THE RELATION BETWEEN EDUCATIONAL ACHIEVEMENT AND SCHOOL SIZE

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I. INTRODUCTION

IN a much discussed book, Pedley (1956) puts forward the view that the sixth forms of maintained grammar schools are the weakest link in the English education system. Their inefficiency is a result of their small size. By virtue of this they are frequently unable to offer much variety of subjects for advanced level, and in spite of the generous pupil-teacher ratio the small number of pupils means that they are inefficiently taught and lack the stimulus of discussion with others. So unsatisfactory does Pedley consider the present sixth form system that he advocates scrapping it altogether and replacing it with larger 'junior colleges'. However, factual evidence for this alleged inefficiency of the small school is rather thin, and in fact Pedley does not offer any apart from headmasters' comments and the observation that maintained grammar schools do badly in the open scholarship competition for Oxford and Cambridge compared with many of the public schools with much larger sixth forms. The observation must be viewed with caution. While it is true that maintained grammar schools are conspicuously absent from the annual *T.E.S.* list of schools obtaining more than six or so open awards, this may simply be because a small school has much less chance of obtaining this number of awards. Any fair comparison should compare the number of awards as a function of the number of boys from the school competing.

Recently a communication by Oldfield (1958) has done something to undermine Pedley's position. He has produced statistical evidence to show that small schools actually do significantly better than big ones. From an analysis of the table of open awards obtained by schools at Oxford and Cambridge published annually by *The Times Educational Supplement* (Worswick, 1958) he shows that, although large schools naturally tend to get more awards than small, when the size of school is taken into account there is a significant tendency for small schools to obtain more *awards per 1,000 boys* than large schools. If his conclusion

that small schools are more educationally efficient than large schools is justified, then this is surely a finding of first rate importance for the social psychology of education. The present paper is concerned with a further examination of this question.

Interesting as Oldfield's finding is, there are two important objections to the analysis he has made. In the first place, figures for school population were taken from *Whitaker's Almanack* and these are unsatisfactory because some of the schools in question admit boys at the age of eight (such as Bradford Grammar School), while others admit at the age of thirteen. Clearly schools of different sizes can only be compared if their open awards are expressed as a percentage of the same age range. Secondly, Worswick's table only gives schools obtaining more than seven open awards. A big school with more than eleven hundred boys is very likely to get this number of awards, and in fact all of the four independent and direct grant schools of this size did so. On the other hand, only an exceptional small school obtains this number of open awards and most small schools do not appear in the table at all. Thus by considering only the schools that appear in the table, all very big schools are being compared with exceptionally good small schools. This basis of comparison is obviously unsatisfactory and might alone account for the negative association between school size and number of awards per 1,060 boys which Oldfield finds.

II. OPEN AWARDS AND SCHOOL SIZE

All open awards at Oxford and Cambridge for 1957–8, published in *The Times Educational Supplement*, were tabulated for Headmasters' Conference schools in England and Wales. These schools fall into two groups, namely independent schools which for the most part take boys at the age of thirteen, and direct grant together with maintained schools for which the age of admission is eleven. Of the 118 independent public schools in England and Wales, 105 are recognized as efficient by the Ministry of Education, and the number of boys in each school aged sixteen and over is published in the Ministry's pamphlet (1958). From this information it is possible to calculate for each school the number of open awards per thousand boys aged sixteen and over. When this figure is compared with the actual number of boys aged sixteen and over in each school, the tendency for big schools to get a large number of open awards in proportion to their numbers is very strikingly revealed; the correlation between the two variables is +·69. The mean number of open awards per 1,000 boys aged 16+ for different sizes of school is shown in Table I.

For direct grant and maintained grammar schools there is no published information concerning number of boys aged sixteen plus. However for 62 of these schools it was possible to discover (from Reeve's and other reference books) the number of boys in the school aged eleven and over

TABLE I

Open Awards: Independent H.M.C. Schools

	No. of boys in school aged 16 plus								Correlation school size and awards
	0–80	81–110	111–140	141–170	171–200	201–230	231–260	260+	
No. of schools	15	19	20	13	11	8	9	10	
Awards per 1000 boys aged 16+	8·0	7·6	9·7	20·4	25·2	34·7	23·1	31·9	·69

and from this to calculate the number of open awards per 1,000 boys in the school. A comparison of this figure with the actual size of the school shows the same tendency for large schools to obtain a large number of open awards: the correlation is +·50 and is significant. The mean number of open awards per 1,000 boys for different sizes of school is shown in Table II.

TABLE II

Open Awards: Direct Grant and L.E.A. Grammar Schools

	Size of school							Correlation
	Less than 300	300–400	400–500	500–600	600–700	700–800	800+	
No. of schools	3	10	14	12	10	7	6	
Mean no. awards per 100 boys aged 11–19	1·1	1·7	3·3	3·0	3·9	3·7	12·4	·50

III. ADVANCED LEVEL RESULTS AND SCHOOL SIZE

The relation of school size to educational attainment at 'A' level was investigated from the results of the Oxford and Cambridge Joint Examination Board for 1957. 103 independent public schools in England and Wales take this examination. The mean number of distinctions and passes per hundred boys aged 16+ for different sizes of school are shown in Table III.

In order to obtain a more homogeneous group of schools, a study was made of all those maintained grammar schools in the county of London which take the London G.C.E. at advanced level. Of the 76 such schools, there are 31 boys' schools and 34 girls' schools which fulfil this condition.

The number of distinctions per 100 candidates and number of passes and failures per candidate were calculated for each school and the results are shown in Tables IV and V.

TABLE III

No. of Boys in School aged 16 plus

	Less 80	80–120	120–160	160–220	220+	Correlation no. of boys and no. of distinctions per 100 boys
No. of schools	17	25	20	19	22	
Mean no. of D's per 100 boys	6·7	7·3	7·9	10·7	13·0	·44
Mean no. of passes per 100 boys	74·8	66·8	72·7	87·8	90·4	·36

TABLE IV

London University 'A' Level: Boys

	No. of candidates per school						Correlation school size and attainment
	0–13	14–20	21–30	31–40	41–50	51–68	
No. of schools	5	5	7	5	4	5	
Distinctions per 100 candidates	18·2	23·6	24·0	23·1	42·6	27·7	·50 significant
Passes per candidate	1·47	1·93	1·70	1·76	1·96	1·95	·22
Failures per candidate	·91	1·05	·99	1·08	·75	·87	−·28

TABLE V

London University 'A' Level: Girls

	No. of candidates per school					Correlation school size and attainment
	0–5	6–10	11–20	21–30	31–42	
No. of schools	4	8	13	5	4	
Distinctions per 100 candidates	0	10·0	8·18	11·7	18·1	·50 significant
Passes per candidate	1·50	1·47	1·56	1·58	1·99	·23
Failures per candidate	·82	·97	·71	·68	·56	−·47 significant

IV. ORDINARY LEVEL RESULTS

An examination of the relation between school size and achievement at ordinary level should do something to make clear how far a small sixth form is handicapped by the very small number of candidates as such. All maintained grammar schools taking London G.C.E. and situated in London County were examined and the numbers of passes and failures recorded in English Language, French and Mathematics. Tables VI and VII show the percentage of passes as a function of the number of streams in the school. The significance of the tendency of more candidates to pass in large schools was tested by means of chi-squared using $2 \times n$ tables. Chi-squared is significant in the case of boys taking French and Mathematics, and girls taking English Language and French.

TABLE VI

Boys

No. of streams in school	2	3	4
No. of schools	4	22	2
Percentage passing			
English Language	55·9	51·8	56·2
French	43·2	48·9	55·7
Mathematics	55·2	61·8	70·7

TABLE VII

Girls

No. of streams in school	2	3	4
No. of schools	10	21	2
Percentage passing			
English Language	54·8	68·5	88·4
French	51·4	62·9	66·9
Mathematics	64·3	47·8	62·2

The attainments of schools of different sizes at 'O' level was also worked out for another G.C.E. Board, which is rather small and for this reason wishes to remain anonymous. The mean marks in English Language, Mathematics and French were calculated for candidates from all maintained and direct grant grammar schools taking the examination. The mean marks of candidates from schools of different sizes are shown in Tables VIII and IX. Using the t test, all differences greater than 1·7 are significant. Again candidates from large schools are doing better than those from small. (There was no tendency in this sample for the larger schools to be the direct grant schools, which might be supposed to have a more intelligent intake.)

TABLE VIII

Boys

	Size of school		
	Smaller than 500	500–700	700 and larger
No. of schools	4	4	2
Mean marks of candidates			
(1) English Language	47·6	49·1	50·7
(2) French	42·2	46·7	50·3
(3) Maths	44·8	53·1	52·3

TABLE IX

Girls

	Size of school	
	Smaller than 500	600–700
No. of schools	3	3
Mean marks of candidates		
(1) English Language	51·7	54·2
(2) French	44·9	54·2
(3) Maths	47·7	50·5

DISCUSSION

The findings seem to show that Pedley is right in his view that the small schools are not producing such good results as the large. They show also that this tendency becomes more marked with higher levels of academic attainment. The better achievements of large schools are most evident in university awards and are markedly present in distinctions at advanced level. In passes and failures at advanced and ordinary levels the differences are less striking. However, it is not at all obvious from the results that Pedley is right in attributing the superiority of the big school to its large sixth form as such. Two other factors might be advanced to explain the association between school size and educational success.

(1) Do the larger schools attract better teachers? In the case of the independent public schools this seems more than probable. The largest schools are the famous ones with the most prestige and those with more than 200 boys aged sixteen and over include Charterhouse, Clifton, Dulwich, Eton, Harrow, Marlborough, Rugby, St. Paul's and Winchester. This is also true of the direct grant schools, where Manchester and

Bristol Grammar Schools appear in the largest group. Whether there is any such tendency among maintained grammar schools in London County seems more doubtful and difficult to establish one way or the other. But a comparison of the attainments of London boys and girls at A level provides a clue here. It will be observed (Tables IV, V) that girls are getting virtually the same proportion of passes as boys, but only half as many distinctions. It is doubtful whether better teachers can account for this difference, since it seems unlikely that women teachers are so much worse than men. It is true that girls may well be less ambitious than boys and be content to pass and not make the extra effort to get a distinction, but this cannot explain the whole of the sex difference; since when boys and girls from sixth forms of the same size are compared the proportions of distinctions obtained are much more nearly equal.

(2) Do the larger schools attract more intelligent children? Again it may be suspected that this is the case in the independent public and direct grant schools, but whether it is so in London County is more doubtful. Two pieces of evidence suggest it is not a factor of paramount importance. First, if the G.C.E. results at 'O' level are taken as an index of intelligence the large schools are only getting something like 8 per cent more passes per 100 candidates and the difference between the small and large schools are not so very marked. But two years later the children at the large schools are getting about 100 per cent more distinctions per 100 candidates at 'A' level. From the evidence of the 'O' level results it is doubtful whether this can be explained entirely by superior intelligence. Secondly, the fact that girls are only getting half as many distinctions per 100 candidates can hardly be attributed to inferior intelligence.

The evidence does therefore do something to support Pedley's argument that the small sixth form is an inefficient unit simply by virtue of its small size. Two further factors may well be important in this connection.

(3) Quite apart from the quality of the teaching, in a small sixth form it is difficult for the teaching to be efficiently organized. In *The Times Educational Supplement* survey of 1949 the headmasters of small grammar schools were the first to acknowledge this. In many small schools it is common for the first, second and third year sixth forms to be taught together, and it seems likely that pupils taught in these conditions are handicapped in comparison with those in larger sixth forms where the years can be taught separately.

(4) A further factor enhancing the academic superiority of the large school may be that it provides a more stimulating and competitive atmosphere. There are several maintained grammar schools in London producing only one candidate per subject per year for advanced level and many more that produce only a small handful. It seems very likely that pupils will be at a disadvantage working in this intellectual isolation

with none of the discussion, stimulus and intellectual give and take which the large school can offer.

What is the optimum size of school? The figures seem to suggest that, within the present size range, the bigger the better. The 'O' level results show that the three and four stream schools have the edge over the smaller ones in that examination. As far as the sixth form is concerned, the open scholarship tables suggest that the minimum size for efficiency is something like 150. The London 'A' level results suggest that a sixth form of 100 is desirable, but as the largest maintained grammar school in London has a sixth form of only 141 it may well be that larger sixth forms would produce better results. As it is, out of the seventy-six maintained grammar schools in London, only ten have sixth forms larger than 100. It looks as if the maintained grammar schools would be in a better position to compete with the best public and direct grant schools if the largest doubled their sixth form size. If the smaller maintained schools are to offer equality of opportunity to their pupils some more radical form of reorganization would be necessary, possibly along the lines of the junior colleges which Pedley advocates.

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