

READING AND INTERPRETING TABLES and GRAPHS involving RATES and PERCENTAGES

Sponsored by the
W. M. Keck Statistical Literacy Project

Invitation to Participate

You have been invited to complete a survey on statistical literacy commissioned by the W. M. Keck Statistical Literacy Project. This survey focuses on the general use of **informal statistics** in everyday situations: reading and interpreting tables and graphs involving rates and percentages.

You have received this invitation because you are a member of the relevant population for this study and because we believe you are motivated to help improve statistical literacy. Your opinions and beliefs on the topic are extremely important to us. ***The information you supply in this survey will be presented to statistical educators for their use in shaping various curriculum in statistical literacy in schools and colleges throughout the world.***

Completing this survey will take approximately 30 to 40 minutes. We apologize for the length, but this detail is needed to help us accurately identify the current level of statistical literacy. Your participation is completely voluntary. You may omit questions if you wish and you may simply withdraw by turning in your survey. There are no direct incentives to induce you to take this survey and no direct rewards for completing this survey. But as indicated previously, your participation is important.

For each question, circle the answer you think best. Please don't guess. If you really don't know the answer to a question after a reasonable time, just circle "Don't know" and move on. In taking this survey, you may become tense or frustrated. If you need to stretch and take a break, you are welcome to do so. Please do not talk with others who are working on their survey. If you decide not to complete the survey, simply fill in the last page and turn in what you have completed.

In some cases there are right answers. But in other cases there is no consensus on what is the right answer. Your opinion will help determine what standards would be appropriate.

We want to assure you that privacy of your answers to this survey is guaranteed. Do not identify yourself on anything you submit. We will not add any individual identification. The anonymous data obtained in this survey will be publicly available and may be used by researchers, educators and authors in various ways. Your submission of your survey will signify your informed consent for such usage.

Please feel free to fill out the separate comment sheet with your comments, questions and concerns. You may also contact us at the e-mail address shown below.

Thank you ever so much for your participation.



Milo Schield, Ph.D.
Professor of Business Administration, Augsburg College
Director of the W. M. Keck Statistical Literacy Project
SurveyA@StatLit.org
Augsburg College IRB #2002-19-3

COMMENT SHEETS:

Feel free to comment on anything related to your taking of this survey.

FOCUS GROUPS: The purpose of the follow-up focus group is to identify questions that are ambiguous or poorly worded. The purpose is not to present right answers or to give reasons why certain answers are wrong. The focus group leaders have been instructed to give no information about which answers were right or wrong.

Please review those questions where you circled “Don’t know.”

If you choose “Don’t know” because of poor wording – wording that seemed ambiguous – please notify the focus group leader of what you felt was ambiguous. If you felt that additional information could and should have been provided, say so.

CLASSIFICATION SECTION

1. What best describes how comfortable you are in dealing with formal statistics (e.g., chance, probability, sampling distributions, confidence intervals, etc.)? (Select only one)

- a. very comfortable b. somewhat comfortable c. somewhat uncomfortable d. very uncomfortable

2. What best describes how comfortable you are in dealing with informal statistics (e.g., reading and interpreting tables and graphs that use rates and percentages)? (Select only one)

- a. very comfortable b. somewhat comfortable c. somewhat uncomfortable d. very uncomfortable

3. What best describes how quantitative your work, teaching, area of study or daily life is? (Select only one.) [If retired, you may use your prior occupation.]

- a. extremely quantitative (e.g., mathematics, statistics, etc.)
 b. highly quantitative (e.g., finance, econometrics, accounting, science, engineering, epidemiology, etc.)
 c. moderately quantitative (e.g., psychology, sociology, MIS, market research, forecasting, etc.)
 d. minimally quantitative (e.g., business management, education, journalism, health care, etc.)
 e. generally non-quantitative (e.g., child-care, music, art, English, philosophy, etc.)

4. What best describes your occupation? (Select only one.) [If retired, you may use your prior occupation.]

- a. student
 b. teacher, elementary/secondary
 c. teacher, college
 d. Other professions
 e. Other

5. What best describes your highest level of schooling completed? (Select only one.)

- a. Primary school
 b. Secondary school / high school
 c. Two-year college (Associates degree)
 d. Four year college (Bachelor's degree)
 e. Graduate degree (Master's or Ph.D.)

6. What best describes your fluency in English? (Select only one.)

- a. English was a native language by primary school
 b. Became fluent in speaking and reading English after primary school
 c. Not yet fluent in speaking and reading English

7. How many undergraduate statistics courses have you completed? (Select only one)

- a. None b. One c. Two d. Three e. Four or more

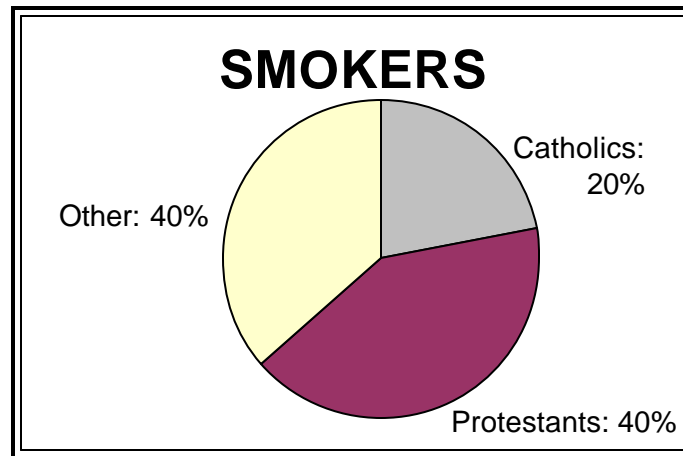
8. What is your age? (Select only one)

- a. Under 18 b. 18 - 24 c. 25 - 44 d. 45 and older

Circle the one answer you think best.

Circle **“DON’T KNOW”** if any other answer would be just a guess.

Assume that all these statements apply just to the subjects in these charts.



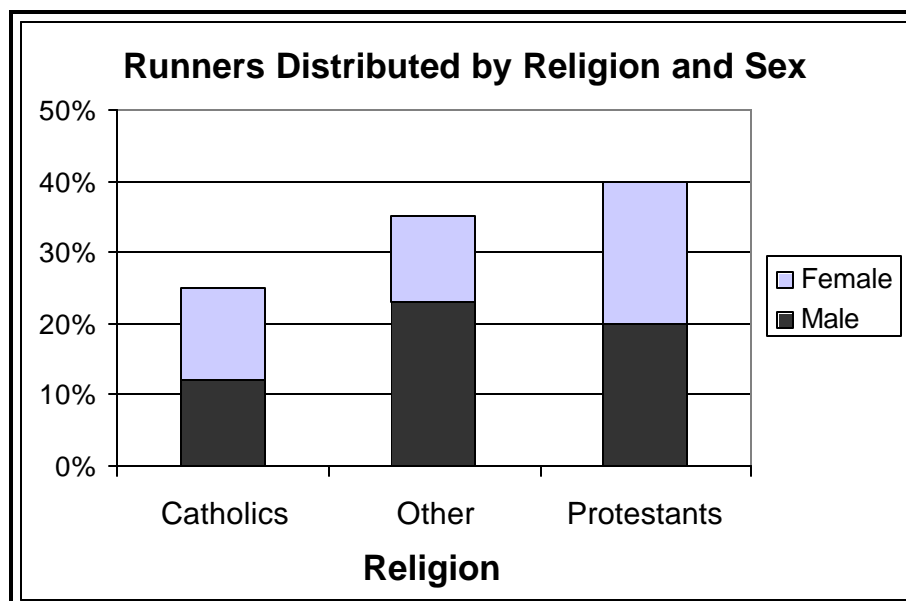
Do you think the following statements accurately describe the data shown in this pie chart?

9. **20% of smokers are Catholics.**

- a. Yes b. No c. Don't know

10. **Protestants (40%) are twice as likely to be smokers as are Catholics (20%).**

- a. Yes b. No c. Don't know



Do you think the following statement accurately describes the data shown in this bar chart?

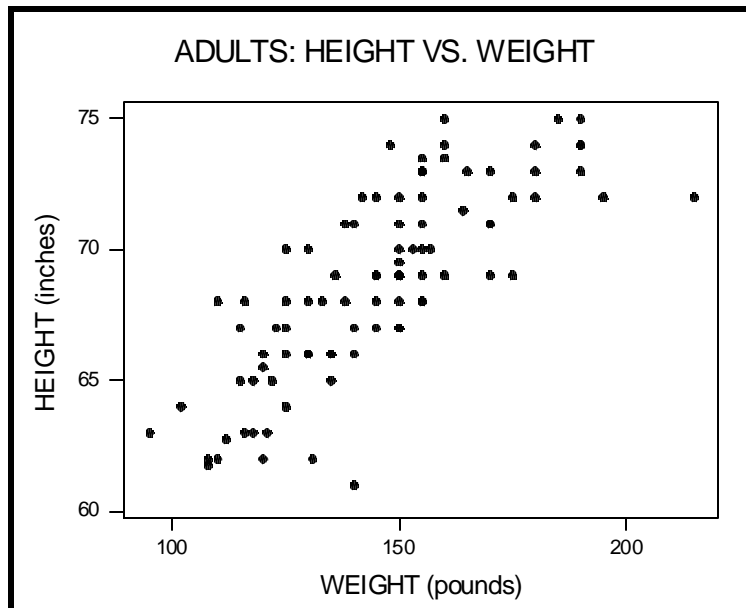
11. **20% of Protestant males are runners.**

- a. Yes b. No c. Don't know

Circle the one answer you think best.

Circle **“DON’T KNOW”** if any other answer would be just a guess.

Assume that all these statements apply just to the subjects in this scatter plot.



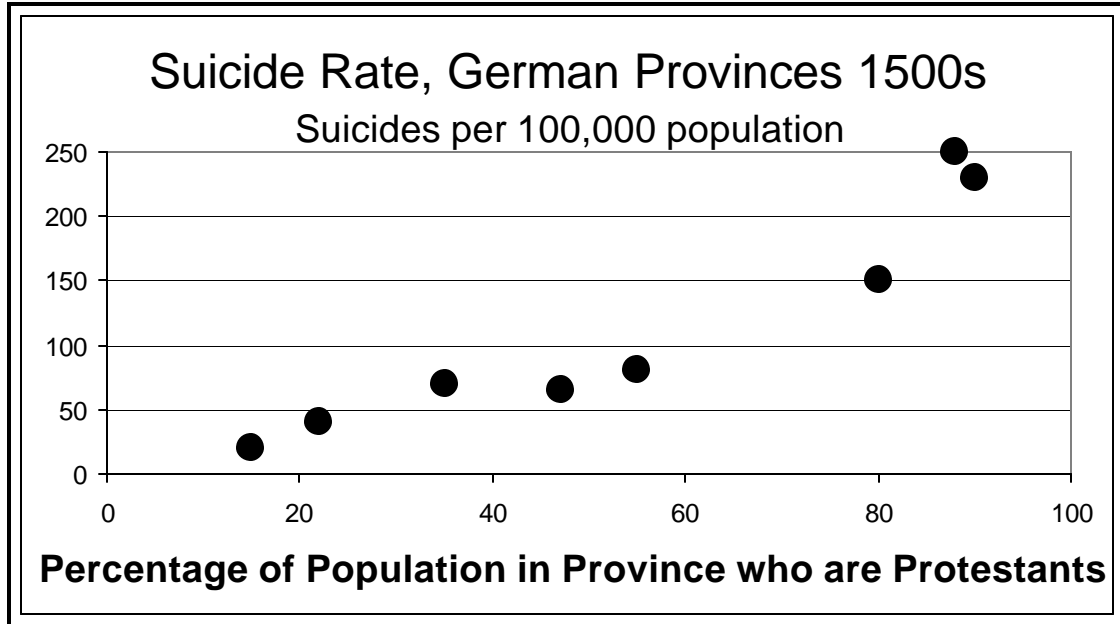
Do you think the following statements are accurate interpretations of the scatter graph shown above?

12. **Adults who weigh more tend to be taller [than those who weigh less].**
 - a. Yes
 - b. No
 - c. Don't know
13. **The more an adult weighs, the taller they tend to be.**
 - a. Yes
 - b. No
 - c. Don't know
14. **[Typically] as weight increases, height increases.**
 - a. Yes
 - b. No
 - c. Don't know
15. **As adults' weights increase, their heights tend to increase.**
 - a. Yes
 - b. No
 - c. Don't know
16. **As an adult's weight increases, their height tends to increase.**
 - a. Yes
 - b. No
 - c. Don't know
17. **An adult who weighs more will tend to be taller.**
 - a. Yes
 - b. No
 - c. Don't know
18. **As an adult weighs more the taller they will tend to be.**
 - a. Yes
 - b. No
 - c. Don't know
19. **If an adult increases their weight, they can expect to increase their height.**
 - a. Yes
 - b. No
 - c. Don't know
20. **If weight increases, height will tend to increase.**
 - a. Yes
 - b. No
 - c. Don't know

Circle the one answer you think best.

Circle **“DON’T KNOW”** if any other answer would be just a guess.

Assume that all these statements apply just to the subjects in this chart.



Do you think the following statements are accurate interpretations of the scatter graph shown above?

21. **As the percentage of Protestants increases, the rate of suicides tends to increase.**
 a. Yes b. No c. Don't know
22. **Protestants are more likely to commit suicide than non-Protestants [are].**
 a. Yes b. No c. Don't know

Circle the one answer you think best.

Circle **“DON’T KNOW”** if any other answer would be just a guess.

Assume that all these statements apply just to the subjects in this table.

RACE	SEX		TOTAL
	Male	Female	
Black	75%	25%	100%
White	50%	50%	100%
Other	40%	60%	100%
TOTAL	50%	50%	100%

Do you think the following statements accurately describe the 25% circled above?

23. **25% of females are blacks.**

- a. Yes b. No c. Don’t know

24. **25% of blacks are females.**

- a. Yes b. No c. Don’t know

25. **25% is the percentage of blacks among females.**

- a. Yes b. No c. Don’t know

26. **25% is the percentage who are females among blacks.**

- a. Yes b. No c. Don’t know

Do you think these statements accurately compare the 25% circled with the 50% immediately below it?

27. **Whites are two times as likely to be female than are blacks.**

- a. Yes b. No c. Don’t know

28. **Females are two times as likely to be white as to be black.**

- a. Yes b. No c. Don’t know

29. **Whites are two times more likely to be female than are blacks.**

- a. Yes b. No c. Don’t know

Circle the one answer you think best.

Circle “**DON’T KNOW**” if any other answer would be just a guess.

Assume that all these statements apply just to the subjects in this table.

PERCENTAGE WHO ARE RUNNERS			
	Non-smoker	Smoker	Total
Female	50%	20%	40%
Male	25%	10%	20%
Total	37%	15%	30%

Do you think the following statements accurately describe the 20% circled above?

30. **20% of runners are female smokers.**
 a. Yes b. No c. Don’t know
31. **20% of females are runners who smoke.**
 a. Yes b. No c. Don’t know
32. **20% of female smokers are runners.**
 a. Yes b. No c. Don’t know
33. **20% of smokers are females who run.**
 a. Yes b. No c. Don’t know
34. **Among female smokers, 20% is the percentage of runners.**
 a. Yes b. No c. Don’t know
35. **Among females, 20% is the percentage of smokers who are runners.**
 a. Yes b. No c. Don’t know

 Do you think these statements accurately compare the circled 20% with the 10% immediately below it?

36. **The percentage of runners is twice as much among female smokers as among male smokers.**
 a. Yes b. No c. Don’t know
37. **The percentage of smokers who run is twice as much among females as among males.**
 a. Yes b. No c. Don’t know
38. **Among these smokers, males are twice as likely to be runners as are females.**
 a. Yes b. No c. Don’t know

Circle only one of the answers to each question.

Two statements “**MEAN THE SAME THING**” if one can always be substituted for the other.

Mark “**DON’T KNOW**” is any other answer would be just a guess.

39. In your opinion, do these two statements mean the same thing?

- **20% of high-school dropouts are black.**
- **Blacks have a 20% chance of dropping out.**

a. Yes b. No c. Don’t know

40. In your opinion, do these two statements mean the same thing?

- **Studies show that television violence is strongly linked with juvenile delinquency.**
- **Studies show that television violence is a cause of juvenile delinquency.**

a. Yes b. No c. Don’t know

41. Which study gives better evidence that taking zinc will decrease a nurse’s risk of a heart attack?

- **In study A, some nurses chose to take supplements containing zinc while others did not. Those nurses who took zinc had 30% fewer heart attacks than those who did not.**
- **In study B, half of the nurses were randomly assigned to take zinc; the others got a placebo. Those nurses who received zinc had 10% fewer heart attacks than those who did not.**

a. Study A b. Study B c. Equal support d. Don’t know

42. Which study gives better evidence that taking zinc will decrease a nurse’s risk of a heart attack?

- **In study A, some nurses chose to take supplements containing zinc while others did not. Those nurses who took zinc had 20% fewer heart attacks than those who did not.**
- **In study B, half of the nurses were randomly assigned to take zinc; the others got a placebo. Those nurses who received zinc had 20% fewer heart attacks than those who did not.**

a. Study A b. Study B c. Equal support d. Don’t know

43. In 2000, a *research hospital* had a higher death rate than a *rural hospital*.

Each patient’s condition was classified as either “poor” or “fair.”

Is it possible that in 2000, this *research hospital* had a lower death rate than this *rural hospital* for those patients in “poor” condition – AND – for those patients in “fair” condition?

a. Yes, possible b. No, impossible c. Don’t know

Circle the one answer you think best.

Circle **“DON’T KNOW”** if any other answer would be just a guess.

Assume that all these statements apply just to the subjects in this table.

Percentage of Smoking Prevalence

Year	All	Males	Females	Whites	Blacks
1955	--	56.9	28.4	--	--
1965	42.4	51.9	33.9	42.1	45.8
1980	33.2	37.6	29.3	32.9	36.9
1990	25.5	28.4	22.8	25.6	26.2

Do you think the following statements accurately describe the 26.2 circled above?

44. **In the US in 1990, 26.2% was the percentage of smokers who were black.**
 a. Yes b. No c. Don't know
45. **In the US in 1990, 26.2% of blacks were smokers.**
 a. Yes b. No c. Don't know
46. **In the US in 1990, 26.2% was the percentage of black smokers.**
 a. Yes b. No c. Don't know
47. **In the US in 1990, 26.2% of smokers were black.**
 a. Yes b. No c. Don't know
48. **In the US in 1990, 26.2% was the percentage of blacks who were smokers.**
 a. Yes b. No c. Don't know

Circle the one answer you think best.

Circle **“DON’T KNOW”** if any other answer would be just a guess.

Assume that all these statements apply just to the subjects in this table.

U.S. Low Birth-Weight Births by State

STATE	PERCENT OF BIRTHS WITH LOW BIRTH WEIGHT ¹		
	1990	1995	1996
U.S.	7.0	7.3	7.4
AL.	8.4	9.0	9.3
AK.	4.8	5.3	5.5
AZ.	6.4	6.8	6.6
AR.	8.2	8.2	8.5
CA.	5.8	6.1	6.0

Do you think the following statements accurately describe the 6.0 circled above?

49. **In the US in 1996, 6% of low-weight births were in California (CA).**

- a. Yes
- b. No
- c. Don't know

50. **In the US in 1996, the percentage of California births among low-weight births was 6%.**

- a. Yes
- b. No
- c. Don't know

51. **In the US in 1996, 6% of California births were low-weight.**

- a. Yes
- b. No
- c. Don't know

Do you think this statement accurately compares the 6.0% in California(CA) with 9.3% in Alabama(AL)?

52. **In the US in 1996, there were more low weight births in Alabama (AL) than in California (CA).**

- a. Yes
- b. No
- c. Don't know

Circle the one answer you think best.

Circle **“DON’T KNOW”** if any other answer would be just a guess.

Assume that all these statements apply just to the subjects in this table.

<i>Percent of Women, 15 to 44, Who Received Selected Medical Services</i>			
AGE AT INTERVIEW	HIV Test	Pregnancy test	Pap smear
15-19 years old	14.6	16.1	33.5
20-24 years old	20.0	27.4	68.7
25-29 years old	25.6	25.3	70.9
30-34 years old	18.5	17.4	69.5
35-39 years old	14.2	8.1	62.9
40-44 years old	10.0	4.3	62.7
Total	17.3	16.0	61.9

Source: Table 198 in 1998 U.S. Statistical Abstract. Changed 23.6 to 20.0

Do you think the following statements accurately describe the 10.0 circled above?

53. **10% of these women who received an HIV test were 40-44.**
 a. Yes b. No c. Don't know
54. **10% of these women 40 to 44 received an HIV test.**
 a. Yes b. No c. Don't know
55. **Among those women who received an HIV test, the percentage of those 40-44 was 10%.**
 a. Yes b. No c. Don't know
56. **Among these women 40-44, the percentage who received an HIV test was 10%.**
 a. Yes b. No c. Don't know

 Do you think the following statements accurately compare the 10% and the 20% circled above?

57. **Women 40-44 were twice as likely to have an HIV test as were women 20-24.**
 a. Yes b. No c. Don't know
58. **HIV tests were twice as likely to be administered to women 20-24 as to women 40-44.**
 a. Yes b. No c. Don't know
59. **Women 20-24 were two times more likely to have an HIV test than were women 40-44.**
 a. Yes b. No c. Don't know

Circle the one answer you think best.

Circle **“DON’T KNOW”** if any other answer would be just a guess.

Assume that all these statements apply just to the subjects in this table.

No. 143. Death Rates, by Leading Cause--States (Top 5 and Bottom 5). Source: 1998 US Statistical Abstract [Deaths per 100,000 resident population estimated as of July 1.]

STATE 1995	Total	Heart disease	Cancer	Cerebro- vascular dis- eases	Accidents and adverse effects	Motor vehicle acci- dents	Chronic obstructive pulmonary diseases	Dia- betes mellitus	HIV	Suicide	Homicide
United States	880.0	280.7	204.9	60.1	35.5	16.5	39.2	22.6	(NA)	11.9	8.7
D.C.	1,244.2	302.4	267.2	66.8	34.8	12.3	24.2	39.5	117.8	7.0	56.8
West Virginia	1,107.0	378.9	259.4	67.9	40.4	21.2	60.0	32.8	0.0	15.1	5.5
Florida	1,081.3	351.6	263.5	69.9	38.1	19.8	52.9	26.0	30.8	15.3	8.8
Arkansas	1,075.1	339.8	244.7	91.5	48.8	26.3	45.0	22.4	6.8	14.5	11.6
Pennsylvania	1,059.2	359.7	250.7	68.6	35.3	13.1	43.9	28.2	11.5	12.1	6.5
Missouri	1,021.9	345.3	230.7	72.9	43.5	20.6	46.1	23.4	8.8	13.5	8.9
California	709.8	216.3	162.8	51.4	29.3	14.1	34.2	16.2	20.4	11.7	11.6
Colorado	667.6	172.1	145.9	42.7	39.8	18.6	42.3	14.3	10.9	17.5	5.7
Hawaii	643.1	196.0	156.4	51.5	27.6	12.0	20.4	14.2	10.4	12.0	4.9
Utah	560.6	148.1	108.6	39.9	32.4	17.2	24.1	21.3	4.8	14.8	3.9
Alaska	423.0	90.6	95.1	24.0	56.2	16.1	17.7	9.3	5.0	17.1	8.9

Do you think the following statements accurately describe the 16.1 circled above?

60. In 1995, the death rate due to motor vehicle accidents was 16.1 per 100,000 Alaskans.
a. Yes b. No c. Don't know
61. In 1995, for those in motor vehicle accidents, the death rate was 16.1 per 100,000 Alaskans.
a. Yes b. No c. Don't know
62. In 1995, the rate of motor vehicle accidents was 16.1 per 100,000 Alaskans.
a. Yes b. No c. Don't know
63. In 1995 for Alaskans who were in motor vehicle accidents, the death rate was 16.1 per 100,000
a. Yes b. No c. Don't know

Please give your evaluation of this survey:

64. **This survey was much more difficult than I thought it would be.**
 a. Strongly agree b. Moderately agree c. Moderately disagree d. Strongly disagree
65. **This survey was much more subtle than I thought it would be.**
 a. Strongly agree b. Moderately agree c. Moderately disagree d. Strongly disagree
66. **This survey was unnecessarily tricky.**
 a. Strongly agree b. Moderately agree c. Moderately disagree d. Strongly disagree
67. **I felt considerable discomfort in taking part or all of this survey.**
 a. Strongly agree b. Moderately agree c. Moderately disagree d. Strongly disagree
-

Please evaluate the relevance and importance of reading these tables and graphs:

68. **These tables and graphs are the kind I need and/or want to be able to read or understand.**
 a. Strongly agree b. Moderately agree c. Moderately disagree d. Strongly disagree
69. **College students should be able to read these kinds of tables and graphs.**
 a. Strongly agree b. Moderately agree c. Moderately disagree d. Strongly disagree

End of Survey. Thank you!

CODING: Code the entries as numbers (a=1, e = 5) if a single letter is selected. Enter an asterisk if no entry is selected or if more than one entry is selected. Version 2p administered on May 29 at Augsburg (later to professional groups). Version 2O administered on May 28 to students. [Renumbered to match 2P] Errors in 2P corrected in 2Q (V1b) and in data from 2O and 2P. #44 repeated in 2p. Fixed in 2q. AL described as Alaska in 2p. Changed to Alabama in 2q. Q1-8: Classification. Q 64-69 Evaluation. Q 12-20 Survey (correct answer unknown). Q 9-11 and 21-63 have correct answers (46 questions). 2Q has no other changes than corrections to 2P. Published data from Version 1 of survey matches numbering in 2Q. 2R has corrections to 2Q but no other changes.