project talent survey: findings of research completed during 1978

human sciences research council

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The data which were used in the research with which this publication deals were obtained by means of Project Talent Survey. Talent Survey is a long-term research project which commenced in 1965, with the major aim of determining the country's manpower potential and of making data available that will assist in developing this potential to the maximum. The project was undertaken with the co-operation of all the education departments of the Republic of South Africa and South-West Africa, as well as of the associations of church and private schools.

The persons responsible for the planning in broad outline between 1959 and 1964 and who had the task of convincing the authorities of the necessity of establishing Talent Survey are Dr P.M. Robbertse, former President of the Human Sciences Research Council (HSRC), Prof. Dr H.P. Langenhoven, at present on the staff of the UOFS, and Dr A.B. Fourie, at present on the staff of the Department of Education and Training. Talent Survey is being carried out under the direction of Mr W. Verhoef, Director, and Dr W.L. Roos, Senior Chief Research Officer of the Institute for Manpower Research. The measuring instruments which were used in Talent Survey's three extensive test programmes at Standard Six, Eight and Ten level, were constructed by the Institute for Psychometric Research of the HSRC.

During the planning stage and in the application of the test programmes, Talent Survey's staff was assisted by an advisory committee consisting of representatives of the education departments of the RSA and SWA, associations of church and private schools and the National Education Council. The assistance of this advisory committee is highly appreciated. The committee was dissolved in 1973 and its functions were taken over by the Advisory Committee for Manpower Research.

Talent Survey is conducted in close co-operation with the HSRC's Institute for Statistical Research, which is responsible for the machine processing and storage of all Talent Survey data. For the latter use is made of the IBM optic reader and computer of the Department of National Education.

In addition, appreciation is expressed to the more than a thousand persons, mostly teachers, who acted as testers, organizers or supervisors at schools, and to the personnel of the psychological and guidance services of the education departments, who trained testers and were important links in the organization of the test programmes. Finally, the eventual success of Talent Survey would not have been possible without the whole-hearted co-operation of the approximately 85 000 pupils who were involved.

PREFACE

Project Talent Survey was started in 1965. Its main purpose is to determine the country's White manpower potential, and to make data available for the maximum development of this potential.

To implement the aim of Talent Survey, the population of the 1965 Standard Six pupils was tested with a comprehensive battery of psychological measuring instruments. These pupils were also followed up at Standard Eight and Standard Ten level and another follow-up after Standard Ten was undertaken by means of questionnaires and by obtaining the examination results of all pupils who receive further training.

Because of the value which Talent Survey research may have for education, it has throughout been the policy to make the results of all Talent Survey research available to schools and other educational institutions. Consequently the first ten Talent Survey reports (MT-1 to MT-10) were made available from 1970 to 1972 in both official languages, *inter alia* to all sec= ondary schools in the country.

Owing to the continuous rise in printing costs, Talent Survey reports have not been sent to Schools since the beginning of 1973. At present only a limited number of copies of reports are printed and sent to the bodies concerned. However, to make schools familiar with the results of Talent Survey research, it was decided in future to send annual synopses of Talent Survey reports to schools. In this way schools remain informed of the findings of Talent Survey research and if interest is shown in a particular report, it may be ordered from the HSRC in the ordinary way. If a report has been sold out and the demand justifies it, a reprint of such a report may be considered.

This report containing synopses is the sixth to be made available to schools and presents the findings of research com= pleted during 1978.

PRESIDENT
December 1979

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Comment: Further details in respect of these six studies appear in the appendix to this report.

SUMMARY

This publication includes synopses of six separate research projects with regard to Project Talent Survey that were completed during 1978. Since some of these research projects were not published in HSRC reports, the research findings of these projects are being made available to schools by means of this publication.

The six studies deal with different subjects. Three are concerned with the cognitive development patterns of adolescents during the secondary school phase. The remaining three studies deal with the prediction of scholastic success, nursery school education and advocates and opponents of corporal punishment.

THE PREDICTION OF SCHOLASTIC SUCCESS

SYNOPSIS

INTRODUCTION

This investigation was undertaken against the background of the unsatisfactory results rendered by the traditional single prediction model for the prediction of scholastic achievement.

Researchers are actively engaged in attempts to increase the predictability of behaviour. In the prediction of scholastic achievement it became apparent that apart from intelligence there should also be other factors that can be used as predictors. In accordance with this view, numerous researchers began using a multiple prediction model.

In another attempt to improve prediction, researchers turned to moderator techniques. According to this technique individuals are divided into homogeneous subgroups differing in predictability. A study of research results regarding moderator techniques, indicates positive as well as negative results.

AIM

The aim of the investigation was to improve the prediction of scholastic achievement by developing and testing an amended multiple prediction model. In this amended prediction model an attempt was made to include the advantages of the multiple prediction approach and of the moderator approach in one model. A chief component approach was also used in a further attempt to improve prediction.

METHOD OF INVESTIGATION

Composition of the test group

The test group used in this investigation comprised boys and girls who are Afrikaans-speaking, who passed the matric examination at ordinary provincial schools in the OFS in 1969, who were in Standard Six in the OFS in 1965 and who took part in the Talent Survey test programme during 1965 and 1969. After the respondents who met with the above-mentioned requirements had been divided according to sex, approximately 25 per cent were withdrawn in a random way with a view to cross-validation. The test groups therefore consisted of an experimental group of boys (N=515), a cross-validation group of boys (N=173),

an experimental group of girls (N=505) and a cross-validation group of girls (N=169).

Independent variables

The test group had taken part in the 1965 Talent Survey test programme. From the data of this programme, the scores in the following tests were chosen as independent variables: New South African Group Test (NSAGT), Junior Aptitude Tests (JAT) Commercial Tests (CT), Technical Tests (TT), General Tests in Language and Arithmetic (GTLA), Spelling Tests, Science Test, History Test, Geography Test, Jnr Snr High School Personality Questionnaire (HSPQ) and the Adjustment Questionnaire. The independent variables used in this investigation comprise 36 intellectual and 24 non-intellectual variables.

Dependent variable

The mean achievement in the matric examination served as dependent variable in this investigation. These data were collected during 1969. The prediction term of this study was therefore more than four years.

Procedure

In the first part of the research the possibility was examined of dividing the test group into an experimental group of boys and an experimental group of girls.

After this a single prediction model was constructed based on correlation co-efficients between the independent variables and dependent variable and a single regression equation.

A multiple prediction model was constructed for the experimental group on the strength of multiple correlation co-efficients and regression equations.

The amended model makes provision for the dividing of the experimental group into two subgroups. Discriminant analysis was used as a technique of classification to compose subgroups in different ways. In the first part the 60-dimensional test space was decreased with the aid of a discriminant analysis to a one-dimensional test space. By using a membership probability = 0,70 as the point of division, two subgroups, a well-discriminated and a poorly discriminated group, were formed. A single and multiple prediction model was constructed for these subgroups.

Two other subgroups were formed by using a membership probability = 0,80 as the point of division. The same procedure as the one that has already been described was followed with these subgroups.

In the next part of the investigation the 60-dimensional test space was decreased to a two-dimensional discriminant space and the same procedure, as described before, was also followed with this variation.

A chief component analysis was subsequently carried out on the independent variables of the experimental group. Chief component scores were calculated for every member of the test group on those components which explain approximately 90 per cent of the variance of scholastic achievement. The multiple prediction model and amended prediction model were repeated with these chief component scores as independent variables.

The regression equations of the single and multiple prediction model were analysed for the cross-validation group and cross-validation validities were calculated.

In the amended model the discriminant function was analysed for the cross-validation group. On the strength of these analyses, different subgroups were formed for which cross-validation validities were calculated.

FINDINGS

It appeared that the experimental group of boys and the experimental group of girls come from different populations. For this reason the research was conducted only on the experimental group of boys.

It appears from the single prediction model that scholastic achievement is a complex phenomenon. Forty-one of the 60 independent variables reveal significant correlations with the dependent variable. Although these variables correlate significantly, the best single variable could explain only 27,6 per cent of the variance of the dependent variable.

The multiple prediction model provided a better prediction than the single prediction model of the dependent variable. The multiple prediction model explains 45,6 per cent of the variance of the dependent variable.

In the amended prediction model different variations of a discriminant analysis were used to identify subgroups. This identification was successful, since it could be indicated that the subgroups come from different populations. It appeared from the results that a chief component approach must be followed in the amended prediction model. Since there is only a slight difference in the cross-validation validities of the single and multiple regression equations of this model, it was recommended that only the single regression equations of this model be used. As a result of this the amended model was theoretically simplified and all problems of the multiple regression model disappeared.

The cross-validation study showed that the regression equation identified for the well-discriminated group in a one-dimensional discriminant space has the highest prediction validity. Against this background an amended prediction model could be constructed consisting of the following main steps:

Step 1: Conduct a chief component analysis of the independent variables. Select those chief components which explain approximately 90 per cent of the variance of scholastic achievement. Calculate the chief component scores for every member of the group on these selected components.

Step 2: Divide the group on the strength of their criterion scores into a low and a high criterion group. Use the chief component scores to conduct a discriminant analysis of the two criterion groups. Calculate the membership probability for every member of the group by analysing the discriminant function.

Step 3: Compose a poorly discriminated and a well-discriminated group by using a suitable membership probability as the point of division.

Step 4: Calculate regression equations for the two groups by using the chief component scores of Component One as independent variable.

With this prediction model in this study more than 70 per cent of the variance of school achievement could be explained for the well-discriminated group. This compares favourably with the 27,6 per cent and 45,6 per cent of the variance that can be explained by the single and multiple prediction model.

RECOMMENDATION

This investigation showed that for the well-discrimi= nated group scholastic achievement can be predicted fairly accurately. The prediction term of this study was longer than four years. Since South Africa has a national system of differ= entiated education, this implies that the prediction of pupils' achievement over a long term is required. The prediction model developed in this investigation may be used for this purpose.

This prediction model may also be used to determine the prediction validity of test batteries that are being developed.

In the interpretation of the findings of this investiga= tion it should be remembered that the test group that was used consisted of Standard Six pupils who had reached matric within four years. Failure or school-leaving was not taken into consi= deration in this study.

CONCLUSION

This investigation showed that the amended prediction model that was suggested has possibilities for better predictions. As a result of the complexity of the model, further research will be necessary to make the model more feasible in practice.

Research with regard to the determining of homogeneous groups of independent variables and factor structures of the poorly and well-discriminated groups will be of particular value.

NURSERY SCHOOL EDUCATION, SCHOLASTIC PROGRESS AND PERSONALITY

SYNOPSIS

INTRODUCTION

Project Talent Survey, one of the most comprehensive long-term research projects ever undertaken in the field of education in the Republic of South Africa, was commenced in 1965 when a comprehensive battery of tests and questionnaires was administered to 69 908 Standard Six pupils. Similar test programmes were repeated in 1967 and 1969 when the aforementioned pupils were in Standard Eight and Standard Ten respectively. The broad aim of Talent Survey is to determine the country's man= power potential and to make available data which will allow for the maximum development of this potential.

Various groupings of pupils are possible with the aid of Talent Survey data, and research on these groups can be under= taken with the variety of test and background data that are available. In this study attention was devoted to pupils who had received pre-school education.

Relevant literature indicates that the pre-school years constitute an important phase in the development of a person. According to this literature it appears that half of a person's intellectual development up to 17 years of age occurs between the moment of conception and four years of age. Apparently a third of the language ability of a child has already developed by the time he enters school. As far as the personality is concerned, it has been said that half of the development of the adolescent personality has already taken place at the age of five.

Data obtained from Talent Survey make it possible to study the effect of pre-school education on a variety of as= pects. Pre-school education may make a contribution to better development of the country's manpower potential, and this study therefore links up with the general aim of Talent Survey.

AIM

The aim of the investigation was to determine the possi= ble contribution of pre-school education to the future scholas= tic progress, achievement and personality development of pupils, in other words , the degree to which nursery school attendance may add to the maximal development of the country's manpower potential.

METHOD OF INVESTIGATION

The experimental group

The experimental group consisted of the population of Standard Eight boys and girls who indicated in Standard Six and Standard Eight that they had attended a nursery school, had received their instruction through the medium of English, and who belonged to an English church. English-speaking pupils were involved since they formed the largest group with regard to the attendance or non-attendance of nursery schools.

The Standard Eight pupils' answers regarding nursery school attendance were checked at Standard Six level, and only those pupils who had answered consistently in both standards were involved in the investigation. The duration of the nursery school attendance could not, however, be determined. Attendance at a nursery school is a reliable fact, but the period of attendance is unknown. A pupil may have attended a nursery school for only a short period, but would still have been included in the experimental group.

The control group

The control group satisfied the same requirements as the experimental group, except that they were pupils who indicated that they had not attended a nursery school.

The experimental and control groups were further divided on the strength of the father's occupation into three socio-economic status groups, namely higher, middle and lower in order to keep the socio-economic status constant.

The classification of the groups according to socio-economic status was as follows:

Socio-economic status	Attended nursery school		Did not attend nursery school	
	N	%	N	%
Higher	1105	59,1	1351	38,9
Middle	368	19,7	655	18,9
Lower	397	21,2	1467	42,2
TOTAL	1870	100,0	3473	100,0

Method of work

To evaluate the differences which may occur at Standard Eight level between the experimental group and the control group, the comparability of the groups was determined on the strength of certain background variables and intellectual abilities in order to obtain a clearer perspective on the possible influence of pre-school education. Once the aforementioned comparability had been established, the experimental and the control group were compared in respect of additional background variables, scholastic achievement and personality which were regarded as criterion variables for the purpose of this investigation to determine the effect that nursery school attendance may have.

The population of Standard Eight pupils was used for comparing biographical data. The Standard Eight sample was used for comparing test data, since detailed test data are available in respect of the Standard Eight sample only.

To determine further whether pre-school education adds to the better development of manpower potential it was determined to what extent pre-school education plays a role in respect of constancy in school attendance. Pupils were identified at Standard Six level and followed up to Standard Ten level to determine the incidence of school leaving of pupils who had attended nursery schools and those who had not.

MEASURING INSTRUMENTS

Use was made of the following measuring instruments for purposes of comparison: Biographical Questionnaire, New South African Group Test, Senior Aptitude Tests, Spelling Tests, Scholastic Proficiency Battery, High School Personality Questionnaire, total final school examination marks and Scholastic Success.

FINDINGS

Comparability of the groups

Of the eleven background variables used to determine the comparability of the groups no significant differences were found in respect of three variables, namely health problems, absence from school and completeness of the family. Significant differences were found in respect of the remaining eight variables, and according to these, pupils who attended nursery schools, in comparison with those who did not, are more often from smaller families, are more often the eldest or second

eldest child in the family, more often discuss their plans for the future with their parents, are less often brought up and cared for by parents, go to school at an earlier age, more often attend provincial-aided or private schools situated in rural areas, and more often come from schools in Natal, the Transvaal and the Orange Free State. The aforementioned significant differences do not, however, apply throughout to all the socio-economic status groups.

With regard to intellectual abilities, as measured by the NSAGT and the SAT, significant differences are found in seven of the thirteen variables, and the significance does not apply throughout to all the socio-economic status groups. In the case of two significant differences, pupils who did not attend nursery school obtained higher scores than pupils who did.

The significant differences in averages found in respect of the NSAGT and the SAT are relatively small and without exception no greater than the standard error of measurement of the tests.

On the strength of the aforementioned, the groups are considered to be highly comparable. It appeared, however, that pupils from the higher socio-economic status group who had attended nursery schools have a slight advantage over similar pupils from the lower socio-economic status group. The differences that were found, were, however, taken into consideration in the further comparison of the groups for determining the effect nursery school attendance may have.

Determining the effect nursery school attendance may have

The groups were subsequently compared with regard to additional background and related aspects, that is, the so-called criterion variables to determine the effect pre-school education may have.

This comparison reveals that in respect of seven background variables there are no significant differences between pupils who had attended nursery schools and those who had not. These variables are age, number of times failed, attitude towards school, average scholastic achievement according to own opinion and ability to read fast. Apart from the aforementioned statistical non-significant differences, pupils who had attended nursery schools are generally younger and more positively disposed to school than those who had not.

Significantly more pupils who had attended nursery schools, in comparison with those who had not, showed a more positive attitude towards school and a more positive interest in the fields of study, languages and Mathematics. Moreover, significantly more pupils from the higher and lower socio-economic groups who had attended nursery schools take Mathematics and a third language as school subjects, and significantly fewer of them wish to leave school after Standard Eight. As far as attitude towards an education is concerned, pupils who had attended a nursery school are more often of the opinion that an education is necessary for progress in life, whereas those who had not attended a nursery school maintain that more money can be earned if one has had a proper education.

In comparison with pupils who had not attended a nursery school the majority of those who had would like to be a leader of a team or group. Pupils who had attended nursery school, more so than those who had not, more often reveal a negative attitude towards school rules: From this follows that pupils who had attended nursery school may be more inclined than those who had not to judge for themselves between right and wrong or good and bad.

Pupils from all three socio-economic groups who had received nursery school instruction, in comparison with those who had not, more often take part in school activities and also show less interest in the commercial and technical fields of study.

Scholastic achievement

In comparison with pupils who had not attended nursery schools, pupils from the higher socio-economic group who had done so, reveal significantly positive differences in four tests of the SPB, namely Social Sciences, Natural Sciences, Arithmetic and Languages. It can be concluded that in comparison with pupils who had not attended nursery school, pupils from the higher socio-economic groups who had attended nursery schools are more likely to obtain more success in their studies in all the aforementioned fields.

Pupils from the higher and middle socio-economic groups who had attended nursery school did significantly better in English First Language of the Spelling Tests than pupils who had not attended nursery schools, but their performance was significantly poorer in Afrikaans Second Language.

As far as the total final examination mark is concerned, no significant differences were found between pupils who had attended nursery schools and those who had not. According to the results of success, it appears that significantly more pupils from the middle socio-economic group who had attended nursery schools than those who had not attended nursery schools, had passed Standard Eight.

Although no significant differences were found in respect of scholastic progress between pupils from all the status groups who had attended nursery schools and those who had not, it does appear that, generally speaking, the former pupils are in a more favourable position than the latter and that pre-school education may contribute to the better scholastic achievement and progress of pupils.

Personality

The findings of the HSPQ indicate that significant differences occur in only one of the five fields mainly determined by heredity, one significant difference in the four fields determined by heredity and environment, and four in the five fields largely determined by environmental influences. Since the pupils in this investigation were to a large degree equalised with regard to environmental components such as socio-economic status, the above findings strongly indicate that pre-school education may have played a role in the personality differences.

In comparison with pupils who did not attend nursery school, those who did attend are more friendly, intelligent, sensitive, group-dependent, enthusiastic and self-assertive. Significant differences were found between pupils from the higher socio-economic group who had attended nursery school and those who had not in respect of Field A (Friendliness), Field B (Intelligence), Field I (Sensitivity) and Field Q_2 (Group Dependence). In the middle socio-economic status group significant differences were found in respect of Field B (Intelligence), Field E (Self-assertiveness) and Field F (Enthusiasm), whereas no significant differences were found in the lower socio-economic groups.

The personality factors that are largely determined by the environment reveal more favourable scores among pupils who had attended nursery school than among those who had not. The above indicates that pre-school education may contribute favourable to the personality of nursery school pupils.

Pre-school education and constancy of school attendance

The percentage of pupils who leave school between Standard Six and Standard Eight and between Standard Eight and Standard Ten is consistently smaller in respect of pupils from all three socio-economic groups who had attended nursery school than in the case of those who had not. In the case of the lower socio-economic status group the difference is significant between Standard Six and Standard Eight. It is therefore apparent that pupils who had attended nursery school are less likely to leave school early than pupils who had not attended nursery school.

CONCLUSION

The historical development of pre-school education in the RSA points to a more positive attitude on the part of all organizations and persons concerned with the education of pupils. As the idea of pre-school education became more generally accepted, many concessions were made and facilities provided by government bodies as well as local organizations.

This investigation was confined to English-speaking pupils and the findings indicate that pre-school education may be of much positive value to the child in an important phase of his development. The findings of this investigation link up to a large extent with the literature on pre-school education and at the same time emphasise the role of pre-school education in the higher educational aspirations and personality development of the child.

In view of the above-mentioned findings pre-school education should receive priority in the development programmes of education departments. Nursery schools as well as trained staff should be available to all pupils. Findings indicate that the lower socio-economic status groups are less likely to obtain their fair share of nursery schools, hence the necessity for free pre-school education. Providing pre-school education for all pupils may help to retain the potential otherwise lost through early school leaving and poor scholastic progress and may even stimulate the further development of this potential.

It is hoped that this investigation will make some contribution towards better knowledge and understanding of the value of pre-school education in the maximal development of the pupil potential of the RSA.

A COMPARATIVE STUDY OF THE PERSONALITIES OF ADVOCATES AND OPPONENTS OF CORPORAL PUNISHMENT

SYNOPSIS

INTRODUCTION

Since insufficient information is available on the relationship between attitude towards corporal punishment and personality, this study attempts to make more information available in this respect. For instance, if it should be found that a specific attitude towards corporal punishment is related to certain personality qualities, then such information may be useful in promoting the effective functioning of pupils in the educational situation.

In the South African system of education corporal punishment is permissible in accordance with departmental regulations. In cases in which corporal punishment is pedagogically accountable and applied, the question arises what the value of such punishment is, that is, whether the aim of such punishment is achieved.

It is thought that the value of corporal punishment is largely determined by the attitude of the recipient towards such punishment. According to this, the hypothesis is that if a pupil's attitude towards corporal punishment is positive, that is, if he believes that it has value, he will react positively to it provided that the approach and atmosphere in which corporal punishment is applied, is pedagogically accountable. If a pupil is negatively disposed towards such punishment, there is a possibility that corporal punishment will intensify his negative attitude and will make him react less appropriately to it.

AIM

The aim of the study was to compare pupils who differ from one another in respect of their attitude towards the value of corporal punishment with regard to background, intelligence, personality, study habits and attitudes, adjustment and scholastic achievement in order to obtain insight into the factors related to attitude towards corporal punishment.

STUDY METHOD

The test group

The test group of 795 Afrikaans-speaking Standard Ten boys was selected from the representative sample of 1969 Stan-

dard Ten pupils who took part in the Talent Survey test pro= gramme. The test group was subdivided into four groups accord= ing to a question in the Biographical Questionnaire which was used in the 1969 Talent Survey test programme and which reads as follows: "What is your attitude towards corporal punishment?"

It has no value (N = 168)
It is of value to some people (N = 417)
It has value (N = 162)
It is the best form of punishment (N = 48).

Standard Ten pupils were used, since it is believed that pupils in the lower standards generally do not have the necessa= ry maturity to reflect meaningfully on the question of corporal punishment.

Only boys were involved in the study, since the field of experience of boys with regard to corporal punishment is different from that of girls. Attitude towards corporal punish= ment is largely based on the experience the individual has had of it. Since corporal punishment in the school situation is not applied to girls, but only to boys, it may have a different effect on the attitude of the respective sexes towards corporal punishment.

Since the PHSF used in this study was not applied to Transvaal provincial schools, only pupils from the Orange Free State, the Cape, Natal and South-West Africa were involved.

Only pupils with a total IQ stanine of 5 to 9 (IQ score of 97 and higher) were used. This ensured greater homogeneity of the test group in respect of IQ, since pupils with below-average intelligence were eliminated.

Only Afrikaans-speaking pupils were involved in the study to keep the culture group homogeneous, since the educa= tional techniques and value assessments of different culture groups may be different.

Measuring instruments

The results of the following measuring instruments were used in the study: The 1969 Biographical Questionnaire, New South African Group Test (NSAGT) Junior and Senior High School Personality Questionnaire (HSPQ), Personal, Home, Social and Formal Relations Questionnaire (PHSF), IPAT Anxiety Scale and the Survey of Study Habits and Attitudes (SSHA).

Apart from the results of the aforementioned measuring instruments, the total final examination mark in Standard Ten was also used in the study as an indication of scholastic achievement.

FINDINGS

Background

Of the 32 background variables used in the study, eleven significant differences between the groups were found. The significant differences were in respect of choice of occupation, supervision during school terms, parents' educational aspirations for their children, number of hours a week devoted to homework, attitude towards leadership, scholastic self-evaluation, persons with whom school-work problems were most often discussed, attitude towards religion, attitude towards homework, attitude towards the rules of the school and attitude towards school-work.

According to these significant differences, boys with a more positive attitude towards corporal punishment have higher educational and occupational aspirations, more often live with parents and relatives during school terms, devote more time to homework, evaluate themselves better on the strength of their scholastic achievement, more often discuss school-work problems with parents and teachers and reveal a more favourable attitude towards leadership, religion and school affairs than boys who have a less positive attitude towards corporal punishment.

The 21 background variables in respect of which no significant differences were found, are the following: occupation of father, kind of school attended, size of family and birth order in the family, person responsible for education and care, number of times failed, plans for the future after leaving school, reason for discontinuing studies after Standard Ten, activity preferred by pupil, number of school activities in which pupil participated, position of leadership held by pupil, state of health, presence of physical and/or psychological defects and/or ailments, number of days absent from school, subject field in Standard Ten, kind of problems having a deleterious effect on school-work, attitude towards education and sport, how often teachers criticise pupil for poor work, the subject or subject field preferred by pupil.

Intelligence

With regard to intelligence, no significant difference was found in the mean scores of the four attitude groups, although there is a slight but consistent rise in the non-verbal and total IQ according to a more positive attitude towards corporal punishment.

Personality

With regard to the 14 personality factors measured by the HSPQ, significant differences were found only in the case of Factor G, Conscientiousness. According to this, boys with a more positive attitude towards corporal punishment are more conscientious, more persevering, quieter and more obedient to rules and they have more superego strength than boys with a less positive attitude towards corporal punishment.

Adjustment

With regard to the 12 adjustment components measured by the PHSF, significant differences were found in the case of components S10, Moral Sense and F11, Formal Relations. According to these significant differences, the behaviour of boys with a more positive attitude towards corporal punishment is more in accordance with the accepted norms of society and they maintain better formal relations with fellow pupils, figures of authority and superiors in the learning situation than boys with a less positive attitude towards corporal punishment.

Anxiety

No significant differences were found among the four attitude groups with regard to anxiety as measured by the IPAT Anxiety Scale.

Study habits and attitudes

The significant differences found in respect of six of the seven scales of the SSHA indicate a relatively strong relationship between attitude towards corporal punishment and study habits and attitudes.

According to the aforementioned significant relationship, boys with a more positive attitude towards corporal punishment reveal better study habits and attitudes than boys with a less positive attitude. The higher level of achievement of the former group of boys in the SSHA indicates that to a greater

extent than the latter group they complete tasks promptly, avoid postponing assignments and they are not inclined to waste time unnecessarily. Secondly, the former group of boys, in comparison with the latter, have a more favourable attitude towards the teacher and his conduct in class and they more readily accept educational ideals, aims, practices and requirements.

Scholastic achievement

Despite the fact that the four attitude groups do not differ significantly in respect to measured intelligence, subject field followed in Standard Ten and socio-economic status according to the occupation of the father, it nevertheless appears that there are significant differences with regard to the mean total Standard Ten final examination mark. According to this, boys with a more positive attitude towards corporal punishment reach a higher level of scholastic achievement than boys with a less positive attitude.

CONCLUSION

If it is assumed that attitude towards corporal punishment to a large extent determines the effectiveness of such punishment for the recipient, corporal punishment appears to be a positive element in the educational situation, provided that the punishment is pedagogically accountable. Firstly, the majority of Afrikaans-speaking boys involved in the study maintained a positive attitude towards the value of corporal punishment. Secondly, such a positive attitude is apparently related to positive dispositions, qualities and attitudes in the personality as well as better scholastic achievement.

EDUCATIONAL CONTEXTS AND COGNITIVE DEVELOPMENT PATTERNS OF ADOLESCENTS WITH REGARD TO THE RESTRAINTS IMPOSED UPON THEM BY THEIR ENVIRONMENT

SYNOPSIS

INTRODUCTION

The general aim of the Project on Education in Large Cities carried out jointly by the Rand Afrikaans University, the Human Sciences Research Council and the Transvaal Education Department is to determine why relatively many Afrikaans-speaking pupils in the Witwatersrand-Vaal Triangle area discontinue school attendance, and to find ways of improving this situation. Viewed in this light this investigation, which was based on Project Talent Survey data, links up with the general aim of Talent Survey, namely to determine what the country's manpower potential is and to make information available that will lead to the maximum development of this potential.

AIM

In this study an attempt was made to give an idea of the differential cognitive development patterns of Afrikaans-speaking pupils who are to some extent environmentally handicapped. The aim was not merely to study the development as such, but to determine the cognitive development as manifest in and in interaction with a specific environment or ecological context. Attention is concentrated specifically on the cognitive development in view of the degree of environmental restraint to which the pupil was exposed during his maturation.

METHOD OF INVESTIGATION

THE TEST GROUP

The test group was a sample of 987 Afrikaans-speaking boys and girls according to home language and medium of instruction who took part in the test programmes of Talent Survey when they were in Standards Six, Eight and Ten. These pupils were divided according to the occupation of the father into a high socio-economic and a low socio-economic status group and each of the two groups were further divided according to sex, giving a total of four groups. According to the above classification into socio-economic status groups, pupils in the middle socio-economic status group were omitted from the test group, so that the test group finally consisted of 861 pupils.

MEASURING INSTRUMENTS

The measuring instruments that were used to determine the cognitive development patterns of adolescents with regard to the restraints imposed upon them by the environment were the New South African Group Test (NSAGT), the Junior Aptitude Tests (JAT), the Senior Aptitude Tests (SAT), the Commercial Tests (CT), the Technical Tests (TT) and the Scholastic Proficiency Battery (SPB).

PROCESSING

In this investigation an attempt was made with the aid of data from Talent Survey to determine whether changes, more specifically structural changes occurred in their cognitive life as pupils grew older. An attempt was made, firstly, to determine structural changes as reflected in the Talent Survey test results of pupils from Standard Six to Standard Eight and from Standard Eight to Standard Ten. This method was used since the available test results were not continuous from Standard Six to Standard Ten. Secondly, an attempt was made to determine whether pupils from different socio-economic backgrounds revealed structural differences with regard to their achievements in the various tests.

It was decided to use Hotelling's T^2 test and the Indscal technique (Individual Difference Scaling) as a method for determining the structural changes and differences. If the T^2 test showed a significant difference, the individual tests were compared in order to identify detail differences.

The Indscal technique is a much more comprehensive method of analysis than ordinary factor analysis. Through this technique two or more different structures can be compared and longitudinal as well as cross-section data can be analyzed. According to the Indscal technique a common structure with r dimensions or "factors" as basis can be determined from two or more structures. The factors of the individual structure are compared with the corresponding factors of the common structure by means of weights with which the factor loadings of the factors of the common structure are multiplied to give the loadings of the individual structures. The relative size of the weights gives an indication of the degree of difference between the factors of the individual structures and the degree of difference of the corresponding factors of the common structure. For instance, in this investigation the structure of a group of collective tests in Standard Six was compared with the structure of the same group of tests in Standard Eight and a common factor

space, the so-called superspace, is determined. The difference in weights at Standard Six and Standard Eight level gave an indication of the degree to which the factors in Standard Six differed from those in Standard Eight. If the value of the weights is smaller than one, e.g. in Standard Six, it means that the specific factor is more poorly represented in Standard Six than in the common space. Inversely, if the value of the weight at Standard Eight level is greater than one, it means that the factor is more strongly represented in Standard Eight than in the common space.

FINDINGS AND CONCLUSIONS

In a discussion of the most important findings of the investigation it should be remembered that the environmentally handicapped (low socio-economic status group) as well as the non-handicapped (high socio-economic status group) pupils involved in the investigation all remained at school until Standard Ten. This means that the investigation was conducted with a relatively selected group of pupils. Thus any differences with regard to cognitive development that were found between environmentally handicapped and non-handicapped pupils can be regarded as highly significant, since these differences represent the smallest differences that could exist between such pupils.

A literature survey and the empirical results of the investigation show the following:

(a) General pattern of cognitive development of environmentally handicapped and non-handicapped secondary school pupils

A uniform picture emerged from the results obtained by intelligence, aptitude and achievement tests. It was found throughout that -

(i) the level of cognitive functioning of pupils who were not handicapped by their environment was higher than that of pupils who were environmentally handicapped;

(ii) during the secondary school phase development occurs in environmentally handicapped as well as non-handicapped pupils and this development implies throughout that there was positive development, i.e. improvement in their achievement;

(iii) the relative development change that occurred during the junior secondary and senior secondary school phases

differed only in some cases between environmentally handicapped and non-handicapped pupils.

The general picture that appears from the investigation is therefore that two groups of selected pupils that are both capable of complying with the demands of the secondary school nevertheless differ from each other in the sense that the environmentally handicapped group experienced and retained a backward position in the secondary school in comparison with the pupils that were not handicapped by their environment.

The main finding of the investigation, namely the lag of the environmentally handicapped pupils is understandable on the basis of insight obtained from the literature on the subject. The accepted fact, for example that the effect of an environmental handicap is irreversible during the early childhood years, was also clearly shown by this investigation. Moreover, the investigation confirmed the point of view that exposing the environmentally handicapped child to scholastic experiences will not necessarily eliminate the accumulated backlog. However, scholastic experiences do have a strong positive effect because they ensure that the environmentally handicapped child's cognitive development does not lag even further behind that of the child who is not handicapped in this way.

The environmentally handicapped child's scholastic experiences not only prevented him from falling further behind, but also had a stimulating and compensatory effect on his cognitive development, but the fact that there remained an obvious difference in the level of cognitive functioning implies the entire context in which the environmentally handicapped child was educated in comparison with his counterparts who were not handicapped in this way. For instance, it implies the quality of guidance the child received from his parents, the quality of communication he enjoyed in his education, his exposure to various experiences as well as the ordening with which he is confronted in his education, i.e. the pupil's total educational situation which causes him to lag behind his non-handicapped counterpart. In this connection it could be asked to what extent the handicap of such children could also be genetically determined.

Another general trend that was found among both groups of pupils, but which was more pronounced and more finely nuanced in the group that was not handicapped by their environment was that progressive differentiation occurred with regard to cognitive development during the secondary school phase, i.e. general abilities progressively differentiate into specific abilities.

(b) Differences in cognitive development among environmentally handicapped secondary school pupils

A number of significant trends emerged from the differential cognitive development of the two groups of pupils. The most noticeable of these was in respect of verbal ability. In the non-environmentally handicapped group there was a noticeably stronger growth in verbal ability with regard to Word Fluency, Verbal Reasoning and general verbal intellectual abilities in comparison with the handicapped group. It was also in respect of verbal abilities that the cognitive development of the two groups differed most significantly during the secondary school phase. The verbal abilities of environmentally handicapped boys deteriorated during the secondary school phase, whereas the achievements of the girls remained constant.

With regard to non-verbal abilities, a degree of reinforcement occurred in the environmentally handicapped group during the secondary school phase.

With regard to long-term memory, the two groups of pupils moved closer together during the secondary school phase. As far as the more associative memory aspect is concerned, the environmentally handicapped boys were relatively strong. This could imply that they, to a greater extent than the non-handicapped group, had to rely on associative memory solutions in their studies.

The field in which the environmentally handicapped group improved its relatively poor position to a relatively strong position during the secondary school phase is its orientation in respect of the mechanical and implements aspect. This probably implies greater involvement on their part in tools and pottering about. In perceptual matters the environmentally handicapped boys showed a stronger growth rate, with the result that during the secondary school phase they and the non-handicapped group drew closer together with regard to perceptually based cognitive abilities.

(c) Sexual differences in the cognitive development of environmentally handicapped and non-handicapped secondary school pupils

Sexual differences that emerged with regard to the cognitive development were not consistent. It did appear, however that certain development trends imply a difference in the level of cognitive development between boys and girls. Thus it was found that reasoning ability in non-environmentally handicapped

boys figures less prominently in Standard Eight than in Standard Six, whereas the converse was true of non-environmentally handi= capped girls. This could point to a phase difference in the state of development during the psychical and cultural puberty in which girls have the advantage over boys, so that relatively speaking they are oriented towards reasoning, while this is not so much the case with boys. Among the environmentally han= dicapped group the subtle change between Standard Six and Stan= dard Eight probably reflects a more limited change in reasoning ability as a result of their relative language impairment.

(d) The effect of education on cognitive development

The empirical data that were available made it impossi= ble to check the cognitive development pattern continuously from Standard Six to Standard Ten in terms of the same cognitive act situations. Thus only an impression could be gained of the cognitive development during the junior secondary and the senior secondary school phases respectively.

Exposure to scholastic experiences evidently counter= acted a deterioration in the cognitive development of the environmentally handicapped group by the positive stimulation of the cognitive element. Other trends were also noticed in the cognitive development that depend on the nature of the exposure to education. Thus it was found that with regard to Calculations the achievement of girls deteriorated whereas that of the boys remained consistent. It was also found that in cognitive activities in which associative thinking is re= quired, e.g. Comparisons, all the pupils showed some degree of deterioration in their achievement. Obviously one is concerned here with a type of cognitive activity that plays an increasing= ly smaller role in the thinking activities at school, since emphasis increasingly falls on insight, complexities and reason= ing activities. Apart from a general cognitive stimulation which results in the differential cognitive development patterns.

CONCLUSION

In this investigation a general coherence was found on the one hand between the ecological context or educational environment in which a child grows up and in which a differential appeal is made to his cognitive abilities and, on the other, the differential cognitive development. This coherence is very general, with the one extreme the differential qualities of the educational environment and the other extreme the cognitive achievements. There is, however, no doubt that there is a re= lation between the educational environment and the differential cognitive development.

The educational implications that emerged from the investigation reflect the total educational challenge of environmental impairment. The implications include the entire problem of compensation education, i.e. eliminating the educational backlog as early as possible in the child's life. Apparently the greatest drawback of the environmentally handicapped is their comparatively inadequate language ability. If education could succeed in eliminating the educational backlogs caused by environmental impairment, pupils could be kept at school longer and in this way their potential could more readily be developed. This is the challenge the environmentally handicapped child offers the school.

EDUCATIONAL CONTEXT AND COGNITIVE DEVELOPMENT PATTERNS OF ADOLESCENT GIRLS

SYNOPSIS

INTRODUCTION

Recent research showed that some sexual differences are not biologically determined, but are caused by the differential demands imposed by society and education on the two sexes. Apparently the sexes do not only reveal different characteristics during different phases of development, but the relations between the characteristics are different for boys and for girls and the two sexes are affected differently by the same influences.

In an investigation into cognitive development during adolescence it is therefore essential to study the course of development of the sexes separately, even if boys and girls were cognitively equal.

This investigation which concentrates basically on the differential cognitive development of adolescent girls constitutes part of the Project on Education in Large Cities which is being conducted by the Rand Afrikaans University. The Project on Education in Large Cities orginated in the concern felt about the extent of school leaving, especially among Afrikaans-speaking pupils in the urban Witwatersrand-Vaal Triangle. Thus the investigation links up with the aim of Project Talent Survey, namely to make data available that will help to develop the manpower potential of the country to the maximum. The Project on Education in Large Cities is being conducted in conjunction with the Transvaal Education Department and the Human Sciences Research Council.

STATEMENT OF THE PROBLEM

There is still considerable uncertainty about the nature and extent of sexual differences with regard to the cognitive, i.e. the degree to which these differences are biologically determined and what the role is of the environment, culture and education as well as what influences from the early childhood years still play a role in adolescence. In this connection researchers were particularly impressed by the extent and nature of sexual differences that emerged during adolescence.

AIM

In view of the above the aim of this study was to investigate differences and similarities among adolescent boys and girls in the nature, rate and scope of their cognitive development during the adolescent phase and to determine the coherence of the differential development patterns and the educational circumstances under which they occur. Emphasis fell on the cognitive development of girls in comparison with that of boys as determined by intelligence, aptitude and scholastic proficiency tests.

For the purpose of this investigation adolescence is defined as the period in a person's life when he matures physically and reaches adulthood, i.e. the transition period between child and adult.

METHOD OF INVESTIGATION

THE TEST GROUP

The test group was a sample of 445 Afrikaans-speaking boys and 542 Afrikaans-speaking girls selected according to home language and medium of instruction who took part in the test programmes of Project Talent Survey when they were in Standard Six, Standard Eight and Standard Ten.

MEASURING INSTRUMENTS

The measuring instruments used to determine the cognitive development of boys and girls during adolescence are the New South African Group Test (NSAGT), the Junior Aptitude Tests (JAT), the Senior Aptitude Tests (SAT), the Commercial Tests (CT), the Technical Tests (TT) and the Scholastic Proficiency Battery (SPB).

PROCESSING

Because of the long-term nature of Project Talent Survey of which the data were used in this investigation, use was made of a traditional longitudinal design. The processing technique firstly looked for structure change in the cognitive development in which use was made of the multivariable Hotelling's T^2 test, factor analysis and analyses according to the Indscal method (Individual Difference Scaling). It was also checked whether significant differences occurred between sex and standard groups (Stds 6, 8 and 10) in respect of specific variables.

FINDINGS AND CONCLUSIONS

A survey of the relevant literature and the empirical results of the investigation showed the following:

(a) Personality and cognitive development

Cognitive development is intertwined with the total personality, i.e. it is a complex and complicated interaction in which various variables play a role. It appeared that certain personality traits, such as aggression, competitiveness, level of aspiration, achievement motivation, dependence and independence, affect the cognitive development of adolescent girls and boys in different ways.

With regard to physical changes during adolescence it appeared that there is a positive relation between early maturation and intelligence as well as between body size and IQ. The effect of nutrition on cognitive development has been proved by research. It also appeared that physiological and sensory sources in conjunction with objective oriented behaviour can be consciously mobilized to realize cognitive potential to a greater extent.

With regard to the cognitive development and the establishment of norms and values, it appears that moral development, motivation, attitudes, interest and religion are closely dependent on this development. Although these aspects are not an inherent part of the cognitive element, they often to a large extent determine the nature and extent of cognitive development, i.e. the values and norms which the adolescent adopted as his own during his development until this stage.

(b) Cognitive development and cultural context

Apparently culture has a strong influence on cognitive development. The cultural expectation with regard to the role of authority of girls seems to add towards the phenotypical image of women and to a large extent this image is not based on natural inherent qualities. From birth onwards girls develop in a specific cultural context in a direction corresponding in part to inherent aptitude, but more specifically to traditional views. To some extent this cultural influence has a limiting effect on the cognitive potential of girls. In adolescence the influence of culture on cognitive development becomes more significant.

The school as a cultural institution undoubtedly makes a positive contribution towards cognitive development, but it is still not certain which factors in the school have the greatest influence. Although boys and girls are relatively equal in general intelligence, the scholastic achievements of girls are generally superior to those of boys.

(c) Cognitive development, educational relationships and educational patterns

Educational relationships and patterns have an important influence on cognitive development. An educational policy which encourages independence, which moderates authority and discipline with reasonableness, which guides and encourages the child to explore, which explains and discusses authoritative acts and which creates a climate of security without hampering the child's growing independence appears to have a positive effect on the young person's cognitive development. A specific educational relationship appeals in different ways to the two sexes and the relationship of the father/mother with the son/daughter has a differential effect on the cognitive development of boys and girls.

The differential way in which identities develop and become established during adolescence is an important factor in achievement, motivation and the actualization of cognitive potential.

The future and occupation directedness of girls is par= ticularly problematical at present and although the traditional role of the woman as mother is not rejected, it is nowadays more closely linked to professional work outside the home. This is a factor that cannot be disregarded in connection with the attitude of girls towards cognitive development and achieve= ment.

(d) General pattern of cognitive development

Considerable cognitive growth occurs during adolescence. The growth in this period which results in a more abstract form of thinking also underlies the moral, personality and other dimensions of development that occur during adolescence. During this time there is increasing differentiation of aptitude with a distinctive development rate for each of the sexes. The development patterns of the different aptitudes in boys and girls sometimes show a decline in the secondary school phase, the one sex reaching a peak before the other and the pace of development not always being the same.

(e) Sexual differences in development patterns with regard to specific aptitudes

(i) Verbal ability

It is known that the verbal ability of girls is superior to that of boys. However, more recent investigations indicate that girls no longer have such a strong advantage over boys in this regard. Early verbal stimulation and encouragement within the educational relationship have a positive effect on the development of verbal ability and this development is continued during adolescence.

This investigation shows that with regard to certain components of verbal aptitude, e.g. Word Fluency, girls retain their advantage over boys, whereas in the case of other verbal tests the achievement of the boys was superior to that of the girls.

(ii) Problem solving

Various abilities make a contribution to an aptitude that can be described as problem solving and that can also be regarded as mathematical or reasoning ability. With regard to these abilities boys generally have an advantage over girls and aspects such as sex role, identification, cultural expectations, attitudes, cognitive style, personality as well as instruction play a role in the development of this ability.

The results of the investigation show that although initially there is little difference between boys and girls with regard to reasoning, both sexes show significant development up to and during Standard Ten. In this respect boys nevertheless undergo a greater degree of development than girls during the secondary school phase; consequently they reach a higher level of achievement than girls in Standard Ten. A similar development pattern and sexual differences were found in respect of problem solving and this corresponds to previous research findings, namely that from 14 years onwards boys obtain an advantage over girls. Until Standard Eight girls have an advantage over boys in numerical ability. This ability apparently reaches a peak in Standard Eight and girls reach this peak before boys.

(iii) Spatial ability

According to recent research the consistent advantage of boys over girls with regard to spatial ability is affected

by educational patterns, differential learning opportunities, cultural sex typification and cognitive style and this advantage of boys is confirmed by this investigation although both sexes undergo significant development in this regard during the secon= dary school phase.

It appears, however, that the course of development of two-dimensional and three-dimensional spatial ability differs. The former apparently reaches an earlier development peak roughly in Standard Eight and this peak is reached first by boys. On the other hand the development of three-dimensional spatial ability shows no stagnation or decrease at the end of the secondary school phase. Although throughout boys have an advantage over girls with regard to three-dimensional spatial ability, both sexes show the same degree of development during the secondary school phase. Thus when one talks of spatial ability it should be remembered that the different components of this ability follow different patterns of development.

(iv) Mechanical ability

It appears according to the literature on the subject that one cannot talk of a general mechanical ability, but that there are highly specific mechanical abilities with only a very slight connection between them and the development of which is affected by practice and familiarity with the material. In this investigation use was made of two tests of a mechanical nature, both based on knowledge of facts. Although boys con= sistently reached a higher level of achievement than girls in these tests, both sexes showed significant development in mechanical ability during the secondary school phase.

(v) Memory

Memory undergoes radical development during adolescence and becomes highly sophisticated. There are indications that girls have better memories than boys, but that the nature of the subject matter that has to be remembered also plays a role. The investigation showed that up to Standard Ten girls consist= ently fared better than boys in memory tests. Both sexes however, showed significant development of memory during the secondary school phase, but it appeared that there was more development among boys than among girls although the girls did better than the boys in the tests.

(vi) Perceptual ability

According to the literature on the subject the development of abstract thinking plays an important role in the development of perceptual ability and it appears that the development of perception takes a different course for the two sexes. According to the results of this investigation perceptual ability in girls develops to a greater extent during the Standard Six to Standard Eight phase and girls retain their advantage until Standard Ten although the peak of development is reached in Standard Eight after which there is a decline in development.

(vii) Speed

In this investigation girls consistently reached a higher level of achievement than boys in tests in which the speed factor played a major role. Although both sexes showed significant development in this regard during the secondary school phase,there was a difference in the course of development between boys and girls.

CONCLUSION

Adolescence is often seen by educators as a difficult period that should be got through as soon as possible. Consequently one does not always realize the tremendous challenge that this phase offers for education because of its development potential. Whereas this investigation was undertaken to study adolescents who do not fully develop, it is necessary to point out that it is in fact environmental influences and the lack of guidance in the cultural set-up which hamper the potential of higher and specifically human development during this interesting but difficult period. The potential innovation during adolescence is missed by so many young people. They stagnate at a time when their actual development should start. To prevent this erosian of potential development and to assist in this development is the challenge and task of every educator.

THE COGNITIVE DEVELOPMENT PATTERNS OF ADOLESCENTS IN URBAN AND RURAL EDUCATIONAL CONTEXTS

SYNOPSIS

INTRODUCTION

The relatively high number of Afrikaans-speaking early school leavers in the Witwatersrand-Vaal Triangle in comparison with pupils in other parts of the Transvaal led to the Project on Education in Large Cities. This Project is being undertaken by the Rand Afrikaans University in collaboration with the Transvaal Education Department and the Human Sciences Research Council which made available data from Project Talent Survey.

Since the Project on Education in Large Cities is mainly concerned with the loss of manpower potential as a result of early school leaving, this investigation links up with the aim of Talent Survey, namely to determine the White manpower potential of the country and to make data available for the maximum development of this potential.

AIM

The aim of the investigation was to study the ecological context and differential cognitive development patterns of secondary school urban and rural pupils. The investigation was undertaken mainly for the following reasons:

(a) To comply with the need that developed for a central integrating theme of the differential development patterns of pupils to serve as a background against which the problem of too early school leaving can be interpreted.

(b) Because not enough empirical research has been undertaken in the RSA to provide a total image of the differential development of secondary school pupils in urban and rural areas.

(c) To determine the nature of the connection between environment and development.

(d) To determine the nature of the differential cognitive development patterns of adolescents in an urban and a rural environment and to find out whether there is a significant difference in such development patterns.

METHOD OF INVESTIGATION

THE TEST GROUP

The test group was a sample of 987 Afrikaans-speaking boys and girls selected according to home language and medium of instruction who took part in the test programmes of Project Talent Survey when they were in Standards Six, Eight and Ten. These pupils were divided into urban and rural groups according to their answers to questions regarding the neighbourhood in which their schools and homes were situated. Pupils were then further divided according to sex, giving a total of four groups of pupils.

MEASURING INSTRUMENTS

The following measuring instruments were used to determine the cognitive development patterns of urban and rural pupils: the New South African Group Test (NSAGT), the Junior Aptitude Tests (JAT), the Senior Aptitude Tests (SAT), the Commercial Tests (CT), the Technical Tests (TT), the Scholastic Proficiency Battery (SPB) and eleven questions from the Biographical Questionnaire that were administered in Standards Eight and Ten.

PROCESSING

The following processing was done to determine the structural differences in the differential cognitive development of urban and rural adolescents:

Firstly, with the aid of Hotelling's T^2 test it was determined whether significant achievement differcences occurred between the groups for all the tests together. If significant differences were found according to the T^2 test, it was further determined by means of the t and F tests which differences in detail existed for the individual test.

Secondly, a factor analysis was carried out of the achievements of the groups in the various tests. Through factor analysis the number of variables was decreased to a smaller number of factors, since variables with common properties load on a specific factor.

Thirdly, by using the Indscal method (Individual Difference Scaling) it was determined whether there are any structural changes in the differential cognitive development patterns of urban and rural adolescents as shown by their achievements in the various tests that were used.

FINDINGS AND CONCLUSIONS

In discussing the main findings of the investigation it should be remembered that the pupils who were involved in the investigation all remained at school until Standard Ten. This means that the investigation was conducted with a relatively select group of pupils. Thus any differences that were found in respect of the cognitive development of urban and rural pupils can be regarded as highly significant, since they represent the smallest differences that can exist between such pupils.

A survey of the relevant literature and the empirical results of the investigation reveal the following:

(a) General pattern of the differential cognitive development of urban pupils in comparison with rural pupils

With regard to intelligence, aptitude and achievement, as can be seen from the tests that were used, a clear picture emerged of the cognitive development in all four groups. The main findings are:

(i) In all four groups intelligence development, as measured by the NSAGT, occurred during the secondary school phase between Standard Eight and Standard Ten. It appeared throughout that the achievement in Standard Ten was signifi= cantly better than in Standard Eight.

Significant differences occurred in the achievement pattern of urban and rural pupils at Standard Eight level, but no such differences were found between the groups in Stan= dard Ten. With regard to intelligence the difference between the urban and rural pupils was eliminated from Standard Eight to Standard Ten, so that at Standard Ten level one group did not reach a higher level of achievement than the other. The rural pupils had, in fact, caught up with the urban pupils. A possi= ble explanation for this general trend is that the influence of the school on the pupil's cognitive development becomes so dominant that the unequal influence with regard to cognitive stimulation from the family and living conditions becomes limited.

(ii) In all four groups of pupils development occurred during the secondary school phase with regard to aptitude as measured by the JAT and the SAT between Standard Six and Stan= dard Eight and between Standard Eight and Standard Ten. In all four groups the JAT achievements were better in Standard Eight

than in Standard Six and the SAT achievements were better in Standard Ten than in Standard Eight.

With regard to aptitude, as measured by the JAT, significant differences in the achievements of urban and rural pupils were found in Standard Eight but not in Standard Six. Similar results were obtained with the SAT, i.e. the achievements of urban and rural pupils did not differ significantly in Standard Eight, but they differed significantly in Standard Ten. Urban and rural pupils therefore initially have the same level of cognitive functioning with regard to specific aptitudes, but in the course of their development they increasingly differentiate into different levels of achievement. The Indscal analyses revealed that with regard to general aptitude urban pupils show development between Standards Six and Eight, i.e. urban pupils in Standard Eight have a better general aptitude than urban pupils in Standard Six, whereas no such development was found among rural pupils. It was also found that urban pupils in Standards Six and Eight have a better general aptitude than rural pupils.

Between Standard Eight and Standard Ten development occurs among rural pupils with regard to general aptitude, i.e. in Standard Ten rural pupils have a better general aptitude than in Standard Eight. No such development was found in the case of urban pupils. Thus it appears that rural pupils develop specific aptitudes later than urban pupils and that the level of cognitive functioning of urban pupils with regard to aptitude is higher during the secondary school phase than that of rural pupils. The fact that urban pupils consistently have the advantage over rural pupils with regard to aptitude confirms that living conditions and educational circumstances in cities are cognitively more stimulating and diversified than rural conditions.

(iii) During the secondary school phase development in achievement, as measured by the TT, CT and SPB, occurred in all four groups of pupils between Standards Six and Eight and Standards Eight and Ten. The achievements of all four groups with regard to the TT and the CT were better in Standard Eight than in Standard Six, and with regard to the SPB better in Standard Ten than in Standard Eight.

The achievements of Standard Six urban and rural pupils differed significantly in the TT and the CT, whereas no differences were found in the achievements of Standard Eight pupils. No significant differences were found in achievement measured by the SPB among Standard Ten urban and rural pupils. The

achievement patterns of urban and rural pupils are thus fixed early in the secondary school phase and in Standard Ten not one of the groups showed definite superiority. This trend confirms the one that was found with regard to intelligence.

The general picture that was obtained of the differential cognitive development of urban and rural pupils thus differs from the image obtained from the literature on the subject and that was expected here. Urban pupils definitely did not show such consistent cognitive superiority over their rural counterparts as was expected, and the course and level of cognitive development of urban pupils have much in common with those of rural pupils. The logical explanation for this is of a dual nature. On the one hand the urban-rural differences are not absolute, since in fact there is only talk of an urban-rural continuum. On the other hand the school, which offers the same experiences to urban and rural pupils, has a homogenizing influence which neutralizes the differential effect of the life and family environment to some extent.

(b) Specific trends that reflect the differential cognitive exposure of the urban and rural set-ups

(i) Non-verbal and verbal abilities

Urban boys have better non-verbal ability than rural boys and both groups of boys show a significant change in achievement between Standard Eight and Standard Ten with regard to non-verbal ability. With regard to the NSAGT subtest Pattern Completion urban pupils have a decided advantage over rural pupils. This fact can be explained in terms of the nature and lay-out of the immediate physical surroundings of urban children. Urban girls have an advantage over rural girls with regard to the NSAGT subtest Number Series, although rural girls show more development in this regard during the secondary school phase than urban girls. This advantage of urban girls over rural girls could be due to the fact that urban girls in their daily life are more confronted by figures and figure systems than rural girls. Rural boys have better verbal ability than urban boys and it was also found that rural pupils are more proficient than urban pupils in the use and appreciation of Afrikaans according to the SPB.

(ii) Reasoning

No clear, specific picture emerged with regard to reasoning ability. Rural pupils have a better associative reasoning ability than urban pupils, whereas the latter have a

better visual discrimination and reasoning ability than rural pupils. Their learning techniques showed that with regard to associative reasoning ability urban pupils more often associate subject matter with some or other image and then recall it when the subject matter has to be reproduced. Thus it appears that urban children approach matters more rationally, whereas rural children are more inclined towards an associative imaginative thinking function.

(iii) Memory

The various groups show definite development of memory. Both rural and urban pupils became less inclined to memorize subject matter as they advanced at school. Short-term memory thus declines during the secondary school phase, whereas with regard to long-term memory the difference between urban and rural pupils diminished.

(iv) Spatial ability

Urban pupils reached a higher level of achievement in this regard than rural pupils, although no development between Standard Eight and Standard Ten was found in any of the groups with regard to visual ability in the two-dimensional sphere.

(v) Mechanical ability

Rural boys showed marked superiority over urban boys with regard to their orientation towards the mechanical and implements aspect. This could be explained by the greater involvement of rural boys with implements and machinery, whereas urban boys are more spontaneous users without personal involvement.

(vi) Commercial ability

Urban pupils have a decided advantage over rural pupils in matters concerned with the economy and commerce. This could be explained by the fact that urban pupils are more involved in and more directly confronted by matters affecting commerce and economics.

(c) Sexual differences in the cognitive development patterns of urban and rural pupils during the secondary school phase

The sexual differences that were found with regard to the cognitive development patterns were not consistent through-

out. However, certain development trends imply a difference in the level of cognitive development between boys and girls. Thus it was found, for example, that with regard to the visual dis= crimination and reasoning factor urban girls reached a higher level of achievement than rural girls in Standard Eight whereas the inverse was found in respect of boys. With regard to general aptitude it was found that urban boys reached a higher level of achievement than rural boys in Standard Ten while for girls the inverse was found.

(d) The influence of education on cognitive development

Exposure to education counteracted the deterioration in the cognitive development of rural pupils to such an extent that few significant differences were found in the level of cog= nitive functioning at Standard Ten level between urban and ru= ral pupils. This corroborated the fact that not only exposure to education, but especially the ordering accompaniment con= comitant with education is important in cognitive development. The school differs from the life and family set-up in that, in addition to providing experiences, it also arranges the expe= riences, and it has a powerful influence on cognitive develop= ment.

CONCLUSION

According to the total image that emerges from the in= vestigation it appears that rural pupils have to overcome greater resistances in order to comply with the educational demands of the school. By implication rural pupils would more readily leave school for cognitive considerations than urban pupils. But school leaving does not always result from cogni= tive considerations. It is often the non-cognitive considera= tions that play a decisive role in school leaving. However, this aspect was not taken into consideration in this investiga= tion.

Attention will also have to be paid to the differences between urban and rural pupils with regard to rate of develop= ment, cognitive style and aptitudes. This differential develop= ment of abilities and the difference in the rate of cognitive development have the educational implication that all adoles= cents do not become capable of formal thinking at the same age, nor will they be ready for all subject fields at a specific age.

APPENDIX

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