In Search of a Problem-based Research Methodology(PBR)

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In this paper I review a new Research-based methodology (Robinson 1996) to find an overarching theoretical framework for my MPhil dissertation (Punia 1992). I first review my MPhil (Punia 1992). A review of the new methodology to test its suitability to provide an overarching theory for my MPhil dissertation follows next. The new methodology presents a form of action research from the perspective of academics concerned with the problem of dissemination of educational research to practitioners, which is different from that of action research used for curriculum development from an advisor's point of view in my MPhil Thesis. As a result of this review I have discovered two new sites for its application in education.

Introduction

Research on Teachers' Thought Processes (Clark and Peterson 1986) provides a useful knowledge of teachers' thinking, but it does not link teacher thoughts with curriculum development. In my MPhil dissertation (Punia 1992) I used my findings of teachers' thoughts on teachers' planning to install school-based curriculum development in a technical institute. However, I did not present an overarching theoretical framework to link the theory emerging from research findings with its implementation and evaluation as a form of action research.

In this paper I explore Problem-based research methodology (Robinson 1993), a form of action research designed to solve educational problems where academics from universities and practitioners work together. This methodology presents the perspective of an academic concerned with the problem of dissemination of research to practitioners and with understanding practitioners' theories of practice.

I critically review PBR to add my perspective as a consultant's and as a teacher educator. The paper is divided into three parts. The first part presents a comprehensive review of my MPhil dissertation and part two presents PBR as a researcher's perspective with its critical review. Part three presents my perspectives on PBR as a teacher educator and as a consultant in curriculum development.

PART ONE

My MPhil Dissertation Reviewed

The Context Analysis

When I arrived at the Fiji Institute of Technology it was surviving under very difficult conditions. The management problem was to keep the public institute going with little technical support from the ministry of education in charge of the institute and financial support from the industry benefiting from the output of the institute. The teaching staff and the management of the institute were responsible for designing, conducting and improving all trade and technician programmes offered at the institute

The institute was made of ten schools engaged in different technologies such as Building and Civil Engineering, Mechanical Engineering, Auto Engineering, Electrical Engineering, Agriculture Engineering, Hotel and Catering, Printing, Business Studies, General Studies and Marine Engineering with 300 members of the teaching staff and 3000 students. Each school. had a head of school. An Academic Board comprised of the principal, the vice-principal, the administration officer, heads of all schools and one member of the teaching staff from each school dealt with all academic matters. The principal, the vice-principal and the administration officer administered the Institute as a whole. The principal, like the advisor, had just joined the college from a reputed secondary school.

The principal and the senior-lecturers were the experienced professionals while most of the heads of schools and most of the lecturers were young and inexperienced educators. However, most of the lecturers had successfully completed a Teachers' Certificate programme offered within the institute. Students with adequate academic qualifications and motivation entered the various schools.

The institute used imported training programmes. Mostly the planned curriculum was in the form of content transmitted to students in direct teaching. Due to lack of expertise in curriculum development in the ministry of education, there was little support and control for curriculum development. I arrived as an advisor in curriculum and staff development to fill this deficiency. The government policy seemed to be aimed at localising curriculum and staff within the Institute.

My Role as an Advisor

I was the advisor to the Fiji institute of technology in the South Pacific during 1982-1986, sent as an aid person employed by the Commonwealth Secretariat in London. Advisory roles

of advisors are difficult to define. Many titles such as advisors, consultants, experts and change agents are used indiscriminately. In fact it is a useful area for research. My role emerged as a result of a very complex process.

Before my arrival the government of the host country approached the Commonwealth Secretariat in London for an advisor in curriculum and staff development. As a result of lengthy negotiations between the parties, the advisor finally arrived in Feb. 1982. The brief provided to me by the Commonwealth Secretariat was to give advice to the heads of schools in mounting new courses and to be actively involved in staff development focused in a teacher training programme conducted by a few local untrained lecturers. The Advisor was to be responsible to the principal. However, when the advisor met the principal for the first time, the principal wanted to employ him as an extra teacher in the school of Building and Civil Engineering and partly on a teacher-training programme offered at the institute. The principal was not familiar with advisory roles. He wished to use me as a technician hired to carry out his ideas.

Contrary to the common belief and practices amongst aid agencies and the host countries the advisory roles are difficult to define before the commencement of a project and they emerge gradually after negotiation between the parties. I had to write a formal report about the needs of the institute with recommendations for future policy in a document entitled: "**FIT-present, problems and promise**." I conducted two studies on teachers' planning to identify the problem; proved my technical competence to advise and to be loyal to the management and the staff before they accepted me as an advisor and began to offer their full support and trust. Hargreaves (1997) wrote: **"***For trust to exist..... people must find one another highly predictable and share substantially the same aims***."** (P. 348). Without this trust, this project could not have achieved the results reported here. Such trust is not always available to advisors. After a short stormy relationship between the principal and the advisor a cordial relationship developed between the two persons. Within this context the following research problem emerged.

The Research Problem

My general problem was to guide the institute in offering training programmes suitable for meeting the needs of the local industry with available local resources, teachers and students. It meant that the planned curriculum proposed was to meet the needs of the local industry and the operational curriculum implemented by the teachers had to match the planned curriculum. This is the universal problem of curriculum development in vocational education. I

conceptualised the interaction between the needs of industry, the planned curriculum and the operational curriculum as shown in figure (1)

The operational Curriculum

The planned Curriculum

Needs
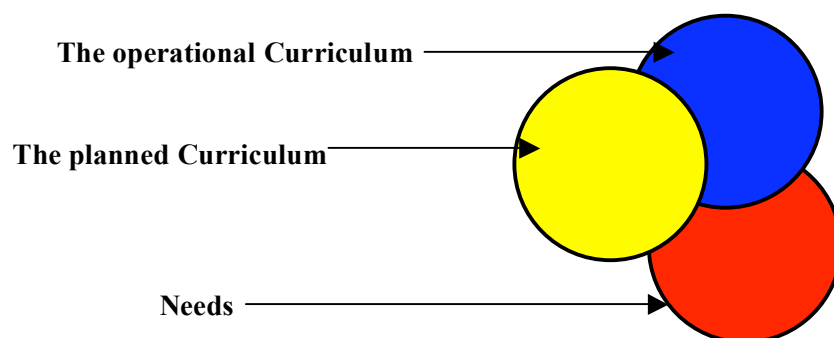
Fig (1) :THE CURRICULUM DEVELOPMENT PROBLEM

It is extremely difficult, in fact impossible, to match the three elements of curriculum development in vocational education to obtain full consistency. However, it is necessary to increase the overlap amongst the three circles and keep it under continuous surveillance. To close the mismatch between the planned and the operational curriculum I needed information about the nature of the operational curriculum within the institute. Some information about the planned curriculum was available in written documents, but information about the operational curriculum was not readily available. I conducted nine exploratory studies of teachers' planning to understand the nature of the planned curriculum within the institute.

When the advisor undertook this assignment, most of the literature on instruction and curriculum planning was prescriptive. Past curriculum development projects had failed to produce anticipated results in education generally. This failure was attributed to the fact that curriculum development was not based on the work of teachers and schools (Hirst 1980, Kelly 1980, Elbaz 1981, Handler 1982, Westbury 1983). To guide the future curriculum development it was necessary to find teachers' present practices. In fact there was no theory of curriculum development in vocational education and training grounded in the work of teachers. I decided to create one using the methodology of an emerging research paradigm called **RESEARCH ON TEACHERS' THOUGHT PROCESSES** reviewed in Clark and Yinger 1977, Shavelson and Stern 1981, Calderhead 1984, Clark and Paterson 1986).

This research had begun to explore how primary and secondary teachers translated the planned curriculum into teaching acts. This translation process was conceptualised as *teachers' planning* (Zumwalt 1983, Clark and Paterson 1986). According to Clark and Paterson (1986) as a subject of research, planning had been defined in two ways. First,

planning was viewed as a psychological process in which a person thinks about the future action before acting. This view on planning draws on research from cognitive psychology. Second, planning was viewed as what teachers do when they say they are planning. The second view uses ethnographic approach in which teachers become informants to researchers.

The studies on teachers' planning had been interpreted in the light of the Tyler Model (1949) then used for curriculum development in vocational education. This model recommends four essential steps for effective planning.

1.Specify objectives;

2.Select learning activities;

3.Organise learning activities;

4.Specify evaluation procedures.

It is basically a rational means-ends model in which the planner's first task is to decide on desired ends, then select appropriate activities to accomplish them. Thus in these terms curriculum planning was characterised as a task that requires orderly thinking and the Tyler model proposed a scientific model for accomplishing this task (Taba, 1962).

The basic assumption of Teachers' Planning Research was that teachers were owning and contextualising the planned curriculum. According to the limited research, teachers' planning was a framework for action and the Tyler model (1949) did not describe teachers' planning. Teachers' planning was like a design process involving problem finding and problem solving. Schon's (1983) model of reflections -in-action and reflections-on-action seemed to describe it more appropriately. Teachers seemed to be owning and contextualising the planned curriculum by fitting the planned curriculum to their own abilities, to the needs of their students, and the available resources. Planning was undervalued in schools when teachers expressed the need for time and training to plan their work. On the whole the findings of the exploratory studies provided a sketchy and a partial picture of teachers' planning. Effects of teacher planning on student learning were unknown

Most of the research on teachers' planning had been conducted in primary schools on small numbers of volunteer teachers with a few exceptions such as Sardo-Brown (1990) and Taylor (1970). According to Yinger (1987) this research was not mature enough to suggest the best way to plan. So most of the research was exploratory and its findings were tentative. What was required to make this research more meaningful was to conduct a large number of studies

to explore all aspects of vocational teachers' planning in a real setting over a long period. My ten studies aimed to fill this gap. These studies had **the following specific aims**.

1. To capture teachers' perceptions of their instructional planning practices in to guide their further development.

2. To create a need for change in teachers' planning by sharpening teachers' perceptions of their planning practices and the desired state of the operational curriculum.

3. To explore the use of research findings in guiding curriculum and staff development.

These aims were translated into the following specific questions:

1. How was teachers' planning defined?

2. How did the teachers plan their work?

3. Why did they plan their work?

4. What were the effects of their planning?

5. What problems did they encounter?

6. What could be done to overcome these problems?

Summary

A vocational technical institute responsible for planning, implementing and evaluating its curriculum is using content-based imported curriculum for its training programmes. Due to lack of expertise in curriculum development an advisor in curriculum and staff development is recruited from an aid agency to help designing curricula meeting local demands. The advisor was faced with the problem of generating a model of institute-based curriculum development. Existing literature on instruction and curriculum development in vocational education was descriptive i.e. it was not based on any empirical studies. Research on "Teachers' Thought Processes" provided context for advisor/researcher's own studies designed to explore vocational teachers' planning practices necessary for further curriculum and staff development in this institute.

A Critical Review of Research on Teachers' Thought Processes

The primary goal of a research study is the production of knowledge based on systematic and rigorous methods of data collection and analysis. Research reports need to be clear explaining focus, methodology, conclusions and evidence in detail. Study needs to be blended with previous research and validity of claims well established. Keeping these principles in mind, the advisor devised his research strategy to match the research context.

This section critically examines research on "Teachers' Thought Processes" and researcher's own research methodology. "*Methodology is a meta-level investigation of limitations,*

resources and presuppositions of methods, aimed at understanding the process of inquiry rather than the product." (Robinson 1993, p.13). It is difficult to assess or judge the value of a piece of research without knowing its methodology. According to my understanding, interpretation of methodology is the activity or business of choosing, reflecting upon, evaluating and justifying the methods you use and the methods we use are there to be tested.

Research on teachers' planning is an integral part of 'Research on Teachers' Thought Processes' (Clark and Paterson 1986). The thinking, planning and decision-making of teachers constitute a large part of curriculum implementation process. These were the fundamental assumptions behind the literature that came to be known as Research on Teachers' Thought Processes and this research had its own specific goals: (1) to describe the mental lives of teachers and (2) to explain teachers' behaviour in teaching.

The research depended mainly on teachers' self-reports. To elicit valid and reliable self-reports was and still is its main problem. Generally, at that time various combinations of five methods namely thinking loud, stimulated recall, policy capturing, journal keeping, and repertory grid had been used, often supplemented with field observations and interviews.

Findings of this research, outlined in the previous section, were remarkably consistent and complementary. However, these findings were the interpretations of the researchers, not those of the researched. Most of the studies were exploratory and their findings were tentative. Teachers' planning was one of the central topics of research on teachers' thinking, largely because of its pivotal role in linking curriculum to instruction. Today this research has greatly expanded and it was recently reviewed in Calderhead (1996).

This research had several unresolved issues. Thought-action relationship was not clearly conceptualised. According to Skinner (1968), 80% of human behaviour is conditioned and Ryle (1949) cogently argued that action preceded thought. It does not seem clear if thought is a prerequisite for the quality of action (see McNamara, 1990).

Capturing human thought is difficult: some human knowledge is tacit, some people have difficulty in expressing their thoughts, and others may say what the researchers want to hear.

Furthermore, researchers were mixing samples of different programmes and of different grades in teaching. The issue of differences amongst teachers of different grades and the influence of context were not addressed. No doubt the findings of various studies were

remarkably consistent but this consistency could be due to the researchers' shared perceptions.

The value of this research to improve practice was not clear. The link between thought and action and between the propositional knowledge and personal practical knowledge remained to be established. Better methods to elicit teacher thoughts about specific actions remained unexplored.

In spite of these issues the early studies paved the way for understanding the work of teachers necessary to link the planned curriculum to the operational one (instruction). Without this kind of knowledge teacher trainers and consultants were offering their ready-made solutions to the problems of curriculum development derived from the propositional knowledge. Teachers' thoughts were necessary to link consultants' solutions to client needs and to bridge the gap between theory and practice of curriculum development.

In the light of the then state of research on Teachers' Thought Processes, I thought it appropriate to conduct his studies with homogenous groups of teachers in vocational education in a particular setting over a long period. I assumed that a long participant observation combined with teacher reports collected over a long period in one context where the researcher and the researched had established a good rapport might provide a reliable source of data.

Now the focus of research on teachers' thinking has changed from earlier studies of teachers' decision-making to focus on teachers' cognitive processes to sense-makers to reflective practitioners. Teachers' thinking has been conceptualised in different ways e.g. Schon (1987) views teacher actions as expressions of teachers' thinking and Shulman (1987) introduced the idea of teachers' thinking in converting content-knowledge into pedagogical-content - knowledge. Teachers' thoughts, feelings, beliefs and values have been studied in various ways in various elements of the teaching task.

This research has some drawbacks: it does not link teachers thoughts to action and the researchers have tended to examine the elements of teaching task in isolation from each other. According to Ross et al:

One of the problems with the studies on teachers' cognition is that researchers have tended to examine different elements of the teaching task in isolation from others and has been heavily

influenced by psychological research models, which Shulman cautions may have driven this programme into a dead end (Ross et al 1992, p.9).

Teachers' personal theories and beliefs serve as the basis for classroom practice and decision-making, yet the relationship is not well understood. Hence there is need to examine the relationship between teachers' thinking and actions. Problem-based Research Methodology (Robinson, 1993) seems to provide such a methodology.

My Research Methodology with A Critical Review

To examine my research questions and the research problem described in the previous section my research was an integral part of day-to-day activities of teachers, the management and the advisor in dealing with emerging problems. In fact I conducted all the studies during my training sessions with groups of teachers. The methodology combined formal data presented in studies, collected through teachers' reports with informal observations of teachers' classroom practices and documentary evidence. The findings were regarded tentative until grounded in practice and in the findings of scholarly research elsewhere. This eclectic approach to research was necessary in researching ongoing and fast moving events in their natural settings where development of understanding was a continuous process. Furthermore, the goal of this research was not to generalise but to capture practitioners' theories of practice to use them as the base for curriculum and staff development in a particular situation. In such circumstances researchers' strategy seemed appropriate. The following **principles of procedure** guided my studies.

1.The principle of successive focusing was used to build the whole picture. Early studies focused mainly on the operational curriculum in general, followed by studies of specific aspects of teachers' lesson planning. The last three studies examined teacher perceptions of good students, effective teaching and effective teaching skills in lesson planning context**.**

2. Repetition of some question in subsequent studies and use of a variety of data collection techniques provided reliability to teachers' reports.

3. Timing of studies was opportunistic
4. Studies were an integral part of training sessions.
5. Homogeneous groups of experienced and inexperienced vocational teachers provided data

5. The researcher and the teachers interpreted the data.

6. Findings were to guide action to deal with the emerging problems.

7.Teacher reports were embedded in specific cases of practice.

8.The researcher refined his interpretations continuously in the light of additional data.

9. Research was to be made public beyond the research groups in the form of seminars and articles in the FIT journal published within the Institute.

10. The Tyler model (1949) provided the basis of interpretations to validate findings in previous research.

11. Each study aimed to produce a good research report with balanced descriptions theoretical and methodological critiques, contextual richness and minimal ambiguity.

Research Assumptions

Based on my experience as a teacher and teacher trainer, I made the following assumptions confirmed in later research.

1.Teachers possess a great deal of practical knowledge in the form of cases, incidents and stories (Elbaz 1981,1991, Calderhead 1988,).

2.Teachers do talk about their work in non-threatening environments with people they trust Day (1991).

3. Teachers are suspicious of research and the researchers unless research has some value for them and unless the research and the researcher become integral parts of their lives (Stenhouse 1975).

4. Unlike the previous research on the teachers' planning (Calderhead 1984), the advisor considered teachers' planning, as a reflective practice comprised of three-phased cyclical process including preactive planning, interactive teaching and postactive reflection. It was a form of action research unknown to me at that time. The advisor's thinking was supported in later studies (Boroko et. al. 1990, Day 1991, Westerman 1991).

Limitations of My Research Methodology

The Advisor managed to solve several unresolved methodology issues of the previous research described previously. Still advisor's methodology had some difficulties.

It combined informal data with formal data gathered through teacher reports, making it necessary for researchers to be participant observers.

Outside researchers may capture teachers' tacit knowledge from in-depth interviews with small samples of teachers. Video recordings and stimulated recall interviews would have been better to capture teachers' interactive thoughts and postactive reflections. However, in this situation, advisor as teacher trainer had access to this information through documents of teachers' plans and teacher evaluations of interactive teaching as a part of teacher training. Furthermore, he needed information from a large number of teachers held representative of whole population of teachers in the Institute.

Analysis of data proved difficult and time- consuming without the use of computers.

This kind of research is difficult to plan and it is context- dependent making it more suitable for teacher trainers, mentors and staff development officers working full time with teachers.

Other research models are possible for outsiders for future research. A survey with the use of an appropriate questionnaire coded for computer analysis is possible with carefully selected samples of teachers. In-depth interviews might be used to support the survey method. This research model may provide quicker results, probably with similar reliability and validity to that of the advisor's research methodology. Unfortunately outsiders may have the problem of access and teachers' cooperation and joint interpretation of research data.

The advisor aimed to generate personal practical knowledge, which was amply supported by its application in practice and in later scholarly research in this area. It raises an interesting question. When does practical and personal knowledge becomes a generalisation?

The advisor was not totally satisfied with his interpretations of his studies in the light of the Tyler model (1949) held useful for curriculum and instructional training. Teachers' planning was partly mental and partly written and its content seemed more holistic than analytic and teachers began their planning with context, not with objectives. Brown and MacIntyre (1993- p.5) quote four influential interpretations of what it might mean to think like a teacher. These are thinking through schemata, reflecting in/on practice, formulating pedagogical content knowledge and perceiving practical arguments.

Reporting research results proved to be a lengthy and a costly process. I presented the results during training sessions to teachers who participated in the studies, during special seminars to

the FIT Academic Board and other groups of teachers and interest groups. Two studies were reported in the FIT journal and the MPhil dissertation (1992) was addressed to academic community. Generally the ten studies meet the criteria of good research reporting. On reflection, the studies could have included more of teachers' voice to make assertions and to enhance the reader interest.

Quality Assurance in My Research

In spite of some of the drawbacks of my methodology, it met the following criteria for quality assurance (Day 1991).

1. Equity of teacher and researcher relationship has to be established.
2. Relevance of research for teachers is important.
3. Nature of contracting access has to be clearly established.
4. Researcher's intellectual, technical and human relations' skills and qualities are prerequisites for the success of this type of research.

According to Day (1991) the quality of the data and the quality of research outcomes depends largely on the above criteria. The key to the success of my research was the mutual trust between the teachers and the advisor and the teachers' interest for professional development. The findings of the studies proved remarkably consistent suggesting some degree of reliability. The findings later successfully guided practice within the institute.

Findings of My Studies

This section presents the major interpretations of the researcher's studies and how these interpretations were used to develop an action strategy. The strategy was later validated in action and in a limited literature on school effectiveness. As a result a new perspective for school-based curriculum development and a new research methodology emerged.

1) My studies showed that teachers, during implementation, restructured the planned curriculum to match it to their context comprised of their own ability, the ability of their students, available time, availability of teaching learning materials, management support in the form of professional advice and accountability. To do so they used a series plans nested in their yearly plans and these plans were partly written and partly mental, depending on a particular situation.

2) Experienced teachers' planning process was a reflective practice comprised of teachers' preactive thoughts, interactive teaching and postactive reflection as an integrated process (Jackson, 1968).

3) Teacher plans did not commence with objectives as recommended in the Tyler model (1949). They commenced with teachers' knowledge of the perceived context

4) There were qualitative differences in the planning practices of experienced and inexperienced teachers. For, example, the inexperienced teachers planned their work to give them confidence and their plans were rigid and less reflective. Experienced teachers were reflective in their planning practices and they used these plans with flexibility to make better use of available resources, particularly of time. Unlike the inexperienced teachers, experienced teachers were proactive and they used their plans for their own professional development. In fact the quality of teachers' plan was a good indicator of their professional development.

5) The researcher found that teachers in this institute seemed to pass through three stages in their professional development varying from survival to efficiency to effectiveness. Like Beeby (1966), based on my findings, I hypothesised that the technical institutes also passed through these stages in their development and this assumption guided the planned development of FIT

6) Teachers had little management support and control in implementing their planned curriculum.
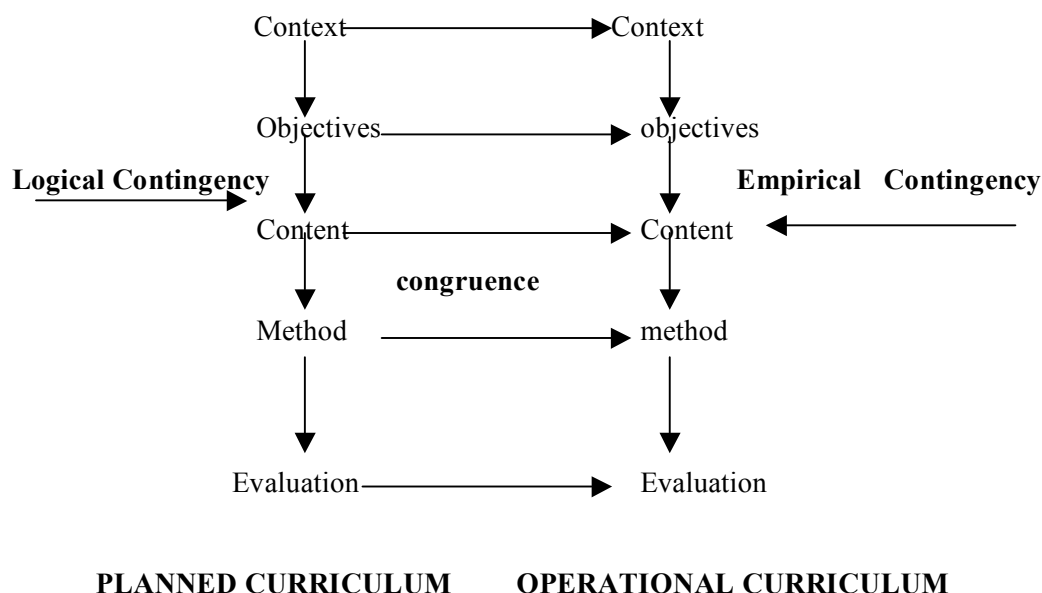
7) Teachers were merely transmitting knowledge, skills and attitudes to students. The responsibility of learning was on students.

8) Teachers identified a series of constraints on implementing the planned curriculum, namely, lack of time to plan, lack of instructional materials, lack of adequate training in instructional planning, lack of management interest and control of quality of teaching in classrooms and absence of planning culture generally.

Use of Findings to Create a Theoretical Framework for SBCD and an Action Strategy

A Theoretical Model for School-based Curriculum Development (SBCD)

In the light of above information, I created this model of institute-based curriculum development. The simplified version is illustrated next.

Context ——————→ Context

Objectives ——————→ objectives

Logical Contingency →   **Empirical Contingency**

Content ——————→ Content ←——————

congruence

Method ——————→ method

Evaluation ——————→ Evaluation

PLANNED CURRICULUM   OPERATIONAL CURRICULUM

Figure (2)- SCHOOL-BASED CURRICULUM DEVELOPMENT

I derived this model from experienced teachers' lesson planning practices but it was later supported in scholarly work elsewhere. Skilbeck (1981) had first added context analysis to the Tyler model (1949) and Stake (1967) had used the idea of comparing the intended to the actual in his countenance model of evaluation.

The above model presents curriculum as a learning experience as (Dewey 1900, Stenhouse 1975). The basic concern of this framework is to relate the curriculum planners' ideas in the planned curriculum to teachers' theories-in-action in the operational curriculum. The interaction between the planned and the operational curriculum might improve the two kinds of curriculum. Furthermore, curriculum development becomes teacher development (Stenhouse 1975).

According to teachers' thinking the relationship between objectives, content, method and evaluation was complex and dynamic. The principles used in school-based curriculum development are listed below.

(1) The planned curriculum must be based on context analysis (constraint structure).

(2) The interaction between the operational and the planned curriculum is dialectical.

(3) Mutual adaptation takes place between the planned and the operational curriculum.

(4) It is necessary to monitor the gap between the two regularly.

Based on this model, I designed and installed a mechanism of linking the planned curriculum to the operational one. This system consisted of a teachers' journal in which teachers recorded the planned curriculum, the operational curriculum, deviations and reasons for deviations from the planned curriculum. At the agreed intervals the teachers and the programme directors met to bridge the gap between the planned and the operational curriculum.

Basically the system set up a dialogue between the propostional knowledge of curriculum planners and teachers' personal and practical knowledge acquired through interaction with the perceived context. When properly used the system had a potential to integrate curriculum development, teacher development, evaluation and research. It was a form of action research (Elliott 1992) unknown to me at that time. Furthermore, it created an excellent framework to study teachers' thought processes on the operational curriculum.

According to my professional judgement the management and the teachers could not have solved the problem of curriculum development in their institute without an outsider's theory in my SBCD. I found that the management and the teachers were in favour of improving the format of the planned curriculum and in removing teachers' perceived constraints on their work. They failed to appreciate the need to link the planned curriculum with the operational one in a collaborative culture. The Academic Board of the Institute accepted this model after long deliberations.

Research-based Action Strategy

The action strategy involved the following action to remove constraints identified in research.

1.The planned curriculum was to use the format outlined in **figure 2** and it was to involve industry and the ministry of education.

2. The planned curriculum was to be linked to the operational curriculum.

3.Teachers were to be trained to match the innovations.

4.More time was to be made available to teachers for planning and reflections.

5.The quality and quantity of teaching materials was to be improved.

6. Student assessment system was to be improved and linked to the planned curriculum.

7.Student assessment and curriculum evaluation were to be an integral part of curriculum development.

8.A collaborative culture was to be adopted to implement the planned strategy.

9. A teacher support and accountability system was to be installed.

10.The development was to be gradual and in stages from survival to efficiency to effectiveness. The initial stage was to be for development from survival to efficiency.

Basically the strategy included the various sectors of curriculum development in need of action to overcome the various problems identified in my research. Teacher's work in classrooms was the focus of intervention. After long discussions it was agreed that the achievement of learning objectives of the planned curriculum was the joint responsibility of teachers, the management and the advisor. The teachers were to be supported by removing the identified constraints. They agreed to management involvement in the implementation of the planned curriculum. I became responsible for the technical support and staff development. This Action Strategy evolved gradually over the whole life of the project. The main problem was solved by breaking it into a series of well-structured problems in several interventions integrated through the general strategy (Robinson 1993).

Validation of The SBCD Model and Action Strategy in Action

The Action Strategy was validated in action as fully described in my MPhil dissertation and in my monthly reports to the Commonwealth Secretariat. There is no space to report the implementation processes with its problems. It is sufficient to note that stakeholders found the planned strategy successful in practice. There was an independent evaluation of the work of the institute by a group of people including industrialists, academics, prominent citizens and civil servants designated by the then minister of education.

At the end of the project, the advisor headed several sessions of all the stakeholders of the project to evaluate the achievements of the project. According to the employers the gap between the planned and the operational curriculum was considerably under control. According to the principal, the failure rate amongst students had dropped by 10%. Teachers and managers involved in the project benefited the most. The institute changed from a reactive one to a proactive one. According to Robinson (1993) problems are solved when there is a general agreement on a particular solution. The stakeholders found the project successful beyond their expectations.

Unlike restructuring schools and management development, this project focused on the work of teachers, the management and an advisor in improving teaching and learning in classrooms. The present top-down strategies pursued in the UK and the USA are expensive and the benefits of interventions may not reach classrooms where teaching and learning occurs. *"By investing in large administrative superstructure to control the work of teachers rather than in teachers themselves, we have sucked resources out of classrooms where they could make a difference." (Darling-Hammond p. 335).* This project shows that curriculum development based on teachers' thinking and under the guidance of a consultant can be highly successful under certain conditions.

This project satisfies the two criteria for a successful innovation identified by in Sarason (1990). He argues that by the classroom impact most educational reform has failed. He attributes this failure to two factors. First, the different components of educational reform have neither been conceived nor addressed as a whole, in their relationships as a complex system. Secondly, major educational change is unlikely to be successful unless it addresses school power relations. This project addressed both these issues with considerable success.

The Emergent Thesis

The emergent thesis is that in the past curriculum development teachers' planning may have been the missing link. The use of the Tyler model (19949) considered appropriate for curriculum development for vocational education is fraught with difficulties for implementers in vocational institutes. To overcome these difficulties the following conditions emerged:

1. Teacher development, curriculum development and context must be integrated into a system.
2. A collaborative culture amongst teachers, the management and the advisor is necessary.
3. Teachers, like other professionals, need support, consultation, time to reflect and adequate training.
4. Teachers' planning as a reflective practice, provides the nucleus for curriculum development and institute development.

A new theory of curriculum development, based on the work of teachers, management and the advisor in a collaborative culture emerged. It is based on the work of teachers in classrooms, not on academic thinking of the curriculum planners.

Limitations of this Work and Possibilities for Future Research

This work has to be considered exploratory. It is not based on the scholarly work by the reputed researchers. The emergent theory proved effective in closing the gap between the

needs of the local industry and those of the teachers and students, the planned curriculum and the operational curriculum.

This work provides a successful case of school-based curriculum development based on teachers' thinking in classroom teaching in a particular context. To plan a similar project deliberately might be difficult. This success was largely attributed to advisor's expertise in several aspects of institute development, his rapport with the principal and the staff of the institute and the presence of the real need to improve practice systematically based on research. In FIT all the factors came together spontaneously and the interplay between the constraints and the opportunities seemed to have moved the project forward. A better understanding of this interplay through more research may provide another perspective on curriculum development as management of the contextual forces.

PART Two
The Problem-based Research Methodology (PBR)

PBR reviewed

I was no aware of the PROBLEM-BASED Research Methodology When I conducted my research and completed my MPhil Dissertation in (1992). I came in contact with the work of Robinson (1993), Haig, (1987) and Perkins (1986) during the EdD programme at the University of Bath in 1998. These writers are concerned with solving real problems in real settings. In this section I critically examine Problem-based Research methodology (Robinson 1993) to create a theoretical framework for my MPhil dissertation (Punia 1992). This methodology is new with a limited numbers of examples of its use in various contexts. This paper presents its use in a particular context.

As an academic Robinson 1993 claims to have developed her research methodology to overcome the problem of low impact of research on practice. She identifies two problems in linking research to practice: the problem of dissemination of research and the features of the research itself such as concern with generalisations and neglect of the influence of context. According to her PBR provides an adequate solution for these problems. According to her:

In Problem-based Methodology, the acceptance-effectiveness dilemma is resolvable because both of these values are simultaneously and collaboratively pursued during the life of the research project. If the theories of practice of relevant practitioners are involved in the problem, then the methodology provides for collaborative examination of the merits of these theories and of the

researcher's alternative. The ensuing dialogue is not a dissemination phase that takes place after the research is finished but a collaborative process of theory appraisal that is central to research itself   Hoyle, 1985 (Robinson 1993, p. 20).

The Research Philosophy

This methodology is based on the assumption that problems are rich structures of constraints on acceptable solutions and that the important function of research is to guide solutions to practical problems (Haig 1987; Robinson, 1993). In this type of research interaction between researcher's academic theories and practitioner's practical theories takes place and practitioners and researchers work alongside to solve the problem at hand. Unlike the usual Action Research where practitioners conduct their own research to create their own theories, in this research methodology, the researchers and the practitioners work collaboratively to solve practical problems, and researchers and practitioners' theories of action are open to critique.

Key Concepts and the Framework for the Research

In problem-based Research Methodology, researcher's problem is to change ill-structured problems in to well-structured problems. According to Robinson (1993):

A problem is ill structured when it lacks obvious criteria for solution adequacy, when means for reaching a solution are unclear and when there is uncertainty about the nature and availability of the required information (p. 26).

Practical problems appear in the negative sense and the neutral sense. When problems in the neutral sense are not resolved, they become problems of the negative sense. Problems in the negative sense are those indicating a gap between the present and the desired state of affairs. In problems of the neutral sense the starting point is not a problematic situation, but a goal to be achieved. For example, the problem in the neutral sense would be to design a training programme meeting the needs of the local industry. And an example of the problem in the negative sense would be to close the gap between the needs of the local context and the planned curriculum.

According to the author structuring problems well solves ill-structured problems. **The process of problem solving is the process of setting and discovering solution constraints.** Complex problems can be solved by breaking them down into a series of smaller well-structured problems using a design process. When a problem solver or a community of

problem-solvers agree on a particular solution of a problem, it is seen a well-structured problem within that community.

Constraints together with strategies to remove them constitute **a theory of action** for the problem solution. Two sorts of theories of action are distinguished after Argyris and Schon (1974): theories of action inferred from how people say they behave or would behave are known as 'espoused theories' and theories inferred from actual behaviour are called 'theories-in-use. According to Robinson 1993:

Problems are resolved by developing a constraint structure, which establishes the parameters of acceptable solution. The constraints together with strategies, which satisfy them constitute the theory of action for the problem solution (Robinson, 1993).

Explanatory accuracy, effectiveness, coherence and improbability test the solution adequacy. Briefly, in explanatory accuracy an account shows how particular events and processes combine together under particular conditions to produce the phenomenon of interest. Often explanatory accuracy remains incomplete. Usually a theory of action is considered effective if it produces the intended consequences without violating important constraints. Coherence involves consistency in problem solutions to the whole set. A theory of action also requires inbuilt mechanisms to detect inadequacies in its own advice.

Furthermore, Robinson (1993) suggests a set of social relations for this type of research inquiry to take place. She advocates the use of critical dialogue. The critical dialogue includes a set of key values such as valid information, informed choice, internal commitment and key strategies including disclosure, public testing and facilitation. According to my professional experience these values, though important to researchers are rarely used in practice. The following framework outlines Robinson (1993) with its advantages and disadvantages.

Key Questions	**Key Concepts**
1.What is the Problem?	Negative sense
	<u>Neutral sense</u>:
	Well-structured and
	Ill-structured
2.How is it solved?	**Theory of action:**
	<u>Espoused theory &theory-in-action</u>

<table>
<tr><td></td><td>Constraints</td></tr>
<tr><td></td><td>Strategies</td></tr>
<tr><td></td><td>Consequences</td></tr>
<tr><td>3.How is solution adequacy Judged?</td><td>**Explanatory accuracy**</td></tr>
<tr><td></td><td>Effectiveness</td></tr>
<tr><td></td><td>Coherence</td></tr>
<tr><td></td><td>Improbability</td></tr>
</table>

4.What are the social relations of the inquiry?	**Critical dialogue**

<u>Key Values</u>:

- o Valid information
- o Informed choice
- o Internal commitment.

<u>Key Strategies</u>

Disclosure

Public testing

Facilitation.

Figure (3): Problem-based Methodology

Key Advantages of the Problem-based Methodology

1. It focuses on improvement of practice through interaction between research and action.

2. It provides clear guidelines to solve practical problems and to test the adequacy of their solutions.

3. It sets up a dialogical relationship between the academic knowledge of the researchers and the practical knowledge of the practitioners to improve practice.

4.It seeks to promote a collaborative culture amongst researchers and practitioners.

5.It is likely to solve the problem of research impact on practice.

6.It may provide a useful theoretical framework for the work of consultants/advisors often hired to solve practical problems.

The Weaknesses of the PBR.

1. It is difficult to solve problems unless the stakeholders own and contextualise their problems.

2. Olson (1987) and my experience has often shown that in most cases practitioners' responses to their problems are adequate and a **build-on model** is more appropriate than a **deficit model** used in solving educational problems.

3. Many practitioners do not have so-called theories of practice. Practitioner's knowledge is personal, practical and situational. It is held in the form of routines, insights, cases and episodes.   Moreover, practitioners' theories of action are often implicit and they find it difficult to articulate them.

4. Achieving consensus on the problems and solutions of problems amongst stakeholders is also problematic. Personal interests, personalities and politics of the stakeholders frequently fail to match. Often one person's problem is another person's solution and vice versa.

4   Problems cannot be solved completely as they do not remain static.

5. Usually there is a disjuncture in values proposed in Robinson (1993) and those of the practitioners. In practice mutual trust and human relations and networks are more important than rational critiques of the academics.

6. Researchers have to work with practitioners over long periods, making problem solving costly.

<div align="center">

Section Three

My Contributions to PBR

</div>

1. A Teacher Trainer's Perspective of Problem-based Research Methodology in Teacher Education

We do find academics from universities, with research experience working with practitioners as staff development officers, teacher trainers and consultants. As a teacher trainer I used a similar strategy in teacher guidance during their interactive teaching.

In my view teaching practice/clinical supervision (Smyth, 988), in teacher training is an excellent site for the use of PBR. by teacher educators from the universities and for mentors from schools. Basically the supervisory system consists of three interrelated processes: pre-observational interview, tutor observations of interactive teaching and joint post-active reflections of interactive teaching. During a pre-observational interview the tutor and the trainee discuss trainee's intentions or lesson plan. During interactive teaching the tutor observes interactive teaching and makes notes of his observations and during post-active interview the tutor and the teacher discuss teacher's strength, weaknesses and develop a strategy for further improvement. This process is continued at agreed intervals. In my view Robinson (1993) provides a useful tool to enhance the quality of clinical supervision. However, it is necessary to establish a systemic approach and to train tutors and trainees to operationalise PBR in clinical supervision. In such a system trainee teachers and tutors have the opportunity to improve themselves and the system.

Teacher's preactive lesson plans are his 'espoused theories of action' to solve his teaching problems. Teacher's interactive teaching is his theory-in-action. Usually there is a gap between the teachers' espoused theories and theories-in-action. The tutor and the trainee aim to close this gap. In a systematic clinical supervision interactions between the tutor and trainee can be recorded and analysed to capture teacher's developing theories of action. There is dearth of this type of knowledge in education.

As an advisor in curriculum and staff development I used similar thinking to link the planned curriculum with the operational curriculum in my school-based curriculum development in Punia 1992 as presented in part one of this paper. There is dearth of similar examples in the literature.

Based on my personal experience I have added problem-based methodology from a consultant and a teacher educator's perspective. These perspectives have the potential to reduce some of the shortcomings of this methodology and to open up an immediate and a wider area for its application to improve the quality of problem solving in education.

Furthermore, it indicates a useful area for future research in developing teachers' personal theorising on curriculum and teaching using action research (Stenhouse 1975). The success of this type of research might depend largely on trainer's research experience and interest in making contribution towards research in solving practical problems of practice. Schubert (1992) wrote: **"those who want to use research to educate teachers must figure out ways**

to tap the experiential insights and understandings of teachers as a new and important kind of research" (p. 271). I believe Robinson (1993) seems to have the potential to meet this challenge.

2. Problem-based Research Methodology Emerging from my MPhil dissertation

Robinson (1993) seems to assume a deficit model of practitioners' practice and aims to use research to improve practice in problem solving. Researcher and practitioner interaction is deemed to occur based on in a critical dialogue to capture practitioners' theories of practice for generalisation using researchers' values. Research knowledge is assumed to be superior to practical knowledge in solving practical problems. These hidden assumptions contradict with my experience in my MPhil dissertation.

My perspective embedded in MPhil thesis is based on developmental model using the design process of practice in the context of consultant and client relationship of mutual trust and respect to solve practical problems collaboratively. In this model research and practical knowledge improves through mutual interaction. Construction projects in the construction industry I am familiar with use this model frequently.

At the structural level Problem-based Methodology seems to provide an adequate overarching framework to link theory with practice in problem-solving contexts. For instance, in my MPhil dissertation the management, teachers and the advisor also a researcher encounter an ill-structured problem to improve practice in curriculum development. My ten studies of teachers' planning provided me with knowledge of the present practices and that of the constraints on linking the present practice with the aspired model. An action strategy evolved from the constraint structure to fill the gap between the existing and the desired state of curriculum development in the Institute. The strategy was put to use in a collaboratively under the leadership of the consultant and evaluated to generate practical knowledge.

In Punia (1992) my theory of action as an advisor is different from that of the management and the teachers in the Institute. However, they accepted my perspective based on research evidence, rationality of my arguments and the trusting relationship I had established with them. The mutually agreed theory guided action with considerable success. This theory has the potential to solve such problems in other similar contexts elsewhere.

According to my professional judgement the theory emerging from our collaborative action met the criteria of Robinson 1993, including explanatory accuracy, effectiveness to achieve purpose, coherence with the other known knowledge and a potential for improbability. The

emergent theory was effective in achieving its intended goal coherent with my other problem solving efforts within the institute and scholarly research elsewhere. The theory has been tested in the light of new information, discussed amongst participants and made public in a variety of forms.

It might be correctly argued that the practitioners in my project owned and contextualised the problem under the advisor's leadership. He used action research to solve the problem for self-learning and to generate professional knowledge. To what extent the practitioners learnt from this experience varied according to their interest and participation in the project. It is very difficult to prescribe power relations in such projects. The key to collaboration in my project was the mutual trust between the head of the Institute and my self as an outsider. This trust developed from my technical competence and a trustworthy character expressed in Prinsipal's testimonial at the end of the project.

The whole problem of creating an appropriate model of SBCD emerged as a result of solving several interrelated problems as suggested in Robinson (1993). Each study developed a collaborative understanding and action to solve a particular problem For example, the first two studies conducted at FIT provided evidence for the contextual constraints on teachers' work. The stakeholders openly discussed the findings of my research and a strategy emerged as a result. The implemented strategy produced the desired effects in solving the problem.

The knowledge generated through this type of research is open for criticism from practitioners. They may argue that generally practitioners work with pre-established routines. They rarely work systematically as portrayed here. Practitioners' routines are results of their prior problem solving efforts. When the background to the problem at hand differs considerably from the original, it gives rise to a new routine. I suggest that this type of knowledge is useful only to create personal and practical knowledge, not public knowledge. The insights have to be integrated and rationalised to produce professional knowledge. That is what I had to learn from the academics from the universities.

However, Robinson (1993) cogently argues that once this type of knowledge is validated in other scholarly work this knowledge is generalisable. My personal and practical knowledge acquired from my consultancy project has been validated in other scholarly work in my MPhil dissertation and in this paper. It may have a high degree of generalisation. As mentioned previously, Problem-based Research is new, requiring more work to better understand and to use it fully. This paper makes only a modest contribution in this direction. Robinson 1996 has

opened up possibilities for researchers and practitioners to work together to improve practice. This is a significant step forward in improving the quality of practical problem solving.

Beyond Problem-based Research Methodology

All research is a form of learning and sensory knowledge is human construction. In my view any systematic and honest approach to learning is a valid research methodology to produce better professional knowledge. As a result of this collective and systematic experience of SBCD many participants to my project in Mauritius and abroad benefited. It is impossible to share and capture a practical experience fully. Words cannot capture reality fully. The personal experiences of the teachers, the management and the advisor involved in the SBCD project were far richer than what is presented here. Kurt Lewin (1949) appropriately wrote: " *If you want to know how something works, try changing it*." Furthermore, every idea has loose ends stuck somewhere. The accounts presented in this paper are not complete. Fullan and Stigelbour, 1991 write:

Changing educational projects is difficult and we do not know enough about it. There are no short cuts and there is no substitute for directly engaging in improvement projects with others. Like most complex endeavours, in order to get better at change we have to practice it on purpose (Fullan and Stigelbour 1991, P. 350).

To find adequate solutions to a problem, a proper balance amongst the system, the human relations and the context is required. This paper has not developed the human relations aspect adequately. The search for an appropriate strategy to solve human problems will continue but Robinson 1993 had made a useful contribution in this direction. I have learnt much from her work.

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