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Aspects of the planning of technology education for South African schools

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Abstract

One of the recommendations made in the discussion document, 'A Curriculum Model for Education in South Africa (CUMSA)¹', which was released by the Department of National Education in 1991, is that technology education should be offered for the first nine years of pre-tertiary education as a compulsory subject and for the last three years as a choice subject. This presentation aims to locate technology education in the context of the socio-political and economic background to education in South Africa and to assess to what extent it meets the emerging aims and needs of education. Further aims are to propose a rationale for the teaching of technology at school level in South Africa, to suggest possible broad aims for the teaching of technology, to outline the nature and character of technology education relevant to the South African situation and to propose a possible methodology for technology education in South Africa. The conclusion is reached that technology education can make an important contribution to South African education if the so-called "technological process" is the major emphasis as this can be transformative and promote quality education.

Introduction

If one wants to engage in any meaningful discussion on education in South Africa, it has to be done against the background of the historical and political developments in the country.

In broad terms, the shortcomings of the existing education system are that the racial basis which underpinned the education system led to problems of disparity in education, the inability for a large number of learners to benefit from the system, problems of relevancy in education as a result of the predominantly eurocentric curriculum, its affordability and the lack of legitimacy in the system.

Opposition to the existing ideology and the resultant inequalities arose from progressive movements which on the one hand led to protests and boycotts, and on the other hand to debate and proposals for an alternative education system. The main role players of the progressive movement in education were, inter alia, the National Education Co-ordinating Committee (NECC) and various non-government education organisations (NGEO's). This led to a movement for people's education which contributed to a critical evaluation of the existing curriculum and other educational issues.

Educational Policy Units (EPU's) were commissioned by the NECC at a number of universities to carry out research in education. More recently the National Education Policy Investigation (NEPI)² was established. NEPI relied heavily on the expertise of the EPU's. Committees, representative of all the major role-players, were

established to work on twelve different aspects of education in an attempt to clarify policy options which could assist in forming a future democratic education and training system. The fundamental principles which guided the deliberations of the various committees were that education was to be non-racist, non-sexist, democratic, equal and that the existing imbalances had to be redressed. These committees produced thirteen discussion documents.

Concurrently with this the State embarked upon its own initiatives. The Education Renewal Strategy (ERS)³ was released on 4 June 1991 as a discussion document. This was a comprehensive plan for the renewal and restructuring of the South African education system to make it more affordable, and to create education and training opportunities for an ever increasing population.

As part of the ERS a discussion document, *A Curriculum Model for Education in South Africa (CUMSA)*¹ was released on 20 November 1991. The aim of the document was to table a draft curriculum model for pre-tertiary education which would eventually contribute to the development of a curriculum which would serve the needs of the total South African population.

Although the reaction to these two documents from certain sections of the population was favourable, there was a great deal of criticism from the so-called progressive movements about the process followed and the legitimacy of the various working committees was questioned.

The most recent development has been the establishment of a National Education and Training Forum (NETF) which will try to incorporate as many stakeholders as possible. One of the key functions of the NETF will be to integrate education and training in one new education department and to formulate policy for a new education system. The present discussions on a new constitution will obviously have an influence on this policy.

One exciting suggestion which has emerged out of CUMSA and which has been generally well received, is the provision for technology education. In assessing it we need to look at it in terms of the needs and demands of a new education dispensation for South Africa. I would appreciate your inputs and comments as these are ideas on technology education which are in an infancy stage.

The way in which the discussion document a curriculum model for education in South Africa (CUMSA) provides for technology education

According to CUMSA seven fields of study are distinguished, of which technology is a separate field of study. Technology is a general formative subject which is compulsory for the first nine years, grades 1 to 9. Technology is an optional subject in the senior secondary phase, and is only in this phase a vocationally-oriented subject. Information technology forms part of the subject Technology.

A conceptual framework

In order to discuss the emergent phenomenon of technology education in a system with often conflicting and mostly disparate interpretations of related concepts, a brief analysis of these concepts is included.

Although CUMSA provides a definition for technology, it lacks a definition for the concepts information technology, information literacy and information skills. According to CUMSA, technology involves humankind's purposeful mastering and creative use of knowledge and skills with regard to products, processes and approaches so as better to manage his environment. Processes in this connection include problem identification, design, execution and evaluation. CUMSA proposes that the teaching of the subject Technology (and especially the design component) should revolve mainly around the components of the so-called "technological process", namely problem identification, design, execution and evaluation⁴. These components emphasise the learner's innovation, creativity, design skills and the handling of information.

I propose the following working definitions derived from the above:

Information technology⁵ involves the creative use of knowledge and skills to acquire, process, organize, store, distribute and use information.

In the South African context Information technology must not revolve around situations where the emphasis is predominantly on computers as this will exclude the vast majority of learners who by force of circumstances will not have access to sophisticated technology⁶.

Information literacy⁷ is defined as the capability to acquire, interpret, evaluate, communicate, understand and use information according to a specific need. Information technology in the real sense of the word is a part of Information literacy. To be computer literate does not imply that you are automatically information literate. The implication of this is that the Technology curriculum must not be centralised only around the computer. The concept of information literacy clearly also presupposes general literacy which is another problem in local education.

Information skills⁷ refer specifically to the development of user skills, for example:

- Skills in the finding of resources.
- Skills in using aids/media as a source for finding information.
- Skills for using media.

The question now emerges as to whether South Africa should introduce technology education in the pre-tertiary curriculum.

Rationale for technology education

A deficiency in the CUMSA document is that it does not provide reasons for the inclusion of technology education in the pre-tertiary curriculum.

The South African society is very complex. It is multi-cultural, multilingual, multi-ethnic and has elements of both first world and third world characteristics. This results in a population which operates at different levels of sophistication. Failure to introduce technology education in the curriculum would mean that the disadvantaged group will become even more disadvantaged. Buying into both design and information technology in early education could have an impact on the pace and quality of education for the disadvantaged. Allotey, from the University of Ghana refers to the need to

access technology as an educational process: "We paid the price for not taking part in the industrial revolution of the late 18th century because we did not have the opportunity to see what was taking place in Europe. Now we see that information technology has become an indispensable tool"⁸.

The increasingly complex nature of technology in modern society and the resultant need for learners to become capable of responding meaningfully to the demands it makes upon them is a further reason for the inclusion of technology education⁹. This includes the ability to:

- understand the basic processes which determine the nature and form of the man-made environment;
- critically consider the potential impact that technology can have on the natural world, society and the individual's physical, economic, moral and general well-being;
- develop/use generic skills and other resources to solve technological problems.

Although technology education, as defined above, represents a subject area, which draws on other existing fields of study, it is, however, qualitatively different from them. It enjoys growing international recognition and makes claim to its own subject integrity and knowledge base. A relevant school curriculum therefore makes the inclusion of technology education an urgent priority¹⁰.

A further point in support of the introduction of technology education is that, as in the rest of the world, South Africa in the midst of a recession. This has led to increasing unemployment. Because of short-sighted policies which did not encourage the development of manpower skills in all sections of the population there exists today a critical shortage of technological expertise. How to remedy this shortage is the subject of great debate. One group believes that the solution lies in the increase in pure vocational training through the school system. A criticism of this position is that it is too limiting and too expensive.

The other position supports a broad general education that extends throughout the secondary school phase and which is characterised by the development of higher cognitive skills, creative thinking and problem-solving. The emphasis here falls on personal development. The skills required for the world of work, it is argued, may be acquired more efficiently and cheaply through non-formal education at the place of work. It is my belief that technology education can make an important contribution to this general education at school

level if it promotes the so-called "technological process".

If we accept the above rationale for the inclusion of technology education in the school curriculum what then should it aim to achieve?

Broad aims for technology education

I would postulate the following broad aims for technology education in South Africa. It must provide learners with the opportunity to:

- (a) master the so-called "technological process", and be able to apply the knowledge and skills in every-day situations;
- (b) learn about technology and the role which it plays in the lives of individuals in society and in the environment;
- (c) obtain knowledge and skills as regards existing technology generally used by the community;
- (d) be able to apply the technological knowledge and skills to improve themselves and to assist in the developing of the community;
- (e) develop a multi-disciplinary thought-approach. This aim stresses the importance of an holistic approach to the teaching of technology;
- (f) develop the ability to debate the possible advantages and disadvantages of technology;
- (g) make a contribution to the further development and expansion of new technology, based on knowledge and experience;
- (h) become aware of possible technology-related occupations;
- (i) realise the empowering nature of the technological process.

The next question which needs to be addressed is how will these aims be achieved through the provision of technology education?

The character and nature of technology education in South Africa

It has already been mentioned that according to CUMSA the subject Technology should consist of two components, namely a design component and an information technology component. We must accept that certain knowledge, skills and attitudes

related to technology will be taught cross-curricularly in the other curriculum subjects and are to be co-ordinated and integrated into the subject Technology. The separate subject Technology implies thus that certain aspects regarding knowledge, skills and attitudes cannot be accommodated in other subjects and have to be addressed in a separate subject.

According to CUMSA components of the present curriculum subjects such as Basic Techniques, Woodwork, Metalwork, Home Economics, Art/Arts and Crafts, Technical Orientation, Media Users Guidance and Computer Literacy could be accommodated in a core syllabus for Technology¹. I foresee problems if technology is misused for the purpose of pure vocational education. The subject Technology must be seen as more than the artificial merging of the above-mentioned subjects. It is more than a subject in which certain skills are being taught to prepare learners for the world of work. It should be a general formative subject which ought to contribute to the education of the learner in totality¹¹. The subject Technology should be viewed as a subject with its own epistemology, philosophy, aims, identity, structure, method of inquiry, curriculum, didactics and opportunities for the promotion of problem-solving and other higher order cognitive skills.

The next section addresses the nature of the content of technology education.

Nature of the content of technology education

I believe that we can accept that technology education in South Africa will consist of two intertwined components, namely a design component and an information technology component.

It is especially the design component which should revolve around the so-called "technological process", namely identifying a problem/need, design, planning and constructing, and evaluation⁴. If it is so constructed it will provide learners on the different levels of sophistication the opportunity to reach the set aims. This component will concentrate on knowledge and skills regarding materials and design. The materials which could be used, are wood, metal, plastics, ceramics and textiles. I would like to sound here a cautionary note that the learning should never be so constructed that it reinforces racist and sexist attitudes.

The information technology component will probably concentrate on the following aspects¹²:

- Generation of ideas and communication of information. (The ability to use IT in order to develop ideas and to communicate information in a variety of forms.)
- Handling of information. (The use of IT to collect information, organise, store, retrieve, amend and to present.)
- Simulation. (The ability to use IT to simulate real or fictitious situations to exploit and develop such models.)
- Measurement and control. (The possibilities to use IT to measure the physical size and to control movement and other movements.)
- Application and effects. (The ability to make informed judgements on the application of IT and the importance thereof for the economy and social environment, e.g. quality of life.)

The next section of the paper will address the implications of technology education for education planning.

The implications of technology education for education planning in South Africa

Because we are still in the planning phase for technology education in South Africa, and time will elapse before implementation, there is still an opportunity to refine the rationale, philosophy, ideology, definitions and aims of the offering. This implies that education planners should not stop thinking creatively and innovatively with regard to, for example, its planning, financing and infrastructure. It would be important for teachers, especially teachers from disadvantaged communities, to be involved in this process of thinking and planning as they are well positioned to make an invaluable contribution to what is relevant and feasible in offering technology education.

Each school subject has to determine which of its components suit technology education and if provision should be made therefore in the separate subject or cross-curricularly.

Experts on curriculum development in this field should start paying attention to the development of a syllabus for technology education. Research and debate in this regard are critical. Questions like the impact of a multi-cultural society on the philosophy and application of technology education and the possible impact of the subject on the society should be addressed as a priority.

Research is already being carried out in Natal and in the Cape province through pilot projects in certain schools. More pilot projects must be undertaken, especially in rural and disadvantaged areas, and lessons learned from these should be taken into account in any further curriculum development¹³.

Implementing a new subject always has implications for teacher education. For the majority of teachers in South Africa technology education will be a new concept and thus a frightening one. This subject will represent for the majority of teachers a new paradigm in that they have been used to a system which relies on rote learning and teaching and may find the shift towards a process approach difficult. The persons and institutions responsible for teacher education will have to devise programmes as a matter of urgency as it is planned to introduce technology education from 1996 in schools in South Africa. The retraining of teachers must also be addressed. In this regard I refer to, for example, the ORT-STEP Institute and to the pilot project of Edgewood College in Natal where schools and student teachers are already involved in technology education. Networking between these and other teacher education institutions will prove to be of great benefit in the planning and training for technology education in South Africa.

Conclusion

In conclusion I would like to state that education must always educate the learner holistically. In this paper I have concentrated mainly on technology education which may have created a one-sided picture. It is, however, important not to forget the important role that the other school subjects play in a balanced curriculum.

The particular nature of the South African situation demands that whatever the nature of technology education is finally decided upon, it must reflect the South African context¹⁴. It would be disastrous to import ready-made programmes from other countries and transplant them uncritically on South African education. We must take care that we do not necessarily replicate the content and methodology which is followed in sophisticated societies. To meet the demands of relevancy, we must give all learners the opportunity to develop gradually from the known traditional technology to the more advanced technology which is offered in First World countries⁶. Learners who are already used to advanced technology should have the opportunity to progress further. There should never be the suggestion that disadvantaged learners should remain disadvantaged but should have access

to new knowledge and skills as the learners progress through the programmes.

Technology education may be applied in a very technicist way to maintain the status quo of a capitalist economy. It, however, can be transformative if the technological process based on an appropriate ideology is followed. This should lead to empowerment of the learner; the hallmark of quality education.

The process that I am advocating ties in with the Freirean spirit of learning. In proposing a quality process instead of mechanical learning, I am proposing pedagogy that is participatory, critical, values-oriented, multi-cultural, student-centred, experiential, research-minded, and interdisciplinary. According to Shor such pedagogy focuses on the quality of the activity, not on the quantity of skills or facts memorised, or on the quantity of hours or credits spent on a task. This would be in opposition to the traditional approach which contributed to the reproduction of inequality in learners. This would also contribute to the desocialisation of the South African learner in that it challenges inequality and the dominant myths inherent in the present education system.

The ultimate criterion for the evaluation of the effect and relevance of technology education is the degree of critical thinking it generates and how much participation it mobilizes, how it relates to other disciplines, to the communities and literacies of learners and to the larger conditions of society.

I have no illusions about the difficulties teachers and educators will experience in trying to bring about transformation in education in South Africa. The tension and conflict resulting from the residual and the emergent will contribute to this. I believe, however, that transformation in the system is an objective worth fighting for.

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