IMPROVING PUPIL RESPONSE TO CLASSROOM INSTRUCTION

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Summary

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Three main problems in Secondary Schools were studied -

a) Organisational and environmental factors affecting learning and instruction

b) Students' attitudes to schooling

c) Instructional patterns and students' response in two specific areas - language and mathematics

In respect of (a) the study confirmed an earlier finding of 1963 that heterogeneous grouping of students, lack of teaching aids, "hall type" class arrangement in the all age (6-16 years) schools, academic curriculum with no provision for technical and agricultural studies, too few trained teachers or experienced graduates on the staff affected pupils' attitudes.

(b) Students' attitude was limited to acquiring a job certificate.

(c) Projects aimed at improving pupil performance by modifying instructional variables hypothesised as crucial were launched in language and mathematics. The language project is still in progress. The mathematics project using concrete and ikonic references in the teaching - learning situation found statistically significant differences between the experimental and controlled groups. This finding pointed to the need for appropriate aids in the teaching of mathematics with the opportunity for the teacher to make them, and suggested that much benefit could be gained from initial and refresher teacher education courses centred around experimental curriculum projects.

Report

In 1968 the Faculty of Education of the University of Guyana with the assistance of a grant from the Carnegie Foundation initiated a project to improve pupil performance in local primary and secondary schools by modifying curriculum and instructional practices. Local educators had constantly expressed concern over the low level of student response in the normal classroom situation and the results achieved at terminal examinations. The research programme undertaken by the Faculty sought to investigate

factors in the school setting which affected student response and achievement and to discover how experimental variations in these factors could influence educational attainment.

Three main problems were selected for study:

(a) organisational and environmental factors affecting learning and instruction

(b) students' attitudes to schooling

(c) instructional patterns and student response.

The investigation of (c) focused on two specific curriculum areas - Language and Mathematics.

The research proceeded in three phases. In the first phase a survey was conducted on the formal work structure of secondary education. This consisted of a descriptive analysis of selected factors in the school situation considered relevant to learning success. In the main these factors were physical conditions, instructional facilities and material, teacher qualifications, and organisational patterns both in the school system as a whole and within the individual school and classroom. The results of this survey, which was really an elaborate extension of an earlier UNESCO investigation (Germanacos, 1963), are presented in Bentt's "A Statistical Analysis of Factors in the Formal Work Structure of Secondary Education in Guyana, January to July 1969" (Bentt, 1969).

The main findings of this analysis were:

1. The median size of classes in secondary schools was not far from the thirty-five recommended for the newer schools in the project report of the International Bank for Reconstruction and Development.

2. Fifty two percent of the schools sampled employed heterogeneous groupimg of students.

3. Teaching aids and equipment as well as library and text books were inadequate for the needs of most schools.

4. Most of the secondary schools had walled classrooms, while most of the secondary departments of the 'all-age' (6-16) schools had a "hall-type" arrangement.

5. The subjects stressed in secondary education were of the "academic" literary and scientific type, with little or no provision for technical or agricultural studies.

6. A qualification level of teaching (Quallot)measure revealed that an almost equal amount of teaching was done at secondary level by university graduates as by teachers with General Certificate of Education Advanced Level qualifications, but only two categories of schools could claim to have a fair proportion of trained and/or experienced graduates on their staff.

In phase two, V. M. Bentt (1971) made a study of "The Attitude of Guyanese Students to their Schooling at the Secondary Level" following up on an earlier work by C. L. Baird (1971) on "Preoccupations of a Sample of Adolescents Receiving Secondary Education in Guyana".

Summary of Attitude Study

1. Assumptions

The major assumption on which this study was based was that students locally have a more or less negative attitude to their schooling at the secondary level.

2. Design

(a) The school population was categorised into eight strata and eighteen schools were randomly selected for study.

(b) A projective device of the sentence completion type was employed for data gathering.

(c) Fifteen frames of reference of which "certification" was a major frame were formed.

3. Results and Conclusions

It was found that more than two thirds of the school population sampled approached their schooling with a limited attitude - school being seen only as a place affording students the opportunity of acquiring job certificates. Inter-form and inter-sex comparisons revealed that there were significant age and sex differences ($p=.01$) when the statistic chi-squared was applied.

Taking into account the degree of negativism which seemed to pervade the responses of most of the students the evidence seemed to suggest that Guyanese students in the main had a very restrictive view of the function of their schooling at the secondary level. This state of affairs was seen to have serious implications for teacher selection and training. Since student teachers were themselves products of the school system, if selection was not carefully made, one would start with trainees whose attitude patterns had to be changed, lest their classroom behaviour produced similar patterns in their students.

These preliminary surveys served as a guide for the selection of school and class samples and for identifying some of the educational, socio-economic and attitudinal variables that acted as constraints on the process of curriculum development.

Phase three was action oriented. Working in two curriculum areas, Language and Mathematics, the research team, after examining instructional patterns and student response in these subjects in selected schools, organised projects aimed at improving pupil performance by modifying instructional variables hypothesized as crucial. It must be noted that the execution of these projects was only possible through the unreserved and active support of the Ministry of Education and the participating schools. To date the Language project is still in progress. The results of the Mathematics project are reported in what follows.

The Mathematics Experiment (Bentt, 1971)

Attitude and performance had so often been linked by local educators that it seemed to urge that some functional aspect of school life which contributes to performance and which may affect attitude be isolated for experimental study. With this in mind the decision was taken to look experimentally at methods of teaching and use as content mathematical topics of the third year syllabus of Guyana secondary schools.

The Problem

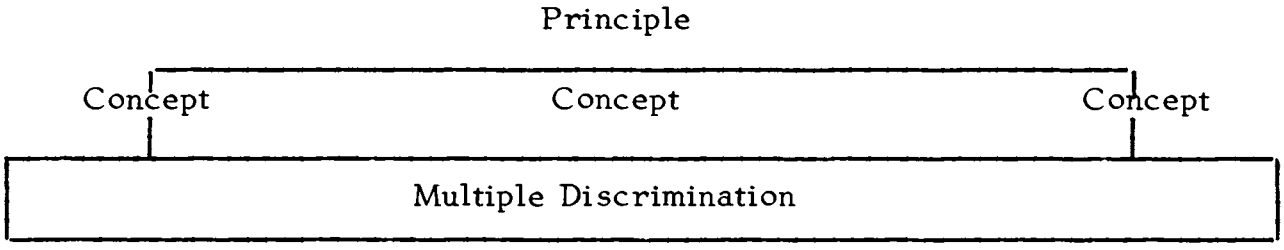
In the study, then, the independent variable was curriculum, defined operationally as what is taught and how it is taught, and the dependent variable was response as measured by performance on achievement tests. It was hypothesized that meaningful concepts increase the ability of students to learn mathematical concepts and principles. The experimental problem was therefore primarily a cognitive one, but an underlying assumption in the affective domain was that attitudes of teachers, as reflected in their teaching styles, would be difficult to change, therefore training sessions providing considerable immersion for participants would be necessary.

The Organisation of Teachers, and Experiment

The "seminar with workshop" approach was adopted, and this involved programmes of orientation, writing of material and construction of learning aids.

The preparation of teaching and learning material, apart from being guided by the cognitive and affective assumptions previously mentioned, was based on the sequential structure for the learning of Mathematical principles and concepts shown below. What this means is that concepts are learned through multiple discrimination and principles are learned through the application of concepts.

A Mathematical Learning Structure



Furthermore, groups though divided along "subject" lines were advised to see mathematics unitarily and not severally as Arithmetic, Algebra and Geometry.

Design

The experiment was carried out in the following manner:

(a) Two classes were chosen for each of four schools and assigned at random to control and experimental groups.

(b) Both experimental and control classes were pre-tested.

(c) The same teacher taught both experimental and control classes.

(d) The same topics were taught in both classes except that the control class was taught "traditionally" and tested before the very topic was tried out in the experimental class.

(e) The children who comprised the sample in both classes were those who would have attained the age of sixteen years or under by the end of the school year.

(f) Entering performance of each child was compared with terminal by co-variance analysis.

Results and Conclusion

Statistically significant ($p=.05$ or $.01$) differences between the performances of experimental and control groups were obtained in two of the four schools; but the F ratio of 15.28 for the four schools taken as a whole was reasonably close to the 18.51 necessary for significance at .05 to encourage a conclusion that there seems to be a great deal of promise in the type of programme experimented with, and that with modification the programme could gainfully be extended to other levels of secondary education.

The results of this programme have certain implications for teacher training. The experiment used as methodical approach, concrete and ikonic references in the teaching and learning situation. Since it is not possible to have meaningful concrete and ikonic references without appropriate aids, opportunity to make these should be given during preliminary training and in periodic refresher courses, for the teacher caught in the hurly-burley of school life and personal affairs never seems to have enough time for the preparation of teaching material.

The experiment provided some valuable insights too into the possibilities of curriculum research as a vehicle for in-service teacher education. A common problem in teacher education courses is a tendency for lectures in Theory to be divorced from the practical day to day problems of the teacher (see Paffard, 1969). In a curriculum research project participating teachers are confronted with the necessity to address their attention to actual classroom problems as well as to studying the theories underlying their teaching experiments. As Broomes (1972) writes "...it seems that the best place to learn curriculum is in schools from persons engaged in developing it, and the persons best motivated to learn curriculum are those who are seeking answers to day to day problems in schools".

The improvement in teacher behaviour seen in many of the teachers who took part in the various teaching experiments suggests that much benefit can be gained from initial and refresher teacher education courses centered around experimental curriculum projects.

The Faculty of Education has just received another grant from the Carnegie Foundation to conduct and extend its work in curriculum, and has institutionalised this function of curriculum research and development by establishing a permanent Department of Curriculum Development. While research projects of the kind described will be rigorously conducted to discover effective procedures of instruction, the Department will utilize whatever findings are currently available to embark on a wider scale of in-service teacher education and of development and revision of school curricula.

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