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ABSTRACT

Results obtained using three methods for gathering attitude data were compared. The methods are ranking, paired comparisons, and the Likert-type scale. Three attitude objects, each consisting of five items, were selected or developed for this study. One set had been used with graduate students previously. Participants were 392 students in education courses, most of whom were female, and most of whom were education majors. Correlations among the methods were very high for the set of items related to characteristics of good teachers. Also high were the correlations between the rankings and paired-comparisons methods for the other two sets of items. Correlations between the Likert-type items and the other two methods were not as dramatic or consistent for these two sets of items. Although the study was limited to three small sets of items, results provide preliminary evidence for agreement among methods under certain conditions. When items have been subjected to established conventions for item development and selection and they meet criteria for good items, high agreement among methods might be expected. The items are presented in an appendix. Eight tables are included. (Contains 9 references.) (SLD)

A COMPARISON OF THREE METHODS FOR ASSESSING ATTITUDES

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Introduction

A number of methods can be found in the literature for the purpose of constructing scales and gathering information concerning attitudes. The most common methods, as identified by Nunnally (1978) include rank-ordering, paired comparisons, constant stimuli (similar to paired comparisons), successive categories (such as the Q-sort), equal-appearing intervals (as on a rating scale), interval estimation, and ratio estimation. The methods and their variants are related to whether the task calls for an absolute or comparative judgment and whether the response is considered to be on an ordinal, interval, or ratio scale.

Early efforts to develop scales that measure attitudes toward various objects are associated with Thurstone and Guttman (Anastasi, 1982). Rossi, Wright, and Anderson (1983) indicated that "Thurstone scaling represents one of the first attempts to quantify attitudes using rigorous methods" (p. 251). Creation of Thurstone scales typically employs any of a variety of methods such as "paired comparisons, the method of equal appearing intervals, and the method of successive intervals" (p. 248) as a first step in selecting and scaling a set of attitude statements. Common to all Thurstone-type scales is the use of a large number of judges who classify statements according to how favorable they think the statements are. The median value and variability of the classification are then the basis for selecting items and assigning them scale values (Anastasi, 1982).

The Thurstone and Guttman approaches represent important milestones in the measurement of attitudes, but as Anastasi pointed out, "Because the construction of a Thurstone scale requires rather elaborate procedures, and the conditions of a Guttman scale

are difficult to meet in practice, Likert (1932) developed a type of scale that is easier to construct while yielding equally satisfactory reliability" (p. 554). The Likert summated rating scales have become quite popular in recent years as various attitude measures have proliferated for specific purposes.

Along with the Likert-type rating scales, the other methods such as the rank order, paired comparisons, and Q-sort mentioned by Nunnally (1978), as well as such techniques as the semantic differential (Anastasi, 1982; Rossi et al., 1983) are frequently described in textbooks and employed in the measurement of attitudes.

Purpose of the Study

The present study compares the results obtained using three methods for gathering attitude data. These include ranking, paired comparisons, and the Likert-type scale.

A ranking task involves presenting respondents with a set of items and asking them to place the items in order. The item to which the respondent feels the most favorable or with which the respondent agrees the most receives a rank of 1, the next receives a rank of 2, and so on. With this approach, respondents are forced to make comparative judgments among stimuli, resulting in the stimuli being placed in some order.

Paired comparisons also involve a ranking task, but the items or statements are presented in pairs. Respondents are then required to select the one in each pair with which they agree more or which they favor more. For a set of items, all possible pairings of those items are presented to respondents. Again, respondents are forced to make comparative responses. The paired comparison task, although a more thorough approach than ranking

according to Nunnally (1978), may become quite unwieldy when a large number of stimuli are involved (Guilford, 1954).

The Likert-type scale typically includes a set of items for which a respondent must select a rating on a scale of, for example, 1 to 5. Scores on each of the items are summed to arrive at a total score that indicates the extent of a respondent's positive or negative attitude toward the object. The advantage of a Likert-type item or scale is that an absolute level of a person's responses to the object can be obtained. This, according to Nunnally (1978), is often the desired information in a study of attitudes. Even though with a rating-type item (such as that found on a Likert-type scale) the respondent's task is one of providing an absolute response, Nunnally (1978) indicated that such a task can yield comparative responses (rankings) if so desired, and the task is much easier than ranking or performing paired comparisons, particularly when a large number of items is involved (Guilford, 1954; Nunnally, 1978).

One reason for conducting this study stems from a recent suggestion that when Likert-type items are all generally rated in a highly positive way or at a similar level of magnitude, the results do not provide a good indication of the ranking of the items. The suggestion was that the researcher could not have faith in the rankings obtained from such Likert-type items. The question then becomes one of whether items rated on a Likert-type scale and those ranked using either ranking or paired comparisons yield similar results. If Likert-type items yield information that is consistent with ranking or paired comparisons in terms or the ordering of items, the fact that it is an easier task would presumably make it a more desirable method. Furthermore, the greater information provided by a set of

Likert-type items, in terms of both a summated score and an index of magnitude of an attitude, further enhance this method's desirability. But if results are not similar for the rating and ranking tasks, is there an explanation for the differences?

A number of studies have dealt with specific aspects of a particular method of developing or using an attitude scale, but very few studies were found that compared methods. Early comparison studies were conducted by Symonds (1925) and Conklin and Sutherland (1923) (both cited in Guilford, 1954) in which certain of the rating procedures were found to be more reliable than rankings. Houston, Al-Heeti, and Al-Harby (1987) compared ranking with paired comparisons within the context of evaluating the readability of passages. They found that the paired comparison procedure yielded more consistent results than the ranking procedure. Edwards and Gonzalez (1993) compared the scales derived using paired comparisons, successive intervals, and a simplified version of successive intervals. Noting that the paired comparison method is "the standard against which most psychological scaling techniques are evaluated" (p. 27), the authors reported that correlations among the scales were between .988 and .999. No recent studies were found that included Likert-type scales in any comparisons, although in terms of scaling a set of items, Likert (1932, cited in Edwards, 1957) found a correlation of .99 between scores based on his weightings and normal deviate weightings.

Materials

Three attitude objects, each consisting of five items, were selected or developed for use in this study. One set of items included five statements regarding characteristics essential for teaching success. These items were a subset of 16 items that had previously been

subjected to a Q-sort by several groups of graduate students over a period of years. The subset selected for this study consisted of the five items that had received standard ranks of "1" or "2" over the several administrations of the Q-sort. The fifth item underwent a minor wording change for the purposes of this study. The five items in this set were:

> Ability to stimulate interest
> Effective organization of subject matter
> Provision for individual differences
> Knowledge of subject matter
> An appreciative attitude, evidenced by nods, comments, and smiles (Chissom, McLean, & Hoenes, 1980, p. 120b)

Another set of items included five statements concerning situations in which computers may be of value. These statements were generated for use in this study. The statements included:

> A tool necessary for career success
> A tool necessary for success in college
> An instructional aid for children
> A form of information retrieval
> A communication device

A third set of items consisted of five characteristics that may be considered important for success in college. Again, these items were generated for the purpose of conducting this study. The five characteristics were:

> Persistence
> Intelligence
> Maturity
> Motivation
> Organization

In addition to the three sets of items, three presentation formats were developed to correspond to the three methods being compared. These included five-point Likert-type scale, a ranking format, and a paired-comparison format. Each set of items was produced in

each format and placed on one of three survey forms. The resulting survey forms consisted of the following:

Form Number	Item Set	Format
1	Computer Uses	Likert
	College Success Characteristics	Ranking
	Teacher Characteristics	Paired Comparisons
2	College Success Characteristics	Likert
	Teacher Characteristics	Ranking
	Computer Uses	Paired Comparisons
3	Teacher Characteristics	Likert
	Computer Uses	Ranking
	College Success Characteristics	Paired Comparisons

In generating the paired comparison format, item pairs were arranged according to the conventions suggested by Guilford (1954). Each item was presented as the left side of the pair half the time and as the right side of the pair the other half of the time. Also, item pairs were arranged so that no item appeared in a pair immediately preceding or immediately following itself. Thus, for five items, the ten pairs of items were arranged in the following way for each set of items:

Pair	Left item number	Right Item Number
1	5	3
2	1	2
3	4	5
4	3	1
5	4	2
6	5	1
7	3	4
8	2	5
9	1	4
10	2	3

Survey forms also included questions regarding gender, year in school, and major. The three survey forms used in this study can be found in Appendix A.

Subjects

Participants in the study consisted of students enrolled in one of three courses in the College of Education at the University of Alabama during the Spring, 1993 semester: BEP 205, Educational Psychology; BER 345, Educational Statistics; and BER 450, Tests and Measurements. With the permission of course instructors, the researcher distributed surveys, read instructions, and remained until all surveys had been completed and returned. Additional instructions were given to each group of students when it was discovered that a few students had misunderstood the ranking and/or the paired comparison task. Surveys were distributed in such a way that within each of the 19 classrooms approximately one third of the participants received Form 1, one third received Form 2, and one third received Form 3.

Treatment of the Data

The responses to each of the Likert-type items were summed across respondents. Means and standard deviations were computed for each item within a set.

For the ranking task, the ranks assigned by individuals were converted to normalized ranks, according to procedures outlined by Guilford (1954). This procedure consists of first obtaining a percentile position using the formula:

$$P = \frac{(R_i - .5)100}{n}$$

where R_i = the rank value and n = the number of items being ranked. These percentile positions are then converted to z values which, in the present study were converted to scale values with a mean of 5 and a standard deviation of 2. The means and standard deviations for the normalized ranks were then obtained for each item across respondents.

The data from the paired comparison task were treated as described by Guilford (1954) and by Nunnally (1978). This procedure involves determining the proportion of respondents selecting one of a given pair over the other. The proportions are converted to z values and placed in a matrix of all possible pairs. The column z values are then summed, averaged, and converted to scale scores that serve to eliminate the negative values.

Once the means or scale values were obtained, the values for a given method were correlated with the values obtained for the same items using the other two methods. These correlations were the basis for judging the extent of agreement among the three methods.

Results and Discussion

A total of 463 students received surveys. Upon initial inspection of results, it was learned that 30 respondents either failed to complete the ranking task or completed it incorrectly. Another 34 participants were similarly identified for the paired comparison task. Seven other respondents were identified for both the ranking and the paired comparisons. These respondents were eliminated from further analyses so that the results would be based on the same large group of students (N=392).

Approximately equal numbers of participants came from each of three courses. Approximately three-fourths of the participants were female, and approximately three-fourths were juniors or seniors. Over half of the participants were Education majors, and another

14% were Nursing majors. Groups were comparable on the basis of course, gender, year, and major across all three forms of the survey. Tables 1 through 3 provide frequencies and percentages by course number, gender, and year in school.

Table 1

Number of Participants by Course.

Course Number	Nº (%)
BEP 205	134 (34.2)
BER 345	132 (33.7)
BER 450	126 (32.1)
Total	392 (100.0)

Table 2

Number of Participants by Gender.

Gender	Nº (%)
Male	92 (23.6)
Female	298 (76.4)
Total	390 (100.0) (2 values missing)

Table 3

Number of Participants by Year in School.

Year in School	Nº (%)
Freshman	20 (5.2)
Sophomore	78 (20.2)
Junior	143 (37.0)
Senior	136 (35.2)
Other	9 (2.3)
Total	386 (99.9) (6 values missing)

Means and standard deviations were calculated for each of the Likert-type items in each set. These values can be found in Table 4.

Table 4

Means and Standard Deviations for Likert-type Items.

Topic	Item Number	Mean	Standard Deviation
Teacher Characteristics (N=133 Respondents)			
	1	4.74	.66
	2	4.47	.67
	3	4.27	.75
	4	4.71	.65
	5	4.44	.76
Characteristics for College Success (N=123 Respondents)			
	1	4.38	.76
	2	3.85	.74
	3	4.31	.79
	4	4.67	.60
	5	4.35	.75
Value of Computers (N=136 Respondents)			
	1	3.70	.97
	2	3.66	1.04
	3	4.24	.73
	4	4.43	.77
	5	3.93	.88

Normalized rank means and standard deviations were calculated for each of the ranking items in each set. These values can be found in Table 5.

Table 5

Normalized Rank Means and Standard Deviations for Ranking Items.

Topic	Item Number	Mean	Standard Deviation
Teacher Characteristics (N=123 Respondents)			
	1	6.56	1.42
	2	4.76	1.46
	3	3.58	1.52
	4	6.37	1.71
	5	3.72	1.64
Characteristics for College Success (N=136 Respondents)			
	1	4.46	1.70
	2	4.56	1.83
	3	4.77	2.12
	4	6.92	1.46
	5	4.29	1.58
Value of Computers (N=133 Respondents)			
	1	4.98	2.05
	2	4.83	1.72
	3	5.50	1.86
	4	5.79	1.72
	5	3.90	2.11

Scale values were calculated for each of the paired-comparison items in each set. These values can be found in Table 6.

Table 6

Scale values for Paired-comparison Items.

Topic	Item Number	Scale Value
Teacher Characteristics (N=136 Respondents)		
	1	1.49
	2	.60
	3	.34
	4	.92
	5	.00
Characteristics for College Success (N=133 Respondents)		
	1	.59
	2	.00
	3	.29
	4	1.29
	5	.11
Value of Computers (N=123 Respondents)		
	1	.48
	2	.16
	3	.60
	4	.41
	5	.00

Pearson product-moment correlations were computed between methods for each set of items using the scale values reported in Tables 4 through 6. Correlations among the methods for each set of items ranged from a low of .41 to a high value of .96. Correlations and corresponding p values can be found in Table 7.

Table 7

Correlations Among Methods for Attitude Items.

Topic	Pair of Methods	r (p value)
Teacher Characteristics		
	Likert-Ranking	.96 (.01)
	Likert-Pairs	.82 (.09)
	Ranking-Pairs	.92 (.03)
Characteristics for College Success		
	Likert-Ranking	.64 (.24)
	Likert-Pairs	.83 (.08)
	Ranking-Pairs	.89 (.04)
Value of Computers		
	Likert-Ranking	.61 (.28)
	Likert-Pairs	.41 (.49)
	Ranking-Pairs	.83 (.09)

Correlations among the methods were very high for the set of items related to characteristics of good teachers. Also high were the correlations between the ranking and paired comparison methods for the other two sets of items. The correlations between the Likert-type items and the other two methods were not as dramatic or consistent for these two sets of items. It will be noted that most of the correlations are nonsignificant at the .05

level. This, despite the fact that the correlations are quite high, is due to the fact that the correlations are based on a very small N (5 pairs are being correlated in each case).

The consistently highest correlations among the three methods were for the items measuring teacher characteristics. It will be recalled that these items were drawn from a set of items that had undergone Q-sorts with several previous sets of judges, whereas the other two sets of items had undergone no similar analyses as a basis for judging their quality.

Other analyses were completed to determine ways in which the three sets of items differed. The values obtained are found in Table 8. The analyses included item analyses to obtain item-total correlations and coefficient alphas, calculations of the range of scale means, noting the minimum and maximum standard deviations for each set of items, and computing the intransitivities for the paired comparisons. Transitivity is a measure of internal consistency for paired comparisons, according to Nunnally (1978). Large numbers of intransitivities reflect lower internal consistency. Intransitivity for an individual respondent was computed according to the procedures outlined by Kendall (1955).

An examination of the values presented in Table 8 revealed important information about the properties of the sets of items. First, the item-total correlations and the coefficient alpha for the items measuring teacher characteristics were higher than for the items in the other two sets. As Anastasi (1982) indicated, "The principal basis for item selection is internal consistency" (p. 554). Also, the percentage of respondents whose responses revealed intransitivities was higher for the computer use items than for the other two sets. Second, the maximum standard deviations for the teacher characteristic items on both the Likert and ranking tasks were lower than the maximum standard deviations for the other two sets of

items. Third, when the items were scaled for the ranking and paired comparisons, the ranges of the scale values were greater for the teacher characteristic items than for the other two sets. Anastasi (1982) pointed out that in the development of a Thurstone-type scale, "The variability of the judgments is taken as an index of [an item's] ambiguity . . . Items are chosen so as to exhibit minimum variability and a wide spread of scale values" (p. 553).

Table 8

Comparison of Item Properties for Three Sets of Items.

Measure	Item	Teacher Characteristics	College Success	Computer Uses
Item-Total Correlation	1	.69	.42	.55
	2	.68	.36	.54
	3	.66	.42	.44
	4	.60	.48	.45
	5	.62	.42	.41
Alpha Coefficient		.84	.66	.72
Range of Likert Means		.47	.82	.77
Smallest Standard Deviation		.65	.60	.73
Largest Standard Deviation		.76	.79	1.04
Range of Rank Scale Means		2.98	2.63	1.89
Smallest Standard Deviation		1.42	1.46	1.72
Largest Standard Deviation		1.71	2.12	2.11
Range of Paired Comparison Means		1.49	1.29	.60
Percentage of Intransitivities		36.1%	27.6%	47.8%

The properties of the teacher characteristic items more closely approximate properties of good items than do the other two sets. It may be for this reason that there was closer agreement among the methods for these items. The items that yielded more consistent results

across methods were items that were more internally consistent (and therefore presumed to be measuring a single object) and less ambiguous. The items demonstrating the least consistent results among the methods were the computer use items, which performed more poorly than other sets of items in terms of the properties mentioned.

Although this study was limited to three small sets of items, the results provide preliminary evidence for agreement among methods under certain conditions. Given a set of items that have been subjected to established conventions for item development and selection and whose properties meet the criteria for good items, high agreement among methods might be expected. If this is true, the method of presentation of items becomes a matter of personal choice. The fact that responding to a Likert-type item is an easier task and yields more information than the other two formats suggests some real advantages to using this format. Support for the fact that the Likert task is easier can be found in the number of participants in this study who either failed to complete the ranking and/or paired comparison tasks or did so incorrectly.

Although the results of this study provide limited evidence of the correspondence between the pairs of methods examined, further studies are needed before any firm conclusions can be drawn. One further study might include larger numbers of items in a given set. Another study might attempt to gather information on a given set in three different formats from the same subjects. One of the reasons that was not done in the present study had to do with limited access to students and the concern that, on a given occasion, being asked to respond to the same items in three different formats might result in a response set about the items and thus bias the results.

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APPENDIX A

SEX (Circle One)	YEAR IN SCHOOL (Circle One)	MAJOR
Male Female	Freshman Sophomore Junior Senior Other	

Listed below are five situations in which computers may be of value. For each statement, indicate the extent to which you agree or disagree with the statement by circling "SD" for "Strongly Disagree," "D" for "Disagree," "N" for "Neutral," "A" for "Agree," or "SA" for "Strongly Agree."

A computer is valuable as:	Rating
A tool necessary for career success.	SD D N A SA
A tool necessary for success in college.	SD D N A SA
An instructional aid for children.	SD D N A SA
A form of information retrieval.	SD D N A SA
A communication device.	SD D N A SA

Listed below are five characteristics considered by some to be important for success in college. Rank these characteristics from "1" to "5" in order of your opinion of their importance. Assign a rank of "1" to the characteristic that you believe is the most important for success in college, a rank of "2" to the characteristic that you believe is the next most important, and so on, finally assigning a rank of "5" to the characteristic that you believe is the least important for success in college.

Characteristic	Rank
Persistence	
Intelligence	
Maturity	
Motivation	
Organization	

Listed below are 10 pairs of characteristics considered by some to be essential for teaching success. For each pair, place an "X" to the left of the characteristic that, in your opinion, represents the more important of the two characteristics for teaching success.

	An appreciative attitude, evidenced by nods, comments, and smiles		Provision for individual differences
	Ability to stimulate interest		Effective organization of subject matter
	Knowledge of subject matter		An appreciative attitude, evidenced by nods, comments, and smiles
	Provision for individual differences		Ability to stimulate interest
	Knowledge of subject matter		Effective organization of subject matter
	An appreciative attitude, evidenced by nods, comments, and smiles		Ability to stimulate interest
	Provision for individual differences		Knowledge of subject matter
	Effective organization of subject matter		An appreciative attitude, evidenced by nods, comments, and smiles
	Ability to stimulate interest		Knowledge of subject matter
	Effective organization of subject matter		Provision for individual differences

SEX (Circle One)	YEAR IN SCHOOL (Circle One)	MAJOR
Male Female	Freshman Sophomore Junior Senior Other	

Listed below are five characteristics considered by some to be important for success in college. For each characteristic, indicate the extent to which you agree or disagree that it is important for success in college by circling "SD" for "Strongly Disagree," "D" for "Disagree," "N" for "Neutral," "A" for "Agree," or "SA" for "Strongly Agree."

Characteristic	Rating
Persistence	SD D N A SA
Intelligence	SD D N A SA
Maturity	SD D N A SA
Motivation	SD D N A SA
Organization	SD D N A SA

Listed below are five characteristics viewed by some as essential for teaching success. Rank the characteristics from "1" to "5" in order of your opinion of their importance. Assign a rank of "1" to the characteristic that you believe is the most important, a rank of "2" to the characteristic that you believe is the next most important, and so on, finally assigning a rank of "5" to the characteristic that you believe is the least important.

Successful Teacher Characteristics	Rank
Ability to stimulate interest	
Effective organization of subject matter	
Provision for individual differences	
Knowledge of subject matter	
An appreciative attitude, evidenced by nods, comments, and smiles	

Listed below are 10 pairs of situations in which computers may be of value. For each pair, place an "X" to the left of the statement that, in your opinion, represents the greater value of computers.

	A communication device		An instructional aid for children
	A tool necessary for career success		A tool necessary for success in college
	A form of information retrieval		A communication device
	An instructional aid for children		A tool necessary for career success
	A form of information retrieval		A tool necessary for success in college
	A communication device		A tool necessary for career success
	An instructional aid for children		A form of information retrieval
	A tool necessary for success in college		A communicative device
	A tool necessary for career success		A form of information retrieval
	A tool necessary for success in college		An instructional aid for children

SEX (Circle One)	YEAR IN SCHOOL (Circle One)	MAJOR
Male Female	Freshman Sophomore Junior Senior Other	

Listed below are five characteristics considered by some to be essential for teaching success. For each characteristic, indicate the extent to which you agree or disagree that the characteristic is essential for teaching success by circling "SD" for "Strongly Disagree," "D" for "Disagree," "N" for "Neutral," "A" for "Agree," or "SA" for "Strongly Agree."

Essential Teaching Characteristics	Rating
Ability to stimulate interest	SD D N A SA
Effective organization of subject matter	SD D N A SA
Provision for individual differences	SD D N A SA
Knowledge of subject matter	SD D N A SA
An appreciative attitude, evidenced by nods, comments, and smiles	SD D N A SA

Listed below are five situations in which computers may be of value. Rank the characteristics from "1" to "5" in order of your opinion of their importance. Assign a rank of "1" to the situation in which you believe computers are of the greatest value, a rank of "2" to the situation in which you believe computers are of the next greatest value, and so on, finally assigning a rank of "5" to the situation in which you believe computers are of the least value.

Computer Value Statements	Rank
A tool necessary for career success	
A tool necessary for success in college	
An instructional aid for children	
A form of information retrieval	
A communication device	

Listed below are 10 pairs of characteristics considered by some to be important for success in college. For each pair, place an "X" to the left of the characteristic that, in your opinion, represents the more important of the two characteristics for success in college.

	Organization		Maturity
	Persistence		Intelligence
	Motivation		Organization
	Maturity		Persistence
	Motivation		Intelligence
	Organization		Persistence
	Maturity		Motivation
	Intelligence		Organization
	Persistence		Motivation
	Intelligence		Maturity