THE IMPLEMENTATION OF TECHNOLOGY EDUCATION IN SECONDARY SCHOOLS IN THE URBAN AREAS OF THE FREE STATE PROVINCE

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ABSTRACT

South Africa has had no formal subject known as Technology Education in its schools until the introduction of Curriculum 2005. The introduction of Curriculum 2005 meant that educators at schools were caught unprepared, as they had to teach a subject that most were not conversant with. The purpose of this study was to determine how successful the introduction of Technology Education (in Secondary Schools in the Free State Province urban areas) was, how the subject is being taught and what problems are experienced. Furthermore, the study aimed to investigate the perceptions of educators of Technology Education, their training to present the subject and whether schools are equipped and resourced to present the subject effectively. The approach was mainly qualitative and non-experimental research was conducted. The population (schools) were selected by means of cluster sampling and the sample (Technology educators) by means of simple random sampling. Data were collected by means of questionnaires and structured interviews. From an international perspective the investigation revealed that the way in which Technology Education has been organised differs from country to country, but that they had similar experiences and problems when they introduced the subject for the first time. The investigation revealed that a low percentage of educators feel that the implementation of Technology Education was successful and that schools were ready for the implementation. Furthermore a need exists for specialised trained teachers, appropriate equipment and physical facilities to present Technology Education. The study further revealed that a high percentage of educators feel that the subject Technology Education does have a place in the Further Education and Training sector.

Key words: Technology education, school system, curriculum

1. INTRODUCTION

The changes in the National Education Policy Act and the implementation of Curriculum 2005 saw the introduction of Technology as school subject in schools (National Department of Education Policy Act no 27 of 1996). Technology, and certainly Technology Education, may be characterised as more of an activity than a discrete body of content (McCormick, 1996:64). Technological knowledge may be divided into conceptual knowledge, which relates to the body of content and procedural knowledge, which relates to the activity (Hennessey & Mc Cormick, 1994:1). Technology should be perceived as a thoroughly integrated activity, not one, which may be separated into content and process, or theory and practice (Williams 2000:1).

In the traditional schools in the Free State the focus in vocational subjects has been on activity (practical), for example on doing and making things, and this has represented a narrow interpretation of procedural knowledge. A relatively recent realisation has been that there are many significant cognitive skills which are important for learners to develop, and which are suitable to be developed in the unique context of Technology education. The development of these cognitive skills occurs through the procedural knowledge of Technology education. (Williams, 2000:2).

2. INTERNATIONAL PERSPECTIVE ON TECHNOLOGY EDUCATION

To get a background of Technology Education in general, the curricula of four different countries were studied: The United States, England, Australia, and Botswana. The rationale for choosing these four countries was that their Technology Education programs have developed rapidly over the past ten years and profound research, experimental programs, and the development of learning materials have been undertaken, especially in Australia, England, and the United States. The aim was not to conduct a comparative study of the curricula of other countries. Rather, it was to synthesize theory and practice. Different countries use different terms to describe Technology Education, such as Technics, Design and Technology, Technology Education, and Technological Education. In this study these titles are considered to be synonymous. John Williams et al (1996:266) mention that most countries do not state a single rationale for Technology Education, nor do they have one organisational approach. Each country builds on its history of technical education and develops an approach to suit the perceived needs of society and the individual. It seems that Technology Education is more dynamic than its technical predecessors, and that current Technology is more dynamic than in the past. Thus, changes in what is considered appropriate content and best practice in Technology Education could also be expected to change rapidly.

According to Black (1998:1), Emeritus Professor in the School of Education at King's College in London, United Kingdom, the influence and problems of Technology Education can be listed as follows:

- Technology's status and nature have been subject to radical changes in recent years.
- The subject is seen to serve several aims, which are given different relative priorities in different countries, and there are many traditions that are associated with competing pressures in the re-definitions of the subject.
- Changes and varieties are further complicated by the different curriculum models within which a reformed subject is meant to fit and play a specific role.

- It is suggested that the tensions between instrumentalist and humanist models for the subject may be dissolving, but that there are deeper problems about the nature of the learning involved in the fields of practical application.
- The most intractable problem is to implement very new pedagogy when the teaching force may be ill-prepared and where the classroom experience needed to transform.

3. TECHNOLOGY AS LEARNING AREA IN THE SOUTH AFRICAN SCHOOL SYSTEM

Every country and nation has its own educational system that is unique, though it is nevertheless tied to some representative educational pattern. The people and the countries history help to shape the educational system of a country. The South African Educational System has many facets that are of its own making, but also portrays much of the Western tradition in education (Behr 1988:9).

The first major curriculum statement of a democratic South Africa was the *Lifelong Learning through a National Curriculum Framework* document (1996) that was informed by principles derived from the White Paper on Education and Training (1995), the South African Qualifications Act (No 58 of 1995) and the National Education Policy Act (No 27 of 1996). The White Paper emphasized the need for major changes in education and training in order to normalize and transform teaching and learning in South Africa. A shift from the traditional aims-and-objectives approach to an outcomes-based education was also stressed (DOE 2002:4).

Technology can be defined as follows:

"Broadly speaking, technology is how people modify the natural world to suit their own purposes. From the Greek word techne, meaning art or artifice or craft, technology literally means the act of making or crafting, but more generally it refers to the diverse collection of processes and knowledge that people use to extend human abilities and to satisfy human needs and wants" (ITEA, 2001:1).

The National Education Policy Act no 27 of 1996, gives the following definition of technology:

''Technology is the use of knowledge, skills and resources to meet human needs and wants and recognise and solve problems by investigating, designing, developing and evaluating products, processes and systems''.

Technology Education can consequently be defined as concerning technological knowledge and skills; technological processes; understanding the impact of Technology on both individual and society; designed to promote the capability of the learner to perform effectively in the technological environment he/she lives in,

and stimulate him/her to contribute towards its improvement (HEDCOM, 1996:12).

Today we live in a complex and diverse society and the knowledge, skills and resources used today are different because of the accelerating developments in Technology. Technology involves everything around us and the way that people use available resources, knowledge and skills, through different processes, to develop our world and satisfy our needs and wants.

4. PROBLEM STATEMENT

The problem that this study investigated was the implications of the implementation of Technology as a subject in the senior phase of the General Education and Training band in schools, and the attitudes of educators towards Technology and OBE in general. The purpose of this research was to highlight problems that might be encountered with the introduction of Technology as a subject without proper planning and preparation by secondary school personnel.

5. RESEARCH QUESTIONS AND OBJECTIVES

Question 1: How successful was the introduction of Technology Education in Secondary Schools in the Free State Province (Urban areas)?
Question 2: How effective is the subject being taught currently?
Question 3: What problems are experienced by the teachers?

The objectives of this study were:

- To determine how successful the introduction of Technology Education in Secondary Schools in the Free State (Urban areas) has been done.
- To determine how effective the subject is currently being taught.
- To determine the problems that teachers and/learners experienced with the implementation of the subject.

6. METHODOLOGY

The approach followed in this study was mainly qualitative and non-experimental research was conducted. Gall and Borg (1996:217) state that sample sizes in qualitative studies are typically small. The sample size might be a single case. Researchers wishing to understand how educators attempt to implement a new curriculum for example, might design a qualitative study that allows them to observe intensely a few educators engaged in this activity for an entire school year (Gall and Borg, 1996:218).

A questionnaire and individual interviews were used as research instruments in this study. Thirty five secondary schools in the Free State Province situated in the Bloemfontein, Welkom and Kroonstad area were involved in the study. Sixty participants (thirty were from former white schools and thirty from previously disadvantaged schools), responded to the questionnaire while ten teachers involved with Technology Education were interviewed.

Creswell (1994:153) states that the process of data analysis is eclectic: there is no "right way". Data analysis requires that the researcher be comfortable with developing categories and making comparisons and contrasts. The data obtained from the questionnaire was statistically processed with the help of SAS-programming (SAS Institute, 1985). The data obtained from the interviews was transcribed, numbered, compared and analysed. The interview responses helped to clarify responses from the questionnaire.

7.2 RESULTS AND DISCUSSION

Potgieter (1994:22) said that although Technology Education was introduced in developed countries a long time ago, it was not without mistakes. South Africa cannot afford to repeat these mistakes and it is vital that lessons are learnt from them in order to avoid the same pitfalls. To save a substantial amount of time, energy and resources, South Africa should not try to re-invent the wheel.

The results with respect to the research questions will now be discussed.

7.1 How successful was the introduction of Technology Education?

The schools used in this investigation indicate as follows when they started with Technology Education:

- 57% in 2000
- 38% in 2001
- 5% in 2002

A very low percentage of educators (41,7%) felt that the implementation of Technology Education was successful and that schools were ready for it. About half of the respondents (53,3%) were of the opinion that the level of training was average to good, and a high percentage of the educators (76,7%) were of the opinion that schools cover all aspects of Technology Education.

Most of the educators (79,3%) indicated that classes were not equipped for Technology Education. Only 58,3% indicated that they were trained to implement Technology Education, while 81,7% indicated that they were already trained to implement Outcomes-Based Education.

A high percentage (91,7%) of the respondents indicated that educator development was important during the introduction of the new curriculum in schools and also convinced that formal training for Technology Education is necessary.

Based on this the following conclusions can be made:

- From the results in the interviews it became evident that the situation / level / standard of Technology Education in different schools are not the same.
- We may summarize the areas of concern, as follows:

    - No syllabus / No clear guidelines from department
    - Poor training/ Don't know what to do/ Time frame for implementation too short
    - Facilities / Not sufficient equipment
    - Class sizes too big
    - Too much theory – not enough practicals
- There were a lot of stumbling blocks that created problems with the implementation of Technology Education in schools.
- The introduction of Technology Education was not that successful according to the educators that were involved and who teach the subject.

7.2 How effective is the subject being taught currently?

Attention was subsequently given to the perceptions of the educators about the manner in which Technology Education teaching should happen.

Only a few educators (30%) felt that the new curriculum is good for the 21st century, and most of them (78,3%) felt that the new curriculum is confusing to educators while 70% said it is based on systems from other countries. In the old curriculum 41.7% of educators felt that the system does not make learners passive in class and 50% of educators felt that educators and handbooks was the only source of information to learners. Further on 61,7% of educators were convinced that the old system encourages learners to be responsible for their own learning.

Classes are very big and learners are organised into groups. Only 21.7% of the educators indicated that classrooms were equipped to teach Technology Education and 58,3% of the educators indicated that educators were already trained to implement Technology Education. 85% of the educators were convinced that staff should still be subjected to Technology Education training and 53,3% of the educators are not convinced that staff at their schools were adequately trained for Technology Education when it was introduced to their schools.

This information leads to the next conclusions:

- There are still big differences of opinion regarding the old curriculum and Curriculum 2005.
- According to the respondent's there are big differences in the syllabus and learning material that is used in different schools.
- There was a need for more specific detail about the curriculum for Technology Education and correlation between schools on syllabus content.
- It is clear that not all educators and classrooms are fully equipped to present Technology Education at schools.
- The lack of equipped classrooms will definitely influence the teaching and standard of Technology Education in schools.

7.3 What problems are teachers experiencing?

A very high percentage (96,7%) of educators are convinced that educators need to be trained and developed (91,7%) to implement the new curriculum, and 91,7% are convinced that formal training is necessary for Technology Education. A further 85% of educators feel that staff should still be subjected to Technology Education training. Some educators (53,3%) are convinced that staff were not adequately trained for Technology Education when it was introduced

The responses of the educators highlighted the following problems that are still being experienced with Technology Education:

- Educators don't know exactly what to do
- Need set guidelines from Department of Education (Syllabus?)
- Group work – some do the work and everybody receives the marks
- Language used in Common Task Assessment too high for children
- Big classes
- Learners not responsible enough – see OBE as where you may be "happy-clappy" in class.
- Resources and equipment in classrooms
- Children from poor community do not have sufficient resources and equipment at home.

The following conclusions can be drawn:

- Most participants had a general idea of what Technology Education is about.
- There were a general positive attitude towards Technology Education and that it is of great value to learners although most educators (81, 7%) felt that the current functioning of Technology Education in schools is negatively affected by the lack of facilities and specialised training of educators in Technology Education.
- It became evident that there were problems experienced with the implementation of Technology Education and that there are still existing problems with Technology Education at schools.

8. CONCLUSION

Finally, as UNESCO (Project 2000+:1983) stated, by the year 2001, there should be in place appropriate structures and activities to foster science and technology literacy for all. South Africa did implement Technology Education in the schools as a new learning area and part of Curriculum 2005.

South Africa will have more success if it looks towards other developing nations, which are transforming or have transformed themselves into developed nations. By following the examples of these countries, and by adapting their technologies and methodologies to suit local needs, South Africa will be better positioned to achieve similar success.

From the results of this study it is evident that the implementation of Technology Education in secondary schools in the Free State Province (Urban areas) was not that successful.

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