research
15 says and where it's not, what the research doesn't say. I
16 think some of these reports have included, you know, have
17 been based on some assumptions that maybe in turn are not
18 based on research. So I think that's what this will
19 contribute in a way that's maybe different than the other
20 documents is it's not a matter of what we all think or
21 what we all vote on, it's a matter of which research we
22 chose to pursue and what we find or don't find in that
23 research basis. So I think when we wrote the Executive
24 Order, that was what we perceived as the difference and
25 certainly - the goal here is teaching and preparing the
26 students to be successful in algebra. So that makes it

1 somewhat different than some of the other documents that
2 looked at issues far beyond.

3 DR. FAULKNER: Let me comment, myself, on
4 this issue. I think Deborah did us a service by bringing
5 it up, and I think Tom -- The answer I would give is
6 that what can make this report different and more
7 effective is a combination of two things; focus and who's
8 listening. The first part is exactly what Liping said,
9 this is focused on a well-defined problem of education in
10 the United States that is widely recognized and generates
11 immediate concern. If we can adhere to the focus and
12 truly address the question of algebra and how do we become
13 more effective, we have, I think, a significant chance of
14 impact. The second thing is who's listening. This report
15 was asked for by the President of the United States and
16 the Secretary of Education. People who have in mind
17 actually pursuing programs that are informed by what we
18 do. So it is not as though this is a document that's
19 being thrown into the winds of current discussion. It has
20 been asked for by people who can act. It may well be, as
21 Tom suggests, that we will end up using and reporting
22 conclusions based on digestions of research that already
23 exist or are incipient and have already, of course, been,
24 because of that, available to the community; but that's
25 not the same thing as reporting them in conjunction with a
26 well recognized particular problem and having it listening

1 to by people who can act. So I think that sometimes the
2 effect is in the time when the story is told and the way
3 it is told, but I think that what that says to us is that
4 we need to tell what it is we want to tell in a way that's
5 well formulated for those who are in a position to
6 actually understand what it is we're saying and be able to
7 formulate a program actually based right off what we have
8 to say. That's my little speech. Tom.

9 DR. LOVELESS: Tom Loveless. The other way
10 I'm thinking in which we can be different is to be candid
11 about the questions that we search for research and don't
12 find it. Even if those topics debunk popular myths that
13 are currently in the math community or the math education
14 community. It's very important that we do that as well;
15 and very often the tenor of many of the reports that have
16 been cited here today are more hopeful than evidence
17 based.

18 DR. FAULKNER: Couldn't agree more.
19 Deborah.

20 DR. BALL: I just want to link the beginning
21 of today with what we're talking about right now, because
22 every group encountered that the evidence base is going to
23 be problematic. So if that's true that we're going to be
24 able to do something that, as Diane said, has an evidence
25 base, that was a struggle today and it wasn't just in our
26 group. So I just want to exhort us. We can't settle this

1 right now, but that problem - just because we have a well-
2 defined question doesn't mean the research is going to
3 match that question. We have a very small challenge ahead
4 of us to decide how far, given what Russ said this
5 morning, how to be transparent about the quality of the
6 evidence and such is a very nice way to handle it. We're
7 going to have some very tough stuff ahead of us. To align
8 what's out there for this particular problem, which is
9 actually not quite as well defined as we might like it to
10 be, and the connection of what's available to that
11 problem. So any preferred plan, you know, we can't go on
12 with it at this moment. I just think that we're going to
13 have to keep coming back to it or it will, in fact, end up
14 where all the other reports have, ending up out there with
15 very similar aspirations; and I don't think we should go
16 into each one of them, but I think there were reasons why
17 they're sitting on our shelves right now and why they
18 haven't had much impact; and we shouldn't be too arrogant
19 about the likelihood that will be different without really
20 understanding why it's been difficult to create reports of
21 this kind in this field. So that's all. I feel like we
22 see the problem. We should just keep trying to tackle it
23 as we work with it.

24 DR. FAULKNER: Well, we won't be different
25 without a clear and accurate message.

26 DR. GERSTEN: I want to support one point

1 that Larry made about focus, because if I look at - I
2 mean, if I compare the NRP report - one reason, of course,
3 it was so likely disseminated was reading first -- you
4 know, basically incorporated and so for the states to get
5 this huge pot of money, they had to incorporate the
6 National Reading Panel Report; so that certainly enhanced
7 dissemination by a factor of about ten thousand. Now, you
8 know, that wasn't the only reason. There was a focus too
9 that is rare in a document. I know reading as well as I
10 know math, or some areas a lot better - but I think that
11 there were many things that were excluded that are very,
12 very important. They didn't deal with the reading and
13 writing connection. They didn't deal with family
14 literary. There are all kinds of things that they said -
15 we're not saying they're unimportant, but we want
16 something to come across that makes some sense to people;
17 and then we can be candid in these areas. We can be
18 candid in five areas, but if we list twenty-seven areas
19 and say, well, we don't really know much about
20 calculators, we don't really know much about
21 manipulatives. It's a little bit of a dumb issue, because
22 we don't know of any programs that don't use them, so -
23 you know, they're fine to use; but we want to have
24 something that is compelling and coherent, but we can't
25 answer, but the idea of what are we going to cut even if
26 we invest time going through all the TIMSS, and some of

1 these old meta analyses on groupings and all. What is
2 there to cut and what can be different here? I think that
3 really needs to be our charge, because we'll get inundated
4 and that is going to be the difference between this having
5 an impact; because if it's all muddled, even if it's
6 funding is contingent upon it, if it's not going to --
7 people aren't going to know what to do with it, but
8 they're not going to do anything productive with it.

9 DR. SIEGLER: Can I make a comment.

10 DR. FAULKNER: Yes, please. Is that Bob or
11 is that Dan?

12 DR. SIEGLER: It's Bob.

13 DR. FAULKNER: Okay.

14 DR. SIEGLER: Okay, so one of the things I
15 heard today is very much to what Russell just said and I
16 think a way of thinking about it is to try to come up with
17 one or two key principles that they think are of
18 overriding importance and really well formulated and where
19 the evidence is very clear. One of the ones that the
20 learning processes sub-panel was talking about a lot and
21 had a lot of support - I think you heard the support, was
22 the mutually reinforcing nature of conceptual and
23 procedural understanding in that and the timing of this
24 issue is ripe right now. Larry alluded earlier to the
25 importance of timing. This is something that there's been
26 a war about and everyone is sick of the war; and it was a

1 poorly thought out war to start with.

2 DR. FAULKNER: Are you done?

3 DR. SIEGLER: The idea is just that if we
4 come up with positive recommendations for a whole bunch of
5 principles they'll be a way of insuring that the reports
6 have as much impact as possible.

7 DR. FAULKNER: Okay. Anything else anyone
8 wants to say today. Does our vice-chair want to say
9 anything? Okay, Vern.

10 MR. WILLIAMS: Vern Williams. Deborah, I
11 have a question for your committee. You mentioned that
12 you would be studying alternative forms of teacher
13 certification, but maybe Tom or someone mentioned that
14 there's not a large body of research relating to that, but
15 it's actually crucial to solving a problem, because we
16 have such a shortage of qualified math teachers in middle
17 schools. One of the principal reasons is that many bright
18 college students refuse to get involved in education,
19 because of hoops that they're forced to jump through, and
20 most of those hoops aren't worth jumping through. Do we
21 really need evidence beyond statistics in some of these
22 areas to come to the conclusion that, for instance,
23 current certification is a big problem?

24 DR. BALL: I think what our group said is
25 that we would - in fact, there is research on teacher
26 preparation and it's relationship to teacher quality and

1 student learning and that we'd be reviewing that
2 literature. We didn't say there wasn't - I think that Tom
3 said there wasn't a meta analysis of that work. I think
4 you're pointing to one of the issues I raised, which is
5 that we asked ourselves the question about not the quality
6 of teacher preparation, but how across the territory of
7 our subgroup, how different forms of evidence are going to
8 play in the kinds of recommendations the panel will make.
9 So without commenting on the nature of what particularly -
10 your own analysis, I think the question of evidence for
11 this one was important and I did try to raise that.

12 DR. FAULKNER: Wade.

13 DR. BOYKIN: I'm just wondering if I've heard
14 the scope that's been sort of carved out by the various
15 subcommittees and I wonder out loud about where's the
16 place for evaluation of - what should we call them -
17 canned proper name math intervention programs. The
18 Missouri Math Project, Cognitive Guidance Instruction,
19 Project C -- do we consider these kinds of programs in our
20 charge? So, you know, what panel is going to take
21 responsibility for those kinds of things?

22 DR. GERSTEN: That would be us. That would
23 be our charge. The things that aren't necessarily - you
24 know, a curriculum from a commercial publisher. We would
25 definitely consider them in our group.

26 DR. BOYKIN: But you take something like,

1 for example, Project C or the Missouri Math Project, there
2 is a development component built into them.

3 DR. GERSTEN: Right.

4 DR. BOYKIN: They have very clear notions
5 about learning processes. In some ways they do cut across
6 categories; for example, Project C tried to teach inner-
7 city kids algebra in elementary school. To some degree,
8 there is some success that they achieved. So the
9 sequencing across curriculum comes up there. So it just -
10 - so in other words, they don't fit neatly into one of our
11 categories. If you all are going to take them on, more
12 power to you. I just didn't think they fit any one of
13 these four areas.

14 DR. GERSTEN: I had the same sentiment. If
15 you folks want to look at those, because -

16 DR. BOYKIN: By all means, please.

17 DR. GERSTEN: I feel like it's more of a
18 professional development intervention in the scheme of
19 things. But you're right. It's a way of teaching. It's
20 not really a curriculum. It's just the way you organize.

21 DR. FAULKNER: It's an instructional
22 program, I mean, it seems to rightly fit into Russell's
23 area.

24 DR. GERSTEN: Yes, yes.

25 DR. STOTSKY: This is a question of a
26 different order. I'm thinking of whatever this final

1 report or drafts are going to be -- probably not the
2 drafts, but the final report -- and whether you're
3 envisioning or whether you see the order envisioning some
4 sort of joint statement that reflects, or seems to
5 reflect, everyone; or whether there may be also some
6 individual statements, visions of individuals that are
7 not, necessarily, captured by whatever appear as the
8 recommendations or suggestions for research. I'm just
9 trying to get a sense of whether this might be a different
10 way of thinking about this report in terms of individual
11 differences about some goals that might be there with
12 rationales. That could be appendices or other.

13 DR. FAULKNER: I think it's highly desirable
14 for us to have a panel report and to say what it is we
15 believe as a panel. I think it weakens reports to have
16 minority reports; sometimes it can't be avoided, but I'd
17 like to avoid it. Skip.

18 DR. FENNELL: Going back to your comment of
19 about ten years -- ten minutes ago -- it feels like ten
20 years ago -- and that's the issue of focus and who's
21 listening once this report is out on the street. It seems
22 to me that it has the potential to frame a really
23 important mathematics that lead to algebra; really
24 important mathematics that's impacted by the research on
25 learning; that's impacted by what we know about
26 instruction and how that connects to teachers, regardless

1 of how prepared. That's saying a lot. The trick is -- I
2 think Deborah captured it pretty well -- we have at this
3 moment laundry lists of things that are out there that
4 could impact. Part of me thinks that we can figure out
5 the math pretty quick; then we address that mathematics
6 through learning and instruction and teachers.

7 DR. FAULKNER: Camilla.

8 DR. BENBOW: I think we're just at a very
9 natural stage with this right now. We've cast a very wide
10 net. We're looking at a lot of different things. It
11 feels like a lot of chaos. Maybe we don't know what
12 terrain we've already treaded in the past. I think as we
13 struggle with the issues, I think the signal will come out
14 of the noise a little bit and I think it will probably
15 become clear with time whether -- five or six messages we
16 want to deliver. It's too early in the process to know
17 what they are right now, but I have a feeling that over
18 time as each separate works -- and we're already hearing
19 overlaps and things like that. It will come through to
20 us. So I think we're at a very natural stage - too many
21 topics, too many things we need to look at, but we will
22 start paring. So I'm confident and I think we just need
23 to keep in mind that we can only do so much; and there are
24 only so many things that people can listen to, but we'll
25 get there.

26 DR. FAULKNER: Good place to stop. Is there

1 any emergency message that has to be said by anyone? If
2 not, then we'll be adjourned until tomorrow. Let me
3 announce to the public again that we will be taking open
4 comment tomorrow afternoon 1:00 to 4:00 p.m. at the
5 Carolina Inn, not here. Thank you.

6 (Session 2 concluded at 4:15 p.m.)