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Developing technology education In Botswana

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Abstract
With respect to technological order and socio-economic and environmental concerns, African educators are challenged to present pupils with a technology education that combines a broad technical spectrum of activities with a wide range of community settings. Botswana's leadership has identified Technical and Vocational Education and Design and Technology as strategic components of the nation's development. The paper seeks to outline the development of technical education in schools in Botswana to date and their impact on teacher education. It also assesses the creditability of our educational system in technology and looks to its future developments.

A brief outline of the concept of Design and Technology as interpreted in Botswana is given; the role and relevance of technical and vocational education in Botswana and their implications for initial teacher education are narrated. The strengths and weaknesses of the present developments are discussed.

Introduction
Education in Botswana has been highly selective and academic in its orientation, catering only for the academically inclined. Those with less mental capability or with special needs were not well accommodated. Since they would have failed to reason academically, or express themselves verbally, they would be deemed to be "good with their hands" as Penfold (1988) expresses. Eggleston (1992) disputes the idea by noting that education should open up a range of intellectual activity to all pupils. Therefore, "Education in any country has a dual function. It must import general knowledge and a broad minded attitude to the population as a whole, and must produce creative specialists in various areas of human activity" (Moravcsik, M.J., 1977).

Overview of Botswana
With a population of 1.33 million, Botswana is approximately 582,000 km² in size, bordered by South Africa in the South and South East, Namibia in the West and North, and Zimbabwe in the North East. It has a border with Zambia, although the existence of the Namibian Caprivi Strip narrows the border with Zambia to approximately 500 metres. Its geographic position makes it extremely vulnerable to the fluid geopolitical situation prevalent in South Africa. Since it gained its independence from Britain in 1966, the former protectorate of Bechuanaland has enjoyed a stable, largely incorrupt and democratic government, with an exemplary human rights record - rarity in Africa. Economically Botswana is sound, and therefore has a satisfactory context in which to develop its Design and Technology education.

Botswana's educational system has undergone (and is undergoing at the moment) a major transformation. Until 1986, the school system was divided into three cycles: a seven-year primary school cycle, followed by a three-year junior secondary cycle leading to Junior Certificate and two years of a senior secondary cycle (a 7-3-2 structure). Due to recommendations by the National Commission of Education (NCE) in 1977, the pattern was due to change to 6-3-3 to assist universal access to basic education. A transitional phase of 7-2-3 was deemed essential and is currently in place. Each cycle is terminated by an external examination. The last three years of the cycle are externally examined by Cambridge overseas school examinations (COSC).

The Early Development of Technical Education and Technology in Botswana
As with any education the highest achievement, both personal and in terms of education provisions, are based on firm foundations. In this any aspect of technical education is particularly dependant on a good grounding in practical study and skills development. Therefore, that grounding is necessary for students and schools to embark on the study of subjects with a practical bias, Design and Technology being such a one.

The roots of modern practical subjects in the Botswana schools can be traced back to the early 1960s when Patrick Van Rensburg established Swaneng Hill School and Serowe Builders Brigade. His philosophy was directed towards education with production, which subsequently evolved "Self-help" projects.
By 1965 school leaver problems started to emerge mainly with primary school children who had no funds for further studies and could not be employed. (They were turned away from secondary schools). To avoid the diploma disease and the educated unemployed (Blaug, M. et al., 1969) Van Rensburg probed the self-help project of Serowe Builders Brigade which involved its students in construction of low cost public buildings, the returns of minimum wages from their work being used to cover the cost of schooling.

It was at this time that a Technical Curriculum at Swaneng Hill School was produced with compulsory core subjects of English, Mathematics, Science and Setswana (our national language). Newly introduced foundation subjects comprised Metalwork, Woodwork, Building Science, Technical Drawing, Commercial subjects, Art and Agricultural Science, subjects assumed to provide skills needed by a developing economy. All this was done with the spirit of providing a practical education with a sound base and related to the world of work and real life.

After Independence in 1966, the new Botswana Government, through the Ministry of Education (MoE) introduced a few certified practical subjects (in Woodwork, Metalwork and Technical Drawing) offered only in few secondary schools.

However, the “1977 National Commission on Education” emphasised and recommended the need to introduce into schools practical subjects that were oriented towards the country’s needs. The problem of terminology interpretation arose as a result. The question was whether this was calling for a practical curriculum, vocationalised to provide life skills or vocational education with emphasis in specific skills or trade training in schools. The issue ended up in practical subjects such as Home Economics, Art, Design and Technology or former Craft courses being relegated with very little recognition as is acknowledged in the 1977 report (Education for Kagisano (meaning social harmony), p.3-12) that:

“...practical subject options are relegated to a position of least choice.”

The main constraint in changing the curriculum, to make it relevant to the real, practical world and to open "...opportunities to combine study and work..." (Government Paper No.1, 1977) was due to the curriculum and structure of the examinations which were geared towards United Kingdom examinations. The result was a back wash effect on teachers and students, making the curriculum look narrow in breadth and lacking in depth.

By 1977 there were five secondary schools offering Technical Drawing at Junior Certificate (JC) level and three at senior secondary level. Six secondary schools offered Woodwork at JC level and three senior secondary schools at Cambridge level; Metalwork at JC and Cambridge level was offered only at one school and that was Swaneng Hill. Only two schools offered Building Science at JC level (Swaneng Hill and Shashe River School). In total ten secondary schools officially offered the practical subjects before mentioned.

The Staffing Position

During this period there were no inspectors or advisers within the Ministry of Education to look after practical subjects. In addition a lack of qualified and experienced teachers to cover the subject within the existing schools was evident. The teacher supply of technical subjects was 12 in number.

Secondly, there was no training for practical subject teachers carried out at any establishment of further education in Botswana. The teaching strength was composed 100% of expatriate staff.

When plans were formulated to provide universal access to the first nine years of education, Woodwork and Technical Drawing were taught in nineteen government secondary schools and Moeding College which is a government-aided secondary school. Due to rapid growth in the construction of Community Junior Secondary Schools envisaged, a dramatic change was called for. As a result Technical Studies in Junior Secondary Schools began in 1986 with the first examination due November 1987. The subject was an integration of Woodwork, Metalwork and Technical Drawing examinable only at Junior Certificate level.

Over and above this, the evolution of technical education in secondary schools has led to a new subject with a new and thematic integrated approach. Design and Technology, a common term in most secondary schools, has evolved from traditional technical subjects.

Remarkably, all these changes took place a few years after the changes in the subject in Britain. Around the early 1970s in Britain there was a need to establish a Design and Technology type of subject. Initiatives emerging from the curriculum led to the use of the title “CDT” in 1980. Round about this time Botswana was having the same problems and worked out the introduction of the subject in 1988.
The teaching of practical subjects in schools in Botswana was similar to the United States with their industrial arts, content-based as opposed to process-based as in Britain. The present Design and Technology subject in Botswana combines both content and process. The start is a very good one so far, led by two Senior Education Officers for the subject in the Ministry of Education. One is an enthusiastic and creative expatriate with a craft skills background, and the other is a highly energetic Motswana citizen with both a craft skills background and Design and Technology orientation. This has made a very dynamic team working together in leadership for the future of the subject in Botswana.

Why the change in Secondary Technical Subjects?
As a result of the move towards nine-year universal access of education, a dramatic change in subjects for Community Junior Secondary Schools (CJSS) was called for. Therefore, technical studies replaced woodwork and technical drawing taught at Junior Secondary level. It was envisaged that technical studies would provide vocational preparation and motivation through its broader curriculum.

The lack of technical subject specialist teachers had to be accommodated by the changes, and to enable at least each CJSS to offer the subject with minimum teacher cost. A thrust was required to enable pupils following basic education to acquire "technological literacy" with which to cope with their future.

There was a need to provide a type of education at secondary level that enhances the balance between the individual's right to a liberal (and general) education and society's need for a work force able to adapt to the specific needs of industry and commerce. There was a demand by the community and the curriculum for a more practical curriculum.

Botswana being in a state of accelerated development requires technical manpower skills, but the country was lacking practical problem solving skills which are evident in many real life situations, e.g. life in rural areas.

Initial Teacher Education in Design and Technology Education
Teacher education is the ‘off-shoot’ of every competent corps or teaching force in schools. We began with no teacher education establishment offering technical subjects in the 1970s to one in 1980 and two at present.

1. Training of secondary teachers at Botswana Polytechnic
Teacher education at the Polytechnic began with the first group of students who commenced their course in January 1980, but the intake and the course they followed was less than satisfactory. The first two years were craft skills based on carpentry and joinery (City and Guilds 834) followed by one year of Cambridge 'O' Level technical drawing and pedagogy. In 1983 the Diploma course in Secondary Education (Technical) commenced. The curriculum for the course was divided into six basic areas of study and comprised practical skills, upgrading educational foundations, curriculum and methodology, English, teaching practice and industrial education. Gradually the course developed to a diploma in Design and Technology in 1983 which was content based and with little technology process taught alongside design in metal and design in wood. At present the course offered at this institution is the five-year full-time BEd. (Design and Technology), validated by the University of Botswana and administered by the Polytechnic.

2. Training of secondary teachers at Molepolole College of Education (MCE)
The first intake of the junior secondary teachers (the UK key stage 3 equivalent) to be trained in an integrated technical studies course commenced their studies in January 1986. At that time there were only 9 students undertaking the course. The students were recruited from within the Molepolole College who were already following education courses in other disciplines, such as science, mathematics, social studies and English. At the time the course concentrated mainly on three areas: arts, craft and technology and was reasonably well equipped through the USAID programme.

Later the course changed to what is now Design and Technology. The move was made in 1989 as a result of demands by the community for change in the curriculum. The subject has developed into one of the main teaching subjects and can be taken alongside the other main subjects described earlier as a minor. The subject, at CJSS, is meant to be taught as a multiple activity programme. In the college calendar, Design and Technology is described as:

"an applied practical education programme that provides the opportunity for its participants to understand, and respond to the technological needs and development emerging in the country"
The overall aim of the programme is the preparation of competent teachers capable of interpreting and using the Design and Technology curriculum so that the subject contributes towards the realisation of the educational goals established for Education through Kagisano. The overall assessment and validation is performed by the University of Botswana.

Technology - Where are we now?
The interpretations of the term are vast. The terminology is a very complex concept. International variations exist and in Botswana’s context we accept that Design and Technology encourages students to think of design as a logical process through which a number of different steps can be identified. It integrates analysis, problem solving, practical capability and evaluative skills and makes an essential contribution to the education of all children, providing a balance between the development of cerebral and practical capabilities.

The four major skills involved are enquiry and exploratory skills, communication, manipulative and evaluative, and discriminatory skills. Enquiry and exploratory skills deal with identifying a problem, investigating it, formulating it and solving it. Communication skills include receiving and projecting information clearly and effectively. Manipulative skills relate to being able to use tools, materials and techniques in making working models, prototypes and finished products. Knowledge of materials and their behaviour is required. Evaluative and discriminatory skills are needed to judge the success of each particular design and its results.

Technology Education at Molepolole College of Education
The definition of Design and Technology programme fits well in the above concept. The students learn practical skills that are useful in the home and the community; they gain insights into the present and future applications of technology in Botswana. The definition and interpretation is, importantly, confined to the local needs.

Technology does and will continue to affect all our lives, albeit at different levels and in different ways. Not all students will grow up at the forefront of technology development and implementation in Botswana, but as users or consumers they become connected with technology. It is valuable then, to provide technological insights in the development of citizenship, as we look at the role of technology in the solution of problems. These include food, production and storage, sanitation, water, energy and the like.

The teaching staff in the department is composed mainly of expatriates and one Motswana citizen, the majority having studied and read for Design and Technology in Britain. The hope is not to adopt the British system and import it to the college, but to adapt and modify our courses accordingly and the outcome will satisfy what Sir Michael Sadler once narrated at Guildford in 1900:

“The practical value of studying, in a right spirit and with scholarly accuracy, the works of foreign systems of education is that it will result in our being better fitted to study and understand our own.”

(Cited in Higginson, J.H. 1979, p.50)

Very sound advice for today's educational community! We are progressing well and the world, the United Kingdom included, should learn from us. What we are careful of is not to discard craftsmen skills in the subject. The role and relevance of the subject to technical and vocational education has been clearly defined to satisfy the priority set by the government to increase access to vocational and technical education.

Conclusion
The development of technology education in Botswana has so far been good, keeping abreast with the changes in society and the curriculum at large. The direction taken by the introduction of design and technology in secondary schools is a positive one, and consideration should now be made in establishing the subject at primary school level.

Initial teacher training in technology education, however, has been planned on short term bases to convert teachers of craft subjects to teachers of design and technology. This has implications for teacher education to carry on intensive and extensive in-service training of the teaching cadre in the field and to render long-term training and education to those following initial teacher education.

“Backward never, forward ever”.

References


