DOCUMENT RESUME

ED 106 310 TM 004 421

AUTHOR	Wyman, W.C.
TITLE	Exploring the TRQ: Technical Supplement. Paper No. 124.
INSTITUTION	Toronto Board of Education (Ontario). Research Dept.
PUB DATE	Jun 74
NOTE	37p.; For related documents, see TM 004 422-427
EDRS PRICE	MF-$0.76 HC-$1.95 PLUS POSTAGE
DESCRIPTORS	Correlation; Elementary Education; Evaluation; Factor Analysis; Matrices; Multiple Regression Analysis; *Questionnaires; *Rating Scales; *Statistical Analysis; *Statistical Data; *Student Evaluation; Tables (Data); Test Reliability
IDENTIFIERS	Canada; *Teachers Rating Questionnaire

ABSTRACT

This paper is an extended series of appendices to the report "Exploring the T.R.Q.: An Assessment of the Effectiveness of the Teachers' Rating Questionnaire," Report Number 123. It should be most useful to those familiar with multiple regression analysis and factor analysis and wishing a more complex record of the statistical procedures originally employed. This supplement takes a precise look at estimation of reliability coefficients from delayed retest data, indices used in evaluating theoretical distributions and analysis of the correlation matrices of the TRQ questions. (Author)

EXPLORING THE TRQ: TECHNICAL SUPPLEMENT

W. C. Wyman

#124

JUNE, 1974

RESEARCH SERVICE

issued by the

Research Department

BOARD OF EDUCATION FOR THE CITY OF TORONTO

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EXPLORING THE TRQ
TECHNICAL SUPPLEMENT

This paper is essentially an extended series of appendices to the report entitled "Exploring the TRQ: An Assessment of the Effectiveness of the Teachers' Rating Questionnaire". It should be most useful to people wishing a more precise account of the statistical procedures employed in the original report, or a more complex look at the data. It is assumed that readers will be familiar with multiple regression analysis and with factor analysis.

Included in this technical supplement are those items which should be included with the original report for the sake of completeness, and for the purpose of allowing the sophisticated reader to verify for himself, the author's conclusions. However, many such items will be of little interest to many users of the TRQ and would add needless volume to the original report. Hence they are published separately in this supplement.

Estimation of Reliability Coefficients from Delayed Retest Data

The teachers' rating questionnaire does not allow a direct measure of reliability. Since only one teacher knows the child well enough to rate him at any given point in time, it is not possible to collect ratings of the same child from two teachers at the same point in time. We do, however, have a series of delayed measures, at one year intervals. As expected, we find that those ratings made only a year apart correlate higher than ratings made several years apart.

When we plot these correlations against the number of years between ratings, it appears that we should be able to estimate the reliability of the test by fitting a regression line to these correlations and extrapolating back to an elapsed time between ratings of zero.

The shape of the regression line should not be straight, but rather, concave downward with an asymptote at zero as time increases. The negative exponential function produces such a curve, and the following discussion will demonstrate its appropriateness in the present context.

The first step is the development of a model which expresses the processes we believe to affect our measurements. Consider a measurement m_0 of a given pupil at time zero. It will consist of a component which reflects the true state of the pupil, $\hat{x}_0$, and a measurement error component, x_{e0}, independent of $\hat{x}_0$. That is, $m_0 = \hat{x}_0 + x_{e0}$. At time t, the measurement of the same pupil will be $m_t = \hat{x}_t + x_{et}$ where $\hat{x}_t$ is the true state of the pupil at time t and x_{et} is the measurement error at time t. The measurement error, x_{et}, at time t is assumed to be independent of errors on all previous measurements and of the true state of the pupil at time t and all previous measurements. That is, x_{et} is independent of x_{ei}, $i = 0, t-1$ and of $\hat{x}_i$, $i = 1, t-1$.

Also, the true state of the pupil at time t is his initial state plus any changes over time. This can be represented as $\hat{x}_t = \hat{x}_0 + \sum_{i=1}^{t} x_{ci}$ where x_{ci} is the change in the actual state of the pupil between time $i-1$ and time i. That is $x_{ci} = \hat{x}_i - \hat{x}_{i-1}$. For our purposes these changes, x_{ci}, must be considered random since we are not able to predict them. It is also necessary to consider each change x_{ci} to be independent of the other changes as well as of the error, x_{ei}, at any time i, and of the true state of the pupil $\hat{x}_{i-1}$ at time $i - 1$.

The assumption that x_{ci} is independent of $x_{c(i-1)}$ is perhaps somewhat questionable as it implies that a child who improves relative to his classmates one year is as likely to get worse as to continue improving in the next year. More concretely, a child ranked by his teacher as ninth in his class in grade 3 and as eighth in grade 4 is as likely to be ranked ninth again in grade 5 as he is of being ranked seventh. I believe that, for our purposes, this is close enough to being true that the assumption is justified. Thus the complete model is written as:

$$m_t = x + \sum_{i=1}^{t} x_{ci} + x_{et}.$$

We will derive an equation for the expected correlation between m_o and m_t by examining the relationship between the variances of these measures. Since the components of the model are independent, the variance of their sum is the sum of their variances:

$$\sigma^2_{m_t} = \sigma^2_x + \sum_{i=1}^{t} \sigma^2_{x_{ci}} + \sigma^2_{x_{et}} .$$

All that now remains is to make a reasonable assumption about $\sigma^2_{x_{ci}}$ and $\sigma^2_{x_{et}}$.

One reasonable assumption is to make the variances of these quantities proportional to the actual variance at time t, $\hat{\sigma}_t$

That is, $\sigma^2_{ci} = K_1 \hat{\sigma}^2_{t-1}$ $\qquad \sigma^2_{et} = K_2 \hat{\sigma}^2_t$

where K_1 and K_2 are positive constants near zero. Note that the variance of x_{ct} (i.e. σ^2_{ct}) is expressed in terms of

$\hat{\sigma}^2_{t-1}$ rather than $\hat{\sigma}^2_t$.

This is because we define $\hat{x}_t$ as $\hat{x}_{t-1} + \hat{x}_{ct}$.

The component $\hat{x}_{ct}$ is the change in $\hat{x}_{t-1}$ and its variance is thus expressed in terms of the variance of $\hat{x}_{t-1}$.

The assumptions about the variances are summarized below:

(1) $$\sigma^2_t = \sigma^2 + \sum_{i=1}^{t} \sigma^2_{ci} + \sigma^2_{et} = \hat{\sigma}^2_t + \sigma^2_{et}$$

(2) $$\sigma^2_{ci} = K_1 \hat{\sigma}^2_{i-1}$$

(3) $$\sigma^2_{et} = K_2 \hat{\sigma}^2_t ,$$

where: σ^2_t = an estimate of the variance of the measurements at time t

$\hat{\sigma}^2_t$ = the actual variance of the pupils at time t

$\sigma^2 = \hat{\sigma}^2_o$

σ^2_{ct} = variance of the changes in the actual levels of the pupils between time $t-1$ and time t.

σ^2_{et} = variance of the errors in measurements at time t.

The relationship between the correlations and the time between measurements will now be derived from the above assumptions in three steps:

Step One: Prove $\hat{\sigma}^2_t = \sigma^2 (1 + K_1)^t$.

Proof: $\hat{\sigma}^2_t = \sigma^2 + \sum_{i=1}^{t} \sigma^2_{ci}$ by definition

$= \sigma^2 + \sum_{i=1}^{t-1} \sigma^2_{ci} + \sigma^2_{ct}$

$= \hat{\sigma}^2_{t-1} + \sigma^2_{ct}$ by definition of $\hat{\sigma}^2_t$

$= \hat{\sigma}^2_{t-1} + K_1 \hat{\sigma}^2_{t-1}$ Assumption 2.

$= \hat{\sigma}^2_{t-1} (1 + K_1)$

$= \left[\hat{\sigma}_{t-2} (1 + K_1) \right] (1 + K_1)$ reapplying the above line

$= \hat{\sigma}^2_{t-2} (1 + K_1)^2$

$= \hat{\sigma}^2_o (1 + K_1)^t$ repeating the above two operations $t - 2$ more times

$= \sigma^2 (1 + K_1)^t$ by definition, QED

Step Two: Prove $\sigma^2_t = \sigma^2 (1 + K_1)^t (1 + K_2)$

Proof: $\sigma^2_t = \hat{\sigma}^2_t + \sigma^2_{et}$ by Assumption 1.

$= \hat{\sigma}^2_t + K_2 \hat{\sigma}^2_t$ by Assumption 3.

$= \hat{\sigma}^2_t (1 + K_2)$

$= \sigma^2 (1 + K_1)^t (1 + K_2)$ from Step 1, QED.

Step Three: Prove $r_{ot} = e^{-(at+b)}$ where r_{ot} is the correlation between measurements at time zero and time t, and a and b are positive constants.

Proof: The correlation r_{ot} is the square root of the proportion of the variance σ^2_t of the measurement at time t which can be accounted for by σ^2_o, the variance of the measurement at time zero. The quantity σ^2 is the component of σ^2_o, in σ^2_t for all values of t and all oth components of σ^2_t are independent of σ^2. Thus σ^2/σ^2_t is the proportion of the variance of the measures at time t which is accounted for (or predicted by) the measures at time zero.

Thus, r_{ot} =

$$\sqrt{\frac{\sigma^2}{\sigma^2_t}} =$$

$$\sqrt{\frac{\sigma^2}{\sigma^2 (1+K_1)^t (1+K_2)}} =$$

$$\sqrt{(1+K_1)^{-t} (1+K_2)^{-1}} =$$

$$= (1+K_1)^{-\frac{t}{2}} (1+K_2)^{-\frac{1}{2}}$$

$$= e^{-at} e^{-b}$$

$$= e^{-(at+b)}$$

where $a = \frac{1}{2} \ln (1+K_1)$ and $b = \frac{1}{2} \ln (1+K_2)$.

The minimum value of a and b is $\frac{1}{2} \ln(1+o) = o$, QED.

Because our problem requires fitting two curves, we use the multiple regression formulation $\hat{Y} = Xb$ where $b = (X'X)^{-1} X'Y$ and

$$X = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 2 \\ 1 & 1 & 3 \\ 1 & 0 & 1 \\ 1 & 0 & 2 \\ 1 & 0 & 3 \\ 1 & 0 & 4 \\ 1 & 0 & 6 \end{bmatrix} \quad \text{and } Y = \begin{bmatrix} 68 \\ 65 \\ 66 \\ 61 \\ 56 \\ 45 \\ 66 \\ 35. \end{bmatrix}.$$

The reliability coefficients are estimated by setting $t = 0$ in the resulting equations

$$r = e^{-(a t + b)}$$

and the 90% confidence minimum values are computed first for all the log values using the formula

$$\hat{Y}_{o,min} = \hat{Y}_o - t_{(df,\ .9)}\, S\hat{Y}_o$$

and then converted back to correlations. The value $S\hat{Y}_o$ is computed by $S\hat{Y}_o = s\sqrt{X'_o (X'X)^{-1} X_o}$, where s^2 is the mean square error (see Draper and Smith, 1966, p. 61), and X'_o is [1,1,0] for reliability of same version and [1,0,0] for reliability of different versions of the TRQ.

The three new sections, when treated in the same manner as the test total, produced coefficients for "a" which were almost identical. Thus, the three sections were pooled in a single analysis to reduce the error variance and produce a more precise estimate of $\hat{Y}_o$. The values of S, X_o, and degrees of freedom (15) were then used in determining the 90% confidence minimum values for all three TRQ sections and the total.

The actual number of observations on which the reported correlations are based is not directly employed in computing the 90% confidence minimum value. However, the sample size does affect this measure through the variability of the correlations about the fitted lines. Two overlapping samples were used. The correlations between grades 3, 4 and 6 were based on a sample of 218 students for whom data existed for all three grades. Correlations between senior kindergarten, grades 2, 3 and 6 (except for the grade 3 and 6 correlation) were based on a sample of 52 students for whom data existed for all four grades. The small samples are due to the losses of data from senior kindergarten and grade three, and to the sample of only 600 used in grade six. It was decided to use the grade six sample as a base and match backwards, in order to keep the sample small and easily manageable by our limited computing resources. Similar considerations led to the decision to not include the grade one students in the sample.

Correlations with "TRQ Total"

As noted in section III .3 of the report, the correlations reported as being between the questions and the test total, are actually the correlations between the questions and the first principal component. Because the questions are all positively correlated with each other, the first principal component will be a vector through the "middle" of the cluster of vestors representing the questions. Since the vector representing the total, will also be in the "middle" of this cluster, the pattern of correlations on these two vectors will be similar. Since we are using these correlations only as a rough indicator of the deviation of the questions from the "average", I did not consider it necessary to compute separate correlations on the TRQ total.

I refer to the correlations with the first principal component as being correlations with the TRQ total because this, I believed to be more easily grapsed intuitively by the average reader.

Indices Used in Evaluating Theoretical Distributions

The three indicators of the effectiveness of the theoretical distributions were called per cent covered, per cent normal and per cent information. I will illustrate the computation of each of these indicators for theoretical distribution, see Figure 9A of the main report.

1. Percent Covered

Each of the five rating categories are assumed to be designed to cover equal intervals in the actual population distribution. In the case of theoretical distribution A, this interval width is 0.7 σ, where σ is the standard deviation of the population. Becau, we assume the population is normally distributed, we can compute the perc itage of the population covered by the five rating categories, by reference to a table of the normal distribution. Distribution A is symetrical; thus, all members of the population within $\frac{5}{2} \times 0.7\ \sigma = 1.75$ of the population mean will be covered by the rating categories as designed. Refering to a table for the area under the normal curve, we find that the proportion covered is $.46 \times 2 = .92$; that is, 92% is covered.

2. Percent Normal

The usual indicator of the similarity of a distribution to the normal distribution, is the Chi-square statistic. However, the following method was used in order to present the indicator as a percentage, making it more comparable with the other indicators. For each of the theoretical distributions, a normal distribution was generated, having the same mean and standard deviation as the theoretical distribution, and the proportion of the ratings expected in each category (according to this assumption of perfect normality) was calculated. The per cent normal is 100 times the tot intersection of the theoretical distribution and the generated normal distribution.

In the case of theoretical distribution A, the standard deviation of the ratings is 2.54 and their mean is 4.0, (note that the population standard deviation is 2.86; the standard deviation of the distribution of ratings is somewhat smaller because of the forcing of the extreme cases into the two end rating categories.) Each rating category, covers $\frac{2.0\sigma}{2.54} = 0.758\sigma$. Using this figure we compute the proportions in the rating categories of the generated normal distribution, again with reference to a table of the normal distribution. For distribution A, these values are .099, .225, .295, .225, and .099, for categories zero to eight respectively. The proportions for the distribution A, itself, are .148, .217, .270, .217, and .148. The per cent normal indicator is 100 times the sum of the minimum values for each of the five categories. That is, 100 X (.099 + .217 + .270 + .217 + .099) = 90%.

3. Percent Information

The information content of a distribution of ratings is computed by the formula:

$$\text{bits} = -\sum_{i=1}^{n} p_i \log_2 p_i = \frac{-1}{\log_{10} 2} \sum_{i=1}^{n} p_i \log_{10} p_i$$

where p_i is the proportion of the ratings in the i^{th} rating category; these values for distribution A, are .148, .217, .270, .217, and .148.

Thus, the number of bits of information in distribution A is 2.28.

The most information possible from five rating categories is obtained from a rectangular distribution having 20% of the ratings in each of the categories. Thus, the maximum possible number of bits is,

$$\frac{-1}{0.30103} \times 5 \times 0.2 \times (-0.69896) = 2.32.$$

The percentage information indicator is the percentage of the total possible information; thus, for distribution A, percentage information

$$= 100 \times \frac{2.28}{2.32} = 98.28\%.$$

Relationships Between the Questions (Theory)

In analyzing the correlation matrices of the TRQ questions, principal components analysis was used. Although a factor analysis program was available, the computing time required, to reach a principal factors solution and to rotate the derived factors, was prohibitive. One early analysis of the grade two questionnaire did complete the cycle of iterations, for three factors and did a varimax rotation on the resulting principal factors. The three factors extracted corresponded closely to the three new TRQ sections, and the communalities of the three physical section questions were very low.

Subsequent analysis of the correlation matrices of other TRQ versions were carried out only as far as the principal components solution as reported. A careful study of these principal components was substituted for the more refined principal factors solution with rotation.

Relationships Between the Questions - Data

In Section III .5 of the report, the relationships between the questions were illustrated by a series of plots of the second and third principal components of the correlation matrices of the TRQ versions.

These plots are reasonably good models of the relationships among the questions, but a more precise look at these relationships requires the correlation matrices themselves and/or the higher order principal components. The following pages present the complete correlation matrices (Tables 1 to 4) and the correlations with (i.e. loadings on) the first ten principal components of each of these matrices (Tables 5 to 8).

Readers may discover that in plotting the second and third principal components, the signs of the loadings have, in some cases, been reversed. This is to facilitate the comparison of the pattern of correlations across questionnaire versions.

The correlation Tables 1 - 4 are printed one row at a time from the correlation matrix. The row number corresponds with the question number. Columns increase from left to right across the page; the first ten column entries printed in the first line, columns 11 to 20 printed in the second line, etc. For example, the correlation between senior kindergarten questions 5 and 19, is 0.459.

Tables 1 - 8 appear following text

Relationship of Questions on Version Two and Questions on Version Three-Plus.

In disucssing the relationship between the questions between the grade two and three questionnaires (shown in Figure 22 of the report) it was mentioned that the second principal component still represented general school ability. The loadings on these first two principal components are plotted in Figure 1. The questions from the two different TRQ versions clearly form two clusters.

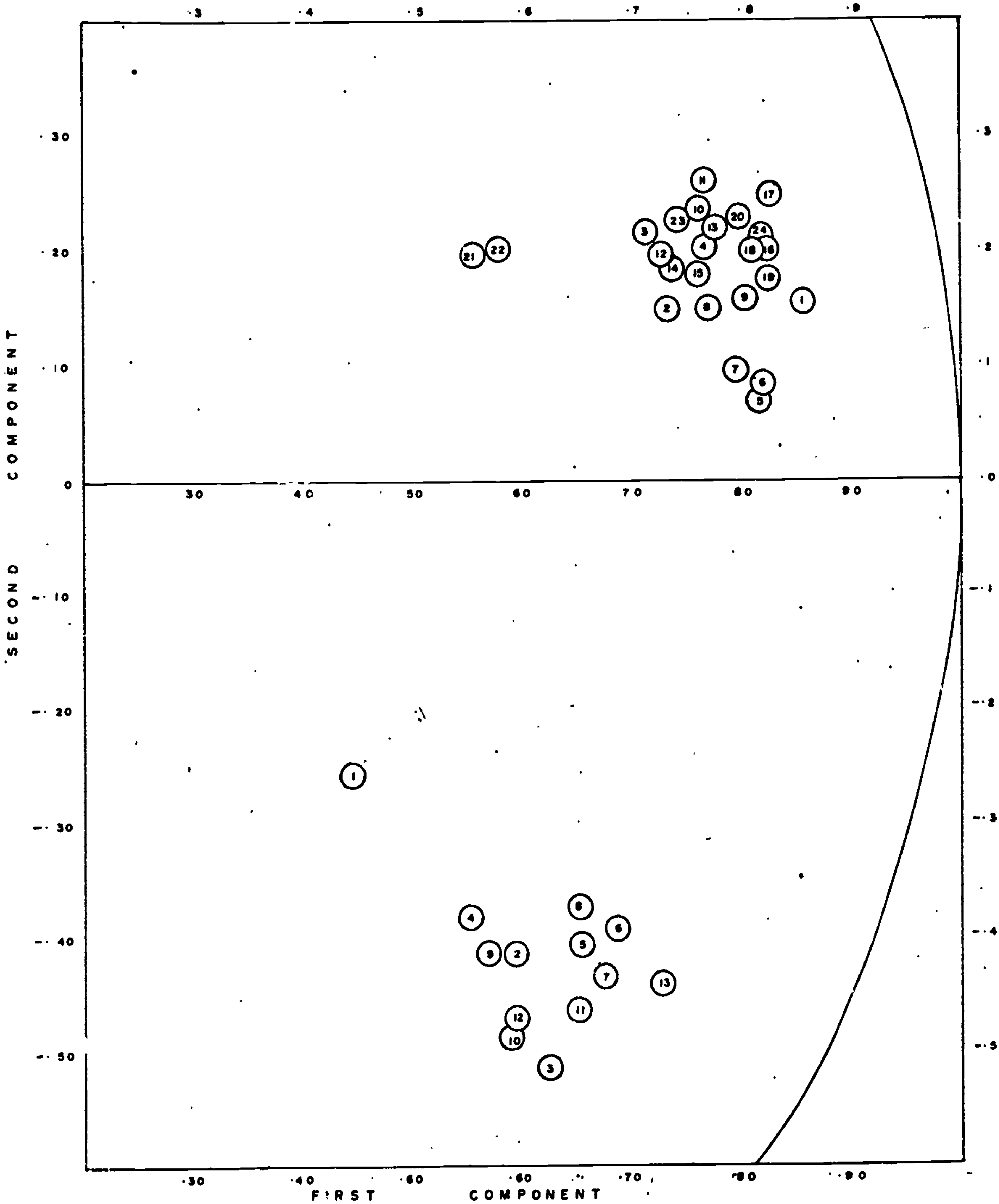

FIGURE I FIRST TWO PRINCIPAL COMPONENTS OF GRADE TWO AND THREE QUESTIONNAIRES TAKEN TOGETHER

The first principal component runs closer to the grade two questions because there are more of them; in fact, our best estimate of the general school ability component would be an axis running midway between the two clusters (assuming the two TRQ versions are equally accurate in measuring school ability).

It might be noted that questions 5, 6 and 7 on the grade two questionnaire are the three closest to the grade three-plus questions. That is, questions GD 2 #5, 6 and 7 are the best overall predictors of the grade three TRQ ratings. All three of these questions are in the new performance section of the grade two questionnaire.

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TABLE 1

Senior Kindergarten Correlations

	1	2	3	4	5	6	7	8	9	10
ROW 1										
	1.000	0.770	0.754	0.757	0.767	0.732	0.615	0.451	0.668	0.399
10+	0.404	0.554	0.701	0.364	0.469	0.554	0.470	0.474	0.425	0.677
20+	0.520	0.608	0.533	0.652	0.467	0.611	0.530	0.582	0.581	0.242
30+	0.263	0.330	0.427	0.350	0.429	0.308	0.243	0.375	0.234	0.469
ROW 2										
	0.770	1.000	0.745	0.717	0.735	0.728	0.594	0.435	0.704	0.389
	0.405	0.559	0.686	0.390	0.457	0.558	0.457	0.475	0.427	0.637
	0.534	0.612	0.540	0.634	0.461	0.582	0.585	0.572	0.564	0.289
	0.310	0.350	0.437	0.367	0.424	0.306	0.266	0.409	0.224	0.453
ROW 3										
	0.754	0.745	1.000	0.744	0.759	0.775	0.606	0.426	0.652	0.455
	0.443	0.604	0.682	0.391	0.418	0.566	0.455	0.419	0.429	0.608
	0.545	0.610	0.505	0.615	0.461	0.584	0.561	0.556	0.567	0.292
	0.301	0.359	0.408	0.363	0.420	0.273	0.264	0.363	0.223	0.402
ROW 4										
	0.757	0.717	0.744	1.000	0.851	0.807	0.727	0.536	0.629	0.406
	0.406	0.585	0.720	0.359	0.452	0.584	0.515	0.480	0.435	0.695
	0.537	0.642	0.537	0.704	0.505	0.609	0.576	0.588	0.613	0.287
	0.305	0.347	0.433	0.372	0.444	0.315	0.252	0.386	0.257	0.459
ROW 5										
	0.767	0.735	0.759	0.851	1.000	0.833	0.693	0.500	0.647	0.426
	0.438	0.613	0.737	0.382	0.501	0.604	0.535	0.514	0.459	0.720
	0.574	0.644	0.586	0.720	0.517	0.639	0.610	0.632	0.634	0.291
	0.304	0.368	0.444	0.379	0.490	0.340	0.288	0.415	0.251	0.505
ROW 6										
	0.732	0.728	0.775	0.807	0.833	1.000	0.689	0.487	0.629	0.456
	0.434	0.610	0.750	0.388	0.449	0.632	0.518	0.497	0.475	0.699
	0.580	0.678	0.576	0.705	0.480	0.597	0.587	0.588	0.596	0.297
	0.304	0.358	0.436	0.381	0.490	0.323	0.257	0.388	0.230	0.488
ROW 7										
	0.615	0.594	0.606	0.727	0.693	0.689	1.000	0.645	0.524	0.382
	0.310	0.492	0.632	0.283	0.356	0.511	0.433	0.394	0.421	0.599
	0.463	0.571	0.439	0.631	0.415	0.527	0.514	0.522	0.554	0.224
	0.248	0.272	0.336	0.333	0.370	0.217	0.182	0.305	0.185	0.360
ROW 8										
	0.451	0.435	0.426	0.536	0.500	0.487	0.645	1.000	0.360	0.395
	0.247	0.353	0.476	0.164	0.289	0.369	0.326	0.318	0.313	0.460
	0.290	0.414	0.342	0.448	0.315	0.355	0.357	0.357	0.380	0.167
	0.243	0.181	0.249	0.282	0.279	0.199	0.140	0.257	0.151	0.293

TABLE 1 (Cont'd.)

ROW 9										
	0.668	0.704	0.652	0.623	0.647	0.620	0.524	0.360	1.000	0.358
	0.385	0.496	0.591	0.443	0.442	0.489	0.468	0.435	0.396	0.567
	0.538	0.501	0.512	0.565	0.469	0.607	0.573	0.577	0.585	0.314
	0.318	0.393	0.451	0.360	0.421	0.311	0.314	0.350	0.240	0.447
ROW 10										
	0.399	0.388	0.455	0.406	0.426	0.456	0.382	0.395	0.358	1.000
	0.409	0.435	0.443	0.227	0.248	0.368	0.318	0.315	0.407	0.407
	0.345	0.383	0.372	0.346	0.261	0.321	0.364	0.322	0.306	0.201
	0.255	0.229	0.291	0.317	0.322	0.269	0.215	0.316	0.098	0.314
ROW 11										
	0.404	0.405	0.443	0.406	0.438	0.434	0.310	0.247	0.385	0.409
	1.000	0.678	0.471	0.449	0.278	0.467	0.513	0.551	0.396	0.495
	0.494	0.465	0.543	0.435	0.310	0.370	0.364	0.410	0.340	0.207
	0.246	0.293	0.374	0.368	0.546	0.556	0.572	0.507	0.168	0.477
ROW 12										
	0.554	0.559	0.604	0.585	0.613	0.610	0.492	0.353	0.496	0.435
	0.678	1.000	0.674	0.443	0.393	0.608	0.589	0.574	0.517	0.636
	0.582	0.632	0.598	0.608	0.397	0.469	0.485	0.525	0.457	0.247
	0.259	0.304	0.479	0.442	0.569	0.494	0.417	0.498	0.229	0.485
ROW 13										
	0.701	0.686	0.682	0.720	0.737	0.750	0.632	0.476	0.591	0.443
	0.471	0.674	1.000	0.399	0.461	0.647	0.541	0.570	0.520	0.774
	0.588	0.739	0.615	0.722	0.427	0.573	0.605	0.601	0.561	0.236
	0.262	0.308	0.473	0.412	0.509	0.385	0.272	0.438	0.206	0.507
ROW 14										
	0.364	0.390	0.391	0.359	0.382	0.388	0.283	0.164	0.443	0.227
	0.449	0.443	0.399	1.000	0.295	0.406	0.487	0.468	0.359	0.424
	0.511	0.352	0.494	0.373	0.338	0.386	0.358	0.410	0.357	0.276
	0.258	0.465	0.410	0.392	0.461	0.502	0.413	0.425	0.226	0.459
ROW 15										
	0.469	0.457	0.418	0.452	0.501	0.449	0.356	0.289	0.442	0.248
	0.278	0.383	0.461	0.295	1.000	0.441	0.435	0.417	0.365	0.500
	0.397	0.394	0.419	0.476	0.520	0.493	0.484	0.490	0.497	0.286
	0.309	0.338	0.449	0.376	0.385	0.332	0.274	0.332	0.207	0.431
ROW 16										
	0.554	0.558	0.566	0.584	0.604	0.632	0.511	0.369	0.489	0.368
	0.467	0.603	0.647	0.406	0.441	1.000	0.663	0.555	0.566	0.655
	0.651	0.616	0.652	0.644	0.404	0.480	0.489	0.483	0.479	0.263
	0.261	0.314	0.526	0.515	0.622	0.431	0.304	0.461	0.220	0.485

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TABLE 1 (cont'd.)

ROW 17										
	0.470	0.457	0.455	0.515	0.535	0.518	0.433	0.326	0.468	0.318
	0.513	0.589	0.541	0.487	0.435	0.663	1.000	0.713	0.596	0.621
	0.645	0.517	0.632	0.568	0.402	0.465	0.478	0.482	0.474	0.255
	0.255	0.348	0.559	0.553	0.703	0.549	0.403	0.485	0.233	0.574
ROW 18										
	0.474	0.475	0.419	0.480	0.514	0.497	0.394	0.318	0.435	0.315
	0.551	0.574	0.570	0.468	0.417	0.555	0.713	1.000	0.526	0.684
	0.563	0.514	0.653	0.560	0.392	0.454	0.474	0.478	0.442	0.210
	0.227	0.306	0.492	0.478	0.662	0.631	0.426	0.528	0.216	0.650
ROW 19										
	0.425	0.427	0.429	0.435	0.459	0.475	0.421	0.313	0.396	0.407
	0.396	0.517	0.520	0.359	0.365	0.566	0.596	0.526	1.000	0.538
	0.514	0.481	0.519	0.467	0.315	0.407	0.432	0.445	0.414	0.217
	0.255	0.291	0.540	0.595	0.549	0.434	0.278	0.382	0.174	0.442
ROW 20										
	0.677	0.637	0.608	0.695	0.720	0.699	0.599	0.460	0.567	0.407
	0.495	0.636	0.774	0.424	0.500	0.655	0.621	0.684	0.539	1.000
	0.648	0.703	0.698	0.742	0.447	0.579	0.589	0.604	0.573	0.216
	0.232	0.311	0.500	0.445	0.602	0.507	0.339	0.475	0.215	0.613
ROW 21										
	0.520	0.534	0.545	0.537	0.574	0.580	0.463	0.290	0.539	0.345
	0.494	0.592	0.528	0.511	0.397	0.651	0.645	0.563	0.514	0.648
	1.000	0.551	0.698	0.632	0.419	0.513	0.501	0.530	0.510	0.299
	0.278	0.431	0.511	0.455	0.639	0.499	0.415	0.491	0.265	0.568
ROW 22										
	0.608	0.612	0.610	0.642	0.644	0.678	0.571	0.414	0.501	0.383
	0.465	0.632	0.739	0.352	0.394	0.616	0.517	0.514	0.481	0.703
	0.551	1.000	0.588	0.703	0.367	0.499	0.513	0.522	0.493	0.196
	0.227	0.246	0.415	0.382	0.484	0.366	0.283	0.453	0.207	0.437
ROW 23										
	0.538	0.540	0.505	0.537	0.586	0.576	0.439	0.342	0.512	0.372
	0.543	0.598	0.615	0.494	0.419	0.652	0.632	0.653	0.519	0.688
	0.693	0.588	1.000	0.673	0.412	0.484	0.508	0.530	0.487	0.292
	0.298	0.370	0.493	0.469	0.657	0.610	0.436	0.550	0.204	0.620
ROW 24										
	0.652	0.634	0.615	0.704	0.720	0.705	0.631	0.448	0.565	0.346
	0.435	0.608	0.722	0.373	0.476	0.644	0.568	0.560	0.467	0.742
	0.632	0.703	0.673	1.000	0.492	0.598	0.578	0.582	0.604	0.267
	0.274	0.329	0.469	0.410	0.550	0.395	0.291	0.417	0.182	0.521

TABLE 1 (Cont'd.)

ROW 25

0.467	0.461	0.461	0.505	0.517	0.480	0.415	0.315	0.469	0.261
0.310	0.397	0.427	0.333	0.520	0.404	0.402	0.392	0.315	0.447
0.419	0.367	0.412	0.492	1.000	0.544	0.472	0.500	0.542	0.417
0.382	0.456	0.403	0.336	0.361	0.278	0.286	0.302	0.235	0.393

ROW 26

0.611	0.582	0.584	0.609	0.639	0.597	0.527	0.355	0.607	0.321
0.370	0.469	0.573	0.386	0.493	0.480	0.465	0.454	0.407	0.579
0.513	0.499	0.484	0.598	0.544	1.000	0.794	0.731	0.802	0.391
0.299	0.429	0.411	0.354	0.412	0.320	0.322	0.339	0.244	0.458

ROW 27

0.580	0.585	0.561	0.576	0.610	0.587	0.514	0.357	0.573	0.364
0.364	0.485	0.605	0.353	0.484	0.489	0.478	0.474	0.432	0.588
0.501	0.513	0.508	0.573	0.472	0.794	1.000	0.741	0.733	0.269
0.251	0.390	0.421	0.364	0.425	0.319	0.328	0.329	0.215	0.474

ROW 28

0.582	0.572	0.556	0.588	0.632	0.588	0.522	0.357	0.577	0.322
0.410	0.525	0.601	0.410	0.490	0.483	0.482	0.478	0.445	0.604
0.530	0.522	0.530	0.582	0.500	0.731	0.741	1.000	0.703	0.283
0.265	0.383	0.423	0.377	0.440	0.365	0.356	0.390	0.244	0.463

ROW 29

0.581	0.564	0.567	0.613	0.634	0.596	0.554	0.380	0.585	0.306
0.340	0.457	0.561	0.357	0.497	0.479	0.474	0.442	0.414	0.573
0.510	0.493	0.487	0.604	0.542	0.802	0.733	0.708	1.000	0.316
0.293	0.404	0.339	0.339	0.415	0.301	0.297	0.338	0.242	0.460

ROW 30

0.242	0.289	0.292	0.287	0.291	0.297	0.224	0.167	0.314	0.201
0.207	0.247	0.236	0.276	0.236	0.263	0.255	0.210	0.217	0.216
0.299	0.196	0.292	0.267	0.417	0.301	0.269	0.283	0.316	1.000
0.559	0.484	0.248	0.249	0.240	0.215	0.227	0.225	0.191	0.241

ROW 31

0.263	0.310	0.301	0.305	0.304	0.304	0.248	0.243	0.318	0.255
0.246	0.259	0.262	0.258	0.309	0.261	0.255	0.227	0.255	0.232
0.278	0.227	0.298	0.274	0.382	0.299	0.251	0.265	0.293	0.559
1.000	0.405	0.327	0.315	0.257	0.246	0.213	0.237	0.145	0.230

ROW 32

0.330	0.350	0.359	0.347	0.368	0.358	0.272	0.191	0.393	0.229
0.293	0.304	0.305	0.465	0.332	0.314	0.248	0.306	0.291	0.311
0.431	0.246	0.370	0.329	0.455	0.429	0.390	0.383	0.404	0.434
0.405	1.000	0.344	0.325	0.346	0.315	0.378	0.306	0.277	0.410

TABLE 1 (Cont'd.)

ROW 33

0.427	0.437	0.408	0.433	0.444	0.476	0.336	0.249	0.451	0.291
0.374	0.479	0.473	0.410	0.449	0.526	0.559	0.492	0.540	0.590
0.511	0.415	0.493	0.469	0.403	0.411	0.421	0.423	0.389	0.248
0.327	0.344	1.000	0.667	0.552	0.446	0.303	0.385	0.190	0.455

ROW 34

0.350	0.367	0.363	0.372	0.379	0.391	0.333	0.282	0.360	0.317
0.368	0.442	0.412	0.392	0.376	0.515	0.553	0.478	0.595	0.445
0.455	0.382	0.469	0.410	0.336	0.354	0.364	0.377	0.339	0.249
0.315	0.325	0.667	1.000	0.542	0.432	0.267	0.377	0.188	0.394

ROW 35

0.429	0.424	0.420	0.444	0.490	0.490	0.370	0.279	0.421	0.322
0.546	0.569	0.509	0.461	0.385	0.622	0.703	0.662	0.549	0.602
0.639	0.484	0.657	0.550	0.361	0.412	0.425	0.440	0.415	0.240
0.257	0.346	0.552	0.542	1.000	0.613	0.452	0.530	0.188	0.623

ROW 36

0.308	0.306	0.273	0.315	0.340	0.323	0.217	0.199	0.311	0.269
0.556	0.494	0.385	0.502	0.332	0.431	0.549	0.631	0.434	0.507
0.499	0.366	0.610	0.395	0.278	0.320	0.319	0.365	0.301	0.215
0.246	0.315	0.446	0.432	0.613	1.000	0.556	0.584	0.201	0.600

ROW 37

0.243	0.266	0.264	0.252	0.288	0.257	0.182	0.140	0.314	0.215
0.572	0.417	0.272	0.413	0.274	0.304	0.403	0.426	0.278	0.339
0.415	0.283	0.436	0.291	0.286	0.322	0.328	0.356	0.287	0.227
0.213	0.378	0.303	0.267	0.452	0.556	1.000	0.535	0.154	0.486

ROW 38

0.375	0.409	0.363	0.386	0.415	0.388	0.305	0.257	0.350	0.316
0.507	0.498	0.438	0.425	0.332	0.461	0.485	0.528	0.382	0.475
0.491	0.453	0.550	0.417	0.302	0.339	0.329	0.390	0.338	0.225
0.237	0.306	0.385	0.377	0.530	0.584	0.535	1.000	0.231	0.480

ROW 39

0.234	0.224	0.223	0.257	0.251	0.230	0.136	0.151	0.240	0.098
0.168	0.229	0.206	0.226	0.207	0.220	0.238	0.216	0.174	0.216
0.265	0.209	0.204	0.182	0.235	0.244	0.215	0.244	0.242	0.191
0.146	0.277	0.190	0.188	0.138	0.201	0.154	0.231	1.000	0.219

ROW 40

0.469	0.453	0.402	0.459	0.505	0.489	0.360	0.293	0.447	0.314
0.477	0.485	0.507	0.459	0.431	0.485	0.574	0.650	0.442	0.613
0.568	0.437	0.620	0.521	0.393	0.458	0.474	0.463	0.460	0.241
0.230	0.410	0.455	0.394	0.623	0.600	0.486	0.480	0.219	1.000

TABLE 2

Grade One Correlations

	1	2	3	4	5	6	7	8	9	10
ROW 1										
	1.000	0.694	0.673	0.719	0.665	0.609	0.640	0.639	0.598	0.542
10+	0.500	0.583	0.473	0.420	0.441	0.559	0.494	0.594	0.579	0.534
20+	0.584	0.567	0.573	0.340	0.332	0.356	0.513	0.526	0.372	0.318
30+	0.493	0.469	0.507							
ROW 2										
	0.694	1.000	0.660	0.664	0.621	0.607	0.629	0.623	0.593	0.509
	0.482	0.553	0.474	0.412	0.429	0.539	0.498	0.589	0.577	0.536
	0.563	0.544	0.556	0.330	0.314	0.352	0.506	0.503	0.368	0.312
	0.427	0.471	0.502							
ROW 3										
	0.673	0.660	1.000	0.642	0.602	0.620	0.628	0.635	0.579	0.476
	0.458	0.525	0.459	0.402	0.461	0.542	0.496	0.573	0.577	0.523
	0.576	0.551	0.561	0.234	0.284	0.338	0.485	0.505	0.364	0.302
	0.410	0.462	0.501							
ROW 4										
	0.719	0.664	0.642	1.000	0.736	0.606	0.603	0.608	0.573	0.566
	0.519	0.601	0.470	0.381	0.403	0.515	0.469	0.584	0.560	0.513
	0.541	0.513	0.523	0.330	0.309	0.327	0.487	0.515	0.342	0.290
	0.467	0.439	0.479							
ROW 5										
	0.665	0.621	0.602	0.736	1.000	0.619	0.535	0.599	0.585	0.597
	0.553	0.643	0.476	0.379	0.394	0.506	0.473	0.588	0.573	0.521
	0.539	0.514	0.514	0.318	0.311	0.323	0.500	0.535	0.329	0.277
	0.460	0.445	0.482							
ROW 6										
	0.609	0.607	0.620	0.606	0.619	1.000	0.615	0.613	0.615	0.525
	0.505	0.581	0.495	0.427	0.445	0.594	0.546	0.600	0.622	0.561
	0.599	0.560	0.589	0.311	0.317	0.390	0.528	0.531	0.391	0.285
	0.416	0.507	0.524							
ROW 7										
	0.640	0.629	0.628	0.603	0.585	0.615	1.000	0.856	0.617	0.501
	0.486	0.538	0.478	0.443	0.480	0.575	0.547	0.596	0.587	0.560
	0.613	0.601	0.583	0.344	0.357	0.382	0.514	0.511	0.400	0.341
	0.434	0.489	0.524							
ROW 8										
	0.639	0.628	0.635	0.608	0.599	0.613	0.856	1.000	0.626	0.507
	0.488	0.542	0.493	0.443	0.434	0.532	0.558	0.595	0.595	0.571
	0.617	0.610	0.600	0.354	0.354	0.391	0.529	0.522	0.406	0.363
	0.454	0.491	0.530							
ROW 9										
	0.598	0.593	0.579	0.573	0.585	0.615	0.617	0.626	1.000	0.592
	0.571	0.680	0.665	0.643	0.465	0.711	0.639	0.758	0.705	0.712
	0.698	0.678	0.690	0.387	0.395	0.536	0.647	0.618	0.598	0.456
	0.487	0.699	0.717							

TABLE 2 (cont'd.)

ROW 10

0.543	0.509	0.476	0.566	0.597	0.525	0.501	0.507	0.582	1.000
0.630	0.635	0.576	0.490	0.364	0.510	0.475	0.539	0.565	0.557
0.521	0.501	0.500	0.357	0.361	0.373	0.548	0.550	0.435	0.380
0.490	0.510	0.529							

ROW 11

0.500	0.482	0.458	0.519	0.553	0.505	0.486	0.438	0.571	0.630
1.000	0.630	0.598	0.549	0.361	0.496	0.457	0.583	0.564	0.581
0.506	0.490	0.498	0.356	0.357	0.401	0.539	0.555	0.483	0.381
0.454	0.529	0.544							

ROW 12

0.583	0.553	0.525	0.601	0.643	0.581	0.538	0.542	0.680	0.635
0.630	1.000	0.675	0.586	0.397	0.588	0.525	0.683	0.646	0.609
0.598	0.559	0.586	0.391	0.396	0.439	0.602	0.586	0.516	0.490
0.484	0.600	0.617							

ROW 13

0.478	0.474	0.459	0.470	0.476	0.495	0.478	0.493	0.665	0.576
0.598	0.675	1.000	0.762	0.391	0.565	0.522	0.659	0.617	0.632
0.564	0.558	0.557	0.363	0.362	0.486	0.597	0.584	0.679	0.545
0.480	0.647	0.651							

ROW 14

0.420	0.412	0.402	0.381	0.379	0.427	0.443	0.448	0.643	0.490
0.549	0.586	0.762	1.000	0.365	0.537	0.491	0.612	0.564	0.628
0.528	0.529	0.537	0.356	0.356	0.513	0.573	0.533	0.760	0.571
0.438	0.659	0.645							

ROW 15

0.441	0.429	0.461	0.403	0.394	0.445	0.480	0.494	0.465	0.364
0.361	0.397	0.391	0.365	1.000	0.536	0.486	0.478	0.497	0.459
0.511	0.510	0.522	0.283	0.294	0.348	0.423	0.424	0.350	0.279
0.329	0.411	0.426							

ROW 16

0.559	0.539	0.542	0.515	0.506	0.594	0.575	0.582	0.711	0.510
0.496	0.588	0.565	0.537	0.536	1.000	0.775	0.718	0.726	0.703
0.741	0.721	0.795	0.383	0.389	0.528	0.633	0.601	0.595	0.380
0.455	0.662	0.662							

ROW 17

0.494	0.493	0.496	0.469	0.473	0.546	0.547	0.558	0.639	0.475
0.457	0.525	0.522	0.491	0.486	0.775	1.000	0.651	0.672	0.666
0.677	0.658	0.678	0.343	0.384	0.502	0.594	0.562	0.452	0.347
0.414	0.603	0.603							

ROW 18

0.594	0.589	0.578	0.584	0.588	0.600	0.596	0.595	0.758	0.539
0.583	0.683	0.659	0.612	0.478	0.718	0.651	1.000	0.762	0.721
0.701	0.674	0.704	0.336	0.394	0.504	0.657	0.646	0.569	0.442
0.495	0.691	0.710							

TABLE 2 (cont'd.)

ROW 19

0.579	0.577	0.577	0.560	0.573	0.622	0.587	0.595	0.705	0.565
0.564	0.646	0.617	0.564	0.497	0.726	0.672	0.762	1.000	0.736
0.698	0.680	0.712	0.375	0.386	0.494	0.656	0.646	0.529	0.411
0.485	0.655	0.676							

ROW 20

0.534	0.536	0.523	0.513	0.521	0.561	0.560	0.571	0.712	0.557
0.581	0.609	0.632	0.628	0.459	0.703	0.666	0.721	0.736	1.000
0.696	0.674	0.682	0.407	0.417	0.543	0.742	0.692	0.587	0.437
0.529	0.708	0.714							

ROW 21

0.584	0.563	0.576	0.541	0.539	0.599	0.613	0.617	0.698	0.521
0.506	0.598	0.564	0.528	0.511	0.741	0.677	0.701	0.698	0.696
1.000	0.809	0.740	0.380	0.391	0.495	0.622	0.594	-0.502	0.403
0.478	0.627	0.654							

ROW 22

0.567	0.544	0.551	0.513	0.514	0.560	0.601	0.610	0.678	0.501
0.490	0.559	0.558	0.529	0.510	0.721	0.658	0.674	0.690	0.674
0.809	1.000	0.719	0.381	0.391	0.528	0.617	0.597	0.503	0.408
0.464	0.632	0.653							

ROW 23

0.573	0.556	0.561	0.523	0.514	0.589	0.583	0.600	0.690	0.500
0.498	0.586	0.557	0.537	0.522	0.795	0.678	0.704	0.712	0.682
0.740	0.719	1.000	0.385	0.403	0.504	0.619	0.594	0.504	0.401
0.474	0.632	0.655							

ROW 24

0.340	0.330	0.284	0.330	0.318	0.311	0.344	0.354	0.387	0.357
0.356	0.391	0.363	0.356	0.288	0.383	0.348	0.386	0.375	0.407
0.380	0.381	0.385	1.000	0.649	0.397	0.393	0.362	0.332	0.304
0.351	0.359	0.360							

ROW 25

0.332	0.314	0.284	0.309	0.311	0.317	0.357	0.354	0.395	0.361
0.357	0.386	0.362	0.356	0.294	0.389	0.384	0.394	0.386	0.417
0.391	0.391	0.408	0.649	1.000	0.425	0.414	0.369	0.332	0.283
0.358	0.376	0.384							

ROW 26

0.356	0.352	0.338	0.327	0.323	0.390	0.382	0.391	0.526	0.373
0.401	0.439	0.486	0.513	0.348	0.528	0.502	0.504	0.494	0.543
0.495	0.528	0.504	0.397	0.425	1.000	0.549	0.465	0.501	0.376
0.379	0.576	0.549							

ROW 27

0.513	0.506	0.485	0.487	0.500	0.528	0.514	0.529	0.647	0.548
0.539	0.602	0.597	0.573	0.423	0.633	0.594	0.657	0.656	0.742
0.622	0.617	0.619	0.393	0.414	0.549	1.000	0.685	0.559	0.472
0.528	0.684	0.687							

TABLE 2 (cont'd.)

ROW 28

0.526	0.508	0.505	0.515	0.535	0.531	0.511	0.522	0.618	0.550
0.555	0.586	0.584	0.533	0.424	0.601	0.562	0.646	0.646	0.692
0.604	0.593	0.594	0.362	0.369	0.465	0.685	1.000	0.532	0.447
0.523	0.639	0.654							

ROW 29

0.372	0.368	0.364	0.342	0.329	0.391	0.400	0.406	0.583	0.435
0.483	0.516	0.679	0.760	0.350	0.505	0.452	0.569	0.529	0.587
0.502	0.508	0.504	0.333	0.332	0.501	0.559	0.532	1.000	0.594
0.443	0.645	0.640							

ROW 30

0.318	0.312	0.302	0.290	0.277	0.285	0.341	0.363	0.456	0.380
0.381	0.400	0.545	0.571	0.279	0.380	0.347	0.442	0.411	0.487
0.403	0.408	0.401	0.304	0.283	0.376	0.472	0.447	0.594	1.000
0.497	0.495	0.506							

ROW 31

0.493	0.427	0.410	0.467	0.460	0.416	0.434	0.454	0.487	0.490
0.454	0.484	0.480	0.438	0.329	0.455	0.414	0.495	0.485	0.529
0.478	0.464	0.474	0.351	0.358	0.379	0.528	0.523	0.443	0.497
1.000	0.486	0.508							

ROW 32

0.469	0.471	0.462	0.439	0.445	0.507	0.489	0.491	0.699	0.510
0.529	0.600	0.647	0.659	0.411	0.662	0.603	0.691	0.655	0.708
0.627	0.632	0.632	0.359	0.376	0.576	0.684	0.639	0.645	0.495
0.486	1.000	0.829							

ROW 33

0.507	0.502	0.501	0.479	0.482	0.524	0.524	0.530	0.717	0.529
0.544	0.617	0.651	0.645	0.426	0.662	0.603	0.710	0.676	0.714
0.654	0.653	0.655	0.360	0.384	0.549	0.687	0.654	0.640	0.506
0.508	0.829	1.000							

TABLE 3

Grade Two Correlations

		1	2	3	4	5	6	7	8	9	10
ROW 1		1.000	0.667	0.630	0.684	0.738	0.726	0.711	0.696	0.704	0.663
	10+	0.668	0.647	0.685	0.653	0.670	0.721	0.725	0.719	0.757	0.695
	20+	0.495	0.465	0.637	0.702	0.456	0.495	0.392			
ROW 2		0.667	1.000	0.647	0.714	0.613	0.606	0.608	0.569	0.674	0.591
		0.561	0.477	0.547	0.530	0.558	0.537	0.639	0.649	0.569	0.556
		0.336	0.374	0.602	0.611	0.354	0.382	0.369			
ROW 3		0.630	0.647	1.000	0.723	0.568	0.579	0.547	0.522	0.619	0.675
		0.573	0.445	0.543	0.500	0.525	0.532	0.676	0.728	0.537	0.553
		0.303	0.385	0.707	0.591	0.325	0.372	0.330			
ROW 4		0.684	0.714	0.723	1.000	0.649	0.652	0.644	0.607	0.754	0.631
		0.600	0.496	0.572	0.569	0.603	0.607	0.679	0.685	0.595	0.600
		0.352	0.382	0.638	0.635	0.375	0.380	0.357			
ROW 5		0.738	0.613	0.568	0.649	1.000	0.924	0.802	0.702	0.699	0.571
		0.578	0.551	0.590	0.596	0.627	0.661	0.632	0.627	0.679	0.613
		0.400	0.386	0.556	0.629	0.430	0.436	0.351			
ROW 6		0.726	0.606	0.579	0.652	0.924	1.000	0.796	0.709	0.700	0.578
		0.579	0.552	0.588	0.595	0.623	0.659	0.639	0.637	0.682	0.619
		0.419	0.408	0.561	0.630	0.440	0.436	0.352			
ROW 7		0.711	0.608	0.547	0.644	0.802	0.796	1.000	0.692	0.687	0.571
		0.586	0.543	0.572	0.603	0.626	0.654	0.634	0.628	0.659	0.619
		0.395	0.396	0.560	0.621	0.436	0.456	0.359			
ROW 8		0.696	0.569	0.522	0.607	0.702	0.709	0.692	1.000	0.668	0.549
		0.596	0.575	0.591	0.600	0.624	0.678	0.624	0.603	0.680	0.622
		0.442	0.423	0.524	0.635	0.562	0.479	0.380			
ROW 9		0.704	0.674	0.619	0.754	0.699	0.700	0.687	0.668	1.000	0.618
		0.606	0.548	0.603	0.614	0.659	0.651	0.677	0.663	0.653	0.626
		0.419	0.428	0.601	0.672	0.439	0.450	0.377			
ROW 10		0.663	0.591	0.675	0.631	0.571	0.578	0.571	0.549	0.618	1.000
		0.700	0.554	0.663	0.540	0.550	0.613	0.743	0.730	0.627	0.637
		0.384	0.448	0.714	0.663	0.392	0.473	0.404			
ROW 11		0.668	0.561	0.573	0.600	0.578	0.579	0.586	0.596	0.506	0.700
		1.000	0.698	0.689	0.551	0.572	0.694	0.716	0.652	0.672	0.686
		0.479	0.476	0.613	0.675	[illegible]	0.504	0.413			

/2

TABLE 3 (cont'd.)

ROW 12										
	0.647	0.477	0.445	0.496	0.551	0.552	0.543	0.575	0.549	0.554
	0.698	1.000	0.739	0.488	0.504	0.677	0.615	0.545	0.711	0.633
	0.599	0.501	0.501	0.611	0.485	0.518	0.342			
ROW 13										
	0.685	0.547	0.543	0.572	0.590	0.588	0.572	0.591	0.603	0.663
	0.689	0.739	1.000	0.534	0.544	0.671	0.692	0.650	0.704	0.673
	0.536	0.497	0.595	0.665	0.480	0.507	0.389			
ROW 14										
	0.653	0.530	0.500	0.569	0.596	0.595	0.603	0.600	0.614	0.540
	0.551	0.488	0.534	1.000	0.875	0.636	0.627	0.599	0.633	0.604
	0.364	0.380	0.523	0.617	0.359	0.414	0.387			
ROW 15										
	0.670	0.558	0.525	0.603	0.627	0.623	0.626	0.624	0.659	0.559
	0.572	0.504	0.544	0.875	1.000	0.648	0.644	0.605	0.640	0.621
	0.383	0.394	0.533	0.634	0.392	0.425	0.397			
ROW 16										
	0.721	0.587	0.532	0.607	0.661	0.659	0.654	0.678	0.651	0.613
	0.694	0.677	0.671	0.636	0.648	1.000	0.731	0.657	0.755	0.756
	0.537	0.495	0.588	0.723	0.487	0.535	0.420			
ROW 17										
	0.725	0.639	0.676	0.679	0.632	0.639	0.634	0.624	0.677	0.742
	0.716	0.615	0.692	0.627	0.644	0.731	1.000	0.789	0.704	0.714
	0.438	0.499	0.730	0.725	0.437	0.489	0.408			
ROW 18										
	0.719	0.649	0.723	0.685	0.627	0.637	0.628	0.603	0.663	0.730
	0.652	0.545	0.650	0.599	0.605	0.657	0.789	1.000	0.664	0.676
	0.400	0.445	0.764	0.685	0.405	0.468	0.402			
ROW 19										
	0.757	0.569	0.537	0.585	0.579	0.692	0.659	0.680	0.653	0.627
	0.672	0.711	0.704	0.633	0.640	0.755	0.704	0.664	1.000	0.725
	0.541	0.507	0.582	0.701	0.518	0.520	0.396			
ROW 20										
	0.695	0.556	0.553	0.600	0.613	0.619	0.619	0.622	0.626	0.637
	0.686	0.633	0.673	0.604	0.621	0.756	0.714	0.676	0.725	1.000
	0.539	0.512	0.628	0.707	0.450	0.527	0.421			
ROW 21										
	0.495	0.336	0.303	0.352	0.400	0.419	0.395	0.442	0.419	0.384
	0.479	0.599	0.536	0.364	0.383	0.537	0.438	0.400	0.541	0.539
	1.000	0.620	0.392	0.503	0.381	0.454	0.294			
ROW 22										
	0.465	0.374	0.385	0.382	0.386	0.408	0.396	0.423	0.428	0.448
	0.476	0.501	0.497	0.380	0.394	0.495	0.499	0.445	0.507	0.512
	0.620	1.000	0.522	0.532	0.379	0.483	0.361			

TABLE 3 (cont'd.)

ROW 23

0.637	0.602	0.707	0.638	0.556	0.561	0.560	0.524	0.601	0.714
0.613	0.501	0.595	0.523	0.533	0.588	0.730	0.764	0.582	0.628
0.392	0.522	1.000	0.681	0.359	0.464	0.373			

ROW 24

0.702	0.611	0.591	0.635	0.629	0.630	0.621	0.635	0.672	0.663
0.675	0.611	0.665	0.617	0.634	0.723	0.725	0.685	0.701	0.707
0.503	0.532	0.681	1.000	0.449	0.529	0.431			

ROW 25

0.456	0.354	0.325	0.375	0.430	0.440	0.436	0.562	0.439	0.392
0.454	0.485	0.480	0.359	0.392	0.437	0.437	0.405	0.518	0.450
0.381	0.379	0.359	0.449	1.000	0.540	0.383			

ROW 26

0.495	0.382	0.372	0.380	0.436	0.436	0.456	0.479	0.450	0.473
0.504	0.518	0.507	0.414	0.425	0.535	0.439	0.468	0.520	0.527
0.454	0.483	0.464	0.529	0.540	1.000	0.623			

ROW 27

0.392	0.368	0.330	0.357	0.351	0.352	0.359	0.380	0.377	0.404
0.413	0.342	0.383	0.387	0.397	0.420	0.408	0.402	0.396	0.421
0.294	0.361	0.373	0.431	0.383	0.623	1.000			

TABLE 4

Grade Three-Plus Correlations

	1	2	3	4	5	6	7	8	9	10
ROW 1	1.000	0.446	0.362	0.518	0.311	0.318	0.373	0.154	0.529	0.206
10+	0.154	0.325								
ROW 2	0.446	1.000	0.573	0.649	0.454	0.477	0.407	0.455	0.539	0.444
	0.447	0.488								
ROW 3	0.362	0.573	1.000	0.615	0.548	0.560	0.481	0.608	0.637	0.582
	0.608	0.573								
ROW 4	0.518	0.649	0.615	1.000	0.455	0.462	0.407	0.467	0.621	0.442
	0.480	0.521								
ROW 5	0.311	0.454	0.548	0.455	1.000	0.629	0.647	0.596	0.674	0.561
	0.503	0.739								
ROW 6	0.318	0.477	0.560	0.462	0.629	1.000	0.528	0.503	0.693	0.492
	0.485	0.679								
ROW 7	0.373	0.407	0.431	0.407	0.647	0.528	1.000	0.498	0.603	0.501
	0.428	0.602								
ROW 8	0.154	0.455	0.608	0.467	0.596	0.503	0.498	1.000	0.544	0.607
	0.631	0.604								
ROW 9	0.529	0.539	0.637	0.621	0.674	0.693	0.603	0.544	1.000	0.546
	0.511	0.725								
ROW 10	0.206	0.444	0.582	0.442	0.561	0.492	0.501	0.607	0.546	1.000
	0.710	0.581								
ROW 11	0.154	0.447	0.608	0.480	0.503	0.485	0.428	0.631	0.511	0.710
	1.000	0.527								
ROW 12	0.325	0.438	0.573	0.521	0.739	0.679	0.602	0.604	0.725	0.581
	0.527	1.000								

TABLE 5

LOADINGS OF THE QUESTIONS ON THE KINDERGARTEN PRINCIPAL COMPONENTS

	COMPONENTS									
Question	1	2	3	4	5	6	7	8	9	10
1	.782	.327	-.069	-.036	.072	-.092	-.103	.044	.151	-.120
2	.778	.291	-.020	-.001	.106	-.094	-.161	.072	.149	-.115
3	.771	.322	-.034	.047	.175	-.077	-.163	.176	.077	-.042
4	.809	.350	-.072	.045	.096	-.091	.008	-.062	.036	-.082
5	.838	.310	-.063	-.008	.081	-.066	-.034	-.049	.057	-.050
6	.823	.304	-.103	.063	.106	-.076	-.081	-.011	-.015	-.019
7	.696	.385	-.123	.125	.059	.030	.207	-.107	-.164	-.150
8	.526	.292	-.131	.258	.130	.169	.494	-.196	-.096	-.261
9	.732	.203	.134	-.077	.039	-.068	-.166	.159	.076	-.194
10	.514	.053	-.104	.283	.268	.354	.193	.342	-.019	.038
11	.629	-.347	-.126	-.087	.353	.151	-.016	.179	.085	.159
12	.764	-.112	-.193	.029	.177	.009	-.054	.146	.058	.228
13	.824	.187	-.212	.026	.031	-.023	-.062	-.021	.003	.090
14	.578	-.317	.166	-.104	.103	-.172	-.169	.176	-.163	-.325
15	.606	.035	.225	-.029	-.257	.067	.060	-.185	.484	.034
16	.765	-.078	-.177	.158	-.120	-.114	-.096	-.041	-.083	.154
17	.746	-.308	-.109	.060	-.196	-.062	.021	-.054	-.106	.007
18	.729	-.345	-.160	-.078	-.090	.006	.069	-.166	.003	-.025
19	.652	-.190	-.125	.275	-.271	.089	.068	.219	-.113	.053
20	.841	.032	-.225	-.054	-.057	-.020	-.001	-.159	-.007	.024
21	.767	-.186	-.031	-.029	-.033	-.150	-.135	-.017	-.219	.042
22	.752	.126	-.268	.029	.066	-.070	-.059	-.049	-.010	.228
23	.782	-.242	-.111	-.031	.015	-.024	-.090	-.160	-.117	.056
24	.811	.146	-.138	-.019	-.057	-.031	-.090	-.224	-.070	.099
25	.615	.101	.401	-.001	-.074	.038	.037	-.178	.200	.023
26	.741	.232	.247	-.305	-.184	.162	.052	.106	-.092	.069
27	.733	.201	.160	-.292	-.208	.215	.064	.144	-.110	.096
28	.745	.150	.156	-.288	-.151	.150	.066	.119	-.063	.105
29	.730	.244	.232	-.266	-.197	.148	.088	.024	-.123	.081

TABLE 5 (cont'd.)

	1	2	3	4	5	6	7	8	9	10
30	.399	-.043	.613	.303	.196	-.000	.117	-.183	-.149	.209
31	.413	-.046	.519	.437	.178	.126	-.066	-.145	.029	.138
32	.512	-.135	.558	.013	.110	-.103	-.039	.047	-.213	-.193
33	.642	-.238	.055	.266	-.347	-.017	-.080	.164	.213	-.124
34	.592	-.289	.022	.388	-.350	.025	.048	.227	.071	-.102
35	.714	-.408	-.129	.044	-.110	-.007	-.029	-.092	-.083	-.011
36	.590	-.573	-.051	-.106	.094	.048	.092	-.101	.063	-.079
37	.487	-.466	.131	-.298	.324	.177	.069	.038	.115	-.061
38	.602	-.372	-.061	-.087	.246	-.004	.129	-.042	.168	.032
39	.319	-.039	.229	-.065	-041	-.675	.524	.197	.049	.201
40	.692	-.302	-.007	-.179	-.015	.018	.063	-.199	-.012	-.198

TABLE 6

LOADINGS OF THE QUESTIONS ON THE
GRADE ONE PRINCIPAL COMPONENTS

Question	COMPONENTS 1	2	3	4	5	6	7	8	9	10
1	.740	-.393	-.129	.005	.089	-.052	-.081	.134	.132	.041
2	.721	-.372	-.085	-.014	.103	.031	-.141	.142	.114	-.080
3	.710	-.384	-.011	-.067	.159	.042	-.091	.167	.094	-.111
4	.714	-.429	-.224	-.005	-.037	-.042	-.057	.140	.111	.057
5	.713	-.401	-.241	-.019	-.157	-.036	.003	.063	.021	.060
6	.735	-.294	.017	-.046	-.052	.081	-.053	.049	-.032	-.004
7	.746	-.331	.039	.033	.297	.116	-.096	-.247	-.273	-.028
8	.756	-.320	.035	.033	.303	.088	-.086	-.246	-.263	-.014
9	.851	.041	.040	-.085	-.042	.108	-.082	-.049	.065	.009
10	.711	-.077	-.319	-.003	-.244	-.017	.199	-.126	-.120	.136
11	.705	.017	-.316	-.029	-.237	.114	.192	-.095	-.210	.051
12	.785	-.025	-.235	-.048	-.226	.131	.049	-.028	.071	.053
13	.766	.274	-.229	-.143	.009	.221	.067	-.027	.073	.038
14	.723	.407	-.179	-.140	.129	.273	-.002	.007	.062	.021
15	.593	-.120	.270	.060	.226	.103	.591	.323	-.115	-.085
16	.821	.023	.352	-.010	-.090	-.017	.060	-.062	.115	.091
17	.758	.021	.356	.015	-.096	-.026	.046	-.106	.019	.100
18	.852	.032	.058	-.085	-.118	.042	-.008	-.042	.105	-.051
19	.837	-.002	.138	-.064	-.131	-.016	.039	-.047	.063	-.071
20	.838	.160	.093	-.037	-.084	-.121	-.23	-.044	-.065	-.133
21	.822	-.034	.272	-.010	-.004	-.047	.021	-.125	.115	.103
22	.805	.005	.287	.006	.035	-.042	-.002	-.090	.065	.132
23	.814	-.004	.293	.008	-.020	-.031	.047	-.070	.153	.072
24	.506	.125	-.114	.717	.008	.075	-.004	-.031	.132	-.110
25	.514	.143	-.057	.719	-.029	.058	-.024	-.035	.030	-.082
26	.625	.305	.140	.184	-.015	.051	-.249	-.361	-.291	.387
27	.790	.174	.019	-.004	-.100	-.208	-.070	.071	-.179	-.176
28	.771	.090	-.041	-.055	-.114	-.242	.021	.055	-.150	-.286
29	.679	.456	-.151	-.144	.209	.170	-.023	.062	.059	-.023
30	.559	.395	-.258	-.078	.436	-.194	.074	-.082	.127	.048
31	.637	.066	-.253	.073	.157	-.542	.094	-.020	.014	.197
32	.793	.308	.072	-.120	-.067	-.027	-.148	.088	-.048	-.130
33	.814	.250	.055	-.123	-.044	-.050	-.135	.054	-.022	-.150

TABLE 7

LOADINGS OF THE QUESTIONS ON THE
GRADE TWO PRINCIPAL COMPONENTS

	COMPONENTS									
Question	1	2	3	4	5	6	7	8	9	10
1	.868	-.082	.077	.073	-.007	-.016	.050	-.036	-.011	.136
2	.750	-.272	-.099	-.073	-.116	.103	-.055	-.358	.093	-.023
3	.738	-.311	-.339	-.060	-.129	.057	-.102	-.009	-.117	.170
4	.790	-.314	-.098	-.047	-.106	.092	-.108	-.268	.006	-.024
5	.811	-.213	.337	.026	-.192	.118	.189	.130	-.070	-.006
6	.815	-.200	.324	.034	-.198	.137	.1-5	.146	-.073	-.006
7	.800	-.180	.291	-.009	-.139	.097	.132	.112	-.022	-.054
8	.794	-.018	.295	-.025	-.110	-.034	-.150	.037	.086	-.067
9	.819	-.193	.082	-.030	-.057	.098	-.098	-.204	.021	-.093
10	.793	-.084	-.325	-.019	-.028	-.146	.059	.129	-.139	-.095
11	.806	.104	-.138	.092	.018	-.242	.101	-.058	-.072	-.276
12	.752	.316	.038	.270	-.040	-.219	.103	-.169	-.182	.001
13	.801	.174	-.088	.174	-.040	-.214	.084	-.083	-.195	.025
14	.749	-.140	.197	-.097	.523	.005	-.123	.035	-.137	.036
15	.772	-.146	.209	-.100	.470	.022	-.146	-.001	-.129	.009
16	.844	.106	.090	.090	.101	-.099	.062	-.018	.279	-.016
17	.859	-.074	-.204	.033	.062	-.104	-.006	.098	.066	-.031
18	.833	-.169	-.256	-.028	-.011	-.044	-.016	.140	.027	.177
19	.846	.117	.125	.135	.045	-.118	.034	.027	.065	.078
20	.826	.114	-.037	.090	.119	-.066	.079	.050	.030	.049
21	.590	.501	.018	.335	.022	.316	-.018	-.150	-.024	.241
22	.603	.425	-.186	.138	.024	.481	-.145	.129	-.071	-.262
23	.775	-.111	-.397	-.020	-.033	.092	-.053	.236	.020	.047
24	.838	.044	-.088	.026	.086	.016	-.004	.031	.215	-.108
25	.578	.349	.220	-.218	-.304	-.239	-.494	.080	-.013	.003
26	.633	.453	-.011	-.414	-.078	.018	.091	.052	-.014	.157
27	.522	.305	-.063	-.560	.064	.079	.265	-.139	-.015	-.051

TABLE 8

LOADINGS OF THE QUESTIONS ON THE
GRADE THREE-PLUS PRINCIPAL COMPONENTS

	COMPONENTS									
Question	1	2	3	4	5	6	7	8	9	10
1	.495	-.740	-.043							
2	.703	-.303	.332							
3	.801	.004	.260							
4	.732	-.360	.333							
5	.803	.123	-.344							
6	.769	.019	-.263							
7	.722	.008	-.388							
8	.752	.351	.125							
9	.853	-.178	-.177							
10	.750	.347	.175							
11	.729	.376	.335							
12	.831	.088	-.269							