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Prospects for design and technology with Zimbabwean teachers through distance education - a pilot study

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Abstract

This paper is based on the findings of a pilot study conducted between October and December of 1995 in preparation for a major project where the aim is to design and develop a resource package that could be used to in-service Zimbabwean teachers in Design and Technology through Distance Education. Since the purpose of the study was to determine the feasibility and viability of the project, six objectives were specified, and the idea was to:

- *determine the kind of technical subjects offered in particular schools; for example, Woodwork and Metalwork.*
- *analyse the current Technical Education syllabi in secondary schools and find out how these could be related.*
- *find out the nature of facilities existing in schools regarding workshops and equipment.*
- *determine what areas of design and technology would be relevant in Zimbabwean secondary schools.*
- *find out the kind of literature being used in schools and determine its relevance to the needs of the curriculum.*
- *determine the possibilities of teachers being able to meet in tutorial groups at regional levels.*

To achieve these objectives, questionnaires and interview schedules were used. Syllabi were obtained from the Ministry of Education. And, twenty teachers participated in the study.

1 Introduction

This paper is based on the findings of a pilot study conducted between October and December of 1995 in preparation for a major project where the main aim is to design and develop a resource package that could be used to in-service Zimbabwean teachers in Design and Technology through distance education. In fact, this study is the first in a series of pilot studies planned for the various stages of a major project that is likely to take place in a period of between four and six years.

Since the purpose of the study was to determine the feasibility and viability of the project, six objectives were specified, and the idea was to do the following:

- a) determine the kind of technical subjects offered in particular schools; for example, Woodwork and Metalwork.
- b) analyse the current technical subject syllabi in secondary schools and find out how these could be related.
- c) find out the nature of facilities existing in

schools, regarding workshops and equipment.

- d) determine what areas of design and technology would be relevant in Zimbabwean secondary schools.
- e) find out the kind of literature being used in schools and determine its relevance to the needs of the curriculum.
- f) determine the possibilities of teachers being able to meet in tutorial groups at regional levels.

To achieve these objectives, questionnaires and interview schedules were used with twenty serving teachers currently studying for the BEd degree in the Department of Technical Education at the University of Zimbabwe. Randomly selected from an intake of eighty, these serving teachers happened to be from twenty schools scattered all over the country. Therefore, it was assumed, in a way, their responses would give a reasonably reliable picture of the situation in schools around the country. Syllabi were also obtained from the Ministry of Education.

Although the department of Technical Education is offering a total of six subjects, only four were of particular interest in this study; Building Technology and Design, Wood Technology and Design, Technical Graphics and Metal Technology and Design. Hence, five teachers were selected from each subject. The other two subjects in the department are, Home Economics and Agriculture.

2 The problem

The specific problem addressed by this pilot study rose from the primary need to justify spending so much money in the design and development of an expensive resource package such as the one in the major project involved here, whose total cost is estimated at about Zim.\$500 000.00. In short, there was a strong need to determine the feasibility and viability of this project. And, the findings from this pilot study were going to be useful in several ways. Most important, was the fact that such findings were going to be a reliable indicator to the researcher, showing whether it was worthwhile or not, to embark on such a project. In other words, this was going to be useful as part of the rationale of the whole project.

3 Findings

The findings of this pilot study were presented according to how they fitted under specific secondary research questions drawn from the objectives stated above.

a) What technical subjects are being offered in particular schools?

On the whole, technical/practical subjects offered in Zimbabwean secondary schools comprise the following traditional subjects; Woodwork, Building, Metalwork, Fashion and Fabrics, Food and Nutrition, Technical Drawing and Agriculture. Of course, these days, the list also includes commercial subjects like Typing and Computer Studies. However, as reflected by the responses from the teachers involved in this study, not all these subjects are offered in particular schools. In most cases, schools offer three or so of these subjects.

Actually, asked to indicate which of these subjects were offered in their particular schools, teachers indicated the following:

No of responses	Subjects
3	Fashion & Fabrics, Food & Nutrition, Woodwork and Metalwork.
2	Woodwork, Food & Nutrition, Building and Agriculture.
5	Woodwork, Metalwork and Fashion & Fabrics.
6	Fashion & Fabrics, Metalwork, Building and Technical Drawing.
4	Technical Drawing, Food & Nutrition, Woodwork and Agriculture.

b) How could the various subject syllabi be related?

For the purpose of this study, syllabi of the following subjects were obtained and studied; Metalwork, Woodwork, Building and Technical Graphics. One most important and underlining similarity, cutting across these syllabi, was the fact that they all tended to promote “creativity” and the act of “problem-solving”. In fact, they all seemed to be moving away from the traditional approach where the learner was expected to copy solutions to given problems. There appeared to be satisfactory evidence of a move towards an approach where the learner was presented with a problem and expected to investigate and determine possible solutions leading to an appropriate final solution. Apart from problem-solving, the four syllabi also shared a common place regarding the way they related facts, procedures, concepts and principles.

c) What facilities exist in schools?

While nearly all respondents reported being reasonably well accommodated in relevant classrooms, workshops, drawing offices and work sheds, they complained of critical shortages of machinery and important hand tools. There was a general dissatisfaction towards the situation regarding the state of machinery and tools. For example, in most schools, machines like; lathes, drills, power

saws and computers (for Computer Aided Design) were either absent or in bad shape.

d) What areas of design and technology would be relevant in the Zimbabwean context?

After consultations with various subject specialists, both in the Department of Technical Education and in the Curriculum Development Unit, the following areas were found relevant in the Zimbabwean context:

- The theory of design and technology.
- Graphic communication.
- Materials (evolution and the nature of materials).
- Materials and process selection.
- Structures (e.g. types of structures and designing structures).
- Mechanisms and motion (machines, levers and linkages).
- Electricity and electronics (distinction between electricity and electronics, power supplies and fundamental concepts of electricity).
- Pneumatics and hydraulics.

An important point to be noted here is the fact that, the choice of these subject areas was among other things mainly based on the knowledge of the Zimbabwean context, given particular needs within the whole system in view of our level of development, especially technologically. One other pertinent factor is that, “Design and Technology” is relatively new in the Zimbabwean curriculum; both as an approach and as a subject. This actually means the areas highlighted here are not exhaustive. With time, more areas are likely to be brought in, depending on specific needs at particular stages in curriculum development.

e) What kind of literature is being used in schools?

Although local publishers and various authors are working hard, trying to promote the production of locally designed literature, what is available at the moment is not sufficient. For example, most subject areas still rely heavily on imported materials, especially text books.

f) Is it going to be possible for teachers to meet at regional level in various areas?

Nearly all respondents indicated belonging to

some kind of teachers’ association; especially the Technical Subject Teachers’ Association which appeared to exist in almost every district. Therefore, it was within such established structures that it was assumed possible for teachers to meet at various regional levels. Actually, this seemed to suggest that anybody proposing to have teachers meeting at regional levels in various districts around the country, would be wise to take advantage these well established structures. Regional offices were also said to be very supportive of these associations.

4 Discussion

Based on the responses to the six secondary research questions highlighted above, this discussion is going to be presented in six stages.

First, knowledge of the technical/practical subjects being offered in secondary schools was very important to the researcher. This gave a clear picture of the kind of clients one would consider for possible inclusion in a programme where technical subject teachers are to be upgraded through distance education. According to Birchall (1995), it is very important for one to be clear about possible customers before launching any educational programme to be offered through distance education. Sponsors will certainly see themselves as “customers”, but more so will the individual learner, who in this case is the main stakeholder in the process (Birchall, *ibid.*). In the case of this study, where the employer, happening to be the Ministry of Education, might be interested in sponsoring programmes aimed at facilitating in-service courses for its teachers, it is the ministry that might as well be the client. Regarding individual learners, it is crucial for one to be aware of their respective subject areas in order to facilitate collaboration between various learners.

Second, once the specific subject areas have been noted, the next step is perhaps to find out how these various subjects can be related. Hence, the need to analyse all syllabi involved. For this study, the four subjects that were involved, clearly shared the interest to promote “creativity” and the “act of problem-solving”.

These two aspects are actually central to any programme where “Design and Technology” might be involved (Kwaira, 1989). Of course, in the Zimbabwean context, “Design and Technology” does not feature as a subject in the curriculum. It only comes in at various levels as an approach that is supposed to be used in the teaching of various technical subjects. Actually, it is already popular in subjects like Woodwork and Metalwork. However several scholars have presented arguments supporting the idea of having it introduced as a subject on its own. This is a major debate still raging in Zimbabwe. It is interesting to relate this situation to the South African case where Potgieter and Ziv-Tal (1995) refer to a programme in which teachers are already being upgraded through distance education in order to teach “Technology” in primary and secondary schools although it is not yet an accredited subject in schools. They are hoping to have it introduced sometime in 1996. This is a typical example of a situation where educators try to fight the world-wide dilemma where societies have their education systems designed to meet past needs of agricultural and industrial societies, and not the coming information society. Moreover, the gap between the needs of evolving information societies and the response of education systems appears to be widening (Bridge and Salt, 1992). In agreement with this observation, Rajasingham (1995) alleges that education systems are preparing people for the ideas, attitudes and values of a way of life that is fading away and for work in areas of shrinking labour requirements. In a way, this allegation also seems to suggest that schools are unable to respond to the new needs of the societies which support them.

Third, understanding the situation in schools, regarding facilities was very important. It enabled the researcher to plan ahead, knowing what kind of equipment (machines and special hand tools) to include in the resource package which is going to include a mobile model workshop. As already reflected in the findings at this level, resources are scarce in most Zimbabwean schools; especially in rural areas. It is therefore sensible that any proposed open distance learning initiative should reflect a detailed understanding of the strengths and weaknesses of the educational and training infrastructure within its target region and build on these wherever possible (Ringsted, 1995).

In this study, asking for information relating to equipment in schools was a kind of infrastructure assessment. Usually, such assessment must include; the technical resources available to potential open distance learning participants, the constraints on access to these resources, the availability of appropriately skilled support personnel to enable the resources to be exploited and the types of co-operation with external actors which are necessary to pursue the initiative (Ringsted, *ibid.*). Given the context of this study, findings relating to the third research question have been part of a useful exercise. They are going to help avoid problems of duplication and displacement. This means a more detailed investigation during the major project will need to focus on the provision of those unique pieces of equipment that teachers will find instrumental in their courses. Injection moulding and vacuum forming machines are good examples of equipment that is non-existent in our schools, yet among some of the equipment teachers are likely to find interesting to use with pupils. In some cases, this means engaging teachers in the kind of skills they might have missed out on during their initial training.

Fourth, being able to identify the relevant areas of design and technology, given the Zimbabwean context, proved useful in the sense that, one was going to be in a better position to determine the new areas of knowledge teachers needed to learn. In fact, this was a follow up to the third research question where the idea was to determine the exact needs of teachers in terms of equipment and other facilities. In technical areas, it is very difficult to separate equipment, knowledge and skills. An awareness of the relevant areas at this level was also important in the sense that one would avoid wasting time and resources on materials teachers had already covered during their training in colleges.

Fifth, the lack of relevant literature, as reflected in the findings to the fifth research question suggests the need to develop several modules relevant to specific subject areas as indicated in the answer to the fourth research question. Of course, where books are imported, there is nothing really wrong, as long as people are able to identify those areas that are relevant to their specific needs in terms of the Zimbabwean

curriculum. It is actually in situations like these that Ringsted (op.cit.) recommends investment targeted at adapting such materials and existing delivery methods. He also suggests having students in control of their learning process, which in a way seems to imply students being also involved in the development of some of the modules during group tasks.

Sixth, the fact that teachers were going to be able to meet at various regional levels was very encouraging. In distance education, the importance of small group learning can not be over-emphasised. According to Jacques (1992), the benefits of small group learning have long been accepted in distance education. In what Joughin and others (1995) term “co-operative learning”, Jacques (ibid.) summarises the benefits very well:

Small group discussion [not only] provides the opportunity for students ... to engage in intellectual discourse but allows students to create a social “family” to which they can belong and become identified with. It also allows students to learn ways of communicating their thoughts , and occasionally feelings, and of gauging their understanding of subject matter, firstly by expressing it and secondly, by comparing it with the understanding of their peers (Joughin, et.al., ibid. p. 258).

Having students gathering in groups is very important, especially during the initial stages of the programme. Where interactive distance education might be used to teach practical skills, as is the case in the project following this pilot study, it is essential that a technical facilitator be present in each of the remote sites to assist the learners and to communicate information to the co-ordinator of the programme (Novak and Gowin, 1984).

5 Conclusions

This pilot study was a great success. Being the first in a series of studies that are going to be conducted during the course of the major project under plan here, it was a good foundation. Most of the answers to questions addressed by this study are going to be useful in the process of seeking funds from the research board at this university (University of Zimbabwe) and from other interested

parties. Also important was the fact that this study gave a clear picture of the main problem to be addressed by the project to follow very shortly.

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