

THE EFFECTS OF CERTAIN FACTORS UPON SCIENCE ORIENTATION IN A SAMPLE OF JAMAICAN FIFTH FORMERS

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Many developing nations are not fully attuned to the necessity of providing a background in science required of the individual for effective citizenship in general, or for those entering scientific and technological vocations, specifically. Even if such awareness exists, these nations may not have the financial resources with which to implement this need. Jamaica epitomizes a developing country caught between these two vices. Having entered upon the road to technological advancement, she has thereby been committed to educating her people in science. Yet, observation of local trends over the years is indicative of a society which cannot be considered a science orientated one.

If one adopts the view that positive science orientation is necessary and desirable - and it appears to be the sine qua non for survival in our present technological age - then one should seek to discover possible reasons for the obvious lack of progress in this area. Research along these lines was conducted by the writer. Salient details of the study are outlined in the ensuing discussion.

THEORETICAL FRAMEWORK

An investigation into the evolution of science education within the Island provided certain relevant features. Historically, Jamaica was one of the last British colonies in the West Indies to develop a secondary system of education, and thus it is possible that progress may well have been hampered by such a late start. Even as the system became more well defined, it was seen to illustrate a distinct similarity to that of Britain the "Mother Country", and as a result aspects of the curriculum content were often irrelevant to local students. (To cite an example, students of botany were expected to be familiar with the primrose - a flower not found in this part of the world).

The "classics" were initially prestige subjects taught at the secondary level, and it was not until about the 1920's - 1930's that sciences were sufficiently well established to become popular among students. Once this shift of emphasis occurred, sciences became the prestige subjects, generally reserved only for the brightest students (and especially boys rather than girls). Cambridge examination results, as well as the annual graduate output from the University of the West Indies both attest to limited numbers of students majoring in the sciences. Hence, although one admits that the utilitarian value of science now appears to be recognised, yet the attitude of Islanders at large suggests that there remains the desire for traditional prestige professions such as law and medicine, rather than for those vocations needed to provide the country's economy with the manpower necessary for its future progress.

Since the role of the secondary school in providing foundations in science was a major concern, the writer sought out relevant researches staged both at home and, (as was more frequently found) abroad. From these, a host of independent variables which appeared to influence science orientation at the secondary level were identified, together with the expected results and instruments used to ascertain such results.

Within this theoretical frame of reference was defined and delimited the proposed area of investigation. While this may appear to be in contrary sequence to the design of most scientific researches, it must be borne in mind that investigation of science orientation in the Jamaican society imposed a specific problem, in that it encompassed virtually unexplored territory. It was only after the theoretical framework had been laid that one could get a clear indication of possible approaches available.

THE INVESTIGATION

This research sought to probe the effects of certain variables upon science orientation, in a select sample of Jamaican boys and girls in their fifth form year of secondary schooling. Independent variables selected for investigation, (categorized as personality, educational and environmental), had each been previously identified from the literature as those which appeared to influence science orientation favourably. Science orientation was accepted as: "Any special qualities of personality, mind, intelligence, background or upbringing that marks a person as a potential scientist, or at least, as one who has developed a method of approaching life which may be called the Scientific Method." Students' G.C.E. "O" level science grades were used as the criterion measure.

There were actually three phases to the investigation, one main and two subsidiary, the main one concerned with obtaining ratings for 576 students on each of the 30 independent variables selected. Data thus obtained were subjected to two major analytical procedures:

1. Orthogonal Factor Analysis, through which the following factors emerged by way of Varimax rotation:

A "School Environmental Factor" for both boys and girls; a "Scientific Ability Factor" for girls only, and with the criterion measure loading significantly here; a "Scientific Inclinations Factor" for both boys and girls, although the criterion measure loaded significantly for boys only; a "Social Environmental Factor" for boys; and a weakly defined "Personality Factor" displayed in the case of girls only.

2. Stepwise Multiple Regression, found to be of greater importance than factor analytical procedures, and through it the best predictors of science orientation were selected in order of importance. For girls, these were two "Educational" variables (Early Educational Experiences and results on a test of Spatial Ability), coupled with one "Personality" variable (Scientific Attitude). For boys, three "Educational" variables were regressed (Vocational Aspirations; Liking for Science - Favourite Subject; and results on a test of Abstract Reasoning). Hence, overall, educational variables were the best predictors in both instances.

One of the two other areas studied, sought to make further explorations of certain results arising from factor analyses and multiple regressions namely, some of the strongest features, as well as findings which were surprisingly weak. As a result of these explorations, a sex difference was defined in favour of boys. Those students continuing to sixth form and G.C.E. "A" levels were also observed, and it was shown that for them, sciences were the most popular options selected, although less than half the students deciding to specialize in sciences did not qualify as science orientated types, according to criteria established by regression predictors.

The final phase of the investigation looked at the practising Jamaican scientist, in order to establish criteria against which findings for the school sample could be judged. It was shown that personality characteristics made little impact on the scientist, but certain educational variables such as early school experiences, basic intellectual ability and liking for sciences, did emerge as important determinants positively related to science orientation.

IMPLICATIONS

The involvement of a people in science and science-related fields is often used, in a broad sense, as an index of the particular nation's development. While there may be arguments against adopting this measure, the writer is of the opinion that it is justifiable, and contends that although the merit of science orientation may not be directly measurable in a cost benefit-type analysis, so many other aspects of development impinge it - in fact, upon scientific literacy - to make it a desirable feature to be fostered. She thus submits that Jamaica needs to educate scientifically literate individuals - characterized as those having an understanding of (a) basic concepts in science, (b) the nature of science, (c) ethics that control the scientist in his work, (d) interrelationships of science and society, (e) interrelationships of science and the humanities and (f) differences between science and technology - so that there exists an informed public capable of taking an intelligent part in decisions geared towards social change through the advancement of society.

We also wish to prepare scholars in the several disciplines of science, and also to provide the background required of individuals entering technological/scientific occupations. Resources are limited, hence the need exists to identify those potentially most likely to succeed in scientific fields, and afford them the opportunity of such training. Persons faced with the responsibility of selecting these candidates would be forced to consider carefully their criteria for selection - to define both the desirable inputs of the situation as well as the learning outcomes sought. The value of this particular research lies in its exploration of such considerations within the Jamaican setting, in the trends indicated from the findings, but above all, in the elementary groundwork it has provided for more extensive and sophisticated research to be based.