

ITEMS Module Teaching Aid

OBTAINING INTENDED WEIGHTS WHEN COMBINING STUDENTS' SCORES

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The enclosed sheets can be photocopied for distribution and/or used to make overhead transparencies.

Compare the Standard Deviations

It is useful for participants to understand that standard deviation is a measure of score dispersion. This sheet lists pairs of score distributions and asks whether the standard deviation of the first distribution is the same, twice, or four times the standard deviation of the second distribution. Several examples illustrate that the magnitude of standard deviation and that of the average score can be independent.

Identify the Proportional Distributions

If students' scores on all assignments and tests are proportionally distributed, the standard deviations of scores will be proportional to the maximum points obtainable on each assignment and test. Consequently, the maximum points can be used to control the relative weights of the scores. Also, the weights of scores on different assignments and tests can then be equated by converting them to percents. Therefore it becomes important for participants to recognize when distributions of scores are approximately proportional.

Asking whether the following two conditions are present represents one technique for determining if distributions are proportional: 1) When converted to percents, do both distributions have approximately the same range (e.g., 60% to 100%)? 2) Are scores distributed about the same within that range (e.g. concentrated at the upper end of both distributions, or distributed quite evenly throughout the range of both distributions)?

Using the Class as Its Own Norm Group When Assigning Course Grades

Two sheets are associated with this exercise. The first list three scores for 25 students, and provides a work space for weighting and combining scores. The second sheet displays the completed exercise. Stanines are used here to equate the weights of scores. The ITEMS module describes how to convert scores to stanines.

Comparing Students to an External Group When Assigning Course Grades

Again, two sheets are associated with this exercise. The distribution of the 14 scores on the three assignments are approximately proportional. Therefore, the maximum points associated with each assignment is used to control their relative weights. Percents are used to equate the weights of scores, and then scores are multiplied by their desired weights.

Compare the Standard Deviations

Group 1 - Test 1: 4 6 8 9 10 10 11 12 14 16
Test 2: 3 5 7 8 9 9 10 11 13 15

Group 2 - Test 1: 24 26 27 28 28 29 30 32
Test 2: 14 16 17 18 18 19 20 22

Group 3 - Test 1: 3 7 9 11 11 13 15 19
Test 2: 7 9 10 11 11 12 13 15

Group 4 - Test 1: 3 7 9 11 11 13 15 19
Test 2: 17 19 20 21 21 22 23 25

Group 5 - Test 1: 7 11 15 15 15 19 23
Test 2: 13 14 15 15 15 16 17

Group 6 - Test 1: 7 9 11 11 11 13 15
Test 2: 13 14 15 15 15 16 17

Group 7 - Test 1: 7 8 9 9 9 10 11
Test 2: 13 14 15 15 15 16 17

Group 8 - Test 1: 21 23 25 27 29
Test 2: 10 12 14 16 18

Listed above are the scores different groups of students obtained on two tests. For each group of students, indicate whether the standard deviation of scores on the first test is the same, twice, or four times the standard deviation of scores on the second.

Answers: 1) same; 2) same; 3) twice; 4) twice; 5) four times; 6) twice; 7) same; 8) same.

Identify the Proportional Distributions

Example 1

A: (10) 7 8 9 9 10
 B: (10) 7 8 8 9 10

Example 2

A: (10) 7 8 9 9 10
 B: (20) 14 16 17 18 20

Example 3

A: (10) 7 8 9 9 10
 B: (20) 7 11 14 15 20

Example 4

A: (10) 7 8 9 9 10
 B: (10) 7 10 10 10 10

Example 5

A: (10) 5 7 8 9 10
 B: (20) 11 14 15 17 20

Example 6

A: (10) 5 7 8 9 10
 B: (20) 10 12 14 15 16

Example 7

A: (10) 5 7 8 9 10
 B: (20) 15 17 18 19 20

Example 8

A: (10) 5 7 8 9 10
 B: (20) 10 14 16 18 20

Example 9

A: (10) 5 7 8 9 10
 B: (20) 10 15 16 19 20

Example 10

A: (20) 8 12 16 16 18
 B: (30) 12 18 24 24 27

Example 11

A: (20) 8 12 16 16 18
 B: (30) 12 19 23 24 28

Example 12

A: (20) 8 12 16 16 18
 B: (30) 8 12 16 16 18

Example 13

A: (20) 15 17 17 18 19
 B: (20) 15 15 20 20 20

Example 14

A: (20) 15 17 17 18 19
 B: (20) 15 17 18 18 20

If students' scores on all assignments and tests are proportionally distributed, the standard deviations of scores will be proportional to the maximum points. Consequently, the maximum points can be used to control the relative weights of the scores.

Listed above are the scores of five students on pairs of assignments (A and B). For each pair, indicate whether the scores on the two assignments are approximately proportional. The maximum possible score a student could obtain on each assignment is given within parentheses. For instance, the maximum possible score on assignment B within Example 6 is 20 points. The highest score a student obtained on that assignment was 16 points, 80% of the maximum.

Answers: 1) yes; 2) yes; 3) no; 4) no; 5) yes; 6) no; 7) no; 8) yes; 9) yes; 10) yes; 11) yes; 12) no; 13) no; 14) yes.

Using the Class as Its Own Norm Group When Assigning Course Grades

	(Step 1)			(Step 2)			(Step 3)			Total	Grade
	Assignment Scores			Stanines			Weighted				
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd		
Michael	25	12	29	—	—	—	—	—	—	—	—
Leiana	24	13	32	—	—	—	—	—	—	—	—
Daniel	24	11	31	—	—	—	—	—	—	—	—
Tom	23	12	35	—	—	—	—	—	—	—	—
Ann	23	14	31	—	—	—	—	—	—	—	—
Frances	22	10	26	—	—	—	—	—	—	—	—
Victoria	21	12	32	—	—	—	—	—	—	—	—
Heidi	19	13	28	—	—	—	—	—	—	—	—
Barry	19	11	26	—	—	—	—	—	—	—	—
Pamela	19	10	24	—	—	—	—	—	—	—	—
Richard	18	10	30	—	—	—	—	—	—	—	—
Scott	18	11	25	—	—	—	—	—	—	—	—
James	17	9	22	—	—	—	—	—	—	—	—
Laura	17	10	27	—	—	—	—	—	—	—	—
Camille	17	8	25	—	—	—	—	—	—	—	—
Joan	16	11	24	—	—	—	—	—	—	—	—
Gail	15	9	22	—	—	—	—	—	—	—	—
Jose	15	10	19	—	—	—	—	—	—	—	—
Ada	15	9	27	—	—	—	—	—	—	—	—
Terry	14	8	23	—	—	—	—	—	—	—	—
Neal	14	7	15	—	—	—	—	—	—	—	—
Steven	14	8	25	—	—	—	—	—	—	—	—
Tammy	13	6	23	—	—	—	—	—	—	—	—
Rita	11	9	21	—	—	—	—	—	—	—	—
Paula	8	7	18	—	—	—	—	—	—	—	—
Desired weights				1	1	1	2	3	5		

Step 1: Students' scores on three assignments are provided.

Step 2: Give the scores equal weights by converting them to stanines. (The standard deviation of scores on each assignment becomes equal, therefore the scores obtain equal weight.)

Step 3: Now that the scores have equal weights, multiply the respective scores by their desired weights. (In this example, the desired weights are 2, 3, and 5.) Total the scores and assign 4 A's, 10 B's, 8 C's, and 3 D's.

Using the Class as Its Own Norm Group When Assigning Course Grades

	(Step 1)			(Step 2)			(Step 3)			Total	Grade
	Assignment Scores			Stanines			Weighted				
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd		
Michael	25	12	29	9	7	6	18	21	30	69	B
Leiana	24	13	32	8	8	8	16	24	40	80	A
Daniel	24	11	31	8	6	7	16	18	35	69	B
Tom	23	12	35	7	7	9	14	21	45	80	A
Ann	23	14	31	7	9	7	14	27	35	76	A
Frances	22	10	26	7	5	5	14	15	25	54	B
Victoria	21	12	32	6	7	8	12	21	40	73	A
Heidi	19	13	28	6	8	6	12	24	30	66	B
Barry	19	11	26	6	6	5	12	18	25	55	B
Pamela	19	10	24	6	5	4	12	15	20	47	B
Richard	18	10	30	5	5	7	10	15	35	60	B
Scott	18	11	25	5	6	5	10	18	25	53	B
James	17	9	22	5	4	3	10	12	15	37	C
Laura	17	10	27	5	5	6	10	15	30	55	B
Camille	17	8	25	5	3	5	10	9	25	44	C
Joan	16	11	24	4	6	4	8	18	20	46	C
Gail	15	9	22	4	4	3	8	12	15	35	C
Jose	15	10	19	4	5	2	8	15	10	33	C
Ada	15	9	27	4	4	6	8	12	30	50	B
Terry	14	8	23	3	3	4	6	9	20	35	C
Neal	14	7	15	3	2	1	6	6	5	17	D
Steven	14	8	25	3	3	5	6	9	25	40	C
Tammy	13	6	23	2	1	4	4	3	20	27	D
Rita	11	9	21	2	4	3	4	12	15	31	C
Paula	8	7	18	1	2	2	2	6	10	18	D
Mean	17.6	10.0	25.6	5	5	5	10	15	25		
Standard Dev.	4.3	2.0	4.8	2	2	2	4	6	10		
Relative Weight				1	1	1	2	3	5		

Comparing Students to an External Group When Assigning Course Grades

	(1st Step)			(2nd Step)			(3rd Step)			Total	% Grade
	Scores on Assignments			Percent Scores			Weighted Scores				
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd		
Nelson	10	22	17	—	—	—	—	—	—	—	—
Tara	10	21	20	—	—	—	—	—	—	—	—
Carla	9	24	20	—	—	—	—	—	—	—	—
Anthony	9	22	16	—	—	—	—	—	—	—	—
Cheryl	9	23	14	—	—	—	—	—	—	—	—
Leslie	8	22	18	—	—	—	—	—	—	—	—
Gregg	8	20	16	—	—	—	—	—	—	—	—
Linda	8	22	14	—	—	—	—	—	—	—	—
Chad	8	20	18	—	—	—	—	—	—	—	—
Teresa	8	19	15	—	—	—	—	—	—	—	—
Valerie	7	22	14	—	—	—	—	—	—	—	—
Russell	7	19	15	—	—	—	—	—	—	—	—
Robin	7	14	13	—	—	—	—	—	—	—	—
Adam	6	15	14	—	—	—	—	—	—	—	—
Maximums...	10	25	20								
Desired Weights...				1	1	1	3	2	5		

Step 1: Students' scores on three assignments are provided, as are the maximum points a student could obtain on these assignments.

Step 2: Give the scores equal weights by converting them to percents. (The maximum possible score on assignments becomes equal, therefore their scores obtain equal weight.)

Step 3: Now that the scores have equal weights, multiply the respective scores by their desired weights. (In this example, the desired weights are 3, 2, and 5.) Total the scores and convert the totals to percents. Assign grades using 90-100% = A, 80-90% = B, 70-80% = C, and 60-70% = D.

Comparing Students to an External Group When Assigning Course Grades

	(1st Step)			(2nd Step)			(3rd Step)			Total	% Grade	
	Scores on Assignments			Percent Scores			Weighted Scores					
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd			
Nelson	10	22	17	100	88	85	300	176	425	901	90%	A
Tara	10	21	20	100	84	100	300	168	500	968	97%	A
Carla	9	24	20	90	96	100	270	192	500	962	96%	A
Anthony	9	22	16	90	88	80	270	176	400	846	85%	B
Cheryl	9	23	14	90	92	70	270	184	350	804	80%	B
Leslie	8	22	18	80	88	90	240	176	450	866	87%	B
Gregg	8	20	16	80	80	80	240	160	400	800	80%	B
Linda	8	22	14	80	88	70	240	176	350	766	77%	C
Chad	8	20	18	80	80	90	240	160	450	850	85%	B
Teresa	8	19	15	80	76	75	240	152	375	767	77%	C
Valerie	7	22	14	70	88	70	210	176	350	736	74%	C
Russell	7	19	15	70	76	75	210	152	375	737	74%	C
Robin	7	14	13	70	56	65	210	112	325	647	65%	D
Adam	6	15	14	60	60	70	180	120	350	650	65%	D
Maximums...	10	25	20	100	100	100	300	200	500	1000		
Relative Weights...				1	1	1	3	2	5			