PREDICTING SUCCESS IN HOME ECONOMICS WITH

THE DIFFERENTIAL APTITUDE TEST

THESIS

Presented to the Graduate Council of the

North Texas State College in Partial

Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

Billie Hopper Nowlin, B. S.

Denton, Texas

June, 1956

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

The counselor seeks information from many sources in his effort to direct students toward areas in which they may achieve success. One source of information is the _Differential Aptitude Test_. When used in conjunction with student interest and personality, the aptitude test makes its greatest contribution to the counseling program.

Recent investigations have attempted to determine the predicting ability of the _Differential Aptitude Test_. In a study by Wolking (4, pp. 117-118), 1955, conducted with eleventh grade high school students at La Crosse, Wisconsin, verbal reasoning, numerical ability, and space relations were found to be reliable predictors of academic success. However, not always did the test predict best in the subject usually assumed to be measured by that test. The numerical ability test was found to be the best over-all predictor. All tests showed their greatest effectiveness in predicting grades in science, geometry and algebra. Home Economics was not predicted as well by any of the tests.

Doppelt and Wessman (2, pp. 213-214) 1952, reporting a study at Ames High School, Ames, Iowa, found that, generally, the _Differential Aptitude Test_ predicted best in the areas one would expect. An exception was noted for eleventh grade girls in that an English test correlated higher with numerical

ability than with sentence ability. It was also noteworthy that the coefficient between correct writing and numerical ability was high for tenth, eleventh, and twelfth grade girls. Bennett, Seashore, and Wessman (1, p. E-51) 1949, in reporting combined studies from a large number of schools, found that for the more frequent high school courses, the numerical ability test was among the best predictors.

Fuqua (3) 1955, in a study of Home Economics Education majors at North Texas State College, Denton, Texas, found the Differential Aptitude Test to show highly significant correlations with achievement in the total college curriculum as well as in the total Home Economics courses. Numerical ability was among the best predictors. Significant correlations were also found between the Differential Aptitude Test and the aptitude areas into which Home Economics courses may be classified, but they were in some cases different from what the correlations with the total college curriculum and the total Home Economics courses had led one to expect. Of the eight areas of the Differential Aptitude Test, numerical ability was the poorest predictor. A suggested need for further study indicates that failure to find correlations between areas in which they would be expected to occur could be due to a mis-interpretation of the content of the Home Economics courses and consequent errors in classification of the courses into the divisions which correspond to the Differential Aptitude Test areas.

It is the purpose of the present study to investigate further the aptitude areas into which Home Economics courses may be classified, and to determine whether a relationship exists between these areas and the areas of the <u>Differential Aptitude Test</u>.

CHAPTER BIBLIOGRAPHY

1. Bennett, George K., Seashore, Harold G., and Wessman, Alexander G., "Third Research Report," _Differential Aptitude Tests Manual_, New York, The Psychological Corporation, 1949, p. E-51.

2. Doppelt, Jerome E. and Wessman, Alexander G., "The Differential Aptitude Test as Predictors of Achievement Test Scores," _Journal of Educational Psychology_, XXXXIII (July, 1952), 210-217.

3. Fuqua, Annie Lou, "Relationship Between the Differential Aptitude Test and Achievement Scores of Home Economics Education Majors," unpublished master's thesis, School of Home Economics, North Texas State College, Denton, Texas, 1955.

4. Wolking, William D., "Predicting Academic Achievement with the Differential Aptitude and the Primary Mental Abilities Tests," _Journal of Applied Psychology_, XXXIX, No. 2 (April, 1955), 115-118.

PROCEDURE

Data for the study were obtained from the records of students who had graduated from North Texas State College as Home Economics Education majors between January, 1952, and May, 1955. Incomplete Differential Aptitude Tests, together with irregular courses, especially of transfers from other colleges, necessitated the elimination of all but seventy-five of the one hundred and twenty-seven graduates.

Scores for the Differential Aptitude Test, Form A, which is regularly administered to Home Economics majors, were obtained from the student guidance center of the college. The eight areas covered by this test are, verbal reasoning, numerical ability, abstract reasoning, space relations, mechanical reasoning, clerical speed and accuracy, spelling, and sentence aptitudes.

Achievement grades for the subjects were obtained from their permanent records. For statistical purposes, these grades were converted to grade points. An A + was equivalent to twelve grade points; A, eleven grade points; A-, ten grade points; B +, nine grade points; B, eight grade points; B-, seven grade points; C +, six grade points; C, five grade points; C-, four grade points; D +, three grade points; D, two grade points; and D-, one grade point. In order to determine their relationship, these grade points, which were used as achievement scores, were correlated with the scores of the Differential Aptitude Test areas.

5

The correlation between the <u>Differential Aptitude Test</u> and the Home Economics courses was made possible by classifying all of the Home Economics courses required of Home Economics education majors according to the eight areas of the <u>Differential Aptitude Test</u>. Each aptitude area was then correlated with the group of Home Economics courses which contained content corresponding to that particular aptitude. The classification of courses according to the eight aptitude areas is shown in Table I. This table shows that all of the twenty-two courses were considered to have content that would be measured by the verbal area of the <u>Differential Aptitude Test</u>. Apparently verbal reasoning is used in all of the Home Economics courses under study. Furthermore, eleven of the Home Economics courses were found to be related to numerical ability; thirteen courses were related to abstract reasoning; nine courses were related to space relations; twelve courses were related to mechanical reasoning; six courses were related to the spelling area; and seven courses were related to the sentence area. Only two Home Economics courses were related to clerical speed and accuracy. Apparently this aptitude is relatively unimportant in the Home Economics curriculum. One course, Home Economics 125, Basic Child Development and Family Relationships, was not included. Its inclusion as a required course for Home Economics Education majors was begun after the completion of earlier degree plans, and its use would have resulted in the elimination of a sizable number of subjects.

TABLE I

HOME ECONOMICS COURSES CLASSIFIED ACCORDING TO
THE DIFFERENTIAL APTITUDE TEST AREAS

Areas	Course Number	Course Title
Verbal	132, 137, 140 145, 147, 233 237, 243, 255 257, 332, 345 360, 361T, 361F 435, 437, 438 439, 440, 448 450	Elem.Clo.,Art in Clo., H.Nurse., Elem.Nutr., Elem.Fds.,Textiles, Hm.Imp., Fd.Prod., Meal Plan., H.Eqp., Adv. Clo., Demon.Tech., Fd.Pres., Cons.T., Cons.Foods, Adv.Nutr., Methods, Std.Teach., Tch.Mts., Hm.Mgt., Adv.Std.Tch., Adv. Chd. Dev.
Numerical	132, 137, 145 233, 237, 243 257, 332, 361T 435, 440	Elem.Clo., Art in Clo., Elem.Nutr., Text.,Hm. Imp., Fd. Production, H.Eqp.,Adv.Clo., Cons.Textiles, Adv.Nutr., Hm. Mgt.
Abstract	132, 137, 233 237, 257, 332 361T,437, 438 439, 440, 448 450	Elem.Clo., Art in Clo.,Textiles Hm.Imp.,H.Eqp., Adv.Clothing, Cons.T., Methods, Adv.Std.Teach., Tch.Mts.,Hm.Mgt.,Adv.Std. Teach., Adv.Chd. Dev.
Space	132, 137, 237 243, 257, 332 438, 440, 448	Elem.Clo., Art in Clo., Hm.Imp., Fd.Prod.,H.Eqp., Adv.Clothing, Std.Teach.,Hm.Mgt.,Adv.Std.Tch.
Mechanical	132, 147, 233 237, 255, 257 332, 345, 360 438, 440, 448	Elem.Clo.,Elem.Fds.,Textiles, Hm.Imp.,Meal Plan., H. Eqp., Adv.Clo.,Dem.Tech.,Food Pres., Std.Teach.,Hm.Mgt.,Adv.Std.Teach.
Clerical	132, 332	Elem.Clo., Adv.Clo.
Spelling	132, 137, 233 237, 332, 361T	Elem.Clo.,Art in Clo.,Textiles, Hm.Imp.,Adv.Clo.,Cons.Textiles,
Sentence	132, 137, 233 237, 332, 345 361T	Elem.Clo.,Art in Clo.,Textiles, Hm.Imp., Adv.Clo., Demon.Tech., Cons.Textiles

After the courses had been classified according to the eight Differential Aptitude Test areas, a further analysis was made of the course content to determine the fractional amount of each aptitude included in each course. To insure the best possible estimate of aptitude values, the interested assistance of the Home Economics staff was enlisted. In a personal interview, a copy of the Differential Aptitude Test and a brief description of the scope of the eight areas were presented to each instructor. The instructor then placed each course she taught in its proper classification under the eight areas of the Differential Aptitude Test. If a course included more than one aptitude, the representative fraction of each was placed in its proper area; the total of the fractional portions of each three-hour course was one. One-hour courses were fractioned on a proportionate basis. Table II shows the fractional division of all of the courses according to the Differential Aptitude Test areas.

Examination of the table shows that there is a wide range in the number of courses which appear in the various aptitude areas. In the verbal area, for instance, all of the twenty-two required courses are found, whereas, in the clerical area, there are only two courses. Furthermore, there is a wide range in the number of aptitude components in each course. Elementary clothing includes all eight aptitudes, but Elementary Nutrition includes only two. Courses which include four or more aptitudes are Elementary Clothing, Art in Clothing,

TABLE II

FRACTIONAL DIVISION OF HOME ECONOMICS COURSES
ACCORDING TO THE DIFFERENTIAL
APTITUDE TEST AREAS

Course	Verb.	Numb.	Abst.	Sent.	Space	Mech.	Cler.	Spell.
Elem.Clo.(132)	1/4	1/16	1/4	1/16	1/4	1/16	1/32	1/32
Art Clo. (137)	1/4	1/8	1/4	1/16	1/4			1/16
Hm.Nurs.*(140)	1/3							
Elem.Ntr.(145)	5/6	1/6						
Elem.Fds.(147)	2/3					1/3		
Textiles (233)	9/16	1/32	1/4	1/16		1/32		1/16
Hm.Imp. (237)	1/4	1/8	1/4	1/32	1/4	1/16		1/32
Fd.Prod. (243)	1/2	1/4			1/4			
Ml.Plan. (255)	2/3					1/3		
Hs.Eqp. (257)	1/4	1/8	1/8		1/8	3/8		
Adv.Clo. (332)	1/4	1/16	1/4	1/16	1/4	1/16	1/32	1/32
Dem.Tech.(345)	2/3			1/6		1/6		
Fd.Pres.*(360)	1/6					1/6		
Cons.F.*(361F)	1/3							
Cons.T.*(361T)	5/48	1/48	1/6	1/48				1/48
Adv.Ntr. (435)	2/3	1/3						
Methods (437)	1/2		1/2					
Std.Tdh. (438)	1/3		1/3		1/6	1/6		
Tch.Mts. (439)	3/4		1/4					
Hm.Mgt. (440)	1/4	1/8	1/4		1/8	1/4		
Adv.S.T. (448)	1/3		1/3		1/6	1/6		
Adv.C.Dv.(450)	1/3		2/3					

* One-hour courses

Textiles, Home Improvement, Household Equipment, Advanced
Clothing, Consumer Textiles, Student Teaching, Home Management
and Advanced Student Teaching. Courses which do not include
more than three aptitudes are Home Nursing, Elementary Nutri-
tion, Elementary Foods, Food Production, Meal Planning and
Table Service, Demonstration Technique, Food Preservation, Con-
sumer Foods, Advanced Nutrition, Methods, Teaching Materials
and Advanced Child Development.

When the statistical analysis was completed, the correlation coefficients were referred to Edwards' (1, p.502) "Values of r at the 5 per cent and the 1 per cent Level of Significance." If r reached the 5 per cent level, it was considered significant; if it reached the 1 per cent level, it was judged to be highly significant.

CHAPTER BIBLIOGRAPHY

1. Edwards, Allen L., _Statistical Methods for the Behavioral Sciences_, New York, Rinehart and Company, Inc., 1954.

DISCUSSION OF RESULTS

The mean, standard deviation, and correlation coefficient derived from the statistical analysis of the data are shown in Table III. Statistics for the eight areas of the Differential Aptitude Test are given in Section A and those for Home Economics courses which correspond to these areas are given in Section B. The second and third columns of the table contain the mean and standard deviation, respectively, of the areas of the Differential Aptitude Test and of the corresponding groups of Home Economics courses. The fourth column shows the correlation coefficient for the Differential Aptitude Test areas and the groups of corresponding Home Economics courses.

Examination of the means of the Differential Aptitude Test areas reveals a range of 22.36 to 70.96. In every instance, the mean exceeds that of the Differential Aptitude Test norm for twelfth grade girls, the only norm available for comparison. The range of the standard deviations, 8.09 to 22.06, is also in close agreement with test norms for twelfth grade girls.

The means for the Home Economics courses range from .27 to 3.56, and the standard deviations from .10 to .51. Since these courses are fractioned to fit into the aptitude areas, there are no available norms with which these statistics may be compared.

12

TABLE III

MEAN, STANDARD DEVIATION, AND CORRELATION COEFFICIENT OF THE
DIFFERENTIAL APTITUDE TEST AND OF THE CORRESPONDING
HOME ECONOMICS COURSES

Areas	Mean	Standard Deviation	Correlation Coefficient
A. Differential Apt. Test			
Verbal	32.19	8.52	
Numerical	22.36	8.09	
Abstract	33.36	6.98	
Space	58.71	22.06	
Mechanical	36.83	10.85	
Clerical	67.15	10.63	
Spelling	70.96	21.13	
Sentence	52.40	15.90	
B. Home Economics Courses			
Verbal	3.56	.51	.572**
132,137,140,145,147,233 237,243,255,257,332,345 360,361F,361T,435,437 438,439,440,448,450			
Numerical	1.17	.17	.643**
132,137,145,233,237,243 257,332,361T,435,440			
Abstract	2.61	.32	.417**
132,137,233,237, 257,332 361T,437,438,439,440 448,450			
Space	1.87	.20	.186
132,137,237,243,257,332 438,440,448			
Mechanical	1.59	.17	.277*
132,147,233,255,257 332,345,360,438,440,448			
Clerical	.27	.10	.274*
132,332			
Spelling	.32	.10	.161
132,137,233,237,332,361T			
Sentence	.58	.10	.299**
132,137,233,237,332,345 361T			

*Significant at the 5 per cent level
**Significant at the 1 per cent level

Reference to Edwards' (1, p.502) table of "Values of r
at the 5 per cent and 1 per cent Level of Significance,"
shows that for seventy-five degrees of freedom, a correlation
of .224 is significant at the 5 per cent level; furthermore,
a correlation of .292 is significant at the 1 per cent level.
In the present study, a correlation coefficient as large as
the 5 per cent level is significant; a coefficient as large
as the 1 per cent level is considered highly significant, and
a coefficient below the 5 per cent level is not considered
significant.

Of the eight correlations between the Differential
Aptitude Test and corresponding Home Economics courses,
four are highly significant, two are significant and two are
not significant. The four which are highly significant are
verbal reasoning, numerical ability, abstract reasoning, and
sentence aptitudes. Verbal reasoning has a correlation co-
efficient of .572. As has been previously mentioned, each
of the courses required of Home Economics Education majors has
a verbal aptitude component. Home Economics students who have
high scores on the verbal area would therefore be expected to
do well in portions of courses requiring verbal reasoning.
Numerical ability has a correlation coefficient of .643, the
highest found in this study. Although Home Economics courses
may not be regarded as largely numerical in nature, the value
of numerical aptitude for measuring general ability is further
established. Abstract reasoning has a correlation coefficient

of .417 with the thirteen Home Economics courses in this area. Students with high scores on the abstract area of the Differential Aptitude Test could be expected to do well with portions of these courses requiring abstract reasoning. The last area having a highly significant coefficient is the sentence area. The correlation, .299, with seven Home Economics courses, indicates that students who have high scores on sentence aptitude could be expected to do well in portions of these courses requiring this kind of ability.

The two correlation coefficients which are significant are mechanical reasoning and clerical speed and accuracy. Mechanical reasoning has a correlation coefficient of .277 with the twelve Home Economics courses in this area, whereas, clerical speed and accuracy has a correlation of .274 with only two courses. Since Home Economics students encounter problems involving mechanical aptitude in many courses, it is reasonable to expect a significant correlation in this area. The fractional component of each of the two courses related to clerical speed and accuracy is only one thirty-second. This is one instance in which the prediction of success seems impractical even in view of a significant correlation.

The two correlation coefficients which were not significant were spelling, with a coefficient of .161, and space relations, with a coefficient of .186. Apparently, students' scores in these areas of the Differential Aptitude Test are not good predictors of success in Home Economics courses which require spelling and space aptitudes.

Limitations of this study should be recognized. An instructor will often vary the content of her classes from year to year in order to adapt it to the needs of her students. The predicting ability of the measured aptitudes is therefore limited to courses with content similar to those used in this study. Also, the difficulty of placing exact portions of a course in the given areas of the <u>Differential Aptitude Test</u> should be recognized.

CHAPTER BIBLIOGRAPHY

1. Edwards, Allen L., <u>Statistical Methods for the Behavioral Sciences</u>, New York, Rinehart and Company, Inc., 1954, p. 502.

SUMMARY

From the results of the correlation of the Differential Aptitude Test areas with the groups of Home Economics courses which have corresponding aptitudes one may conclude that the Differential Aptitude Test is a valuable instrument for predicting success in courses in Home Economics which have considerable portions of any specified aptitude of the areas which the test is assumed to measure.

The four areas having the highest predictive value are verbal reasoning, numerical ability, abstract reasoning and sentence aptitude. In courses requiring these aptitudes, students could be expected to do well in direct proportion to their scores on these areas of the Differential Aptitude Test.

Two of the areas which are less significant, but nevertheless important, are mechanical reasoning, and clerical speed and accuracy. Home Economics students could be expected to do well in portions of courses requiring these aptitudes if their scores were high in these areas of the Differential Aptitude Test.

The correlation coefficient for spelling and for space relations were not significant. Apparently, there is little or no relationship between a student's success in portions of

courses requiring these aptitudes and her score on these areas of the Differential Aptitude Test.

Assuming that considerable amounts of aptitudes must be present in order to predict success in Home Economics courses in terms of any specified aptitudes for which significant correlations were found, some implications for guidance are apparent. Students with high scores on verbal reasoning could be expected to do well in sixteen of the twenty-two Home Economics courses if at least one third of the course content is based on verbal aptitude; thirteen of the twenty-two courses if at least one half is accepted as a basis for prediction; and all of the courses if at least one fourth is accepted. Students with high scores on verbal and abstract reasoning could be expected to do well in twenty-one of the twenty-two courses if one accepts for prediction at least one half as a basis of course content; five courses could be predicted in their entirety since all their content is in these two areas. Students with high scores on verbal reasoning and numerical ability could be expected to do well in thirteen of the twenty-two courses if at least one half is accepted as the basis for prediction; four courses could be predicted on the basis that all of the aptitudes are in these two areas. Sentence, alone or combined with other areas, would have little to contribute since only one course has a fractional portion greater than one sixteenth. High scores on mechanical reasoning would indicate success in

three of the twenty-two courses if one third is accepted as a basis for prediction; the remaining nineteen courses have such small representation as to make prediction impractical. The use of clerical speed and accuracy as a predictor is also impractical since only one thirty-second of two of the courses requires these aptitudes. High scores, on space and spelling would be of no predictive value since neither has a significant correlation. Apparently, those students who have high scores in the areas of verbal, abstract and mechanical reasoning would present the best possible combination for predicting success in Home Economics courses.

Further statistical analysis is necessary to determine whether the Differential Aptitude Test areas which are related to Home Economics courses requiring similar aptitude are better predictors of success in these courses than they are of unrelated courses. Further analysis is also necessary to determine the relationship between individual Home Economics courses and each of the eight Differential Aptitude Test areas.

BIBLIOGRAPHY

Books

Edwards, Allen L., *Statistical Methods for the Behavioral Sciences*, New York, Rinehart and Company, Inc., 1954.

Articles

Doppelt, Jerome E. and Wessman, Alexander G., "The Differential Aptitude Test as Predictors of Achievement Test Scores," *Journal of Educational Psychology*, XXXXIII (July, 1952), 210-217.

Wolking, William D., "Predicting Academic Achievement with the Differential Aptitude and the Primary Mental Abilities Tests," *Journal of Applied Psychology*, XXXIX, No. 2 (April, 1955), 115-118.

Reports

Bennett, George K., Seashore, Harold G., and Wessman, Alexander G., "Third Research Report," *Differential Aptitude Tests Manual*, New York, The Psychological Corporation, 1949.

Unpublished Materials

Fuqua, Annie Lou, "Relationship Between the Differential Aptitude Test and Achievement Scores of Home Economics Education Majors," unpublished master's thesis, School of Home Economics, North Texas State College, Denton, Texas, 1955.