

Alignment Study in Language Arts, Mathematics, Science, and Social Studies of State Standards and Assessments for Four States

A Study of the State Collaborative on Assessment &
Student Standards (SCASS)

Technical Issues in Large-Scale Assessment (TILSA)

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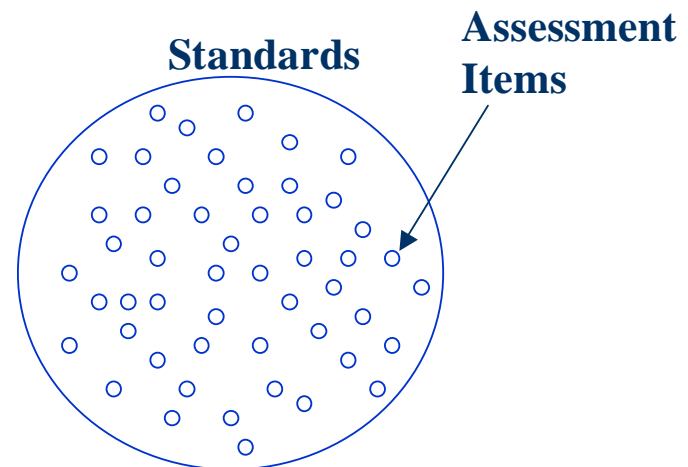
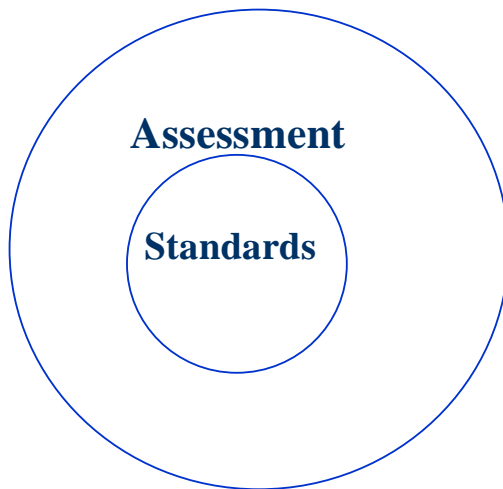
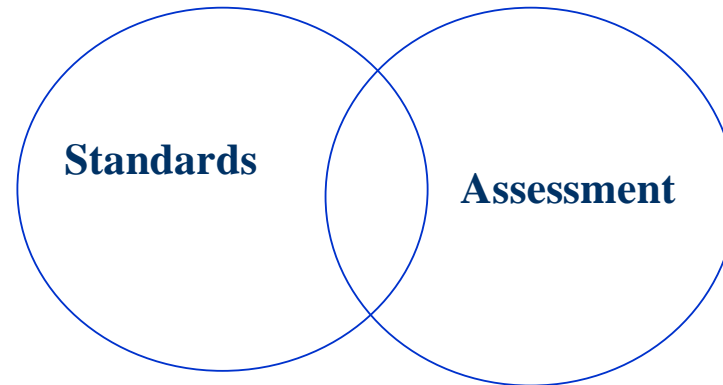
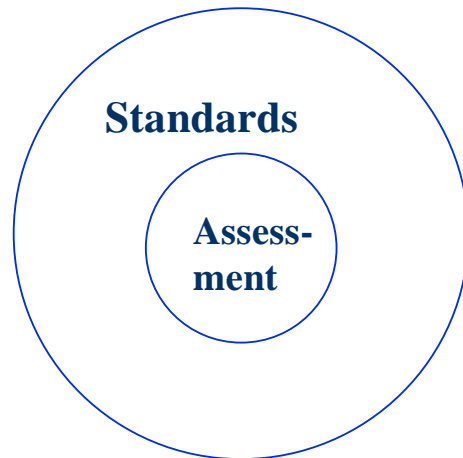
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ALIGNMENT

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.

Degree of Alignment



Steps in Alignment Study

1. Identify criteria and acceptable levels
2. Identify expectations and assessments
3. Develop coding matrix
4. Train reviewers
5. Reviewers code assessment items
6. Spreadsheet data entry and analysis
7. Prepare tables
8. Report results

NISE Five General Criteria

1. Content Focus
2. Articulation Across Grades and Ages
3. Equity and Fairness
4. Pedagogical Implications
5. System Applicability

Specific Criteria

Content Focus

- A. Categorical Concurrence
- B. Depth-of-Knowledge Consistency
- C. Range-of-Knowledge Correspondence
- D. Structure-of-Knowledge Comparability
- E. Balance of Representation
- F. Dispositional Consonance

Acceptable Levels for Each Standard

Criteria	Levels
Categorical Concurrence	6 or more items per standard
Depth-of-Knowledge Consistency	At least 50% of items at or above knowledge level of related objectives
Range-of-Knowledge Correspondence	Items correspond to at least 50% of objectives per standard
Balance of Representation	Index value of at least .70 (no bi- or unimodal distributions)

$$\begin{array}{r} 121 \\ 13 \\ 32 \\ + 34 \\ \hline \end{array}$$

- 1) 190
- 2) 200
- 3) 290
- 4) N

Level 1
Recall

A car odometer registered 41,256.9 miles when a highway sign warned of a detour 1,200 feet ahead. What will the odometer read when the car reaches the detour? (5,280 feet = 1 mile)

- (a) 42,456.9
- (b) 41,279.9
- (c) 41,261.3
- (d) 41,259.2
- (e) 41,257.1

Did you use the calculator on this question?

Yes

No

Level 2

This question refers to pieces N , P , and Q .

In Mr. Bell's classes, the students voted for their favorite shape for a symbol. Here are the results.

	Class 1	Class 2	Class 3
Shape N	9	14	11
Shape P	1	9	17
Shape Q	22	7	2

Using the information in the chart, Mr. Bell must select one of the shapes to be the symbol. Which one should he select and why?

The shape Mr. Bell should select: _____

Explain:

Level 3

Average Measure Intraclass Correlation of Depth-of-Knowledge Levels Ratings for Mathematics

State/Grade	Number of Reviewers	Number of Items	Alpha	95% CI Lower-Upper
A4	4	61	.47	.11-.68
A7	4	61	.93	.89-.95
A7 (Repl)	4	63	.77	.66-.85
A9	4	63	.81	.72-.88
B5	4	49	.79	.67-.87
B8	4	46	.58	.34-.75
C4	4	48	.88	.81-.93
C4 (Repl)	4	52	.89	.84--.93
C8	4	146	.86	.82-.89
C11	4	56	.91	.86-.94
Average			.79	

Reliability of Depth-of-Knowledge Levels Ratings for State E Language Arts, Mathematics, Science, and Social Studies

Grade	Number of Reviewers	Number of Items	Alpha*	95% CI Lower-Upper
State E Language Arts				
4	5	93	.52	.34-.67
7	3	92	.70	.56-.80
10	3	85	.62	.45-.74
State E Mathematics				
4	4	61	.47	.12-.68
7A	4	61	.93	.89-.95
7B	4	63	.77	.66-.85
9	4	63	.81	.72-.88
State E Science				
Chem Ext	5	60	.81	.73-.88
Chem Int	3	55	.56	.31-.73
Bio Ext	5	59	.75	.63-.84
Bio Int	3	55	.40	.06-.63
State E Social Studies				
10 Ext	5	52	.84	.76-.90
10 Int	3	60	.72	.57-.82
11 Ext	5	59	.53	.31-.70
11 Int	3	60	.66	.48-.78

Agreement between Two Groups of Reviewers on
Categorical Concurrence Criterion--Mathematics

State	Grade	Number of Standards	Exact Agreement on Standards		Partial Agreement on Standards ¹		No Agreement on Standards	
			N	%	N	%	N	%
State G	4	7	5	71	1	14	1	14
State E	7	4	4	100				
Total		11	9	82	1	9	1	9

Note 1: Partial agreement is defined by the results of one group indicating a Weak Alignment and the other group indicating Alignment or No Alignment.

Agreement between Two Groups of Reviewers on
Depth-of-Knowledge Consistency Criterion--Mathematics

State	Grade	Number of Standards	Exact Agreement on Standards		Partial Agreement on Standards ¹		No Agreement on Standards	
			N	%	N	%	N	%
State G	4	5 ¹	2	40	2	40	1	20
State E	7	4	3	75			1	25
Total		9	5	55	2	22	2	22

Note 1: Both groups coded an insufficient number of items for one standard and one group did the same for a second standard to rate this criterion.

Agreement between Two Groups of Reviewers on
Range-of-Knowledge Correspondence Criterion--
Mathematics

State	Grade	Number of Standards	Exact Agreement on Standards		Partial Agreement on Standards		No Agreement on Standards	
			N	%	N	%	N	%
State G	4	5 ¹	5	100				
State E	7	4	4	100				
Total		9	9	100				

Note 1: Both groups coded an insufficient number of items for one standard and one group did the same for a second standard to rate this criterion.

Agreement between Two Groups of Reviewers on
Balance of Representation Criterion--
Mathematics

State	Grade	Number of Standards	Exact Agreement on Standards		Partial Agreement on Standards		No Agreement on Standards	
			N	%	N	%	N	%
State G	4	5 ¹	3	60	2	40		
State E	7	4	4	100				
Total		9	7	78	2	22		

Note 1: Both groups coded an insufficient number of items for one standard and one group did the same for a second standard to rate this criterion.

Comparison of External Reviewers with Internal Reviewers
by State and Grade
Science

State	Grade	Group	Number by DOK Level				Total Obj	Mean	S.D.	Alpha
			1	2	3	4				
E	Chem	Ext (5)	40	31	14	2	87	1.75	.81	.81
		Int (3)	44	37	5	1	87	1.57	.66	
E	Biol	Ext (5)	27	36	14	4	81	1.94	.84	.71
		Int (3)	32	39	9	1	81	1.74	.70	
F	8	Ext (5)	23	27	4	0	54	1.65	.62	.59
		Int (3)	16	29	8	1	54	1.89	.72	

Comparison of External Reviewers with Internal Reviewers
by State and Grade
Social Studies

State	Grade	Group	Number by DOK Level				Total Obj	Mean	S.D.	Alpha
			1	2	3	4				
E	10	Ext (5)	7	35	20	1	63	2.24	.67	.80
		Int (3)	4	33	25	1	63	2.37	.63	
E	11	Ext (5)	6	51	26	1	84	2.26	.60	.83
		Int (3)	5	54	23	1	84	2.23	.59	
F	8	Ext (5)	3	9	28		40	2.63	.63	.75
		Int (2)	4	16	20		40	2.40	.67	
F	HS	Ext (5)	5	22	22		49	2.35	.66	.82
		Int (2)	8	33	8		49	2.00	.58	

(Replication)
 Summary of Four Content Focus Criteria
 Grade 7 Mathematics
 (Number of Assessment Items—65 Multiple Choice Items)

Standards	Alignment Criteria			
	Categorical Concurrence	Depth-of- Knowledge Consistency	Range-of- Knowledge	Balance of Representation
I. Number Sense	YES	YES	YES	YES
II. Algebra & Functions	YES	YES	YES	YES
III. Measurement & Geometry	YES	YES	YES	YES
IV. Statistics, Data Analysis & Probability	YES	YES (26% Under)	YES	YES

(Original)
 Summary of Four Content Focus Criteria
 Grade 7 Mathematics
 (Number of Assessment Items—65 Multiple Choice Items)

Standards	Alignment Criteria			
	Categorical Concurrence	Depth-of- Knowledge Consistency	Range-of- Knowledge	Balance of Representation
I. Number Sense	YES	YES	YES	YES
II. Algebra & Functions	YES	YES	YES	YES
III. Measurement & Geometry	YES	YES	YES	YES
IV. Statistics, Data Analysis & Probability	YES	NO (56% Under)	YES	YES

Summary of Attainment of Acceptable Alignment Level on Four
Content Focus Criteria
Grade 4 Mathematics
(Number of Assessment Items—65 Multiple Choice Items)

Standards	Alignment Criteria			
	Categorical Concurrence	Depth-of- Knowledge Consistency	Range-of- Knowledge	Balance of Representation
I. Number Sense	YES	YES	YES	YES
II. Algebra & Functions	YES	YES	YES	WEAK
III. Measurement & Geometry	YES	YES	YES	YES
IV. Statistics, Data Analysis & Probability	NO	WEAK	WEAK	YES

Balance of Representation Between Standards and Assessment
as Rated by Four Reviewers
Grade 4 Mathematics
(Number of Assessment Items—65 Multiple Choice Items)

Standards	Balance Index (1 perfect-0 no Balance)				Balance of Representation Acceptable
	% Hits in Std/Ttl Hits		Index		
Title	Mean	S.D.	Mean	S.D.	
I. Number Sense	41	1	.81	.01	YES
II. Algebra & Functions	31	1	.67	.05	WEAK
III. Measurement & Geometry	23	1	.81	.01	YES
IV. Statistics, Data Analysis & Probability	4	1	.96	.07	YES
Total	25	14	.81	.12	

Range-of-Knowledge Correspondence and Balance of Representation
 Between Standards and Assessment as Rated by Four Reviewers
 Grade 4 Mathematics
 (Number of Assessment Items—65 Multiple Choice Items)

Standards	Range of Objectives				Balance of Know. Acceptable
	% Objs Hit		% of Total		
Title	Mean	S.D.	Mean	S.D.	
I. Number Sense	13.5	1.80	76	9	YES
II. Algebra & Functions	5.25	.43	72	2	YES
III. Measurement & Geometry	11.50	.50	68	3	YES
IV. Statistics, Data Analysis & Probability	2.50	.50	50	10	WEAK
Total	8.19	4.59	67	13	

Depth-of-Knowledge Consistency Between Standards and Assessment
as Rated by Four Reviewers
Grade 4 Mathematics
(Number of Assessment Items—65 Multiple Choice Items)

Standards	Level of Item w.r.t. Standard						Depth-of-Knowledge Consistency Acceptable
	% Under		% At		% Above		
Title	Mean	S.D.	Mean	S.D.	Mean	S.D.	
I. Number Sense	26	44	73	44	2	8	YES
II. Algebra & Functions	10	29	88	29	3	8	YES
III. Measurement & Geometry	4	20	95	21	1	7	YES
IV. Statistics, Data Analysis & Probability	50	50	50	50	0	0	WEAK
Total	18	38	81	38	1	7	

**Categorical Concurrence Between Standards and Assessment
as Rated by Four Reviewers
Grade 4 Mathematics
(Number of Assessment Items—65 Multiple Choice Items)**

Standards			Level by Objective			Hits		Categorical Concurr. Acceptable
Title	Goals #	Objs #	Level	# of objs by Level	% w/in std by Level	Mean	S.D.	
I. Number Sense	4	17.75 ¹	1 2	11 7	61 39	26.75	.43	YES
II. Algebra & Functions	2	7.25	1 2	5 2	71 29	20.50	1.12	YES
III. Measurement & Geometry	3	17 ²	1 2 3	15 1 1	88 6 6	15.25	.43	YES
IV. Statistics, Data Analysis & Probability	2	5	1 2 3	3 1 1	60 20 20	2.75	.43	NO
Total	11	46.75	1 2 3	34 11 2	72 24 4	65.25	.83	

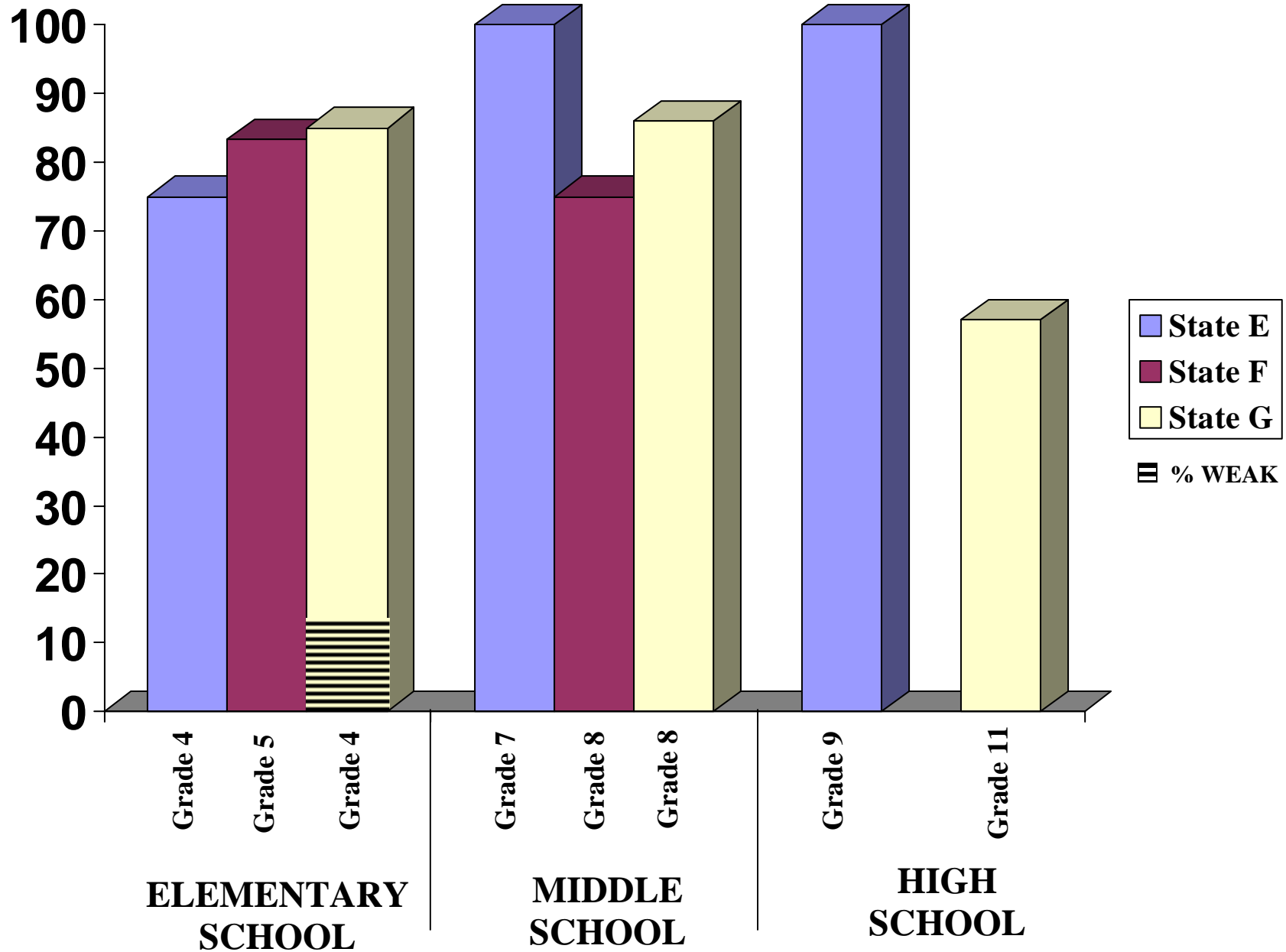
¹Includes one generic objective because coded items did not correspond to existing objectives.

²Includes two generic objective because coded items did not correspond to existing objectives.

Percent of Standards with Acceptable Alignment

Categorical Concurrence

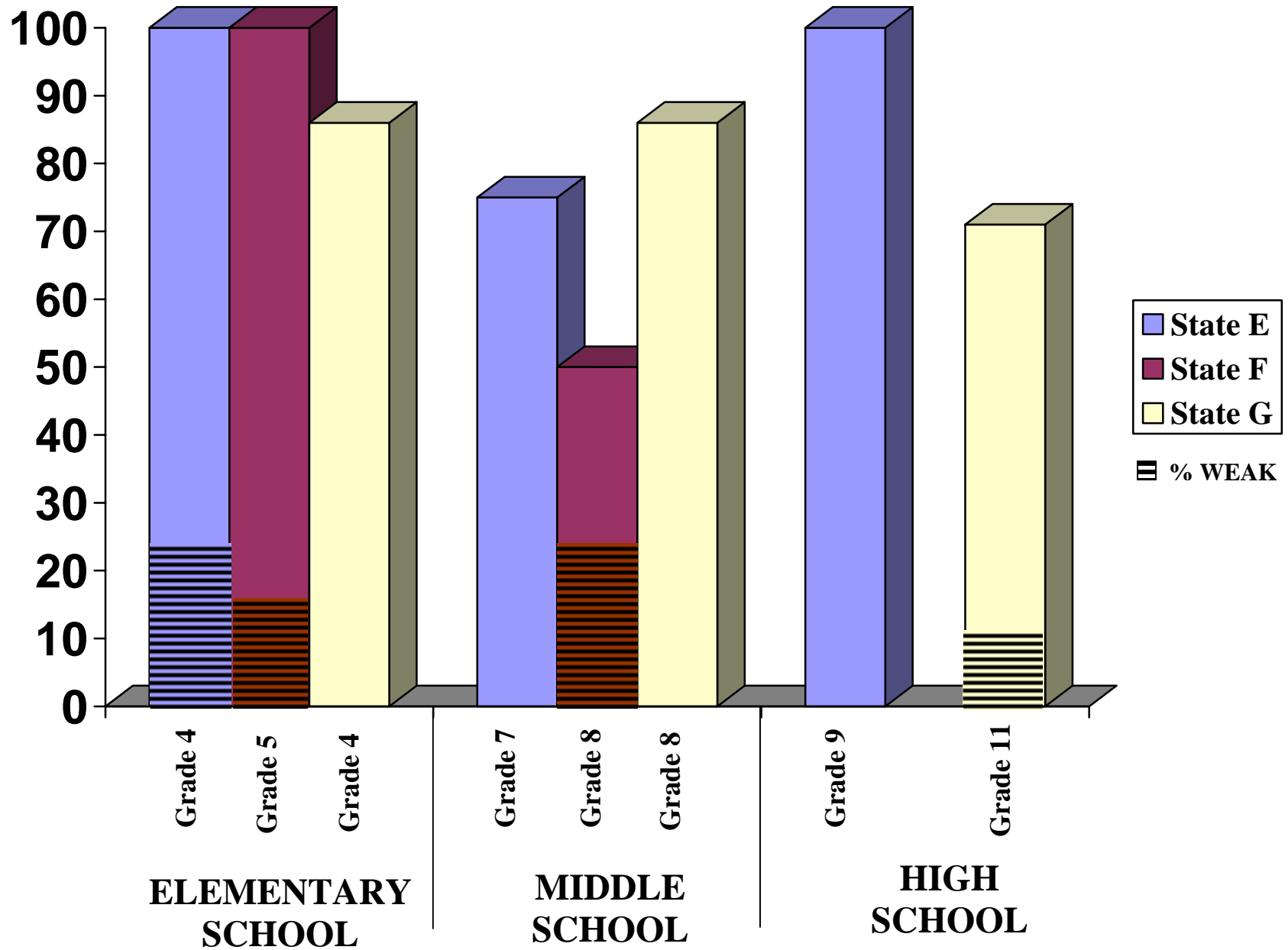
Mathematics



Percent of Standards with Acceptable Alignment

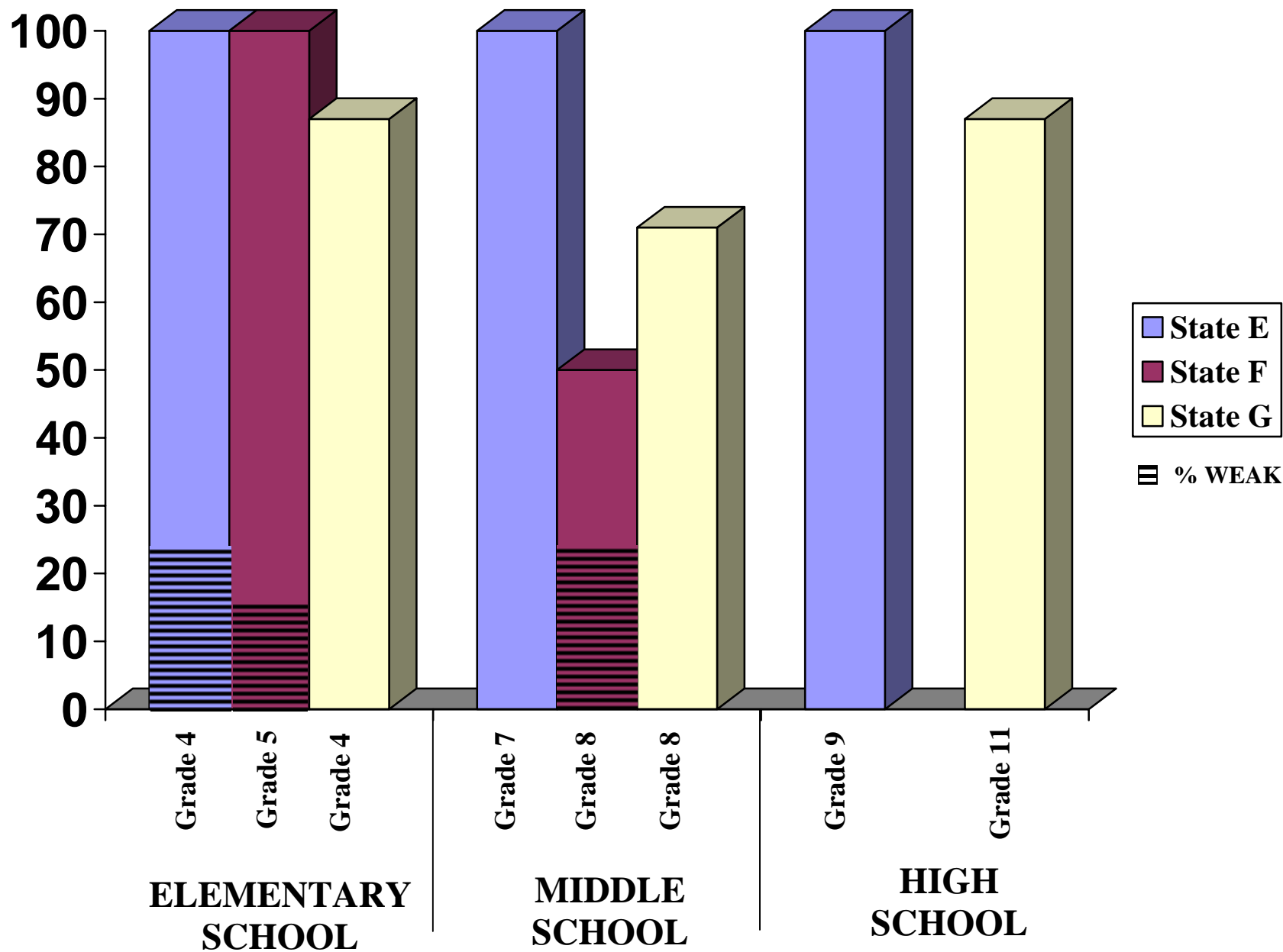
Depth-of-Knowledge

Mathematics



Percent of Standards with Acceptable Alignment

Range-of-Knowledge Mathematics



Percent of Standards with Acceptable Alignment Balance-of-Representation Mathematics

