Systemic Alignment Strand Summary
Norm Webb, Facilitator

SESSION I

Alignment is a powerful tool for focusing instruction, curriculum, and assessment. We want to get all schools going in the same direction. See overhead 1, "Vertical and Horizontal Alignment within an Educational System" for a schematic for viewing alignment. If all students are performing at high levels, alignment is not an issue.

Alignment is the degree to which expectations and assessments are in agreement and serve in conjunction with one another to guide the system toward students learning what is expected.

In your system, how does the purpose align with the policy (framework, standards, etc.), the program (instruction, reform model), and practice (student outcomes). The ultimate goal for alignment is a fully functional system working toward students learning important mathematics and science. It is equally important that both vertical and horizontal alignment take place. Vertical alignment is usually the most difficult. Examples of vertical alignment: how higher ed requirements align within framework; how higher ed requirements align with classroom instruction and professional development. Examples of horizontal alignment: national standards align with work expectations; teacher certification aligns with expected class instruction.

Criteria for Alignment

These criteria are intended to provide a means for thinking about alignment. They are not considered to be the definitive list. It is expected that this set of criteria will evolve over time. Dr. Webb distributed Research Monograph 6, "Criteria for Alignment of Expectations and Assessments in Mathematics and Science Education" to conference participants. Please see the monograph for a full discussion of the criteria. It may be found online at http://facstaff.wcer.wisc.edu/normw/researchmonograph.htm.

1. **Content Focus**
   A. *Categorical concurrence*. The same or consistent categories of content appear in both expectations and assessments.
   B. *Depth of knowledge consistency*. Depth of knowledge can vary on a number of dimensions, including level of cognitive complexity of information students should be expected to know, how well they should be able to transfer this knowledge to different contexts, how well they should be able to form generalizations, and how much prerequisite knowledge they must have in order to grasp ideas. See more description of depth of knowledge below.
   C. *Range of knowledge correspondence*. Expectations and assessments over a comparable span of knowledge within topics and categories. Even with strong

categorical concurrence, the span of expected knowledge within categories may not always be entirely covered by the assessment system.

D. *Structure of knowledge comparability*. The underlying conception of science and mathematics knowledge in expectations and assessments are in agreement.

E. *Balance of representation*. Similar emphasis is given to different content topics, instructional activities, and tasks. The expectations and assessments give comparable emphasis to what students are expected to know, what they should be able to do, and in what contexts they are expected to demonstrate their proficiency.

F. *Dispositional consonance*. When expectations include more than learning concepts, procedures, and their applications. Are beliefs and values of what teaches thin, what students think in consonance with standards?

2. Articulation across grades and ages

A. *Cognitive soundness determined by best research and understanding*. There has been considerable research on the learning of mathematics and science, which has produced extensive knowledge of how students mature in their understanding of these content areas. Expectations and assessments should build on this knowledge to develop a sound learning program and they should be aligned.

B. *Cumulative growth in content knowledge during student's schooling*. Expectations and assessments should be linked by underlying rationales of mathematics and science as content areas. Although the learning of mathematical and scientific concepts over time doesn't follow a strict order of steps, students often need to grasp certain concepts and ideas in order to address more advanced ideas.

3. **Equity and fairness** – When expectations are that all students can learn to high standards, aligned assessments must give every student a reasonable opportunity to demonstrate attainment of what is expected. Expectations and assessments that are aligned will serve the full diversity in the education system through demanding equally high standards for all students while fairly providing means for students to demonstrate the expected levels of learning.

4. **Pedagogical implications** – Classroom practice greatly influences what students learn. Expectations and assessments can and should have a strong impact on these practices and should send clear, consistent messages to teachers about appropriate pedagogy.

A. *Engage of students and effective classroom practices*.

B. Use of technology, materials, and tools

5. **System applicability** – Although expectations and assessments should seek to encourage high expectations for student performance, they also need to form the basis for a program that is realistic and manageable in the real world. The policy elements must be in a form that can be used by teachers and administrators in a day-to-day

setting. Also, the public must feel that these elements are credible, and that they are aimed at getting students to learn important and useful mathematics and science.

Depth of Knowledge

See handout or pdf of "Depth-of-Knowledge Levels for Mathematics" for a complete discussion of the four levels of depth of knowledge.

Level 1 Recall (e.g., computation)
Level 2 Skill/concept (e.g. word problem, some computational skill)
Level 3 Strategic thinking (e.g. problem involves reasoning, multiple criteria involved, strategic thinking, must explain their answer)
Level 4 Extended thinking (e.g. ask students to develop a dice game, but give some parameters and questions)

Both activities 1 & 2 of this session focused on the first criteria for alignment—content focus—which takes depth of knowledge into account.

Activity 1

Use depth of knowledge scale to analyze standards and expectations. Participants applied this to the Texas Essential Knowledge and Skills (Texas state standards) for grade 8 mathematics. You can access the TEKS at http://www.tea.state.tx.us/rules/tac/chapter111/ch111b.html.

Dr. Webb mentioned that sometimes teachers will evaluate the standards based on how they would teach it (perhaps very creatively at a level 3 or 4) but that would be different from they would evaluate it, at a lower level of depth of knowledge.

Activity 2

Determine the depth of knowledge level for items of the Texas Assessment of Academic Skills Test for 8th grade math and establish the items' alignment with the state standards. Not in alignment if standard and test items don't require same depth of knowledge.
You can download the 8th grade math TAAS test that was used at http://www.tea.state.tx.us/student.assessment/resources/release/taas/release01/gr8.pdf.

When you look at alignment, you may look at multiple criteria. On test you want to see a balance of the categorical concurrence and depth of knowledge. Regarding categorical concurrence, the same or consistent categories of content should appear in the standards and on the assessment. Regarding depth of knowledge, standards and assessments are aligned if what is elicited from students on the assessments is as demanding cognitively as what the students are expected to know and do in the standards.

SESSION II

Activity 1

Look at other criteria for systemic alignment besides content focus. Participants broke into groups to discuss either a) articulation across grades and ages, b) equity and fairness, c) pedagogical implications, or d) system applicability. Each group considered the following questions: What matters most? What's the unit of comparison? What are acceptable levels?

See additional overheads for a summary of discussion that followed in each group.

Activity 2

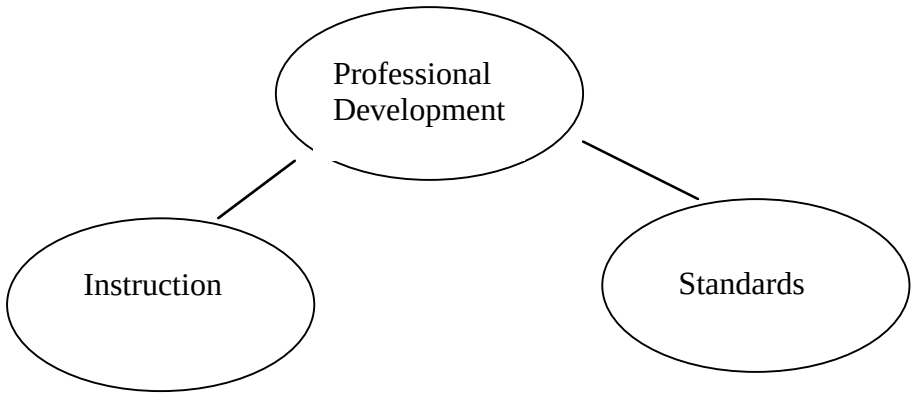
So far the group has looked at all criteria and what matters, units of comparison and scale of agreement. Now the group turns it focus to the components with the system. The group broke down into smaller groups to look at the following 5 components:

- Curriculum
- Instruction
- Accountability
- Professional Development
- Leadership

Using the Component Map Worksheet #1 each group considered the elements and activities which were included in each component and the unit for analysis.

Session III

This session pulled the previous two sessions together. Participants used Component Map Worksheet Number 2.



If you consider components for alignment, how do you know that these are aligned? Develop a strategy for looking at what matters most, the unit of comparison and the degree of acceptability.

Discussed the case of curriculum and instruction. When comparing these two components, you might decide the alignment unit of comparison is content focus.

Indicators of alignment might be cognitive demand, student performance, teacher performance, and concurrence. To measure alignment, you might use teacher observations, student and teacher portfolios and student test scores. The test scores could include teacher-made tests, district-prepared tests, or standardized. However, you would need to also have instruments for measuring, such as an observation instrument, rubric for the portfolios, lesson plans, and agreed-upon standardized tests. Finally, you would determine what is the acceptable level for comparison of components.

The need to align makes one look at all components and factors that affect the outcomes. Must also appreciate the complexity of the process and realize that it isn't a linear process.