THE CONCEPTION AND IMPLEMENTATION OF A SOCIAL POLICY:

KANO STATE EXPERIMENT

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PART FIVE:

The Welfare Dimension

PART SIX:

Theology Dimension

ENHANCING THE PARTICIPATION OF GIRLS IN SCIENCE AND TECHNOLOGY IN KANO: A STUDY OF GIRLS' SCIENCE SECONDARY SCHOOLS.

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INTRODUCTION

The creation of a New Social Order has become an evolving objective of any contemporary government wishing to give its citizens the full benefits of its social and economic policies. As part of this social service, the Kano State Governemt appointed four Committees in 1987 to determine the final shape of a new Social Policy for Kano. The Committees were on The Destitutes, The Almajirai, Women Affairs, and Social Mobilisation.

Each of these Committees was given specific terms of references to enable it to make recommendations that will lead to a brave new hope for citizens of Kano State. A Government White Paper which contained the governments' reactions to the Committees' findings and recommendations was released in May 1988. This paper will concentrate on the recommendations of the Committee on Women Affairs, using as its analytical framework, the recommendations and Government observations that derive from the main term of reference given to the Committee by government which dealt with education for women. This was:

> Term of Reference Number 6. To identify the vital areas where female labour/work is specifically required for the well being of the society (e.g. Nursing, Medicine, Teaching, Social Work etc) and to encourage women to pursue such careers. In recording to this

Term of Reference, the Committee on Women Affairs noted that:

The Shariah recognises the fact that women have a role in societal development

through contributing to the upkeep of their homes, and public work such as Nursing and Midwifery provided that conducive atmosphere prevails in accordance with the Shariah. But today you find a situation in which male doctors and other medical professional attend to women can do such work to help develop the Nation if given the necessary education. (Kano State 1988 p.10)

Based on this main observation, the Committee on Women Affairs made a series of recommendations, the main one being. The gove rnment should emphasize the importance of female education. All encouragament ought to be given to female education. Also, female education should be free. (Kano State 1988 p.11)

The Kano State Government accepted these recommedations. It is within this framework that I would wish to analyse a government strategy to encourage the participation of girls in Science and Technology disciplines. I intend to argue that both the Committee's recommendation and the original term of reference given by the government to the Committee have not paid adequate attention to the nature of the problems; i.e. the reasons for low representation of women in labour oriented disciplines, particularly science and technology. I would also argue that a dangerous trend has been reinforced in the Committee's observations - and that is of the sex stereotyping of the capabilities of girls, a situation which, as I will demonstrate with empirical evidence, the girls themselves do not seem to do much to eliminate. But first, I would like to provide a theoretical framework for my analysis.

THEORETICAL FRAMEWORK

Despite the diversity of curriculum reform activities in science education all over the world, surprisingly only girls do study science and technology disciplines, especially at pre-tertiary level of education, and particularly within governmental framework of provisions for education. This is despite a lot of evidence which reflects growing concern about lack of representation of women in science and technology in all cultures.

For instance, during a Workshop on the Enhancing of the Participation of Women in the Popularisation of Science and Technology held in Dhaka, Bangladesh 19-25 January 1987, a common report of the participations was that Women and girls are disproportionately underrepresented in science and technology education and, as a consequence, also as professionals and technicians in the science and technology disciplines. (Commonwealth Secretariat, 1987)

Other studies in various other cultures in both developed and developing countries reported similar findings (Comber and Keeves 1973, Auvien 1970, Erickson and Erickson 1984, Okereke 1986, Kelly 1976, 1981, and Haley-Oliphant 1985). Yet again

other studies suggest that girls are virtually "switched off" studying science subjects (e.g. Hardin 1983) because of cultural and social stereotypes that fixed the roles for boys and girls. The behavioural stereotype for girls was one of the factors "switching" them of studying science.

However a number of intervention projects were initiated in many countries aimed at encouraging girls, especially at secondary schools to perceive science as a force in their lives - both through study and career prospects. This is because as Hardin (1987) argued.

One of the things that has been learnt over the years is that the problem of women and science is complex and requires long-term and sustained programmes for its solution. (Hardin 1987 p.7).

Most of these efforts were initiated by organisations and individauls with a concern for girls in science education, and mainly in developed countries. These included GIST (Girls in Science and Technology) in Britain. Handover Project in The Netherlands, Sex Equity Department of the Government of Sweden, and the Al-Ahram Science Club of Egypt (Haley-Oliphant 1985). Few studies were reported of government initiatives in either developed or developing countries aimed at enhancing the participation of girls in Science and Technology disciplines which would enable them to make a more effective contribution to a New Social Order.

However, in Kano State, Nigeria, a government concern with increasing the quantity and quality of scientific and technological manpower in the State led to the creation of the Science Secondary Schools project in 1977 which operate as Senior Secondary Schools. Initially the project was meant only for boys. But in 1981 65 girls were selected with the view of placing them in a girls' science secondary school at Taura, which, like the entire Science Schools project, would be the first of its kind in Nigeria.

But because the building for the girls' science school were not ready at Taura, the students were taken in transit to Government Girls Secondary School, Kura where two sets graduated (1984 and 1985). In January 1985, fresh intake into the Girls Science School Taura started their studies at Taura, rather than Kura This paper based on field work carried out as part of larger study (Adamu 1988), examines the Girls' Science School Taura as a government initiated reformist strategy aimed at enhancing the participation of girls in science and technology in a traditional society (1).

BACKGROUND TO GIRLS' EDUCATION KANO STATE

No meaningful study of girls and science education in a society such as Kano State can take place without first providing an overview of the general education process

in the state. This should provide a contextual framework around which the nature of the problem can be fully appreciated.

Modern education (i.e. education with roots in Nigeria's colonial past) has never been fully accepted in Kano, especially for girls, because of the historical antecedents which linked the development of education with christian missionary activities in Nigeria. This was brought about by the Islamic nature of Kano State (Kano State 1976). As a Kano State government Committee (The Galadanchi Committee) set up to analyse the problems of education generally in Kano observed;

> There is still, in our society, the lingering suspicion of Western education as an agent of Christianity. As a result of this suspicion, it is difficult to convince a great number of our people.

But in an ironic twist of history, the 1980s witness a massive surge in demand for girls' education in Kano. This is for instance indicated in a report in the New Nigerian newspaper of 17th October 1986 (p.12) which state,

Kano State has recorded a dramatic rise in the number of females seeking admission into post primary institutions. Few years ago the State government complained of poor response of females to western education. Over 17,000 sat for the common entrance examinations this year (1986) out of which 7,156 were recommended for admission into post primary institutions. The Commissioner for Education .....said it was only 4,000 of those recommended for admission were actually admitted.

Often studies in the past have blamed parents for not allowing their daughters to attend western type of schools (e.g. Kano State 1976), yet the government, most likely aware of the overall ratio of male to female births in the State does not seem to make adequate provisions to cater for the greater demand for education by girls in the 1980s by providing more schools for girls in proportion to the demand. In this situation, without enough schools to go to, one wonders what happened to the 13,000 girls who would not be admitted to schools in 1986, as the newspaper report indicated.

THE GIRLS' SCIENCE SCHOOL PROJECT

In the face of both apparent parental resistance to western style of education, and the government inability to provide more schools for girls in proportion to their population, the establishment of the Girls' Science Secondary School at Taura (and later another one at Jahun in 1988) would certainly seem to be a radical move away from tradition. In the end, it emerged probably as the only way in which girls can be encouraged to participate in science and technology disciplines.

By 1987, the total population of the Girls' Science School was 405. It is in this figure that the Kano State policy initiators of the project see the Girls' Science Schools as something of an achievement: creating a learning context where over four hundred girls from Kano State are taught the main core science subjects on a non-option basis necessary for scientific and technological career advancement.

THE COMMITTEE ON WOMEN AFFAIRS - THE ANALYTICAL FRAMEWORK.

It is at this point that I will go back to my analytical framework by recalling the recommendations of the Committee on Women Affairs. It would seem to me the Committee was too silent about the existence of the Girls' Science Schools Project, otherwise their recommendations would have reflected either on the learning context of the students in all schools in Kano, or made suggestions about specific curricular provisions and learning circumstances that affect girls learning all subjects, including science; e.g. teacher biases which pushes girls to "expected" subject choices, etc.

And if the Committee on Women Affairs has noted the existence of the Girls' Science Schools, it would have acknowledged its awareness that a radical move had already been made to enhance the participation of girls into the very careers the Committee would wish to see more women involved in. As it was, the Committee did not provide any specific strategies to enable the government to achieve its recommendations. There is a need to determine therefore whether such Committees are necessary to begin with: or whether a more empirical way of determining the problems that afflict the society should not be sought - and at a probably lesser cost.

Indeed the need for the participation of women in science and technology has now become a Federal Government concern. As the The Triumph newspaper of Monday 29th May 1989 (p.2) reported.

> Over N300,000 has so far been spent this year by the women education unit of the federal Ministry of Education to promote the education of girls in the fields of science, technology and mathematics. The ministry has also launched a women education Science Technology Mathematics (STM) scholarship scheme to cover tuition, boarding, transportation and books for senior secondary school girls in the federal and states secondary schools.

Further, a more radical move was proposed by the Federal Ministry of Education. This was in the form of new Federal Technical Colleges at Akwa Ibom and Sokoto States for girls only. The literature on Science Education in Africa reveals this is one of the first strategies of its kind in Africa.

Thus if awareness of these States and Federal strategies were acknowledged by the Committee on Women Affairs. One would have seen recommendations that provide suggestions about how to refine these reformist strategies to enhance the participation of girls in science and technology; rather than the lame recommendation that encouragement ought to be given to female education. It is, and in very novel way totally different from any other developing country.

But perhaps surprisingly, even in this move to provide more opportunities for girls to study science education within a legislative framework, especially in a traditional society such as Kano, elements of stereotyped stratification from officials with regards to the students eventual careers was somehow inevitable. For instance, in most official statements, as was the case with the recommendations of the Committee on Women Affairs, it was indicated a major objective of the Girls' Science School is to produce women doctors and nurses. Not much emphasis or apparent importance is attached to the need for the production of women engineers, geologists, aeronautic engineers, computer scientists, veterinary doctors, or agricultural engineers. As an official rationalized.

> If you go to the Hospital today, you will find that up till now the ratio of medical doctors is more men to few women attending of females; you see more men attending to female patients than females attending to female patients. By the establishment of the Girls' Science School, this problem should be reduced. (interview 29/9/1986). (2)

This expectation, of course, may also be a reflection of Kano State economy and social structure: doctors may be in greater demand than computer scientists or engineers. However, the expectation that girls should enter in the "caring professions" is found in many other countries. For instance, Kelly et al (1982) carried out a survey of gender roles at home and school and found that British parents rate the job of doctors and nurse for girls on higher mean rating of suitability than for boys.

CURRICULAR PROVISIONS

The most controversial aspect of the Girls Science Schools was in the range of subjects offered to them. The six core subjects associated with science and technology careers are compulsory to them -as for boys. In essence, this is the most distinguishing characteristic that makes

(2) Quotes based on personal interviews I held with key policy initiators of the project during a field word for a larger study on the evolution of the Science Schools as manpower development strategies.

See Adamu (1988) the Science schools different from Non-Science Schools _ the lack of subject option system in sciences. These core subjects are: Biology, Chemistry, Physics, Mathmatics, Geography and English. But the discrimination against the girls is that they must also offer Hausa, Islamic Religious Knowledge and Nutrition. In the boys' schools, the six core subjects are also compulsory, but in addition, the boys can choose two electives from Technical Drawing, Agricultural Science and Further Mathmatics. In addition, they can also choose between Hausa or Islamic Religious Knowledge. The overall idea is for the students in the Science Secondary Schools system to offer nine subjects for Senior School Certificate Examinations (SSCE).

The curricular offering for the boys school therefore provides them with a wider choice of careers in science and technological disciplines; but the girls tended to be shepherded towards "soft sciences" or the "caring disciplines."

CAREER AND EDUCATIONAL ASPIRATIONS AND EXPECTATIONS

But even though the general social condition of women in Kano State does not give much room for optimism about the further education and consequently career prospects of girls in science education, nevertheless the students from Girls' Science School Taura show strong educational aspirations, as indicated by Table I

TABLE I
EDUCATIONAL ASPIRATIONS OF TAURA GIRLS' SCIENCE SCHOOL STUDENTS

INSTITUTION	FREQ	PERCENT	VALID PERCENT	CUM PERCENT
POLYTECHNIC	1	2.1	2.1	2.1
UNIVERSITY	46	97.9	97.9	100.0
TOTAL	47	100.0	100.0	

However, it is not surprising a majority of the respondents (97.9%) indicated the university as their highest expected level of education - even among girls in the Science School has provided the girls with a basis for believing they can contribute to development in Kano, and as such there should be no barriers, especially from parents (who allowed them to take the examination) to further education and careers in science or technology (3).

Similar responses to educational aspirations in the Girls' Science School are

obtained when the respondents were asked to indicate their career preferences, as shown in Table III where a majority of 97.7% chose medical careers - unwittingly confirming official stereotyped.

(3) The responses in Tables II and III that follow are based on a questionnaire survey conducted on the Girls' Science Secondary School, Taura in 1987. At that time, the Jahun school has not been started.

expectations of the main objective of setting up the Girls' Science School in Kano State.

TABLE II
CAREER ASPIRATIONS OF TAURA GIRLS' SCIENCE SCHOOL STUDENTS (N = 42)

CAREER	FREQ	PERCENT	VALID PERCENT	CUM PERCENT
HUMAN MEDICINE	23	48.9	54.8	54.8
PHARMACY	13	27.7	31.0	85.7
NURSING	5	10.6	11.9	97.6
ENGINEERING	1	2.1	2.4	100.0
MISSING	5	10.6	MISSING	
TOTAL	47	100.0	100.0	

Wanting to become a doctor accounted for the highest response with 54.8%, followed by Pharmacy (31%) and Nursing 11.9%. Only one respondent indicated wishing career in Engineering. It would seem therefore that there is a silent agreement between what the girls wanted to become in life, what the government expects of them, and certainly what the Committee on Women's Affairs recommends for them. This might be explained by social conditioning where the girls were probably brought up to believe that their roles in life lies in "caring professions."

FUTURE PROSPECTS

As is the case with the whole Science Secondary Schools Project in Kano, the main criteria used
to determine the success of the project is the examination results of the students. This strategy is used by officieals to argue that the establishment of the schools has enabled a production of higher number of science students, including girls, who can go on to higher institutions. The results of the GCE O Level examinations taken in the Girls Science School since 1984 are indicated in Table III

TABLE
TAURA GIRLS' SICENCE SECONDARY SCHOOL
SUMMARY OF GCE LEVEL EXAMINATION RESULTS, 1984-1988

SUBJECT	NO	CREDIT	%	PASS	%	FAIL	%
GEOGRAPHY	235	77	32	120	51	115	49
CHEMISTRY	362	61	16	171	47	191	53
BIOLOGY	364	48	13	173	48	191	52
PHYSICS	364	45	12	116	32	248	68
MATHS	364	39	10	116	32	248	68
ENGLISH	362	31	8	97	27	265	73
MEAN	341	50	15	132	39	209	61
HAUSA	362	285	78	338	93	24	7
I.R.K.	364	218	60	303	83	61	17
H/MNGMT	63	36	57	62	98	1	2
F/NUTRIT	278	75	26	242	87	36	13
MEAN	266	153	58	236	89	30	11
TOTAL MEAN	311	91	30	173	56	138	44

(Sources: Adamu, 1989)

Interestingly enough, although the students offer Geography, Mathematics and Physics good combinations for astrophysics, geology, aeronautic engineering, mining engineering etc nevertheless, their achievements in Physics and Maths would seem to steer them more towards nursing and catering professions than hard core sicences, as reflected in their relative successes in Bology and Chemistry.

This observation is borne out by an analysis of the results of the Girls' Science School in Table III. As the table shows, although there was a mean pass rate of 56% in all the 10 subjects offered, this was not because of their achievement in the science subjects. The table shows that the five most successful subjects in the Girls' Science School were Hausa, Islamic Religious Knowledge, Home Management, Geography and Food and Nutrition.

Science Subjects - the main reason for setting up the school - rated low achievement percentages ranging from 16% credit level in Chemistry to 13% in Biology and 12% in Physics. Mathematics and English rated the lowest with 10% and 8% credit achievements respectively. Thus the overall mean results in science were not encouraging. Only 15% of the students got credit level achievements in the six core

science subjects, 39% overall passes, and a vast majority of 61% failed over a period of four years. It is for this reason that I earlier argued that the girls themselves do not seem to be helping the situation by such low achievements in science, despite the privileged status of their schooling.

But there are two possible explanations for the results in Taura Girls' Science School - and both were offered by the first Principal of the School. The first might be caused by initial factors of development and settlement which has a rippling effects as reflected in the examination results. As the first Principal of School explained to the members of the Science and Technical Schools Board during their familiarisation tour of the Taura Girls' Science School on 26th February 1985,

> "The provision of well equipped laboratories in a Science institution cannot be over emphasized though it is costly. At present we have two laboratory buildings finished (Chemistry and Physics), and two others at standstill (Geography and Biology). We put our request to the Board to accelerate equipping our labs to enable us start practical lessons. Over the last six weeks, we concentrated effort in giving the students theoretical knowledge. It is therefore high time to start some practical lessons to go along."

The second reason is more compelling - and rooted in the cultural matrix of Kano society. Again as the Principal explained at another occasion,

> "The serious obstacle to women education in Kano State is that with all the opportunites and necessary encouragement given many girls are not allowed to complete their school. They are withdrawn by their parents in order to get them married early. The academic performance of those allowed to continue is affected by the marriage contract. Girls whose marriage contract are made while they are still in school often feel that their future is settled and they have no need to work hard in schools." (Principal's School Speech 8 November 1985).

In the light of these two observations, it just might be possible that the results of the Taura Girls Science School might be mainly affected by social expectations prevalent in the society. It is not unlikely, for instance, for most of the students to feel their education is futile if they are only ending up married after school anyway and probably with no career prospects in Science.

Of course other factors must be contended with. For instance, the science reuslts of the girls might either reflect innate inability in science - which would be difficult to prove - or faulty teaching process. Whatever the case, more investigations are needed to make the girls science school more academically cost-effective in relation to their primary

purpose' i.e. enhancing the participation of girls in science and technology careers.

Moreover, it is quite clear that to make science education more functional for girls in Kano, and to make the girls' Science School live up to its expectations of being a science school, wider and more scientific curricular offerings must be made available to the students. For instance, Agricultural Science should be given a serious consideration. At least if the stereotype of the role of women in the society must be maintained by the Science Board, then this subject might make it possible for the students to apply knowledge of agricultural practices at home. But generally, if the policy initiators of the project are convinced of the value of girls science education, then there is no reason why the girls should not be given the same curricular offering as the boys. After all, the Girls' Science Schools were established on the same equal intellectual footing as the boys' schools.

The importance of the results in Table III are indicated in an official statement from the officials of the Science Schools Board about these results:

> "It is gratifying to note that 18 girls out of the 65 that sat for the GCE ordinary level examinations obtained five credits and above; thus qualifying for direct university entrance." (Adamu 1988).

Policy makers further point out that the production of an average of 341 girls who have undergone pure science training from the Taura Girls' Science School is more than for entire Kano in the last five years prior to the establishment of the science school. This alone justifies this interventionist strategy to encourage girls science education in Kano State.

But even if a large number of girl science students have been produced by the Girls' Science School, there was no way of ensuring they can actually follow up both their educational and career aspirations in a traditional society such as Kano, especially as expected by the policy makers. For as the Science Schools Board officials acknowledged,

> "Despite the fact that the first batch of Girls' Science School students (1984) have performed better in their examinations as compared to other Girls in Kano State, very few of th em are now pursuing Science and Science related course in our institutions of higher learning." (Adamu 1988)

And yet this could not be because parents are against it. That many parents allowed their students to be taken to the Girls' Science Schools indicates their willingness to participate in the project. Indeed, from various discussions with education officials, the Girls' Science Schools seemed to have acquired a prestigious status (although admission is strictly by merit). This is one area where further investigation is needed to

fully refine this type of science education strategy, especially in social contexts such as that offered by Kano State.

CONCLUDING REMARKES

It is therefore clear that although concern for women in general education, and especially their participation in science and technology disciplines has become an international issue, few long lasting strategies were suggested to solve the problem. Most of the initiatives centre around enlightenment services with interest groups - mainly in developed countries - drawing attention to the problem .

In the light of this, the Kano State Girls' Science Schools, arising out of a traditional culture where modern women eudcation has not made significant impact on the society is a bold attempt at providing a long term science should feature as part of the science curriculum.

d) Books and other curricular materials. Books and resources for science and technology are usually heavily baised towards males, and the production of non-biased materials, incorporating interests and approaches which will appeal to girls, may help towards encouraging them to go into science and technology, though it will not be sufficient as a step on its own.

e) Entry of girls and Women to careers in science and technology. Tertiary institutions must demonstrate a willingness to accept female students in much greater numbers than they do now. They can do this by offering special programmes for school leavers, arranging for women engineering students to visit schools and for schoolgirls to visit workplaces.

If the Girls' Science Schools project is refined and implemented fully without any sex stereotyping in mind, it could provide a basis for a radical re-evaluation of the role of women in national development, especially in strongly traditional cultures.

(1) The data collected for this paper was from formal school and classroom observations, interviews with school authorities, analysis of documents relating to the establishment of the Science School project in Kano, and self-completing questionnaries given to 100 students in the Girls Science Schools; although only 47 were fully completed and returned. These formed the basis of subsequent discussions in this paper of the desirability of sending boys to school, let alone girls. (Kano State 1976 p.35)

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