

## FACTOR STRUCTURE OF THE “ATTITUDES TOWARD RESEARCH” SCALE

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### SUMMARY

*Students at the undergraduate level usually tend to view research methods courses negatively. However, an understanding of these attitudes is necessary to help instructors facilitate the learning of research for their students, by enabling them to create more positive attitudes toward such courses. The aim of this study is to describe the development of an “attitudes toward research” scale and verify the dimensions of attitudes toward research among undergraduate students enrolled in introductory research courses. The basic hypothesis of this research study is that the concept of attitudes is multidimensional in nature. The sample of the study consisted of 226 students who had completed a research methods course. Based on a factor analysis, five factors of student attitudes toward research were identified. These were the factors of usefulness of research, anxiety, affect indicating positive feelings about research, life relevancy of research to the students’ daily lives, and difficulty of research.*

**Keywords:** Statistics education research; Research methods; Quantitative research attitudes; Scale development; Factor structure; Attitudes toward research; Psychometrics

### 1. THEORETICAL FRAMEWORK

Students at the undergraduate university level, typically tend to view research-related courses with negative attitudes and feelings. These negative attitudes have been documented in numerous studies for a number of years in relation to courses in research, statistics and mathematics (Adams & Holcomb, 1986; Elmore & Vasu, 1980; Wise, 1985). One of the main problems of these negative attitudes is that they have been found to serve as obstacles to learning (Wise, 1985; Waters, Martelli, Zakrajsek, & Popovich, 1988). In turn, these negative attitudes have been found to be associated with poor performance in such courses (Elmore, & Lewis, 1991; Woelke, 1991; Zeidner, 1991). Causal models, however, suggest that attitudes are actually mediators between past performance and future achievement (Meece, Wigfield, & Eccles, 1990).

Prior research studies have found that negative attitudes toward a course (e.g., mathematics) have been found to explain a significant portion of the variance in student learning (Ma, 1995). In turn, these attitudes influence the amount of effort one is willing to expend on learning a subject, which also influences the selection of more advanced courses in similar areas (e.g., research and statistics courses) beyond those of minimum requirements. Therefore, assessing students’ attitudes toward a research methods course is important in order to enable instructors to develop instructional techniques leading to more positive attitudes toward the subject (Waters et al., 1988).

In a 1980 study, Roberts and Bilderback (1980) found that most students who take statistics are quite anxious. Once this preponderance of negative attitudes was revealed, many more survey instruments designed to measure university students’ attitudes toward statistics were developed (Dauphinee, Schau, & Stevens, 1997; Zeidner, 1991). One such instrument is the Survey of ‘Attitudes Towards Statistics’ (Schau et al., 1995), which is comprised of four dimensions, those of affect, cognitive competence, value, and attitudes about the difficulty of statistics. Another instrument

created for the same purpose was that of Attitudes Toward Statistics (Wise, 1985), which was designed to measure two separate domains, student attitudes toward the course they were enrolled in, and student attitudes toward the usefulness of statistics in their field of study. The Statistical Anxiety Rating Scale (Cruise et al., 1985) was designed to measure the value of statistics, the interpretation of statistical information, test anxiety, cognitive skills in statistics, fear of approaching the instructor and fear of statistics. Other similar instruments included the Statistics Attitude Survey (Roberts & Bilderback, 1980), and the Statistics Anxiety Inventory (Zeidner, 1991).

However, although a number of instruments that measure attitudes toward statistics already exist, they all differ in content and configuration (Dauphinee, 1993). For example, although some instruments represent attitudes as a construct with six factors, others regard it as a unidimensional construct which hypothesizes that no meaningful domains exist within attitudes (Roberts & Bilderback, 1980). The identification of the factors that form the structure of the student attitudes toward a research methods course may bear important theoretical and practical implications, especially due to the fact that this has never been examined before. For example, by identifying these subscales of attitudes, research methods instructors may include themselves in the process of learning research from a different angle. By using these domains, instructors may facilitate the learning of research for their students, by enabling them to create more positive attitudes toward such courses. Therefore, the central aims of this study are to explore the multidimensional factor structure of the "Attitudes Toward Research" scale (ATR) and to examine its psychometric properties. This questionnaire was developed by the author of this paper in the Fall of 2002, and the original version consisted of 56 items that were created on a Likert type scale. Based on the analysis of the psychometric properties of this questionnaire that is presented in this paper, further refinements of the questionnaire have been completed, and are presented in section 3. Although the questionnaire was administered in Greek, a translated version of the questionnaire is presented in English in the Appendix.

## 2. METHOD

### 2.1. SAMPLE

The data for this study were collected from students who had completed a compulsory and introductory undergraduate course in 'Methodology of Educational Research' at the University of Cyprus. All the students in the sample were enrolled in the elementary or kindergarten education major. This major is considered of very high esteem in Cyprus, and only the highest ability students are accepted into this major. Students from no other majors were obtained from the University since research methods courses are only required for students in the elementary and kindergarten education major. The target population for this study included all students who had completed this course in a period of three years. This population would have consisted of about 450 students. Among the 226 students who took part in the study, 98 (43.4%) completed the questionnaire on the last day of their research methods course, while the remaining 56.6% also answered the questionnaire on the last day of the semester, although they had completed the course one to four semesters earlier. Of the total 226 students in the sample, 15.6% were male and the remaining 84.4% were female. Although there was a disproportionate number of females in the study, this was because there are generally more female than male students that choose to major in elementary or kindergarten education in Cyprus, and the breakdown is not dissimilar to that usually holding in the group majoring in these subjects.

Of the complete sample, 36.9% were sophomores, 34.2% were juniors and 28.9% were seniors. All students who had attended the classes from which the data were collected, responded to the questionnaire, and no non-responses were encountered.

The students were also asked to indicate their self reported level of socioeconomic status (SES), as well as the overall level of their parents' education. Both questions were closed option questions, where the students had to select among four options (very high, high, average and low). In terms of SES, only one student indicated that their level of SES was very high. There were 84.4% of the students that indicated that their SES level was average, 12.8% who indicated that their SES was high,

and 2.2% that indicated that their SES was low. In terms of the parents' level of education, 5.3% indicated that their parents' education was very high. About 25% indicated that their parents' level of education was high, while 55.8% considered their parents' level of education to be average. In terms of the Grade Point Average (GPA) that the students had at the University, the majority of the students (57.1%) indicated that their grades ranged from 7.01 to 8.00 points, out of a total of 10 points. There were 15.25% of the students who had grades that ranged between 6.01 to 7.00, while the rest of the students had grades higher than 8.01 points. What is also interesting is that the students were also asked about their high school grade point average (GPA). The results of the study showed that 50% of the students had grades that ranged from 19.01 to 20, out of a total of 20 points, while 34.8% had grades ranging from 18.01 to 19.00. The rest of the students had grades lower than 18.01. The lowest grades were obtained by only a single student who responded as having earned a high school GPA between 12.00 -14.00 out of 20. In addition, 5 students had high school GPAs between 14.01-16.00.

The research methods course in which the students were enrolled, was designed to prepare students to undertake a research project related to educational issues. This course covers the fundamental concepts of research methodology, as well as basic statistical terms and techniques required to analyze research data. Primary emphasis is placed on the research stages; those of conceptualizing and defining a research problem, conducting literature reviews, data collection and analysis techniques, as well as writing and interpreting results, discussions and conclusions in research articles. This course also places substantial emphasis on measurement issues such as scales of measurement, and reliability and validity issues. Finally, the students in this course are required to design and execute a research project related to educational issues throughout the semester.

## 2.2. STATISTICAL PROCEDURES

The Attitudes Toward Research (ATR) scale that was created by the authors of this paper, consisted of items listed on a 7-point Likert scale. The score 1 represented the option "strongly disagree" while option 7 on the scale represented the category "strongly agree". An initial pool of 56 Likert-type attitudinal items regarding attitudes toward research was constructed. Some items were positively worded and some negatively worded. For the analysis of the data, all negatively worded items were reversed so that a higher numbered response on the Likert scale would represent positive attitudes.

At a preliminary examination, the 56 items of the ATR measure underwent an initial reliability analysis to determine the internal consistency of the items (Andrews & Hatch, 1999). In addition, the product-moment coefficient  $r$  between each item and the total score was also calculated. Items which were not significantly related to the total score, or whose coefficient was less than 0.50 were removed from the questionnaire. Forty-one items remained in the pre-final version of the questionnaire.

A principal factor analysis with varimax rotation was then used to create the factor structure of the 41 questions included in the scale (SPSS, 1998). This analysis was used to "reduce a set of observed variables into a relatively small number of components that account for most of the observed variance" (Marcoulides & Hershberger, 1997, p 164). In order to give each factor a clear and distinct meaning for both theoretical interpretation and practical implication, the orthogonal varimax method of rotation was used to minimize the number of variables that have high loadings on more than one factor. To determine the optimum factor solution, the following criteria were used: (a) computation of the percentage of variance extracted, and (b) interpretability of the factors (Comrey & Lee, 1992). A factor loading with absolute value greater than 0.50 was considered sufficiently high to assume a strong relationship between a variable and a factor. Factor loadings less than 0.50 in absolute value were regarded as insignificant, and the items containing such loadings were removed from the scale. In addition, it was decided that factors with only one or two items, even with loadings greater than 0.50, would be excluded from the final version of the scale. Furthermore, with respect to determining the number of factors, only factors with eigenvalues greater than 1.1 were considered as significant (Rummel, 1970). Finally, the factors that were developed from this study were analyzed further with the use of multidimensional scaling. This was done in order to create a map of the locations of the factors in reference to each other, based on their similarities and dissimilarities.

### 3. RESULTS

For the purpose of examining the reliability of the ATR measure, Cronbach's alpha coefficient was used to measure the internal consistency of the items in the scale. An initial examination of the entire first version of the questionnaire (all 56 items) produced a reliability coefficient of 0.947 which is very satisfactory. Eleven factors were originally extracted, accounting for 66.4% of the variance. However, based on the restrictions included in the methodology section of this paper, several of the items of the original version of the questionnaire were removed because they were considered as inappropriate. Once the inappropriate items were removed, 32 items remained in the scale. Once the factor analysis was re-run with those items, a five-factor solution remained, which included a robust set of constructs that were relatively easily interpreted. These five factors accounted for 66.25% of the total variance. Details of the items included in the final version of the scale are presented in the Appendix.

The results of the factor analysis have produced a five factor solution. The first factor was clearly the most important one since it accounted for 18.92% of the total ATR scale variance. All items in this factor with loadings greater than 0.50 had to do with the students' opinions about the usefulness of research in their careers. This factor consisted of 9 items, while the two items with the highest loadings on this factor were those of 'research is useful for my career' and 'research is connected to my field of study'. This factor therefore was named 'research usefulness in profession'. This usefulness is interpreted as the perception that students have in terms of how research will be useful and help them in their professional lives.

The second factor accounted for 17.94% of the variance and included items describing tension, stress, fear, difficulties in understanding research, and was called 'research anxiety'. This factor consisted of eight items. The two questions with the highest loadings on this factor were those of 'research makes me nervous' and 'research is stressful.' The third factor which was composed of eight items accounted for 15.42% of the variance and was labeled as 'positive attitudes toward research'. The two questions with the highest loadings on this factor were those of 'I love research' and 'I enjoy research'. The fourth factor accounted for 8.30% of the variance, and consisted of four items referring to the use of research in a student's personal life, and was therefore called 'relevance to life'. The two items with the highest loadings on this factor were those of 'I use research in my daily life' and 'Research oriented thinking plays an important role in everyday life.' The last factor, 'research difficulty', accounted for 5.67% of the total variance. This factor that consisted of only three items included items related to 'having trouble with arithmetic' and 'finding it difficult to understand the concepts of research'. The results of the factor analysis with the loadings of the five factors are presented in Table 1. The items labeled as "Recoded" are listed this way so that all of the items with high values on the Likert scale represent high agreement levels in terms of the respondents' positive attitudes.

The responses on the remaining 32 items on the ATR scale indicated a high reliability for the test, ( $r=0.948$ ). The coefficient alpha reliabilities for the responses to items on each of the five subscales were relatively high. Coefficient alpha reliability for the research usefulness in the profession factor was 0.919 (9 items); for the research anxiety factor it equaled 0.918 (8 items); the reliability for the positive attitudes toward research factor equaled 0.929 (8 items). The reliability of the life relevancy factor equaled 0.767 (4 items), while the reliability for the research difficulty factor equaled 0.711 (3 items).

After the factor analysis was performed, a score was calculated for each student on each factor by obtaining the mean for all items comprising each factor. The mean score of the students on the research usefulness for the profession factor was  $F1=5.20$ ; for the research anxiety factor the mean was 3.17; the mean of the positive attitudes toward research factor was 3.90; for the relevance to life factor the mean score was 5.04, while the mean score of the research difficulty factor was 4.84.

Table 1. Rotated factor loadings of the ATR scale

	Component				
	F1 Research usefulness for profession	F2 Research Anxiety	F3 Positive attitudes toward research	F4 Relevance to life	F5 Research difficulty
Research is useful for my career	.822	.067	.209	.171	.022
Research is connected to my field of study	.783	.107	.282	.037	-.006
Research should be indispensable in my professional training	.768	.087	.264	.272	.132
Research should be taught to all students	.738	.133	.259	.017	.112
Research is useful to every professional	.667	.036	.174	.377	.112
Research is very valuable	.658	.127	.086	.160	.124
I will employ research approaches in my profession	.649	.130	.148	.330	-.029
The skills I have acquired in research will be helpful to me in the future	.608	.164	.296	.418	.051
Knowledge from research is as useful as writing	.601	.087	.285	.377	-.165
Research makes me nervous-RECODED	.156	.857	.189	.080	.077
Research is stressful-RECODED	.197	.807	.239	.054	-.019
Research makes me anxious-RECODED	.220	.798	.217	.010	-.085
Research scares me-RECODED	.160	.794	.155	.024	.161
Research is a complex subject-RECODED	.048	.766	.242	.016	.090
Research is complicated-RECODED	.079	.700	.265	.157	.172
Research is difficult-RECODED	.137	.678	.284	.123	.102
I feel insecure concerning the analysis of research data - RECODED	-.089	.590	.017	.108	.197
I love research	.207	.318	.812	.125	.039
I enjoy research	.222	.268	.789	.077	.034
I like research	.232	.345	.775	.109	.074
I am interested in research	.338	.254	.736	.111	.176
Research acquired knowledge is as useful as arithmetic	.186	.352	.723	.233	.049
Research is interesting	.383	.115	.655	.101	.181
Most students benefit from research	.499	.177	.517	.142	.154
I am inclined to study the details of research	.446	.199	.511	.073	.032
I use research in my daily life	.163	.043	.235	.752	-.008
Research-orientated thinking plays an important role in everyday life	.391	.040	.086	.688	.060
Research thinking does not apply to my personal life-RECODED	.398	.210	-.046	.598	.144
Research is irrelevant to my life-RECODED	.408	.163	.200	.569	.081
I have trouble with arithmetic-RECODED	.074	.060	.137	.012	.792
I find it difficult to understand the concepts of research-RECODED	.146	.427	.062	.204	.686
I make many mistakes in research-RECODED	.096	.518	.203	.005	.610

A test developed by Hotelling, called Hotelling's  $T^2$ , was then applied to the data. This test allows for the comparison of several observed means, five in our case, to a set of constants, which was the median of the seven point Likert scale that was used in the ATR measure. The results of the

MANOVA indicated statistical significance (Hotelling's  $T^2 = 30.967$ ,  $p < 0.01$ ). Since the hypothesis of no differences was rejected, the univariate test was used to get an idea of where the difference among each of the five subscales compared to the median of 4 may lie. The results are summarized in Table 2. Thus, as a group, students consider research to be useful in their professional lives, and in their personal lives (relevance to life). However, the students tended to have quite negative attitudes toward research as well as anxiety toward the subject, although they responded that they did not have a lot of difficulty in understanding this subject. The factor that deviated the most from the median was research usefulness, indicating that the students truly understood and appreciated the usefulness of research in their professional lives. The next highest factor was that of relevancy of research in the student's personal lives. The factor that deviated the least from the median was that of positive attitudes toward research. This indicated that although the students indicated that they had some negative attitudes toward this subject, they did not deviate a lot from the median indicating that their responses were actually quite neutral in terms of attitudes. The overall students' attitudes toward research, when taking into account all seven dimensions is 4.43 which is positive although it is actually closer to the median of the seven point Likert scale.

Correlation coefficients between the Attitudes Toward Research sub-scales were also calculated. As presented in Table 3, the intercorrelations of the Attitudes Toward Research factors suggested the following pattern of interrelationships. The research usefulness factor was most highly correlated with the factors of relevancy to life ( $r = 0.69$ ) and with the factor of positive attitudes toward research ( $r = 0.67$ ). The anxiety subscale was most highly correlated with the positive attitudes ( $r = 0.58$ ) and the difficulty ( $r = 0.52$ ) factors. Finally, the research difficulty factor was most highly correlated with the research anxiety factor ( $r = 0.52$ ).

*Table 2. Cell means, standard deviations and univariate F-tests*

Factors	X	s	Hypoth. SS	Error MS	F	p
F1 research usefulness	5.19	1.13	5870.017	1.28	4582.07	0.000
F2 research anxiety	3.19	1.27	2222.091	1.62	1368.89	0.000
F3 positive attitudes	3.91	1.23	3337.655	1.50	2223.60	0.000
F4 relevance to life	5.04	1.10	5530.293	1.21	4559.43	0.000
F5 difficulty of research	4.84	1.21	5102.393	1.63	3129.25	0.000

*Table 3. Inter-correlations between the five factors*

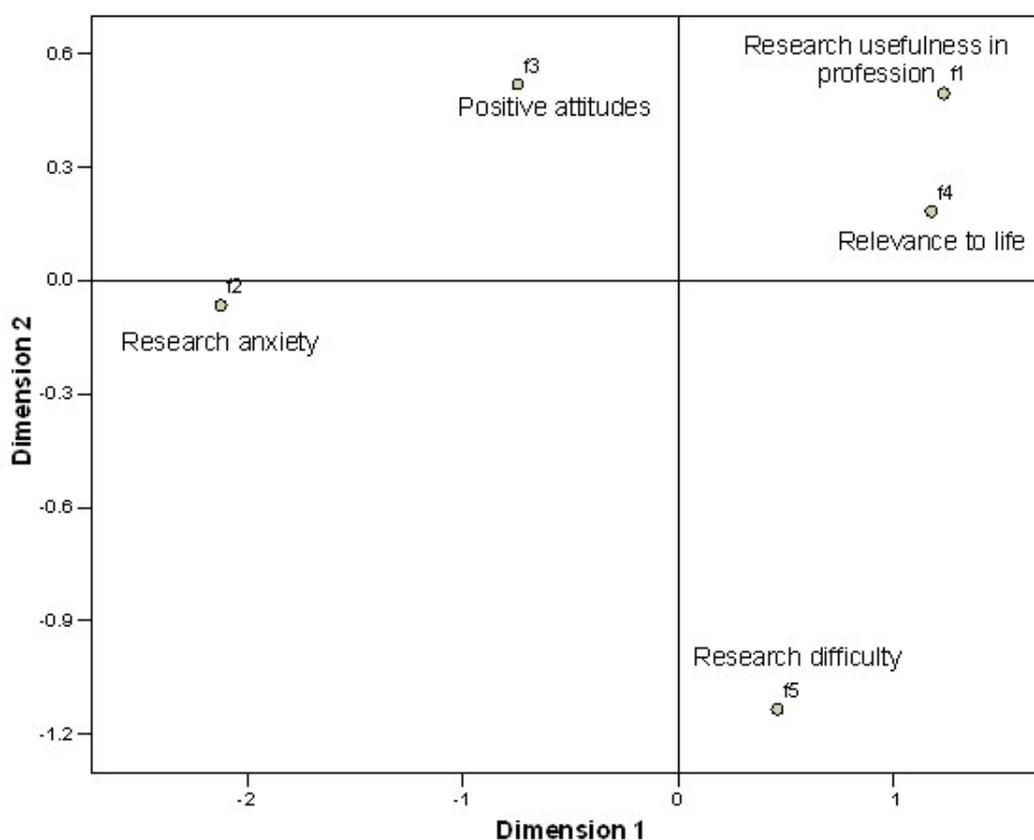
	Research usefulness for profession	Research anxiety	Positive attitudes toward research	Relevance to life
Research anxiety	0.363(**)			
Positive attitudes toward research	0.671(**)	0.587(**)		
Relevance to life	0.697(**)	0.324(**)	0.485(**)	
Research difficulty	0.290(**)	0.527(**)	0.424(**)	0.287(**)

\*\* $p < 0.01$  for all correlations

There are many different measures for quantifying similarity, and the Pearson correlation coefficient is one of those most frequently used (Norusis, 1990). However, similarity measures can also estimate the degree of closeness between objects. For this study, a multidimensional scaling analysis was performed with the statistical package SPSS. Multidimensional scaling was used in order to be able to display multivariate data (the five factors in this case) on a lower two-dimensional space. This is done by mapping the distances between points in a high dimensional space into a lower dimensional space (Johnson, 1998). Four clusters have resulted from the use of these measures (see Figure 1). Projecting the points of each of the factors on Dimension 1 of the axis reveals two different groups of factors: the first group is comprised of the factors dealing with the usefulness of research in

the student's professional and personal lives and goes along with the factor of research difficulty. The second group in the same dimension contains factors that deal with attitudinal issues related to the subject of research methods (positive attitudes and research anxiety). However, by projecting the points on Dimension 2, two different groups are created. Group 1 includes the factors of research anxiety, and research difficulty, while group 2 includes the factors of research usefulness (in the students' personal and professional lives) and positive attitudes toward research. This distinction again shows that on the one hand research anxiety and difficulty seem to interrelate, while the positive attitudes toward research appear to group together with the usefulness of research. Overall however, by looking at the two dimensions it is clear that the usefulness of research factors are constantly grouped together, and are never grouped together with the research anxiety factor. This is to show that research anxiety could possibly stem from other factors that have nothing to do with whether the students consider research to be useful in their lives or not. In addition, positive attitudes toward research are never grouped together with the factor of positive attitudes toward research. This again shows that there are different factors that can possibly influence the student's attitudes toward this subject, that have nothing to do with whether they consider a research methods course to be difficult or not.

Figure 1. Two dimensional configuration of the five factor model based on Euclidian distances



#### 4. DISCUSSION

The major objective of this study was to verify the domains of attitudes related to research among education undergraduate students. The majority of the instruments designed to measure attitudes, have been focused on statistics, and have produced configurations of attitudes ranging from one to six dimensions. Although there may be some degree of similarity in the attitudes between statistics courses and research methods courses, none of the instruments related specifically to attitudes toward research. One definition representing a configuration of attitudes toward research was created by the

Attitudes Toward Research (ATR) measure. The current study based on the ATR measure indicated that students' attitudes toward research are comprised of seven areas.

More specifically, an exploratory factor analysis using undergraduate students indicated that the ATR measure consists of five meaningful factors. The first factor is that of the usefulness of research in the student's professional life. The second factor is that of research anxiety. The third factor is that of positive attitudes toward research. The fourth factor is that of relevancy to the student's non-academic and non-professional lives, which is comprised of attitudes about the use of research in the student's life, while the fifth factor is that of the difficulty of research.

This study has also examined the relationships that existed between the five factors that were produced in this study. Overall, the strongest relationship existed between the usefulness factor and the relevancy to life factors. This confirms a common observation about human attitudes: people feel favorably toward activities, or objects that are useful in their lives. Another strong relationship that was found in the data had to do with affective factors, including those of research anxiety, research difficulty and positive attitudes toward research. These results indicate that there are basically two main groups of factors that are influencing the study's results. On the one hand students tend to form some affective views toward research, that may or may not be influenced by whether they consider research to be a useful subject or not. More specifically, although the usefulness of research for the profession and in daily life is highly correlated with the positive attitudes factor, this is not the case with the factors of research difficulty and anxiety. This indicates that students who can see the usefulness of research also tend to have more positive attitudes toward the subject. However, issues of whether research is difficult, or if it causes anxiety to the students do not appear to be highly correlated with the usefulness factors.

By identifying the five factors that comprise students' attitudes toward research, instructors may begin discussions about the importance of learning research and its importance on making academic and professional career choices. In addition, by using information from these domain areas, instructors may be able to identify specific modifications to attitudes, skills and behaviors to facilitate the learning of research and foster a deeper appreciation of this subject. The availability of an instrument such as the ATR scale which has been designed for students, may provide information concerning motivational aspects associated with learning research, and might also have potential for identifying distinctive attitude profiles of students who find research problematic. Overall however, this study's results validate the utility of the ATR scale in measuring student attitudes toward research.

The results of this study also need to be re-examined to determine if they can be replicated with other samples of students, as well as with different populations. In addition, the future exploration of the relationships between attitudes and student achievement in research is an important area that still needs to be examined further. Finally, it would also be useful to examine the process of attitude change of students, and what it is based on, by collecting student data at various points in the semester. With the use of structural equation modeling, these variables could all be integrated in a single analysis to determine how these variables all influence each other.

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## APPENDIX

## STUDENTS' "ATTITUDES TOWARD RESEARCH" SCALE \*\*

The following statements refer to some aspects of educational research. Please answer all the questions sincerely. DO NOT DISCLOSE YOUR IDENTITY ANYWHERE.

**Circle one of the numbers opposite each of the statements that follow.**

By selecting number 1 you indicate that you strongly disagree.

By selecting number 7 you indicate that you strongly agree.

	Strongly Disagree					Strongly Agree	
	1	2	3	4	5	6	7
1. Research makes me anxious *	1	2	3	4	5	6	7
2. Research should be taught to all students	1	2	3	4	5	6	7
3. I enjoy research	1	2	3	4	5	6	7
4. Research is interesting	1	2	3	4	5	6	7
5. I like research	1	2	3	4	5	6	7
6. I feel insecure concerning the analysis of research data *	1	2	3	4	5	6	7
7. Research scares me *	1	2	3	4	5	6	7
8. Research is useful for my career	1	2	3	4	5	6	7
9. I find it difficult to understand the concepts of research *	1	2	3	4	5	6	7
10. I make many mistakes in research *	1	2	3	4	5	6	7
11. I have trouble with arithmetic *	1	2	3	4	5	6	7
12. I love research	1	2	3	4	5	6	7
13. I am interested in research	1	2	3	4	5	6	7
14. Research is connected to my field of study	1	2	3	4	5	6	7
15. Most students benefit from research	1	2	3	4	5	6	7
16. Research is stressful *	1	2	3	4	5	6	7
17. Research is very valuable	1	2	3	4	5	6	7
18. Research makes me nervous *	1	2	3	4	5	6	7
19. I use research in my daily life	1	2	3	4	5	6	7
20. The skills I have acquired in research will be helpful to me in the future	1	2	3	4	5	6	7
21. Research is useful to every professional	1	2	3	4	5	6	7
22. Knowledge from research is as useful as writing	1	2	3	4	5	6	7
23. Research is irrelevant to my life *	1	2	3	4	5	6	7
24. Research should be indispensable in my professional training	1	2	3	4	5	6	7
25. Research is complicated *	1	2	3	4	5	6	7
26. Research thinking does not apply to my personal life *	1	2	3	4	5	6	7
27. I will employ research approaches in my profession	1	2	3	4	5	6	7
28. Research is difficult *	1	2	3	4	5	6	7
29. I am inclined to study the details of research procedures carefully	1	2	3	4	5	6	7

30. Research is pleasant	1	2	3	4	5	6	7
31. Research-orientated thinking plays an important role in my daily life	1	2	3	4	5	6	7
32. Research is a complex subject *	1	2	3	4	5	6	7

\* The items with an asterisk are items whose direction has been changed in the analysis.

\*\* This version of the questionnaire has been translated to English from Greek.