DOCUMENT RESUME

ED 078 012 TM 002 824

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TITLE The Development and Preliminary Evaluation of an Instrument to Measure the Vocational Interests of Low-Reading High School Students.
INSTITUTION Ottawa Board of Education (Ontario). Research Centre.
SPONS AGENCY Department of Manpower and Immigration, Ottawa (Ontario).; Ontario Dept. of Education, Toronto.
PUB DATE Feb 73
NOTE 53p.; Paper presented at the Annual Conference of the National Council for Measurement in Education (New Orleans, Louisiana, February 26-28, 1973)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Disadvantaged Youth; *Low Ability Students; Occupational Clusters; Occupational Guidance; *Rating Scales; Secondary Grades; Tables (Data); Technical Reports; *Test Construction; Test Reliability; Test Validity; Vocational Education; *Vocational Interests

ABSTRACT

A Vocational Interest Inventory was developed for vocational high school students with low reading level, short test-attention span, low IQ, and impoverished educational and family background. The VII, of which there are separate versions for boys and girls, consists of items representing job tasks, for each of which the respondent indicates his preference on a four-point scale. All items are presented pictorially and verbally, and most words are at a reading level of grades 5 to 6. A total of 212 boys and 106 girls in the validation sample, and 193 boys and 132 girls in the cross-validation sample, completed the inventory. The time required varied from five to ten minutes, depending on reading level. Factor analyses of responses were performed for both samples. Retesting was conducted over intervals of 4, 9, and 13 months for the CVS and over 21 and 33 months for the VS to determine scale stabilities. Stability indices were low, suggesting that the vocational interests of low ability students are more fluid than the academic interests of students expecting to complete high school. Scales were found to have predictive validity for the clusters of shop courses offered the students. The VII also seems to satisfy most of Kuder's 12 principles of interest measurement. Only sample pages from the inventory are provided. (KM)

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THE DEVELOPMENT AND PRELIMINARY EVALUATION OF AN INSTRUMENT TO MEASURE THE VOCATIONAL INTERESTS OF LOW-READING HIGH-SCHOOL STUDENTS

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Paper presented at 1973 Annual
Conference of the National Council
for Measurement in Education,
New Orleans.

February 26-28

The first stage of the study was supported jointly by grants from the Canada Dept. of Manpower and Immigration and the Ontario Dept. of Education. The second stage was funded by the Ontario Ministry of Education's Grants-in-Aid Programme.

THE DEVELOPMENT AND PRELIMINARY EVALUATION OF AN INSTRUMENT TO MEASURE THE VOCATIONAL INTERESTS OF LOW-READING HIGH-SCHOOL STUDENTS.

The interest inventory described in this paper was developed during a study which established a validated battery of predictor tests for use in identifying suitable career pathways for low-reading vocational high school students (Lokan and Halpern, 1972).

1. Introduction

In the current concern with the problems faced by disadvantaged groups in our society, we have seen the advent of many special educational and work training programmes, in keeping with the democratic ideal that every child, youth and adult should have the opportunity to experience an education suited to his needs and abilities.

Research studies directed toward "the disadvantaged" have made some dents in the problem of test bias as it affects minority (usually ethnic) groups. The main focus of these studies, as we could perhaps expect, has been "How can we adjust our college admissions procedures to ensure that minority groups are treated fairly?". The solution is usually sought in the derivation of separate regression equations for different groups - the idea of "differential predictability" - based on the use of existing tests (e.g. Cole, 1972). In line with well-established traditions in educational research, studies of non-college-bound students have been visible by their small number.

The problems of disadvantaged groups extend way beyond the identification of students who should benefit from a college education. A positive step toward alleviating some of the problems has been the establishment of compensatory and other special educational programmes, which have met with varying degrees of success. As noted by Freeberg (1970), the growth of large-scale work-training

programmes for disadvantaged groups "has forced many long-standing and often dormant problems in psychological testing to a level of immediate concern". The dual needs for evaluation of the effectiveness of special programmes and for assessment of the individuals enrolled in them have spotlighted a yawning gap in the psychologists' armoury of tests.

The word "disadvantaged" has tended to have ethnic connotations in most studies to date. However, with reference to our middle class, predominantly verbally-oriented school programmes, it is equally applicable to any subgroup of students who are unable to succeed in these programmes. The reasons for their lack of success may be many - all too often race is one of them. Many low- or non-achieving students come from what may be described as "educationally impoverished" backgrounds - low SES, low level of parents' education, low motivation for schooling. Most, by the time they reach secondary school, have a genuine lack of conventional scholastic aptitude. No wonder that Karp and Sigel (1965) have found many reasons why available tests are mostly unsuitable for assessing them.

2. Setting for the study

The study by the present author referred to at the beginning of this paper (Lokan and Halpern, 1972) was carred out in one of several special vocational high schools that have been established in Ontario during the last ten or so years. The programmes at these schools are specially geared to the needs of students who are considered to have minimal chances of success in any regular four or five year curriculum. Students at these schools may take a two-year terminating course, but are encouraged to remain for a full four-year programme.

The school involved in this study was opened in 1967, and usually has a total enrolment of between 700 and 800 students. Boys outnumber girls by about two to one. Most of the students enter the school from Grade 8 at elementary level, though some transfer from other regular high schools. Half of each day is spent

studying shop courses, the other half on academic work at an appropriate level. Twenty-five shop courses are available; each student must take six in his or her first year, before specializing in two shops from among these six during his or her second year. Thus, assuming that it is desirable for the students' shop specialty training to be in the area in which they will later find work, crucial decisions concerning possible future occupations for them need to be made at the grade nine level.

3. Development of a Guidance Battery

The development of a suitable predictor battery to aid high school students in special vocational programmes to select appropriate courses has been described elsewhere (Lokan and Halpern, 1972). Briefly, it was decided to include measures of vocational interests and occupational preferences, together with measures of scholastic, verbal, mathematical, clerical, and mechanical aptitude, eye-hand co-ordination and general motor ability, in order to provide as comprehensive a coverage of traits as possible. Where possible, it was intended to use existing, published tests to measure these traits. However, after preliminary trials it soon became apparent that, because of the special nature of the students who were subjects of the study, most of the tests would have to be adapted or entirely constructed. The resulting battery was subjected to a double cross-validation design, with encouraging results. The entire first-year groups of students in two successive years were used as subjects. In subsequent sections of this paper these two groups of students will be referred to as the VS (Validation Sample) or "Sample 1", and the CVS (Cross-validation Sample) or "Sample 2".

4. Nature the Student Population

The nature of the student population can perhaps best be understood from an examination of Figure 1, which shows the distribution by reading grade level for both the validation sample and the cross validation sample (entire entering first year groups in 1969 and 1970, respectively). A requirement for admission to the school is that the students must be 15 years of age, yet the average reading grade level, as measured by the Nelson Reading Test, Form A, was about 5.7. The mean IQ (non-verbal) of both samples was about 86. Published tests for average students of their age group would have yielded very restricted ranges

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Figure 1 about here

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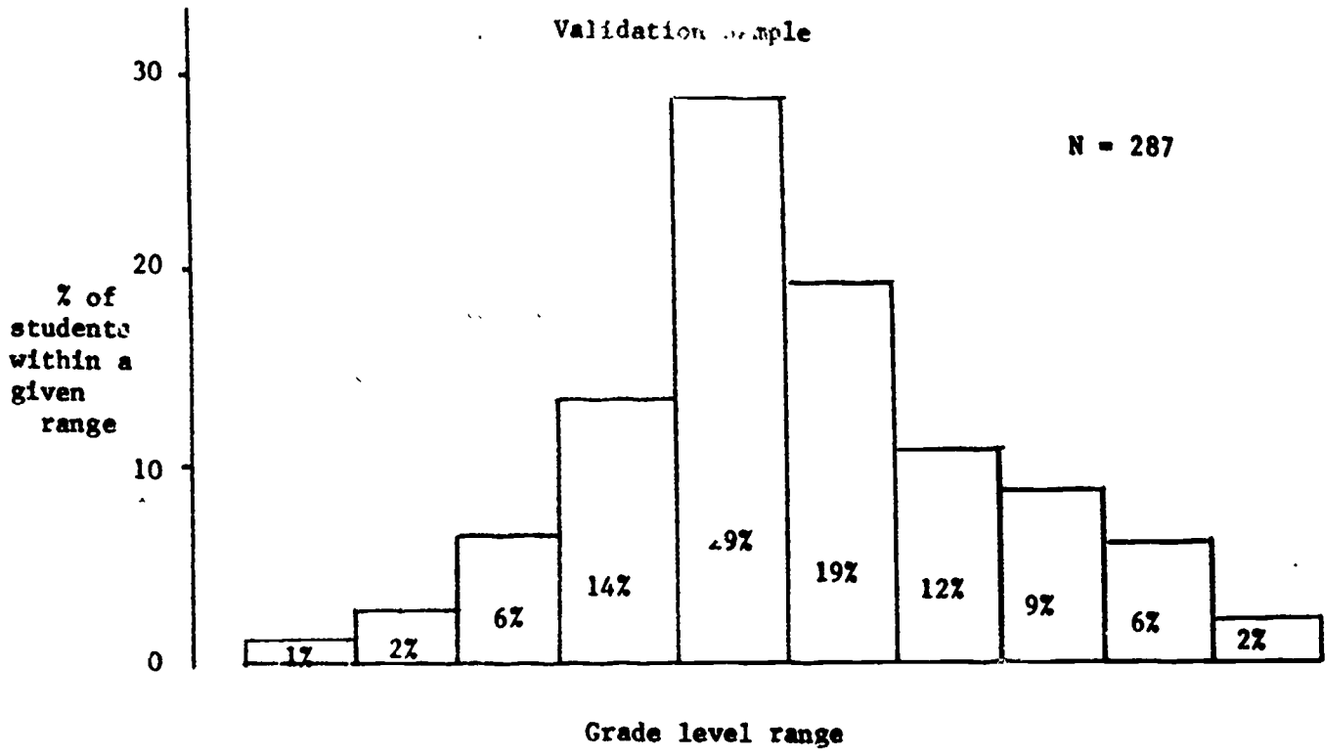
of scores, scores which would in most instances not be valid anyway because the students would not have been able to read the test items. Some tests for lower age groups were tried, but were usually found to be too difficult or too long. (Most of the students come to the school with poor motivation for test taking, and are characterized by short attention spans).

Many students in the study came from limited experiential backgrounds (most fathers were in semi-skilled or unskilled occupations, or were unemployed or non-existent; about 30% of the students came from families on welfare). The students probably knew very little about their own abilities beyond the fact that they had experienced constant failure at elementary school. Thus it seemed that a comprehensive series of tests, provided that they were at a suitable level of difficulty, could be of real assistance in placing the students in appropriate training courses.



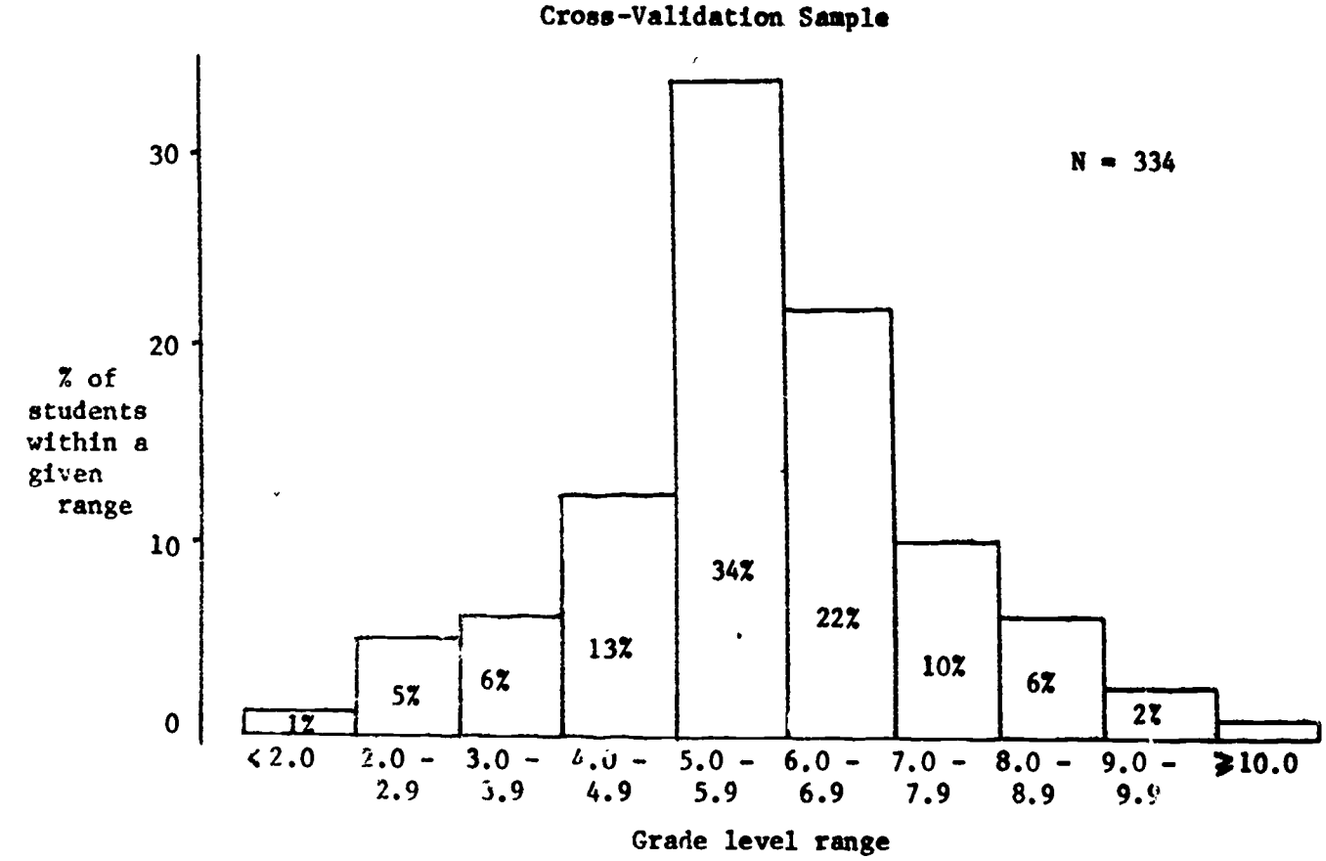


Figure 1: Distribution by sample of reading levels, as measured by Nelson Reading Test, Form A.

5. The Nature of Vocational Interests

Vocational interests are conceived by some authors as meaningful traits in themselves. To these writers, for example Berdie (1960) and Strong (1943), interest inventories measure interests, vocational choices and vocational preferences. Others believe that expressions of interest in occupational tasks per se are superficial, and become meaningful only when considered as manifestations of personality traits (e.g. Holland, 1966) or as the implementation of a self-concept (Super, 1957). To these writers, vocational interest inventories are personality inventories. Clark (1961), in writing of the development of the Minnesota Vocational Interest Inventory (MVII), commented on the wide variation in the nature of items included in vocational interest inventories, which is an indication that the dimensions tapped by these inventories are not clearly understood.

To add to the difficulty of interpretation of interest scores, the several most widely used inventories were constructed in different ways, involve different methods of scoring, and provide scores on different numbers and types of scales. However, factor analytic studies have commonly shown similar factors occurring in different instruments (Super and Crites, 1962). Scientific, Social, Language-literary, Mechanical, Business and Artistic factors have frequently been found. With the addition of an Outdoor factor, similar factors were obtained in a study of the 37 Project Talent interest scales given to high school students (Woods, 1970).

Frequently, these and similar factors have been thought of as independent dimensions of interests. However, what is often the case is that significant inter-relationships exist among some of the scales. Cronbach (1970) has commented that the most satisfactory way of mapping interest traits is on a globe, with the most positively related occupations near each other, and least (or even negatively) related occupations on opposite sides of the globe. In proposing a structural base for the comparison of several different inventories, Cole and Hanson (1971) demonstrated for five major inventories that a planar, circular configuration of

interest categories predominated. Adjacent categories in the circle were more closely inter-related, opposite categories least related. All the configurations showed scale scores which could be grouped into categories similar to the six used by Holland in his V.P.I., or the eight used by Roe (1956) in her classification scheme for occupations. With some slight changes in nomenclature and the addition of "Arts and Entertainment", Roe's scheme uses the same categories as the factors which were prominent in factor analytic studies of interest inventories referred to earlier.

Some vocational interest or preference instruments have been based on the occupational classification scheme used in the Dictionary of Occupational Titles (US Dept. of Labor, 1965). Occupations are grouped according to the nature of tasks involved, and are characterized according to level of complexity along the three dimensions of involvement with data, people and things. D'Costa (1969) used this scheme as a basis for his "cubistic" model of vocational interests, with three levels of complexity proposed for each dimension. Job activity i[illegible] for twenty-four of the twenty-seven cells in the "cube" defined by these leve[illegible] and dimensions were included in the inventory. A factor analysis showed some evidence supporting the three basic dimensions, but this was by no means clear-cut, and a further two factors were found. The California Occupational Preference Survey (COPS) (Knapp, 1966) was also based on the DOT, and is mentioned here bacause it formed the basis for the instrument (Freeberg, 1970) which in turn was the foundation of the VII described later in this paper. Eight interest areas were used; Science, Technical, Outdoor, Business, Clerical, Linguistic, Aesthetic and Service. Initially five levels of task complexity were incorporated, but after factor analysis these were collapsed to two for six of the areas and a single level for the Outdoor and Clerical areas. Thus the COPS provides fourteen scale scores.

6. The Role of Vocational Interests in Guidance

The close correspondence between interest areas defined by factors that have repeatedly emerged from studies of inventoried interests, and the categories used in many occupational classification schemes, suggests that interests should be useful predictors of occupational success and satisfaction. While some research results have been inconsistent (e.g. Madaus and O'Hara, 1967; Shann, 1972), it seems that interest inventories generally do predict career choice, and persistence and satisfaction in a job (Cronbach, 1970, Ch.14). Less evidence is available as to whether they predict job success. Where interests are particularly valuable is in the differential prediction of chances of success in one field as compared with chances in another field (Maier, 1957; French, 1963,1964; Katz and Norris, 1972). Used for differential prediction, interest tests provide a method for helping individual students attain satisfaction for themselves.

Regardless of whether conclusive empirical support for the predictive value of interest measurements can be established, such measurements are important components in the currently favoured model of career guidance which stresses the maximization of the client's understanding of himself (Cronbach, 1970; Ginzberg, 1971). Cronbach lists many practical reasons why interest inventories are well adapted to vocational counselling, chief among these being that, since students generally do not see anything mystical or threatening in interest "tests", the scores derived from these tests provide a useful beginning point for individual counselling.

7. Development of the Vocational Interest Inventory

It will be recalled that the students who were subjects of the present study were low-reading, low-achieving high school students in a special vocational programme. It was felt that some kind of interest measurement would be desirable in a guidance battery aiming to help them select suitable shop training courses

from the wide variety available. In its first two years of operation, no formal guidance programme was used at the school, and students who had difficulty in choosing shop courses to study were asked for direct expressions of interest. Not only was it found that many students had no idea what their interests were, but others, after selecting shop courses they thought they would like, put in requests for programme changes in large numbers.

Finding an interest inventory suitable for this kind of student population, represented by our sample, proved to be very difficult. The few well-researched interest inventories in existence, for example the Strong Vocational Interest Blank (Strong, 1959) and the Kuder Preference Record (Kuder, 1951), are characterized by large numbers of items requiring a great deal of reading. Primarily these instruments are aimed at college or potential college students. For the non-academic population of students who will enter a restricted range of occupations, mostly semi-skilled trades, much less has been done in the area of interest measurement. Extensive work was done by Clark (1961) on the construction of the Minnesota Vocational Interest Inventory (MVII) for non-professional men, but this inventory is also somewhat lengthy, and is intended for high school graduates who will go on to be "the skilled workers of the nation".

While it is hoped that all the students, upon graduating from the vocational high school in our study, will enter skilled and semi-skilled trades, it is not realistic to expect that very many of them will achieve success at the highly-skilled end of the spectrum. Many highly-skilled jobs require a high school grade 12 certificate before they can be entered, and very few students in our sample, which has an average reading level at least three years lower than its average age, are likely to gain such a certificate. In terms of the worker traits classification scheme used by the Dictionary of Occupational Titles (U.S. Dept. of Labor, 1965, Vol.II, p.652-3) most of the students would be graded as Levels 3 or 2 in General Educational Development, (6 = High), and 3 or 4 in General Intelligence (1 = High

and 5 = Low), indicating that a large number of occupations would not be appropriate for them.

Existing inventories which were tried during pilot stages of the study were the MVII, which was found to be far too long and often too hard (many students needed up to two hours to complete it), the Gordon Occupational Checklist (Gordon, 1963), which also proved to be too long and required greater reading ability than the students were capable of, and the Geist Picture Inventory (Geist, 1964). In the Geist Inventory the students found many of the pictures, which are drawn with fine lines in rather detailed fashion, difficult to interpret. The Ohio Vocational Interest Survey (OVIS) (D'Costa, 1970) was not available in its final published form at the time the study began, but would have been too long for the students in our sample anyway.

By far the most useful work on interest measurement from the point of view of the current study was published by Freeberg (1970), who had undertaken a special project on assessing disadvantaged adolescents in New York City. The Vocational Interest Inventory (VII) which was used with the total group of first-year students in our study in October, 1969, was adapted from several of Freeberg's test booklets. The recommendations in his report regarding test format and administration were followed closely, since it was felt that our group of students did not differ greatly from his in terms of relevant characteristics such as low reading level, short test-attention span and generally impoverished educational background.

8. Nature of the VII

The Vocational Interest Inventory was made up of items representing job tasks, for each of which the respondent indicated his preference on a four point scale. Separate versions were prepared for boys (30 items) and girls (28 items). All items were presented both pictorially and verbally, with all drawings done in clear, dark lines and all lettering printed in large type. Care was taken, as far as possible, to select words at a reading level of Grades 5 to 6. About half

of the items were used as they appeared in Freeberg's tests, a further third were modified, and ten items were new ones. The Inventory was made up in booklet form (8½" x 11"), with two items to a page. Students were not required to use a separate answer sheet, following the findings by Clark (1968) that slow learners made significantly more errors when using answer sheets than when writing answers directly on their test papers. A summary of the item content is given in Appendix A and a specimen page from each version of the Inventory is included.

The selection of items to be included was based upon a consideration of the types of jobs the students would be likely to enter and the types of shop training courses offered at the school. Most of the higher level technical jobs included in Freeberg's inventories were omitted,since it was felt that including them would probably produce a confounding of aspirations with realistic interests. Freeberg's inventories clustered items into seven four-item categories, namely clerical, Service, Technical, Business, Outdoor, Science and Aesthetic. These clusters were based on those used in the California Occupational Preference Survey (COPS), which in turn had been derived from factor analyses of tasks from the Dictionary of Occupational Titles (Freeberg, 1970). However, factor analyses of his own results showed that these clusters did not seem appropriate for the disadvantaged adolescent population with whom he was working. He was able to identify five factors, which re-clustered items into Clerical (unchanged), High Level Technical and Business, Lower Level Technical Skills, Personal Service, and Low Level Occupations. Freeberg concluded that "the perception of job tasks would thus appear to be more highly influenced by status considerations, in a sample composed exclusively of disadvantaged adolescents, than for a wider cross-section of young adults" such as the predominantly middle class population used for the COPS.

It is probably true that the sample of students in our study did not represent such a generally disadvantaged section of the population as Freeberg's sample did (Ottawa has little of New York City's close-packed urban settlement). Nevertheless,

it certainly could not be described as "predominantly middle class", and in terms of other relevant characteristics such as the low level of the students' educational achievement it seemed it seemed desirable to follow Freeberg's advice that "scoring or modifications of the measure for future applications might best adhere to these differences found in task clusters." Job tasks were accordingly grouped in four clusters, as follows:

Cluster	Abbreviation used	No. of items in Cluster	
		Boys	Girls
Clerical	C	5	7
Lover Level Technical	LLT	11	7
Personal Service	PS	7	7
Low Level Occupations	LLO	7	7
TOTAL		30	28

In the actual test booklets the items were presented in randomized order. Since only sparse information on the final clustering of items is given in Freeberg's report, and it was not possible to obtain his detailed results at the time when the VII had to be constructed, occasional guesswork had to be used for the initial assignment of items to categories, particularly for aesthetic tasks such as "Drawing illustrations for a magazine".

9. Administration of the VII.

The Inventory was administered to groups of from 50 to 75 students at a time. At least one proctor per ten students was present at each session. Items were not read aloud except to very low-level reading groups, but students were encouraged to ask questions and enough time was allowed so that those who required it could be helped individually. The time required varied from five to ten minutes, depending on the reading level of the groups being tested. The students' reaction to the format of the test appeared to be highly favourable. A total of 212 boys and 106 girls in the validation sample, and 193 boys and 132 girls in the cross-validation sample, completed the Inventory.

10. Scoring

Each item was scored 4,3,2 or 1 depending on the degree of interest expressed by the respondent (4 = high interest). A preliminary set of cluster scores was determined for each student, based on the initial grouping of items into the four categories described in the previous section. Correlations of the items with their hypothesized scales were computed for the validation sample. With a few exceptions, the items were found to correlate higher with the scale to which they had been assigned than with the other scales, even after the correlation coefficients were corrected for item-scale overlap. From the point of view of internal consistency the hypothesized scales performed well, considering the relatively small number in each, yielding generally high α coefficients for both sexes, as shown in Table 1.

TABLE I

Alpha Coefficients for Hypothesized Interest Scales

Scale	Males	Females
Clerical	0.74	0.79
Technical	0.81	0.77
Service	0.73	0.67
Low Level	0.68	0.78

In spite of these generally encouraging results it was decided that a factor analysis of the responses from the validation sample should be carried out, to explore the psychological dimensionality of the Inventory ("logical" keying often does not produce the most homogeneous clustering of items for a specific group of respondents). Scores on all items were therefore intercorrelated, and separate analyses for boys and girls were carried out. Four factors for each sex were extracted by the principal factor method, with squared multiple correlations in the diagonal cells. The factors were then rotated to the varimax criterion (Kaiser, 1958). The resulting factor loadings of each item on the four factors are presented in Table 2 for boys, and Table 3 for girls.

Table 2

Factor Loadings ≥ |.20| for Items of the VII - BOYS Validation Sample (N = 210)

(first solution, with SMC's as communalities, no iterations)

Item	Proposed Category [a]	Factors I	II	III	IV
1	C	.55			
2	PS	.43		.20	
3	LLT		.56		.25
4	LLO				.72
5	LLO				.64
6	LLT	.62			
7	C	.63			
8	LLT		.66		
9	LLT	.51			.25
10	LLO	.23			.55
11	LLO			.54	
12	PS	.44			
13	LLT	.20	.66		
14	PS		.21	.56	
15	LLT		.37	.23	.42
16	C	.39		.42	
17	LLT		.60	.35	
18	LLO		.66		
19	PS	.36		.44	
20	LLO		.45	.33	.25
21	PS	.60		.28	
22	C	.58			
23	LLO	.26			.36
24	C	.58			
25	LLT	.48	.36		
26	LLT		.33	.32	.37
27	PS	.43		.48	.21
28	LLT	.34	.63		
29	PS		.27	.66	
30	LLT		.56		.39
% of common variance accounted for by factor		49%	18%	13%	9%

a) C = Clerical; PS = Personal Service; LLT = Low Level Technical; LLO = Low Level Occupations.

Table 3

Factor Loadings ≥ |.30| for Items of the VII - GIRLS
Validation Sample (N = 106)

(first solution, with SMC's as communalities, no iterations)

Item	Proposed Category [b]	Factors I	II	III	IV
1	PS			.48	
2	PS		.42		
3	LLO				.61
4	C	.63			
5	LLT		.37		.40
6	LLO		.47		.55
7	PS			.57	
8	LLT		.33	.41	
9	PS				.49
10	LLO				.50
11	LLO		.68		
12	C	.67			
13	LLO	.33	.57		.33
14	PS	.47		.38	
15	LLT			.54	
16	C	.59			
17	LLO		.43		.46
18	C	.62			
19	PS	.36		.69	
20	LLT		.60		
21	C	.67			
22	C	.68			
23	LLT	.40	.54		
24	LLO				.66
25	PS			.61	
26	LLT		.55	.35	
27	LLT		.60		
28	C	.32		.57	
% of common variance accounted for by factor		41%	23%	12%	9%

a) C = Clerical; PS = Personal Service; LLT = Low Level Technical; LLO = Low Level Occupations

11. Results of Initial Factor Analysis

Only a brief summary of the factor analysis results will be given here. It can be seen from Tables 2 and 3 that for males 89% of the variance was accounted for by the four factors extracted, while the corresponding percentage for females was 85%. A comparison of the obtained with the expected factors revealed the following:

		Obtained	
Factor	Expected	Male	Female
I	Clerical	White Collar	Clerical
II	Technical	Blue Collar	Aesthetic/Technical
III	Service	Service	Service
IV	Low Level	Outdoor	Low Level

The expected clerical factor did emerge. The sex differences in the tasks pictured for this factor suggested that it be relabelled White Collar for males. The label Clerical was maintained for females. The expected service factor appeared for both sexes. The original low level tasks maintained their grouping for females but divided for males. The tasks remaining on low level for males could more properly be labelled Outdoor. The tasks which shifted from the original low level group were recognized as having technical components. These, together with other tasks originally labelled Technical were grouped in Factor II as Blue Collar for males. On this same factor, the female technical tasks were of such a nature that they were relabelled Aesthetic/Technical. Very few items could not clearly be placed in a single cluster, and no item did not have at least a moderate loading on at least one factor. Some movement of items from their hypothesized scale groupings did occur, but in most instances reasons accounting for the movement could be seen. However, one or two items were found to have loadings on factors with which they seemed to have no logical affiliation. Table 4 shows a summary of the grouping of items based on the factor analysis results, while the hypothesized and revised groupings are shown in the Appendix. All further scoring of the VII has used the composition of scales derived from these factor analysis results.

Table 4

VII - Items Classified by Category (after first factor analysis).

Males	Females
Factor I - White Collar	**Factor I - Clerical**
1. Run office duplicator	4. Care of office files
2. Care of sick	12. Run office duplicator
6. Decorate store window	13. Make travel arrangements
7. Care of office files	16. Keep company accounts
9. Illustrate magazines	18. Keep stock records
12. Act in movie or play	21. Do shorthand and typing
21. Show things to store customers	22. Operate telephone switchboard
22. Keep stock records	
24. Keep company accounts	**Factor II - Aesthetic/Technical**
25. Draw plans for buildings	
	2. Act in movie or play
Factor II - Blue Collar	11. Care for lawns, flowers, etc.
	13. Keep bees
3. Fix pipes and faucets	20. Illustrate magazines
8. Welding work	23. Fix jewellery
13. Repair machinery	26. Cover chairs etc.
17. Repair car troubles	27. Paint or decorate houses
18. Fix telephone wires	
20. Operate a crane	**Factor III - Service**
28. Repair TV sets	
30. Construct buildings	1. Do hair styling
	7. Sell cosmetics in homes
Factor III - Service	15. Decorate store windows
	19. Show things to store customers
11. Wash and clean cars	25. Take and serve orders in a cafe
14. Drive a taxicab	28. Operate a cash register
19. Sell automobiles	
29. Serve gas to customers	**Factor IV - Low Level Occupations**
	3. Run a pressing (ironing) machine
Factor IV - Outdoor	6. Harvest vegetable crops
	9. Care of sick
4. Do truck garden farming	10. Clean floors in buildings
5. Take care of cows	24. Work in dry cleaning plant
10. Plant and take care of lawns	
23. Raise and take care of bees	

12. Internal Consistency of Scales Derived by Factor Analysis

Internal consistency reliability indices (α coefficients) were computed for the derived scales, using data from both the validation and cross-validation samples combined. These are shown in Table 5. In view of the brevity of the scales and the reasonably large sample size, these coefficients seem to be satisfactory.

Table 5

Alpha Coefficients for Derived Interest Scales

Scale	Males	Females
White Collar/ Clerical	0.80	0.78
Blue Collar/ Aesthetic-Technical	0.85	0.91
Service	0.68	0.69
Outdoor/ Low Level Occupations	0.76	0.68

13. Further Factor Analysis Solutions

Responses on the VII from each sex in the CVS were submitted to separate factor analyses. Again, the principal factor method with SMC's in the diagonal followed by varimax rotation was used. However, these analyses were done at a different computing centre with a different package (SPSS), which incorporates some differences in its factor analysis procedures. Notably, iteration is carried out on the communality estimates until the differences from one iteration to the next are small, and the estimated communality for the number of factors selected is considered to be a measure of the common variance. Eigenvalues are re-computed, and the percentage of common variance accounted for by the number of factors requested is always 100%.

Differences in procedure from one factor analysis solution to the next have always been troublesome, though it has generally been found that the number and

nature of meaningful factors is not too greatly affected (Nunnally, 1967, p.355). Nevertheless, to provide solutions that would be equivalent in their methodology, the VS analyses were re-done with the SPSS package. Some departures from the first solutions for the VS occurred for the girls. The second solutions for the VS are shown in the Appendix in Tables 16 and 17 , while the solutions for the CVS are shown in Tables 18 and 19 , In presenting these tables some allowance has been made for sample size by changing the minimum levels of loadings reported.

An examination of means and standard deviations on the derived scales for the VS and CVS, shown in Tables 12 and 13 of the Appendix, revealed only small differences. It was thus considered legitimate to combine data from the two samples to carry out a further analysis. Since none of the earlier analyses satisfied the suggested rule of thumb about "ten times as many subjects as items," it was felt that the combined analysis should definitely be done, and would probably form the basis for further decisions concerning the composition of the scales.* Results of one further factor analysis, carried out on data collected in a similar special school in Ottawa, are also shown in the Appendix, in Table 20. No results are reported for girls at this school because of the small number (about 70) who were available to write the inventory.

14. Reconciliation of Factor Solutions

In assessing the construct validity of an instrument's scales through factor analysis, the aim is to find each item loading high on one factor only, and to find a common psychological element linking all items within a factor. If scores are then computed based on collections of items derived from such a factor solution, these scores are independent in the sense that there is no overlap of items among scales. If an item is found to load quite highly on two scales, and logical reasons for this can be seen, it is possible to score that item on both scales for the purpose of relating scale scores to a criterion. However, this introduces methodological problems if intercorrelations among scales are included in a predictor

* (See Appendix, Tables 14 & 15.

matrix for regression analyses, since the scale intercorrelations will be spuriously high. For this reason, it was decided to omit scores on items for which the classification seemed unclear in this study. Thus items 15, 16, 26 and 27 for boys, and 5,8 and 17 for girls, were not included in the derived scales.

An examination of the additional factor solutions which became available in the second and third years of the study suggests that further revisions should be made in the composition of scales. Since the extent among solutions of differences which are artifacts of the solution procedures themselves is unknown, it seems justifiable to allow a little subjective judgment in making recommendations about the composition of scales to be used in further work with this instrument.

To assess the correspondence between the solutions obtained for the VS and CVS analysed separately, Tucker's coefficient of congruence (Harman, 1967, p.270) was computed. The obtained coefficients are shown in Table 6, (page 21). Because of limitations in the sample sizes used in these separate analyses, it would be surprising if very high coefficients were found, because the solutions in small samples are more likely to be influenced by chance factors. In view of the sample sizes, the White Collar and Blue Collar factors for boys are very consistent, and the Outdoor factor is moderately consistent. For girls, there is good agreement between the two solutions for the Clerical factor, and moderate agreement for the Service, Low Level Occupations and Technical factors.

On the basis of consideration of the various solutions, the categorization of items shown in Table 7 is suggested. Items with loadings <.30, or items with divided loadings, in all solutions were excluded with no further consideration. Item analyses of responses in both samples were also examined. No items were found which did not receive the full range of responses, though there was one item for boys (#17) and three for girls (# 1, 19, 28) which had consistently high means. One item for boys (#23) and three for girls (# 10, 13, 17) consistently had low means. In some cases it appeared that this may have contributed to the ambiguity of class-

Table 6

Coefficients of Congruence for the Factor Solutions obtained in the two Separate Samples

BOYS

Cross-Validation Sample Factors	Validation Sample Factors I	II	III	IV	V	VI
I	.15	.87	.25	.05	.26	.27
II	.09	.13	.15	.79	.35	.00
III	.91	.11	.13	.11	.07	.22
IV	.11	.45	.09	.00	.71	.08
V	.76	.05	.28	.06	.08	.41
VI	.15	.17	.83	.07	.09	-.32

GIRLS

Cross-Validation Sample Factors	Validation Sample Factors I	II	III	IV	V	VI
I	.89	.35	.06	.04	.13	.03
II	.29	.31	.77	.38	.20	.41
III	.27	.33	.52	.71	.28	.02
IV	.21	.76	.25	.09	.66	.01
V	-.09	.04	.68	.19	.18	.06
VI	.14	.04	.34	.64	.23	.00

ification of the items, but on the other hand loadings for some items with restricted range were quite clear.

Table 7

Categorization of Items based on several Factor Analysis Solutions

Category	BOYS Items
I : White Collar	1,2,6,7,9,12,16,19,21,22,24
II : Blue Collar	8,13,17,18,28
III: Service (autos)	11,14,29
IV : Outdoor	4,5,10,23

Category	GIRLS Items
I : Clerical	4,12,16,18,21,22
II : Technical	20,23,26,27
III: Service (Sales)	7,19,25,28
IV : Low Level Occupations (incl. Outdoor)	3,5,6,9,10,13,17,24

15. Intercorrelations of VII Scale Scores

The intercorrelations between the VII scales derived from the first factor analysis and the other variables in the predictor battery are shown for both the validation and cross-validation samples in the Appendix (Tables21 and 22). With a few exceptions, the interest scales are not significantly related to the various ability measures, but tend to be significantly related among themselves. This pattern of results is not an unfamiliar one, as it replicates Freeberg's own results* (1970), and similar findings were reported by Clark (1961).

A factor analysis carried out separately by sex on the predictor battery intercorrelations for the validation sample strongly indicated the existence of at least one separate interest dimension in the battery. The factor loadings are shown in Table 8. These analyses were done with the BMD package, using the principal factor method with SMC's as initial estimates of communality, with up to ten iterations. The extracted factors were then rotated to the varimax criterion. The same package and method were later used to factor analyse the predictor intercorrelations from the CVS for each sex separately, to see if the existence of these separate interest dimensions was substantiated. The resulting factor loadings are shown in Table 9.

Again, the interest scales loaded on separate factors from the other tests, though not necessarily in the same combination as those in the VS analyses. Several other studies in which a variety of predictor scores have been factor analyzed, in samples of students ranging from disadvantaged inner city adolescents

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* Freeberg's test battery emphasized attitudinal measures rather than cognitive and motor skills measures such as our study used. However, four of his tests involved aspects of "Practical Reasoning", and these all showed low to negligible correlation with his interest scales.

Table 8

Factor Loadings greater than |.20| for Predictor Variables, by Sex - Sample I

Variable	MALES (N = 159 to 192)				FEMALES (N = 87 to 95)				
	I (Reasoning)	II (Interests)	III (Clerical Ability)	IV (Motor)	I (Cognitive)	II (Interests)	III (Clerical Interests)	IV	V (Clerical Ability)
1. Mathematics 1XF	.67								
2. Highland Pk Math	.50		.21		.26	.32			.35
3. Filing	.38		.21		.27			-.34	.27
4. Number Comparisons			.82					-.30	.78
5. Name Comparisons			.77		.37				.60
6. Object Drawing								-.62	.25
7. VII - Clerical		-.66					.64		
- Technical		-.62		-.23		-.66			
- Service		-.68				-.55	.35		
- Outdoor		-.67			-.26	-.75		.25	
11. IQ (non-verbal)	.25			-.22	.26			-.23	.55
12. DAT Mech Reas	.42			-.33					
13. Reading			.30		.59		-.23		
14. Motor Ability				-.67					
Percentage of total variance accounted for by factor	24%	13%	7%	6%	32%	10%	6%	4%	3%

Table 9

Factor Loadings greater than |.20| for Predictor Variables, by Sex - Sample 2

Variable	MALES (N = 180 to 200)					FEMALES (N = 132 to 138)				
	I (Reasoning)	II (Interests)	III (Clerical Ability)	IV	V (Service Interests)	I (Cognitive)	II (Interests)	III (Clerical Ability)	IV (Technical Interests)	V
1. Highland Pk Math	.76				.25	-.75				
2. Filing	.67					-.65		-.23		
3. Number Comparisons			.80			-.36		-.73		
4. Name Comparisons	.31		.80			-.43		-.78		
5. Object Drawing				-.60		-.33		-.21		-.62
6. VII - Clerical		-.69					.21		.21	
- Technical		-.54			-.39				.55	
- Service					-.59		.70			
- Outdoor		-.29					.75			
10. IQ (non-verbal)	.59			-.32		-.62		-.34	.36	-.36
11. DAT Mech Reas.	.66			-.47						
12. Reading	.63	.21				-.70		-.28	-.21	-.23
Percentage of total variance accounted for by factor	28%	12%	7%	4%	3%	34%	12%	5%	4%	3%

to college students, have reported separate interest dimensions (Freeberg, 1970; Norris and Katz,1970; Lunneborg, Greenmun and Lunneborg, 1970). Freeberg found one dimension defining "General Vocational Interest" for his disadvantaged males, and two dimensions, distinguishing high and low skill level tasks, for females.

16. Stability of the VII Scale Scores

A perennial problem in the use of interest measures with school students is that it is felt that interests are relatively unstable constructs before late adolescence. However, some studies of the use of interest measures with high school students, which can serve as a basis for comparing the performance of the VII, have been done (for example, Jenkins, 1958; Katz, Norris and Halpern, 1970; D'Costa et al 1970, 1971).

No long-term indices of stability were reported by Jenkins, but test-retest reliabilities after a fiveweek interval for each occupational area and interest domain are given by sex for grades 9 and 12, and for college students. For grade 9 boys, these ranged from .58 for Visual Arts (Decorative) to .89 for Numerical, and for grade 9 girls they ranged from .51 for Hunting to .86 for Amusement (Production). These indices were based on only about one hundred students of each sex, a rather small number for a published test, and no description of the samples was provided.

Test-retest reliabilities after an interval of two weeks on the Ohio Vocational Interest Survey (OVIS) for about 600 students of each sex at each of two grade levels (8 and 10) are given by D'Costa et al (1970). The indices ranged from .72 to .90, with medians per grade level per sex ranging from .78 to .85. Long term stability indices over a two-year period were reported for a similar number of students (Schaffer, 1971) who wrote the OVIS in 1969 and 1971. These ranged from .44 to .70 for males, and from .39 to .71 for females. In a much larger study which investigated properties of the twelve scales of the Academic Interest Measures (AIM) for students in grades 10, 11 and 12, Katz et al (1970) reported test-retest reliab-

ilities after three weeks clustering about .86, one year (from grade 10 to 11) stability indices ranging from .60 to .77, and two year (from grade 10 to 12) stability indices ranging from .52 to .74. Although it includes "academic" in its title, AIM has scales labelled Art, Secretarial, Industrial Arts, Home Economics and Business, which would largely encompasss the fields represented in the VII. However, tasks included in the AIM scale items cover a very much wider range of skills.

The scale stabilities for the VII over intervals of four, nine and thirteen months for the CVS, and over twenty-one and thirty-three months for the VS, are shown in Table 10. For the CVS, scores for only those students who wrote the test on all three occasions were included in the analyses. Short-term test-retest reliabilities, after three weeks, were computed for a small group of boys from the VS, all reading at about the grade six level, who completed the inventory twice. When the VII was administered in a second similar high school last year a sample of students from all reading levels was used to obtain further evidence on the short-term test-retest reliability of the scales, since it was felt that the homogeneity of the first group may have influenced the results. The indices obtained from both groups are shown in Table 11. As can be seen, all indices are quite high except for Girls/Service.

The stability indices obtained are considerably lower than those obtained by Katz et al (1970), suggesting that the vocational interests of low ability students are considerably more fluid than the "academic" interests of students who mostly expect to complete at least four years of high school. In our sample, boys' interests were more stable than girls', and interests in service tasks changed most over all.

TABLE 10

Stability Indices for the VII Scales, by Sex and Sample

BOYS

	Sample I (Validation)		Sample 2 (Cross-Validation)		
	Interval				
Scale	21 months (Sept 69 - June 71) N=71	33 months (Sept 69 - June 72) N=43	4 months (May 70 - Sept 70) N=96	9 months (Sept 70 - June 71) N=96	13 months (May 70 - June 71) N=96
White Collar	.45	.48	.65	.72	.60
Blue Collar	.55	.54	.58	.55	.51
Service	.48	.45	.52	.64	.33
Outdoor	.50	.40*	.53	.52	.50

* Sig., P<.004. All others sig. at P<.001

GIRLS

	Sample 1		Sample 2		
	Interval				
Scale	21 months N=40	33 months[a]	4months N=71	9 months N=71	13 months N=71
Clerical	.33**		.63	.46	.37
Aesthetic/Technical	.68		.76	.63	.56
Service	.57		.53	.52	.39
Low Level Occupations	.50		.66	.62	.51

[a] Insufficient cases available for correlation

** Sig., P<.02. All others sig. at P<.001

Table 11

Test-retest Reliabilities of the VII Scales After Three Weeks

Scale	BOYS		GIRLS
	Group 1 (from Sample 1) N=23	Group 2 (from second school) N=57	Group 1 (from second school) N=22
White Collar Clerical	.85	.79	.81
Blue Collar Aesthetic/Technical	.82	.78	.86
Service Service	.73	.73	.50
Outdoor Low Level Occupations	.89	.79	.87

17. Predictive Validities of the VII Scales

The predictive validities of the VII scales have been described in detail in another paper (Lokan and Halpern, 1972) and will only be discussed briefly here:

For prediction purposes the 25 shop courses were grouped empirically into four clusters for each sex. The clusters were as follows:

BOYS	GIRLS
A. Mechanical tasks	A. Clerical taks
B. Aesthetic tasks	B. Personal grooming
C Construction tasks	C. Domestic tasks
D Miscellaneous	D. Miscellaneous

Details of the allocation of shops to clusters are given in the Appendix. The over-all average in academic subjects was also a criterion.

Several of the VII scales contributed significantly to the prediction of scores on the various criteria, predictions which in general held up very well on cross-validation and double cross-validation. For boys, the White Collar scale entered the regression equation for Academic average, Shops B (Aesthetic) and Shops D (Miscellaneous). The Blue Collar scale helped to predict scores for Shops A (Mechanical), while the Service scale entered the equation for Shops D (Miscellaneous), and the Outdoor scale for Shops C (Construction). For girls, the VII scales tended to enter the equations as suppressor variables. The Service scale had negative weights in the equations for Shops B, C and D (all clusters but Clerical). The Aesthetic/Technical scale contributed to the prediction of Academic average and Shops B (Personal Grooming) but had a negative weight for Shops A (Clerical). The Low Level Occupations/Outdoor scale contributed to the prediction of Shops C (Domestic) and D (Miscellaneous). In no case was an interest variable the first selected by the stepwise regression routines. However, it was common for interest variables to be selected second or third.

18. The VII and Kuder's Twelve Principles of Interest Measurement

A majority of the principles outlined by Kuder (1970) are satisfied by the VII. The items are reasonably distributed in the domain of interests relevant to the target population. The activities described appear to be clear to the students, occupational titles are not used, and the items are neither unpleasant nor threatening. Internal consistency reliability indices of the scales are quite good, and indices of stability are fair. Reporting of scores can easily be done in order of magnitude, as Kuder suggests. Properties on which the VII does NOT satisfy Kuder's principles are that separate forms are used for the two sexes (this seemed desirable in the context of the study) and no attempt was made to minimize effects of response bias (since the VII is intended for guidance rather than selection purposes this is not a crucial issue - in fact it could be useful for a counsellor to know that a client feels negatively, or positively, or indifferent about most things). The VII's capability of differentiating well between occupational groups has not as yet been investigated. All students in our validation and cross-validation samples studied at least four shops during the year, so that it was not possible to identify clearly any "occupational group" for individual students. However, as Katz et al have pointed out, criteria such as marks and later interests seem more relevant to school guidance programmes than resemblance to a group. In their words, a "prediction .. of what choice a student is likely to make .. (seems) to have very dim usefulness in guidance" (1970, p.8).

In summary, The Vocational Interest Inventory seems to be a promising instrument for use with low-reading secondary school students in vocational programmes. Evidence gathered to date concerning its psychometric and predictive properties is encouraging. Follow-up data on the success and satisfaction with their shop specialty programmes in second and third year for the VS, and in second year for the CVS, has been collected. It is planned that studies of the ability of the VII scales to differentiate among students in the various shop clusters should be carried out with this data.

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VII - Summary of Item Content and Classifications - MALES

Item No.	Content	Proposed[a] Category	Revised[b] Category
1	Run an office duplicator	C	W
2	Help take care of sick in hospital	PS	W
3	Fix leaky pipes and faucets	LLT	B
4	Do truck garden farming	LLO	O
5	Take care of cows and milk them	LLO	O
6	Decorate a store window	LLT	W
7	Take care of office files	C	W
8	Do welding work	LLT	B
9	Do illustrations for a magazine	LLT	W
10	Plant and take care of lawns etc.	LLO	O
11	Wash and clean cars	LLO	S
12	Act small part in movie or play	PS	W
13	Check and repair machinery	LLT	B
14	Drive a taxicab	PS	S
15	Put plaster on walls etc.	LLT	?
16	Sort mail	C	?
17	Check out and fix car troubles	LLT	B
18	Fix telephone wires	LLO	B
19	Sell automobiles	PS	S
20	Operate a crane	LLO	B
21	Show things to customers in a store	PS	W
22	Keep records of stocks and supplies	C	W
23	Raise and take care of bees	LLO	O
24	Keep company records and accounts	C	W
25	Draw plans for buildings	LLT	W
26	Clean and repair buildings	LLT	?
27	Take and serve orders in a restaurant	PS	?
28	Check and repair TV sets	LLT	B
29	Serve Gas to customers	PS	S
30	Use lumber in building construction	LLT	B

a) C=Clerical; PS=Personal Service; LLT=Low Level Technical; LLO=Low Level Occupations

b) W=White Collar; B=Blue Collar; S=Service; O=Outdoor

VII - Summary of Item Content and Classifications - Females

Item No.	Content	Proposed[a] Category	Revised[b] Category
1	Do hair styling	PS	S
2	Act small part in movie or play	PS	A
3	Run a pressing machine	LLO	LLO
4	Take care of office files	C	C
5	Bake bread in large ovens	LLT	?
6	Harvest vegetable crops	LLO	LLO
7	Sell cosmetics in homes	PS	S
8	Sew new or remade clothes	LLT	?
9	Do things for sick people in hospitals	PS	LLO
10	Clean floors etc. in buildings	LLO	LLO
11	Plant and care for lawns, flowers etc.	LLO	A
12	Run office duplicator	C	C
13	Raise and take care of bees	LLO	A
14	Help make travel arrangements	PS	C
15	Decorate store windows	LLT	S
16	Keep company records and accounts	C	C
17	Take care of cows and milk them	LLO	?
18	Keep records of stocks and supplies	C	C
19	Show items to customers in a store	PS	S
20	Do illustrations for a magazine	LLT	A
21	Do shorthand and typing	C	C
22	Operate a telephone switchboard	C	C
23	Fix jewellery	LLT	A
24	Work in a laundry or dry cleaning plant	LLO	LLO
25	Take and serve orders in a cafe	PS	S
26	Cover chairs etc.	LLT	A
27	Paint or decorate houses	LLT	A
28	Operate a cash register in a store	C	S

a) C=Clerical; PS=Personal Service; LLT=Low Level Technical; LLO=Low Level Occupations

b) C=Clerical; S=Service; A=Aesthetic; LLO=Low Level Occupations

NAME: _____ _____
LAST NAME FIRST NAME

HOME FORM: _____

VOCATIONAL INTEREST INVENTORY

BOYS

The pictures in this booklet show different things that people do on jobs. With each picture are four ways that people might feel about doing such work. PUT A CROSS [X] IN THE BOX NEXT TO THE WAY THAT TELLS BEST HOW YOU FEEL ABOUT DOING THAT KIND OF WORK.

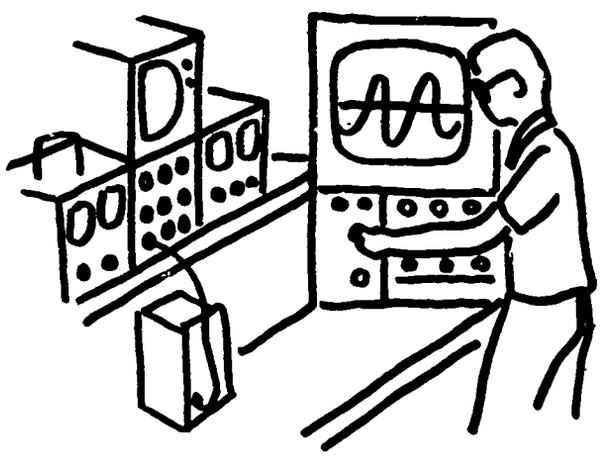
The Collegiate Institute Board gratefully acknowledges the assistance of the Educational Testing Service in the preparation of this test.

27

Take orders and serve food or drinks in a restaurant.

- ☐ Pretty bad - I couldn't take doing it.
- ☐ Not too good - I might do this but I wouldn't like it.
- ☐ This is OK - I wouldn't mind this too much.
- ☐ This is great - just the kind of thing I would like to do.

28



Check and repair TV sets.

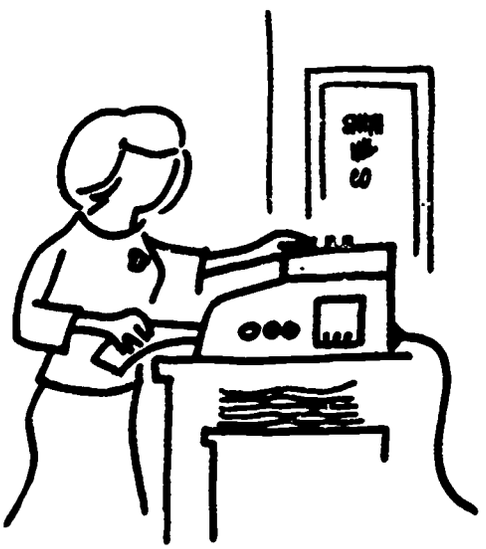
- ☐ Pretty bad - I couldn't take doing it.
- ☐ Not too good - I might do this but I wouldn't like it.
- ☐ This is OK - I wouldn't mind this too much.
- ☐ This is great - just the kind of thing I would like to do.

11

Plant and care for lawns, shrubs and flowers.

- ☐ Pretty bad - I couldn't take doing it.
- ☐ Not too good - I might do this but I wouldn't like it.
- ☐ This is OK - I wouldn't mind this too much.
- ☐ This is great - just the kind of thing I would like to do.

12



Run an office duplicator or copy machine.

- ☐ Pretty bad - I couldn't take doing it.
- ☐ Not too good - I might do this but I wouldn't like it.
- ☐ This is OK - I wouldn't mind this too much.
- ☐ This is great - just the kind of thing I would like to do.

Table 12

Means and Standard Deviations for VII Scales, by Sample and Test Occasion - BOYS

	Sample 1 (Validation)			Sample 2 (Cross-Validation)	
	$\bar{X}$				
Scale	Sept 69 (N=174)	June 71 (N=71)	June 72 (N=48)	Sept 70 (N=180)	June 71 (N=123)
White Collar	21.7	21.0	20.9	19.9	20.5
Blue Collar	20.8	19.0	20.2	20.5	20.5
Service	11.6	11.7	10.9	11.5	11.8
Outdoor	8.0	8.1	8.4	7.7	8.7

	S.D.				
Scale	Sept 69	June 71	June 72	Sept 70	June 71
White Collar	6.1	5.3	5.2	5.6	5.4
Blue Collar	6.4	5.2	5.2	5.0	5.7
Service	3.4	2.8	3.1	3.2	3.2
Outdoor	3.1	2.5	2.8	2.7	2.7

Table 13

Means and Standard Deviations for VII Scales, by Sample and Test Occasion - Girls

	Sample 1 (Validation)			Sample 2 (Cross-Validation)	
	$\bar{X}$				
Scale	Sept 69 N=86	June 71 N=40	June 72 N=15	Sept 70 N=124	June 71 N=96
Clerical	19.2	17.8	17.5	17.6	16.7
Aesthetic/Technical	15.2	15.3	15.9	14.0	14.5
Service	17.7	16.4	15.1	17.2	16.0
Low Level Occupations	13.0	13.9	12.9	12.4	12.9

	S.D.				
Scale	Sept 69	June 71	June 72	Sept 70	June 71
Clerical	4.5	5.3	5.3	4.9	5.0
Aesthetic/Technical	7.5	5.2	5.5	4.5	4.9
Service	3.9	2.8	3.3	3.8	3.6
Low Level Occupations	3.8	2.5	3.0	3.7	4.0

Table 14

Factor Loadings > |.20| for Items of the VII, BOYS, Both Samples Combined (N=390)

Item	Proposed Category (a)	Factors I	II	III	IV	V	VI
1	C	.43					
2	PS	.35			.20		
3	LLT		.37			.45	
4	LLO			.71		.21	
5	LLO			.72			
6	LLT	.55				.26	
7	C	.65					
8	LLT		.58			.23	
9	LLT						.85
10	LLO			.40		.33	.21
11	LLO			.30	.44		
12	PS	.41					.20
13	LLT		.68				
14	PS				.49		
15	LLT			.21		.59	
16	C	.41			.26		
17	LLT		.57		.35		
18	LLO		.64				
19	PS	.40			.31		
20	LLO		.34		.25	.41	
21	PS	.59			.26		
22	C	.62					
23	LLO			.44			
24	C	.59					
25	LLT	.32	.32				.45
26	LLT	.21	.32		.22	.45	
27	PS	.39			.43		
28	LLT		.62				
29	PS				.63		
30	LLT		.41	.24	.21	.34	
% of common variance accounted for by factor		46	19	15	9	6	5

a) C = Clerical; PS = Personal Service; LLT = Low Level Technical; LLO = Low Level and Outdoor

Table 15

Factor Loadings ≥ |.20| for Items of the WII, GIRLS
Both Samples Combined (N=233)

Item	Proposed Category(a)	Factors I	II	III	IV	V	VI
1	PS						.44
2	PS		.28	.33			.22
3	LLO			.26		.53	
4	C	.62					
5	LLT		.20	.48	.28		
6	LLO		.25	.68			
7	PS				.50		.26
8	LLT						.46
9	PS			.41	.21		
10	LLO			.52	.26	.21	
11	LLO		.47	.55			
12	C	.69					
13	LLO			.60			
14	PS	.41	.27		.39		
15	LLT		.34		.38		.31
16	C	.59					
17	LLO		.27	.52			
18	C	.63	.21		.26		
19	PS	.32			.62		
20	LLT	.20	.45				.21
21	C	.66					
22	C	.52			.23		
23	LLT	.28	.60	.24			
24	LLO			.35	.27	.57	
25	PS				.58		
26	LLT		.57		.21		
27	LLT		.66				
28	C	.30			.58		
% of common variance accounted for by factor		48	22	10	9	5.5	4.5

a) See footnote to Table 14, previous page

Table 16

Factor Loadings > |.20| for Items of the VII, BOYS, Validation Sample (N=210)

Item	Proposed Category(a)	Factors I	II	III	IV	V	VI
1	C	.52	.22				
2	PS	.37		.20			
3	BLT		.50			.42	
4	LLO				.75		
5	LLO				.70		
6	LLT	.55					.26
7	C	.66					
8	LLT		.62				
9	LLT	.24					.84
10	LLO					.38	
11	LLO			.57			
12	PS	.35	.24				.27
13	LLT		.64				
14	PS			.57			
15	LLT		.23			.66	
16	C	.45		.33			
17	LLT		.56	.40			
18	LLO		.67				
19	PS	.41		.36			
20	LLO		.37	.26		.40	
21	PS	.65					
22	C	.58					
23	LLO	.25			.38		
24	C	.56			.22		
25	LLT	.23	.31				.62
26	LLT		.22	.30		.44	
27	PS	.46		.41	.22		
28	LLT	.27	.68				
29	PS		.27	.65			
30	LLT		.51		.25	.40	
% of common variance accounted for by factor		48	19	13	9	6	5

a) See footnote to Table 14, p. 43

Table 17

Factor Loadings ≥ |.30| for Items of the VII, GIRLS Validation Sample (N=106)

Item	Proposed Category(a)	Factors I	II	III	IV	V	VI
1	PS					.68	
2	PS					.40	
3	LLO						.66
4	C	.61					
5	LLT			.42			
6	LLO			.72			
7	PS		.46			.36	
8	LLT				.33	.46	
9	PS			.41			
10	LLO			.58		.32	
11	LLO			.59	.40		
12	C	.65					
13	LLO	.33		.57	.39		
14	PS	.44	.34				-.35
15	LLT					.48	
16	C	.58					
17	LLO			.55			
18	C	.58	.32				
19	PS	.31	.69				
20	LLT				.73		
21	C	.70					
22	C	.71					
23	LLT	.31	.21		.62		
24	LLO		.32	.37			.56
25	PS		.58				
26	LLT		.31	.39	.42		
27	LLT			.32	.50		
28	C		.88				
% of common variance accounted for by factor		42	23	13	10	7	5

a) See footnote to Table 14, p. 43

Table 18

Factor Loadings ≥ |.20| for Items of the VII, BOYS, Cross-Validation Sample (N=180)

Item	Proposed Category(a)	Factors I	II	III	IV	V	VI
1	C			.26	.22		
2	PS		.22			.38	
3	LLT		.24		.55		
4	LLO		.63				
5	LLO		.69				
6	LLT			.21	.38	.57	
7	C			.54		.33	
8	LLT	.40			.33		
9	LLT	.28				.46	-.21
10	LLO		.46			.34	
11	LLO		.39				.29
12	PS					.56	
13	LLT	.72					
14	PS					.28	.35
15	LLT		.23		.47		
16	C					.45	
17	LLT	.57					.26
18	LLO	.61					
19	PS	.23		.44	-.26		.25
20	LLO	.32			.36		.25
21	PS			.26		.58	.20
22	C			.47		.47	
23	LLO		.56				
24	C			.77			
25	LLT	.35		.43			-.31
26	LLT	.42		.24	.44		
27	PS					.44	.36
28	LLT	.57					
29	PS						.62
30	LLT	.34	.25				
% of common variance accounted for by factor		40	20	19	9	7	5

a) See footnote to Table 14, p.43

Table 19

Factor Loadings ≥ |.25| for Items of the VII, GIRLS Cross-Validation Sample (N=127)

Item	Proposed Category(a)	Factors I	II	III	IV	V	VI
1	PS						
2	PS					.30	.57
3	LLO		.36				
4	C	.59					
5	LLT		.37		.31	.42	
6	LLO		.27	.26		.74	
7	PS				.56		
8	LLT	.29					
9	PS				.28	.35	
10	LLO		)62		.15		
11	LLO		.26	.40		.49	.30
12	C	.69					
13	LLO		.65				.49
14	PS	.32		.40	.36		
15	LLT			.45	.39	.25	
16	C	.65	.26				
17	LLO		.47	.29			
18	C	.67		.28			
19	PS	.29			.55		
20	LLT			.27			.57
21	C	.64					
22	C	.34		.25			
23	LLT		.38	.53			.29
24	LLO		.58				
25	PS		.33		.56		
26	LLT			.65			
27	LLT			.68			
28	C	.41			.44		
% of common variance accounted for by factor		47	20	10	9	7	6

a) See footnote to Table 14, p. 43

Table 20

Factor Loadings ≥ |.25| for Items of the VII, BOYS Second School (N=144)

Item	Proposed Category(a)	Factors I	II	III	IV	V	VI
1	C		.28				.26
2	PS					.46	
3	LLT	.60					
4	LLO				.64		
5	LLO				.57		
6	LLT		.54			.25	
7	C		.69			.25	
8	LLT	.66					.29
9	LLT		.39			.38	
10	LLO				.75		
11	LLO			.50		.29	
12	PS		.26			.66	
13	LLT	.72					.33
14	PS			.49			
15	LLT	.36					.54
16	C		.58				
17	LLT	.74	-.26				
18	LLO	.54					
19	PS	.37		.26		.37	
20	LLO	.51		.29			
21	PS		.37	.43		.33	
22	C		.57	.40			
23	LLO				.65		
24	C		.73				
25	LLT						
26	LLT	.42					.35
27	PS		.32	.49		.30	
28	LLT	.47					
29	PS			.64			
30	LLT	.41					.49
% of common variance accounted for by factor		36	27	14	11	7	5

(a) See footnote to Table 14, p. 43

Table 21

Intercorrelations of Predictor Tests - VALIDATION SAMPLE[a]

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
ıths 1XF	1		0.52	0.41	0.21	0.25	0.14*	0.02*	0.07*	0.05*	-0.08*	0.09*	0.32	0.25	0.30
md P.Ma.	2	0.52		0.61	0.33	0.35	0.28	0.07*	0.08*	0.09*	-0.06*	0.12*	0.38	0.51	0.60
Filing	3	0.39	0.55		0.27	0.24	0.19	0.07*	0.16	0.21	0.03*	0.12*	0.21	0.46	0.43
Compa.	4	0.22	0.39	0.42		0.61	0.16	0.22	-0.02*	-0.07*	-0.10*	-0.02*	0.17	0.32	0.24
ompar.	5	0.15*	0.40	0.28	0.45		0.23	0.19	-0.01*	-0.01*	-0.12*	0.07*	0.18	0.35	0.20
Object rawing)	6	0.14*	0.30	0.36	0.40	0.26		0.18	-0.05*	-0.11*	-0.07*	0.11*	0.24	0.22	0.23
Ability	7								-0.03*	0.12*	0.08*	0.26	0.30	0.10*	0.27
lerical	8	0.10*	-0.08*	-0.06*	0.07*	0.07*	0.07*			0.42	0.29	0.24	-0.16	0.03*	0.01*
Service	9	-0.10*	-0.30	-0.16*	-0.22	-0.00*	-0.11*		0.24		0.47	0.43	-0.20	0.01*	0.09*
Outdoor	10	-0.11*	-0.34	-0.13*	-0.14*	-0.11*	-0.12*		0.05*	0.36		0.41	-0.02*	-0.12*	0.01*
chnical	11	-0.06*	-0.26	-0.01*	-0.07*	0.03*	-0.02*		-0.08*	0.17*	0.27		0.08*	0.01*	0.19
DAT/MR	12	0.36	0.29	0.27	0.22	0.25	0.10*		0.03*	-0.11*	0.11*	0.08*		0.17	0.43
Reading	13	0.39	0.53	0.53	0.30	0.26	0.20*		-0.01*	-0.11*	-0.24	-0.01*	0.32		0.30
I. Q.	14	0.40	0.67	0.55	0.55	0.42	0.35		-0.03*	-0.28	-0.34	-0.12*	0.37	0.49	

(a) Results for males above diagonal; results for females below diagonal.

* These correlation coefficients are not significantly different from zero at the .05 level.

Table 22

Intercorrelations of Predictor Tests - CROSS-VALIDATION SAMPLE(a)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
aths IXF(b)	1														
. Pk Math	2			0.51	0.25	0.42	0.26		-0.02*	-0.04*	-0.22	-0.02*	0.53	0.56	0.51
lling	3	0.54			0.25	0.28	0.17		0.01*	0.13*	0.01*	0.10*	0.50	0.45	0.42
r Compa.	4	0.44	0.45			0.66	0.16		-0.06*	-0.06*	-0.02*	0.06*	0.26	0.86	0.23
Compa.	5	0.46	0.48	0.75			0.20		-0.05*	0.02*	-0.08*	0.06*	0.42	0.39	0.22
t Drawing	6	0.30	0.40	0.40	0.36				0.12*	-0.02*	-0.06*	0.10*	0.42	0.15	0.31
Ability(b)	7														
Clerical	8	0.09*	0.10*	0.20	0.23	0.00*				0.44	0.14*	0.28	-0.04*	-0.07*	-0.10*
Service	9	-0.03*	-0.04*	-0.02*	0.02*	-0.03*			0.21		0.34	0.37	0.08*	-0.05*	-0.04*
Outdoor	10	-0.03*	-0.03*	0.06*	0.07*	-0.11*			0.20	0.17*		0.12*	-0.03*	-0.09*	-0.14*
Technical	11	-0.16*	-0.14*	-0.04*	-0.05*	-0.02*			0.27	0.15*	0.51		0.22	-0.05*	0.02*
(c)	12													0.47	0.56
g	13	0.59	0.57	0.50	0.57	0.44			0.10*	-0.14*	-0.08*	-0.12*			0.39
	14	0.55	0.52	0.51	0.60	0.48			0.13*	0.15*	0.02*	0.00*		0.53	

(a) Results for males above diagonal; results for females below diagonal
(b) Scores on these tests not available for cross-validation sample
(c) Not administered to girls in cross-validation sample

* These correlation coefficients are not significantly different from zero at .05 level

Table 23

Allocation of Shops to Clusters

BOYS		GIRLS	
Cluster	Shop	Cluster	Shop
A	Auto Body	A	Typing & Office Practice
	Auto Service		
	Electrical Repair		
	Graphic Arts	B	Personal Grooming
	Machine Shop		
	Small Engines	C	Dry Cleaning
			Food Services
B	Art		Home Management
	Drafting		Industrial Sewing
	Instrumental Music		
	Painting and Decorating	D	Art
	Retailing		Graphic Arts
	Upholstering		Horticulture
			Hospital Care
C	Carpentry and Millwork		Instrumental Music
	Sheet Metal		Painting and Decorating
	Trowel Trades		Retailing
	Welding		Upholstering
D	Building Maintenance		
	Dry Cleaning		
	Food Services		
	Horticulture		
	Hospital Care		
	Industrial Sewing		
	Typing & Office Practice		