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RESEARCH REPORT

SCHOOL TYPE AND ACADEMIC ACHIEVEMENT: 1985

JOSEPHINE JORDAN
Department of Psychology, University of Zimbabwe

Psychological research often requires a sample frame representing the diversity of social conditions found in Zimbabwe. In theoretical research, we wish to ascertain that a model of behaviour accounts for human responses equally well in all circumstances. In applied research, we evaluate the effectiveness of a technique in the full range of conditions under which it will be used. For psychometric and educational research, school type is a possible operationalization of the range of circumstances under which Zimbabweans grow up and develop.

In 1964 and 1969, Irvine presented evidence on the relationship between school type, school achievement and psychological test performance. In a study of Form I pupils, Irvine (1964) showed that school types, defined as rural boarding, urban day and rural day, were a more dominant influence in both school and psychological test performance than the Standard Six barrier examinations. Irvine (1969, 284) classified the schools into three grades: A, B, and C.

Grade A Schools — Single-sex, denominational boarding schools built on Crown Land with long-serving staff, offering four-year courses.

Grade B Schools — Schools, mainly boarding, sharing some of the characteristics of the A schools, but including non-denominational government schools and schools in small urban centres.

Grade C Schools — Schools either in large urban areas or on European farm land, non-boarding and mixed-sex with a high proportion of staff with short terms of service in these schools.

There was a strong relationship between school type and the Junior Certificate results of 1965.

From a wider sociological study in 1971, Dorsey (1975) presented confirming and extending evidence of the relationship between school type and examination achievement. Dorsey related 'O'-level achievement to several characteristics of the schools: size of enrolment; teacher–pupil ratio; qualifications of staff; racial composition of staff; ethnic composition of student body; social composition of student body; denominational affiliation of school; sex composition of school; and rural boarding-school environment. 'O'-level achievement of schools was represented by the percentage of pupils who obtained first-division passes. 'O'-level achievement was significantly related to four school characteristics: racial composition of staff; denominational affiliation of school; sex composition of school; and rural boarding-school environment. In addition, Dorsey showed that of the top ten schools (in 1971 there were 69 schools offering 'O'-level, 67 being included in Dorsey's sample), eight schools were single-sex mission boarding-schools, i.e. schools in Irvine's Group A category.

Fifteen years have now passed since Dorsey's data were collected, with
national independence, the integration of the Ministries of African, European and Asian and Coloured Education, and the rapid expansion of the school system in the intervening period. This article reports a re-examination of the relationship between school type and examination achievement using the ‘O’-level results of the integrated and expanded school system of 1985.

METHOD

School categorization

In 1985, 779 centres presented ‘O’-level candidates. Scrutiny of the records of the Examinations Branch of the Ministry of Education showed that summary statistics of ‘O’-level results are presented by the University of Cambridge Local Examinations Syndicate.

In the light of Irvine’s and Dorsey’s results the most valuable printout related ‘O’-level results to school type. The computer output classified schools into eight categories: Government Group A; Government Group B; Commercial Colleges; District Council; Farm and Mine; Mission; Private; and Rural Council or Provincial Authority. Students who entered the examinations privately were categorized separately.*

A second printout that was relevant to this study compared the performance of boarding and non-boarding pupils. However, examination of the records of the Planning Section of the Ministry of Education showed that in 1986 only 12.3 percent of pupils were boarders. The low percentage of boarders renders a complete two-way analysis, boarding by school type, tenuous in parts; consequently, despite the high heuristic value of the boarding/non-boarding classification, this dimension was abandoned for this study.

School type was categorized, therefore, by the eight school types listed above, which are used in the routine statistics presented by the Ministry of Education.

Examination classification

In 1965, Irvine used Form I results, in 1969 Irvine used Junior Certificate results, and in 1971 Dorsey used first-division passes at ‘O’-level to represent academic success. This study is concerned only with ‘O’-level examination results which are no longer reported by the University of Cambridge Local Examinations Syndicate in the form of divisions. The printouts of examination results by school type were provided by examination subject (for example, English Language) and listed the number of children in each school type who attempted the subject and the number who obtained A, B, C, D, E and U grades. From these data, only two statistics were used: the percentage of children who obtained A-grade passes and the percentage of children who obtained overall passes, i.e. the total percentage of children obtaining A, B and C grades.

ANALYSES

Comparison of academic success in subjects offered by all school types

The academic success of the eight school types was compared in two ways: firstly,
with the proportions of students who obtained A grades; and, secondly, with the proportions of students who obtained overall passes. Two separate 8 x 2 chi-squares were calculated to summarize the comparisons and were repeated for each of the fifteen subjects. For the sake of completeness, chi-squares were calculated even where very small numbers of students were expected to obtain A grades or overall passes. Where the data violated chi-square assumptions, it is clearly marked in the results.

Rank order of the eight school types by academic success
The 30 chi-square statistics generated in the first analysis indicate whether or not school type effects examination results. The statistics do not, however, tell us which of the school categories obtain higher proportions of A grades or overall passes, or whether differences in school types are consistent over subjects. To provide a rank ordering of school types over different school subjects, the ten subjects which were offered by all school types and which were taken by an excess of 25,000 candidates were employed in a Friedman ranked analysis of variance (Siegel, 1956). The analysis ranks the performance of the schools on each of the subjects included and computes a summative statistic with the distribution of chi-square.

Comparison of the academic success of school types for subject groups
The last analysis was prompted by the possibility that some school types may do better in mainstream subjects and others may do better in alternatives. All the examination subjects taken in 1985 — with the exception of English Language, Literature in English, Art, Music, and subjects taken by private students only — were grouped into subject clusters (for example, all History papers were classified as History), and proportions of children obtaining A grades and C grades or better were recalculated for each school type. The school types were then ranked on the proportion of children obtaining A grades and C grades or better in the subject clusters. Rank orders only are presented as the data are not amenable to statistical analysis.

RESULTS

Comparison of academic success in subjects offered by all school types
The fifteen subjects offered by all school types are listed in Table I. A list of the 47 subjects not offered by at least one school category is available from the author.

A summary of the chi-square statistics, representing a comparison of the performance of the eight school types in each of the fifteen subjects, is provided in Table II. In all but one analysis, Economics grade A passes, the differences between the eight school types are significant. The statistical non-significance of the school type differences in Economics grade A passes is due to the combination of a very low proportion of grade A passes and very few candidates. In eleven of the thirty analyses (clearly marked in Table II), the chi-square must be interpreted with caution. In these eleven analyses, either the proportion of grade A passes or overall passes, or the number of children writing that subject in one or more school categories, or both, was too small to allow meaningful statistical analyses.

Rank order of the eight school types by academic success
The ten subjects which were taken by 25,000 candidates or more are English Language, Mathematics (Syllabus D), Geography (Central Africa), Shona,
Table 1
SUBJECTS OFFERED BY EVERY SCHOOL TYPE IN THE 1985 'O'-LEVEL EXAMINATIONS, WITH THE TOTAL NUMBER OF CANDIDATES

<table>
<thead>
<tr>
<th>Subject</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Language</td>
<td>101,236</td>
</tr>
<tr>
<td>Mathematics (Syllabus D)</td>
<td>86,405</td>
</tr>
<tr>
<td>Geography (Central Africa)</td>
<td>84,788</td>
</tr>
<tr>
<td>Shona</td>
<td>76,250</td>
</tr>
<tr>
<td>History (Central and Southern Africa)</td>
<td>62,277</td>
</tr>
<tr>
<td>Literature in English</td>
<td>50,569</td>
</tr>
<tr>
<td>Combined Science</td>
<td>41,207</td>
</tr>
<tr>
<td>General Science (Zimbabwe)</td>
<td>36,142</td>
</tr>
<tr>
<td>Bible Knowledge (Life of Christ)</td>
<td>31,612</td>
</tr>
<tr>
<td>Bible Knowledge</td>
<td>25,721</td>
</tr>
<tr>
<td>Commerce</td>
<td>13,515</td>
</tr>
<tr>
<td>Principles of Accounts</td>
<td>8,722</td>
</tr>
<tr>
<td>Human and Social Biology</td>
<td>6,460</td>
</tr>
<tr>
<td>Biology</td>
<td>5,976</td>
</tr>
<tr>
<td>Economics</td>
<td>2,349</td>
</tr>
</tbody>
</table>

Source: Ministry of Education

The rearrangement of the examination subjects into groups produced nine subject clusters: African Languages, Business Studies, Bible Studies, Geography, History, Mathematics, Other Languages, Practical Subjects and Science. A full breakdown of the examination papers included in each cluster is available from the author.

Tables IVa and IVb present the rank orders of the school types for the nine new subject clusters for grade A achievement and then overall passes. These data are presented for heuristic purposes only. They are not amenable to statistical analysis because it is possible for one pupil to write, say, two Mathematics papers, rendering the data non-independent to an unknown extent, and also because the frequency of small numbers underlying the rank orders, would reduce the meaningfulness of the analysis even further.
Table II

CHI-SQUARE STATISTICS INDICATING THE DIFFERENCES IN ACADEMIC ACHIEVEMENT OF THE EIGHT SCHOOL CATEGORIES IN THOSE SUBJECTS OFFERED BY EVERY SCHOOL TYPE

<table>
<thead>
<tr>
<th>Subject</th>
<th>Grade A</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Language</td>
<td>1,554.79</td>
<td>4,408.84</td>
</tr>
<tr>
<td>Literature in English</td>
<td>193.37*</td>
<td>2,474.75</td>
</tr>
<tr>
<td>Bible Knowledge (Life of Christ)</td>
<td>904.69*</td>
<td>1,590.96</td>
</tr>
<tr>
<td>Bible Knowledge</td>
<td>319.34*</td>
<td>1,259.73</td>
</tr>
<tr>
<td>History (Central and Southern Africa)</td>
<td>874.97</td>
<td>2,570.66</td>
</tr>
<tr>
<td>Geography (Central Africa)</td>
<td>551.20</td>
<td>3,856.74</td>
</tr>
<tr>
<td>Economics</td>
<td>3.68**</td>
<td>45.24*</td>
</tr>
<tr>
<td>Shona</td>
<td>774.81</td>
<td>2,056.13</td>
</tr>
<tr>
<td>Mathematics (Syllabus D)</td>
<td>831.69</td>
<td>2,363.31</td>
</tr>
<tr>
<td>General Science (Zimbabwe)</td>
<td>29.28*</td>
<td>55.36</td>
</tr>
<tr>
<td>Biology</td>
<td>225.97*</td>
<td>394.54</td>
</tr>
<tr>
<td>Human and Social Biology</td>
<td>34.56*</td>
<td>156.66*</td>
</tr>
<tr>
<td>Combined Science</td>
<td>182.23*</td>
<td>906.33*</td>
</tr>
<tr>
<td>Commerce</td>
<td>121.81</td>
<td>398.60</td>
</tr>
<tr>
<td>Principles of Accounts</td>
<td>78.23</td>
<td>430.42</td>
</tr>
</tbody>
</table>

Degrees of freedom = 7. Details of the data input and calculations can be obtained from the author.

* Exercise caution in interpreting these statistics. Chi-squares are inapplicable when an expected frequency is less than 1 or if 20 per cent of cells (3 or more in this instance) have expected frequencies of less than 5 (Siegel, 1956, 110).

**Only in Economics grade A passes were there no differences between the school categories. In this subject, very few pupils obtained A grade passes.

DISCUSSION

The chi-square analyses comparing the achievement of different school types in different subjects and at grade A and pass levels, show a school type influence on 'O'-level results. The Friedman analyses of variance further show that the differences in school achievement are systematic, with Mission schools obtaining the best results followed by Government Group A schools. District Council schools obtain the worst results whether A grades or overall passes are considered. The remaining five school types fall between the two extremes.

Data presented in Tables IVa and IVb provide a heuristic check of these results. Some variations are present when subjects are clustered into groups and these variations are worth noting, but the post hoc analyses do not materially challenge the results of the statistical analysis. (Three notable variations are that District Council schools fare better when Ndebele is grouped with Shona to form the cluster African Languages, and when the two major Bible Studies and Science papers are each taken together.)
### Table IIIa

**RANK ORDERS OF SCHOOL TYPES ON ACADEMIC SUCCESS (GRADE A) IN TEN SUBJECTS TAKEN BY 25,000 OR MORE CANDIDATES**

| Subject                        | School Type (k = 8) | Group A | Group B | Community College | District Council | Farm/ Mine | Mission | Private | Rural/ Provincial |
|--------------------------------|---------------------|---------|---------|-------------------|------------------|------------|---------|---------|---------|------------------|
| English Language               |                     | 1       | 5       | 2.5               | 8                | 7          | 4       | 2.5     | 6       |
| Literature in English          |                     | 1       | 4       | 4                 | 8                | 7          | 2       | 4       | 6       |
| Bible Knowledge                |                     | 2       | 6       | 3.5               | 5                | 7.5        | 1       | 3.5     | 7.5     |
| Bible Knowledge (Life of Christ)|                    | 1       | 5       | 7.5               | 4                | 7.5        | 2       | 3       | 6       |
| History (Central and Southern Africa) |                   | 2.5     | 2.5     | 7                 | 8                | 4          | 1       | 5.5     | 5.5     |
| Geography (Central Africa)     |                     | 1.5     | 5       | 6                 | 8                | 1.5        | 3       | 4       | 7       |
| Shona                          |                     | 2       | 6       | 8                 | 4                | 7          | 1       | 5       | 3       |
| Mathematics (Syll. D)          |                     | 2       | 3       | 8                 | 7                | 5          | 1       | 6       | 4       |
| General Science (Zimbabwe)     |                     | 8       | 3       | 7                 | 6                | 1          | 2       | 4       | 5       |
| Combined Science               |                     | 2.5     | 4       | 8                 | 7                | 5.5        | 1       | 2.5     | 5.5     |

| Rj                             | 23.5                | 43.5    | 61.5    | 65     | 53     | 18      | 40      | 55.5    |

\[ \chi^2 = 34.41 \quad \text{d.f.} = 7 \]
### Table IIIb

RANK ORDERS OF SCHOOL TYPES ON ACADEMIC SUCCESS (GRADE C OR BETTER) IN TEN SUBJECTS TAKEN BY 25,000 OR MORE CANDIDATES

<table>
<thead>
<tr>
<th>Subject <em>(n = 10)</em></th>
<th>School Type <em>(k = 8)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group <em>A</em></td>
</tr>
<tr>
<td>English Language</td>
<td>1</td>
</tr>
<tr>
<td>Literature in English</td>
<td>1</td>
</tr>
<tr>
<td>Bible Knowledge</td>
<td>2</td>
</tr>
<tr>
<td>Bible Knowledge (Life of Christ)</td>
<td>2</td>
</tr>
<tr>
<td>History (Central and Southern Africa)</td>
<td>2</td>
</tr>
<tr>
<td>Geography (Central Africa)</td>
<td>1</td>
</tr>
<tr>
<td>Shona</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (Syll. D)</td>
<td>2</td>
</tr>
<tr>
<td>General Science (Zimbabwe)</td>
<td>8</td>
</tr>
<tr>
<td>Combined Science</td>
<td>2</td>
</tr>
</tbody>
</table>

| Rj  | 24 | 52 | 49.5 | 68 | 53 | 14.5 | 55 | 44 |

χ² = 35.56  
*d.f. = 7*
SCHOOL TYPE & ACADEMIC ACHIEVEMENT

Table IIIc
COMPARISON OF THE SCHOOL TYPES RANKED ON ACADEMIC ACHIEVEMENT OVER THE TEN MOST POPULAR ACADEMIC SUBJECTS

<table>
<thead>
<tr>
<th>School type</th>
<th>Grade A</th>
<th>Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Government Group A</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Private</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Government Group B</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Farm and Mine</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Rural or Provincial Council</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Commercial Colleges</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>District Council</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Table IVa
RANKING OF SCHOOL TYPES BASED ON PERCENTAGES OF A GRADES OBTAINED IN DIFFERENT SUBJECT GROUPS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Group A</th>
<th>Group B</th>
<th>Community College</th>
<th>District Council</th>
<th>Farm/ Mine</th>
<th>Mission</th>
<th>Private</th>
<th>Rural/ Provincial</th>
</tr>
</thead>
<tbody>
<tr>
<td>African Languages</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>7</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Business Studies</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>8</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Bible Studies</td>
<td>1.5</td>
<td>5.5</td>
<td>5.5</td>
<td>4</td>
<td>8</td>
<td>1.5</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Geography</td>
<td>2.5</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>2.5</td>
<td>1</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>History</td>
<td>2</td>
<td>3</td>
<td>5.5</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>5.5</td>
<td>7</td>
</tr>
<tr>
<td>Mathematics</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Other Languages</td>
<td>4</td>
<td>—</td>
<td>1</td>
<td>—</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Practical Subjects</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>4.5</td>
<td>2</td>
<td>4.5</td>
<td>1</td>
</tr>
<tr>
<td>Science</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>
The data presented and analysed in this article replicate and confirm the continuing validity of the school type categories, initiated by Irvine and Dorsey and institutionalized in the statistics presented by the University of Cambridge Local Examinations Syndicate. The consistent rank-ordering of the school categories provides a reliable dimension on which to sample schools in field research. At the one end of the continuum are Mission schools with consistently superior performance. Contrasted with the Mission category are District Council schools. Between these two extremes are Government Group A schools performing consistently well, which can be contrasted in turn with Government Group B schools.

The existence of the school type continuum provides unambiguous sampling prescriptions. When it is necessary or desirable to test a theory or procedure in the full range of Zimbabwean conditions, Mission and District Council schools provide two quasi-experimental conditions which will maximize differences and therefore provide the most powerful test of the model under investigation. For pilot studies, or when less rigour is required, it would be possible to contrast samples derived from Government Group A and Government Group B schools.
Acknowledgements
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Section of the Ministry of Education. Their assistance is gratefully acknowledged.

References

