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EDITORIAL

Technical and Vocational Education has demonstrated capabilities to contribute to the economic growth and well-being of the people in many developed countries. Encouraged by these revealing experiences, many under-developed and developing nations have started giving increased importance to technical and vocational education. Efforts are being made to impart productive skills, training and education to different sections of the society in a variety of occupations through formal and non-formal programmes.

Several countries have introduced several innovative approaches in re-discovering the goals and objectives of technical and vocational education; planning the structure, pattern and curricula of course offerings; motivating the learning by a variety of methods, media and material; training of teachers through pre-service and in-service programmes and managing the physical, fiscal and human resources.

Many of these experiments have resulted in the formulation of probably replicable models and shareable experiences. For their beneficial transfer to those engaged in similar pursuits, dissemination of information becomes inevitable. It is true that this is partly being done through international conferences, seminars, workshops, study visits and the like. Yet, there is a growing need for broader coverage of experiences and their wider circulation amongst a larger number of concerned people in different countries. There is perhaps a dearth of journals exclusively devoted to exchange of such experiences in this important area of technical and vocational education.

This JOURNAL is an another attempt to bridge this gap. The Journal views technical and vocational education in its broadest sense and aims at covering all its aspects through articles, research reports, reviews and write-ups of various programmes and projects. It hopes to serve as a means of communication amongst all those pursuing the cause of promotion and furtherance of technical and vocational education and training.

It is in this perspective that we are happy to present this *maiden* issue to our readers, writers and well-wishers. We look forward to their continued support and guidance by way of contributing articles, critical review of the contents and valuable suggestions to foster the growth of the Journal.

Decision-making Skills for Technical Teachers

ROY KILLEN AND EDWARD RICHARDSON

ABSTRACT

A need frequently overlooked in technical teacher education programmes is the necessity for teachers to develop effective decision-making skills. This paper outlines the magnitude of the problems faced by teachers who are not highly skilled decision-makers. It describes research to identify the types of decisions made by teachers in technical and further education in New South Wales. From an analysis of the research findings, a decision-making model, suitable for use by technical teachers, is developed. This model can be used in teacher education programmes to improve teachers' decision-making skills through analysis of case studies of critical incidents. The authors suggest ways in which such a programme of decision-making skills development can be implemented by drawing on their experiences at Newcastle CAE.

Introduction

Decision- making is an integral part of teaching. No teacher can be efficient and effective unless he/she is a competent decision-maker. Because executives in industry and commerce require skills in decision-making, it is common practice for such people to develop these skills through some formal course of study designed by experts and frequently provided at high cost. Industry believes the effort and high cost are justified by the results produced. Why, then, is decision-making a frequently neglected area of study in technical teacher education programmes?

If teacher training programmes are analysed, several reasons may be found to explain the absence of courses on decision-making. The most common reasons appear to be:

(*a*) The course has a strictly limited time frame which does not allow for the "luxury" of specialised topics such as decision-making; or

(*b*) The course is based on an assumption that either studies of the basic disciplines (psychology, sociology, etc.) or an integrated study based on teaching skills is adequate, transfer of training will occur and teacher decision-making skills will develop; or

(*c*) Decision-making is not recognised as a legitimate area for study — perhaps in the belief that such skills cannot be taught in general terms and it is preferable for the skilled teacher educator to pass on to the novice, rules for the application of well tried and tested procedures.

Of these possibilities, only the second is likely to lead to a situation in which teachers develop adequate decision-making skills — and even then the development of such skills is likely to be incidental or accidental.

Need

To appreciate the importance of decision-making as a legitimate concern in technical teacher education programmes, it is necessary to recognise the wide range of circumstances in which teachers need to make executive decisions. The most obvious areas are:

– planning
– teaching
– evaluation.

In the planning context the most common decisions relate to:

(*a*) syllabus interpretation
(*b*) objectives/purposes of instruction
(*c*) content selection
(*d*) time allocation
(*e*) method selection
(*f*) resources/instructional materials
(*g*) methods of assessment.

In the teaching context the decisions concern the same areas as those considered in planning plus, in particular,

(*a*) short-term direction of student activities
(*b*) classroom control/discipline
(*c*) motivation of students
(*d*) feedback to students
(*e*) means of adjusting teaching to meet the changing demands of a particular class
(*f*) means of adjusting teaching to meet the range of demands of students at different levels and of different abilities.

In the evaluation context most decisions are related to the determination of

(*a*) suitable methods of evaluation of students' achievement
(*b*) the general effectiveness of instruction as a means of achieving pre-specified objectives
(*c*) the suitability of specific content and methods of instruction as means of achieving pre-specified objectives, from the points of view of both students and teacher.

Unless specific instruction can be given on how a teacher should handle each and every situation pertaining to the above, a teacher education programme needs to provide teachers with general skills in decision-making in all these areas and, equally importantly, skills for evaluating the quality of the decisions they make. One of the difficulties technical teachers face is that, except for the teaching of simple operations such as hand skills, it is rarely possible for them to gain direct feedback on the effects of their decisions. For example, if a teacher decides to vary the content of a course, or change the emphasis on various aspects of that content, this decision will affect student learning; what the teacher can rarely determine is the extent of the effects of such decisions. Teachers need expertise in decision-making for the following reasons:

1. They must recognise when a decision has to be made.
2. They must be conscious of the basis on which they are making the decision.
3. They should be able to predict the likely effects of their decisions.
4. They should be able to evaluate the effects of their decisions.

If a concerted effort is to be made to improve the quality of the decisions made by teachers, the first step must be to increase the teachers' awareness of the decisions which are being made.

Earlier Studies

Berliner (1983) reported research which suggests that school teachers generally make ten non-trivial decisions during each hour of normal classroom activities. Frequently these decisions are based on principles such as strategic leniency or power sharing–principles which the decision-making teachers may not fully understand. It seems reasonable to assume that technical teachers are in a similar situation.

It is important for teachers to be aware that they are making non-trivial decisions. For example, a teacher who decides to be tolerant of inappropriate behaviour or to accept below-standard student performance, in the interests of maintaining student participation and progress towards a

long-term goal, may be said to be using strategic leniency. Providing such decisions to be lenient have been based consciously on sound premises it would not much matter what the process was called, or even that the user knew he was utilising an identified, named, strategy. It would, however be important for the teacher to realise the general nature of the decision made and the possible consequences of it. Such an awareness may not develop unless the teacher has made some systematic study of decision-making processes.

Another vital point made by Berliner (1983) is that teachers tend to make conscious decisions only when something unusual happens. A corollary of this situation is that teachers give little thought to the decisions they make in "normal" circumstances. Are teachers to blame for this situation or is it due to a lack of adequate emphasis on decision-making in teacher education programmes? Berliner certainly suggests that the blame rests very heavily on the teacher educators.

Ultimately, teachers must accept responsibility for their own actions and professional development. If teachers become fully aware of the implications of the decisions they make and believe that their decision-making really affects students' learning, they may be more inclined to try to make high-quality decisions.

Flanders (1983) suggests that one of the most important things to teach a teacher is how to analyse his/her own teaching. This applies equally to decision-making and to all other aspects of teaching.

Evans (1983) suggests that the decision-making of inexperienced school teachers is characterised by three main problems:

(*a*) they are slow to make decisions;

(*b*) they frequently do not know how to respond to classroom events;

(*c*) they generally do not anticipate classroom events.

Similar problems have been found to exist for inexperienced technical teachers. These problems are often manifested in the following ways:

(*a*) an ignorance of the real nature and causes of problems;

(*b*) a failure to analyse situations thoroughly;

(*c*) the use of threats or force to resolve conflict situations;

(*d*) general survival rather than managing behaviour.

Teachers need skills in making conscious decisions to control the variables which exist in any teaching situation. Logically, the first step in developing a rational approach to decision-making is to identify these variables and recognise that decisions have to be made.

TAFE Research

Research into TAFE teacher decision-making was carried out by four lecturers from Newcastle College of Advanced Education and the Institute of Technical and Adult Teacher Education (Sydney) during the years 1981 and 1982. This research was funded by the Australian Commonwealth Tertiary Education Commission as a special initiative in TAFE teacher education.

The research involved interviewing approximately 180 TAFE teachers whose teaching experience ranged from less than 6 months to more than twenty years. These teachers were asked to describe critical incidents which had occurred during their teaching experience. A critical incident was defined as "any situation in which a teacher is required to make a decision which has potentially serious implications for any of the parties involved". This broad definition gave teachers a fairly free rein to discuss a wide variety of experiences. The descriptions of critical incidents were either tape recorded and later transcribed, or written accounts were provided by the teachers concerned. In this way, approximately 250 descriptions of critical incidents were collected.

The incidents were analysed in terms of:

(*a*) the context in which the teachers were required to make decisions;

(*b*) the matters about which decisions had to be made;

(*c*) the outcomes of the decisions — their perceived success from the point of view of the teacher and the other parties concerned;

(*d*) the appropriateness of the decision, considering the time which was available to the teacher for considering circumstances and alternative plans of action;

(*e*) the short-term and long-term effects of the decisions;

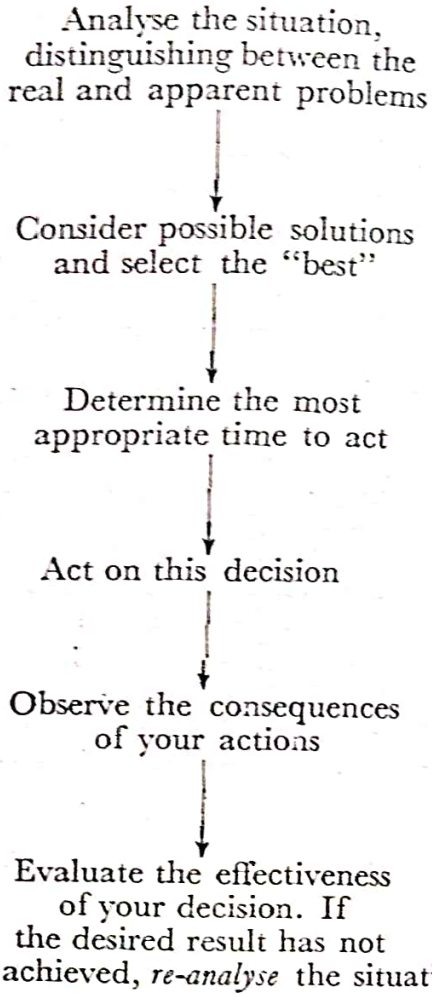
(*f*) the legal/moral implications of the decisions.

Analysis of these critical incidents resulted in the following major findings:

1. Teachers were frequently forced to base decisions on limited information and as a result the real problems were not identified.
2. Generally, a limited number of alternatives was considered — often because decisions had to be made quickly.
3. the timing of the teacher's actions was frequently inappropriate.
4. Teachers frequently showed limited concern for the effects of their decisions and did not attempt to analyse the results of their decisions.

Model

To be objective it must be admitted that these assessments were made with the wisdom of hindsight and frequently with the help of the teacher concerned. The reality of the teaching situation is that decisions often need to be made rapidly, and making a perfect decision in such circumstances is difficult, to say the least. However, once the major problems were identified, it was possible to construct a simple decision-making model which, if followed, would minimise the possibility of the occurrence of at least some of the major problems listed above. The model is shown below:



The simple linear format of the model has both advantages and limitations. The main advantage is that it shows the decision-making process as a series of events rather than a single step — deciding what to do. Such a simple model, however, does not reveal the complexity of the various stages of the process. A major problem is likely to occur at step 1 — it may be extremely difficult to distinguish between the real and apparent problems in a given situation. However, an awareness that such a distinction needs to be made is a vital first step towards effective decision-making.

The decision-making model will not solve problems any more than woodworking tools alone will make furniture. The model is a tool to be used when and

where appropriate. Use of the suggested model will not guarantee that teachers will make rational decisions or that rational decisions will necessarily be appropriate ones. However, it is an improvement on, and creates an awareness which replaces, the haphazard approach where alternatives and reasons are not considered at all, and where neither rationality nor appropriateness prevails.

The model does not address the matter of identifying potential problems. Rather it suggests a procedure to follow to retrieve the situation if a potential problem has not been identified. Experience, coupled with appropriate consideration of successful decision-making strategies, will help most teachers to develop a sensitivity and responsiveness which will help them to minimise the occurrence of problem situations. Progression to this stage in decision-making could be seen as replacing the first two steps of the previous model with:

Identify the potential problem

↓

Consider alternative means of preventing this problem arising and select the "best" course of action

Approach

The TAFE Department at Newcastle CAE has recognised the importance of decision-making skills for teachers. It also recognises that development of these skills should not be left to chance. Two approaches have been used to incorporate the development of teacher decision-making skills into the Diploma in Teaching (TAFE) programme.

The first approach was to integrate the study of critical incidents in TAFE teaching into several modules of the course — in particular the modules dealing with classroom management and teaching strategies. To a lesser extent, this approach was used in modules on curriculum and evaluation. This approach was beneficial to students but tended only to whet their appetites for a more detailed study of decision-making.

The second approach was to include a module on teacher decision-making in the Diploma in Teaching (TAFE) programme. This module allows students to investigate the principles of decision-making and to develop their decision-making skills through in-depth study of critical incidents. The major resource used in this module is a book and a series of guidelines for role-playing critical incidents, produced from the research described earlier.

The materials reflect the finding that decisions result in interpersonal interactions although they may have their basis in teacher decisions about such things as method or content selection, resource utilisation or evaluation. Since these interactions between teacher-student, teacher-teacher or student-student are the results of teacher decisions, they provide a useful basis for examination of decision-making strategies. Furthermore, as a reflection of the normal TAFE teaching situation, the majority of the incidents used involve teacher-student interactions which could be broadly classified as:

(*i*) organisation and discipline problems;

(*ii*) challenges to teacher's ability and knowledge;

(*iii*) personal problems between teacher and student;

(*iv*) personal problems of students.

In developing teachers' decision-making skills, four types of critical incidents have been found useful in practice at this college:

(*a*) Incidents which involve basically one major issue and which describe actions taken by participants to try to resolve that issue.

(*b*) Incidents which involve basically one major issue and which are open-ended in that they are left at their critical point without suggested solutions.

(*c*) Incidents which incorporate several major issues with suggested solutions.

(*d*) Incidents which incorporate several major issues and are open-ended.

For incidents of type (*a*), teachers apply the decision-making model as follows:

(*i*) the real problem is identified;

(*ii*) the causes and effects of this problem are discussed;

(*iii*) the actions taken by the teacher in the incident are discussed from the point of view of:

- the appropriateness of these actions;
- the timing of these actions;
- the likelihood of those actions solving the problem;
- the effects of the actions (if known);
- any legal or moral implications of the actions.

A similar form of analysis is used for incidents of type (*c*). For type (*b*) and (*d*) incidents, teachers need to develop their own solutions to the issues involved. These possible solutions are then discussed by the group in a similar manner to that suggested for incidents of type (*a*).

(Killen, McKee, Macleod, Spindler, 1983).

The development of rational decision-making processes is based on awareness, modelling, practice and adaptation. Awareness is developed by analysing a range of critical incidents and discussing them in small groups. Some incidents are positive models; others are examples of ineffective decision-making. Many critical incidents studied are open-ended to give students practice in decision-making and predicting the possible results of their decisions. Further practice is also provided through role playing. As teachers develop their decision-making skills they are encouraged to adopt them in their on-going teaching. Feedback to the teachers on the effectiveness of their decisons is provided during observations of their practical college teaching.

The aim of the module in the course at Newcastle is to improve technical teacher effectiveness by:

(*a*) developing decision-making skills which will allow teachers to determine appropriate solutions to any problems which occur in their classrooms;

(*b*) developing decision-making strategies which will allow teachers to make appropriate decisions when planning, teaching and evaluating;

(*c*) developing an awareness of the importance of communications in teaching so that potential problems can be identified in time to prevent their occurrence.

The critical incident analysis approach has been successful at this College in allowing most technical teachers to achieve these aims.

Conclusion

Novice teachers frequently seek guidance and advice from more experienced colleagues by asking questions such as "What will I do if...." In essence, this is asking someone else to make their decisions and solve their problems. When teachers develop effective decision-making strategies and confidence in their ability to solve problems, they can replace this question with a more useful one — "What do I need to know to handle this situation?" When teachers develop an appropriate awareness of the importance of their decisions, they will ask further questions such as "What decisions do I need to make in planning, teaching and evaluation?" "What are the possible consequences of these decisions?" "On what facts or assumptions can I base my decisions?" Only when decision-making is seen as a guide to teaching, rather than as a necessary part of problem-solving, will teachers fully appreciate the importance of developing effective decision-making strategies. If teachers are to become effective decision-makers, efforts must be made during their teacher education programes to develop these skills. This paper

has outlined one approach to decision-making skills development that is being used at Newcastle CAE and which appears to have considerable potential.

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A Conceptual Framework for Developing a Faculty Appraisal System

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ABSTRACT

In this paper, the principles, purposes and practices of staff appraisal generally in vogue are outlined. Critical performance areas for faculty appraisal in technical institutions are listed. Different approaches — appraisal by superiors, appraisal by peers, appraisal by students, self-appraisal, and an integrated approach — are briefly discussed. Linkages between the outcome of appraisal and staff and institutional development are indicated. General problems and constraints in staff appraisal are mentioned. Finally, a conceptual framework for developing a Faculty Appraisal System is suggested.

Introduction

In an educational institution, people consisting of administrators, teaching staff, supporting staff and students form a very precious human resource which requires to be handled imaginatively. Their divergent thinking processess, working styles and value systems go a long way to contribute to the success or failure of the Institute. They are to be nurtured, cajoled, motivated, rewarded and reprimanded in such a way that they give the best in them for efficient and effective institutional performance. Their knowledge, experience and expertise need to be identified, channellised, promoted, developed and deployed for optimum utilisation. Towards this end, different institutions have been introducing different systems of review/ appraisal/evaluation of performance and potential of their staff.

At one extreme is an approach which treats people like materials in a production process. People are directed, controlled, inspected and manipulated mechanically. If they do not meet the standards, randomly chosen, they are either reworked or discarded. Such approaches are fraught with peril, followed by considerable amount of resistance for appraisal, change, innovation and development. At the other end,there is another approach, characterised by adhoc provision for self-evaluation without a policy, plan or procedure, resulting in no evaluation of any worth, either from the point of individual or that of the institution. In between, lie different methods, models or approaches which attempt linking performance appraisal to satisfying personal needs, job-related needs, institutional needs and career development needs.

Approaches of appraisal need be based on certain principles such as that appraisal should not take the form of a ritual for frightening the people. But, it should be a normal on-going, non-threatening and supportive process, conceived with identifying the problems confronted by a member of the staff, in an advisory role with shared mission and collaborative approach.

These principles try:

- to seek the acceptance of the people being appraised;
- to help the individual develop intrinsic rather than extrinsic motivation;

- to create a situation in which people take an active rather than a passive role in the appraisal process;
- to convince the individual that the appraiser's role is that of a helper rather than a judge; and
- to establish a system of control which is principally internal and the individual sets his own standards and targets and identifies his strengths and weaknesses on a continuing basis.

Purposes of Appraisal

Performance appraisal may serve the following purposes:

- To enable the staff to know where they stand in terms of their plus and minus points.
- To identify the training and developmental needs to update their professional knowledge and skills and respond positively to changes.
- To inventory their talents and aspirations for manpower planning by way of suitable promotions and transfers.
- To recognise their accomplishments for reward and commendation.
- To create a suitable environment and working conditions for enhancing job satisfaction.
- To improve the performance of task groups and team work by harmonising the interrelationship between the members.
- To improve communication and working relationship between the staff and their superiors.
- To increase the institute's capacity to anticipate and cope with the changing and future needs.

Areas of Concern for Appraisal

Job description consisting of roles, functions and activities including job summary, limits on authority and responsibility may form a good basis for sighting the areas of concern for performance appraisal of a given faculty member. Some areas of work in which faculty members in Technical Institutions are generally associated with and which call for performance appraisal are given below as illustrative examples only.

*Subject matter competence:

- Scholarship in subjects taught and knowledge of allied subjects
- Modern practices and developments in industry
- Contemporary practices and future trends

*Teaching effectiveness:

- Planning and instruction
- Testing and evaluation
- Modifying student behaviour

*Research and development:

- Scientific investigations in pure, applied and sponsored research
- Innovations in curriculum design, instructional material development and implementation

*Consultancy services:

- Nature, level, magnitude, financial gains and customer satisfaction

*Professional standing:

- Publication of books, articles, monographs, laboratory manuals
- Awards, honours, commendations
- Membership on regional, state and national bodies

*Student and community services:

- Guidance and counselling relating to students' study problems, personal problems, placement problems and continuing education
- Community work relating to social/societal needs
- Contributions to co-curricular/extra-curricular activities

*Management and Administration:

- Interpersonal relationship with students, colleagues, parents and public
- Continuing self-development in knowledge, skills and attitude
- Resource management and utilisation
- Office procedures, rules and regulations
- Professional ethics and accountability

*Knowledge of Technical Education System:

- History, growth and development
- Philosophy, goals and objectives
- Structure, administration and control
- International trends and practices

Approaches for Appraisal

Periodical interviews

The recognition of the defects associated with post-performance appraisal or summative evaluation has prompted the need for periodical interviews between a faculty member and his superior on a continuing basis.

The basic assumptions involved in this approach are:

- Performance on-the-job should form the subject matter for appraisal rather than the personality of the individual concerned.
- Appraisal should cover the whole range of knowledge and skills relevant to all the areas of performance.
- The appraisee needs to know what is expected of him; how he is doing and what type of assistance and support he needs from his superior.
- The process should be non-hurting and non-punitive as far as possible.
- The results of the appraisal should be communicated in 'value free' form for the benefit of the individual concerned.

According to this approach, the faculty member and his superior agree upon the jobs and tasks to be performed and standards to be achieved for a period of time, say, next six months. The goals and responsibilities agreed upon are made as specific as possible for execution and achievement. In their next meeting, the successes and failures are assessed and targets refixed. This brings to light the shortcomings and failures of his superior also. In this process, the authority of the superior is deemphasised and an attempt is made to reach a decision mutually.

Self-Appraisal

Self-appraisal approaches presume that institutions/organisations let their staff know selection/recruitment policies and procedures, define career paths for vertical and horizontal mobility and provide opportunities for staff and institutional development. In addition, the people working in institutions/organisations take charge of their career as they are aware of their interests, abilities and aspirations and they know where they are and where they are going and actively pursue their interests. Self-appraisal approaches call for construction of tools to seek evidence on the performance in each area of work. These tools may be in the form of carefully worded constructs or statements on each item of evaluation relating to job/position.

The respondent may record his level of performance against each item and get an idea how well he is doing in each area of evaluation.

Alternatively, a brief description of the characteristics indicative of effective performance and ineffective performance may also be added on a bipolar basis against each item. The respondent records his level of performance against these criteria and appraises himself where he stands with respect to each area of evaluation.

In yet another approach of this type, no criteria or standards are laid down for the statements included in the evaluation

instrument. The respondent records his perceptions of effective performance and ineffective performance for each of the statements. Then, he records his own performance and undertakes self-appraisal against the criteria fixed by himself.

The first approach is thus free of any criteria; the second approach has externally imposed criteria and the third approach has criteria fixed by the respondent himself.

Appraisal by peers and experts

This is mostly done by observation followed by discussion with the concerned member of the staff. Rating forms covering all the relevant items of knowledge and skills, abilities and competencies to be evaluated are carefully prepared and used. The evaluators observe the performance of the ratee in live situations and assessment is made on the basis of the recorded ratings and discussion.

Appraisal by students

Teaching is addressed to students. It is therefore said that they are the best people to judge the performance of their teachers. Some institutions have adopted this approach. As reported, the procedure consists of preparing questionnaires, preferably comprising of multiple choice items, making them known to the students at the beginning of the year, administering them on the students at the end of the year, processing the responses and furnishing the final account to the staff which may be kept private, if so desired.

Integrated Approach

This approach attempts to integrate staff appraisal with staff development and institutional growth. The following observations made in the ACFHE/APTI document on "Staff Development in Further Education" are worth noting in this context.

- Education is a labour-intensive industry.
- Amateurism is rife in educational administration and personnel management is virtually non-existent.
- Staff (academic and administrative) are under-developed 'Resource'.
- Educational Institutions have objectives to meet and these objectives must be made to confirm, cohere and correspond to individual needs.
- A more rational approach is necessary to improve efficiency and effectiveness and to achieve results.

The procedure for this Integrated Approach is comprehensively given as under:

- Statement of institutional goals — current and future.
- Identification of key-result areas, ongoing and developmental.
- Guiding the staff to choose areas of operation according to their knowledge, experience, expertise, interest and position.
- Stating performance objectives for each member of the staff in measurable terms — quality, quantity, time and recources required.
- Drawing action plans and implementing them.
- Undertaking review and appraisal of their performance with peers or superiors.
- Conducting congruency and contingency analysis of performance against predetermined standards.
- Identifying strengths and areas of improvement and devising ways to improve upon them for each individual.
- Identifying the problems and constraints associated with institutional resources and procedures and providing enriched and enlarged conditions for better job performance.

This type of 'Do-it-yourself' approach is aimed at:

- making the institution function better as a whole.

- developing a sense of responsibility and personal accountability within each member of the staff and encourage his initiative and
- linking performance appraisal to staff and institutional development.

Linkages with Staff and Institutional Development

Staff appraisal provides a wealth of information on professional, personal and potential abilities. It may be used judiciously to meet the purposes of evluation earlier discussed. For example, if the overall performance of a staff member appraised is satisfactory, he may be encouraged to improve upon his strengths, by providing opportunities for job enrichment or job enlargement. If he is assessed to have developed special interest and abilities in some specific areas, he may be given support and encouragement by deploying him suitably. If he has demonstrated potential abilities to assume higher responsibilities, he may be commended or suitably rewarded. Appraisal data may also be used for increasing job satisfaction by improving job environment and modifying the institutional/departmental procedures for facilitating trouble-free working. If 'merit money' is provided in an institution for promoting excellence, it may be distributed on the basis of appraisal ratings, among the persons concerned, fixing a datum, if necessary.

If one is found wanting, he may be informed with specific instances for improvement and his training needs may be identified in one or more of in the following areas:

- academic development (theory, practice)
- personal development (communication skills, interpersonal skills)
- pedagogical development (knowledge, skills, practice)
- management and administration (theory, practice)
- perceptual development of technician education system (philosophy, aims, goals, practices)
- growing institutional needs for development and expansion
- diversingly changing values, learning styles and aspirations of students.

These developmental needs may be met by deputing the staff judiciously to one or more of the following programmes:

- Induction training
- In-service training — conferences, seminars, workshops
- Long-term in-service training programmes — academic, pedagogical
- Secondments to industry
- Research or project work

Problems and Constraints

All said and done, many have expressed serious doubts about the applicability or practicability of many of the approaches developed for appraisal of staff. Frank D. Bacon, Head of the Staff Development and Education Section at Salford College of Technology, U.K. in his paper on "Practicalities of Staff Development" had argued:

"I have investigated alleged appraisal systems in colleges and have found that they exist only on paper; I judge that this reluctance to operate the systems confirms my view that they are untenable".

"The majority of the under-performers is likely to be poorly regarded; is there any point in appraisal interviews? The majority of the efficient teachers is likely to be well regarded and will know it; is there any point in appraisal interviews? There remain the minority cases — the under-performer who for whatever reasons is well regarded and the efficient teacher

who (perhaps because of a clash of personalities) is poorly regarded. The former may profit; the latter will certainly not. Appraisal interviews can do nothing to remedy such situations."

Problems also arise due to differing perceptions among the staff with respect to purpose of appraisal and use of appraisal information. These differences are due to

- varying degrees of commitment to work,
- value differences due to differential social and cultural backgrounds,
- varying interest in different performance areas,
- lack of agreement about the utility of the appraisal system and validity of its enforcement.

These differences may result in resistence to staff appraisal. It is always better to take the staff into confidence at every stage in developing the appraisal system and its implementation strategies.

Framework for Developing an Appraisal System

In the light of the foregoing discussions, a framework for developing a faculty appraisal system is suggested as under:

(*i*) Establish the need for introducing a comprehensive faculty appraisal system.

(*ii*) Identify the purposes of appraisal.

(*iii*) Decide the performance areas/ sub-areas for appraisal for each category of the faculty.

(*iv*) Fix the weightages to be given to each performance area/sub-area.

(*v*) Decide the categories of appraisers and distribute the weightages for each sub-area amongst the relevant appraisers

(*vi*) Develop appropriate tools and instruments for appraisal of the relevant sub-areas by each category of appraisers.

(*vii*) Decide the logistics for appraisal and administer the tools/instruments.

(*viii*) Collect the data, work out the overall scores for each sub-area considering the weightages allotted to each category of appraisers.

(*ix*) Assess the performance of the individual in each area on the basis of the scores obtained by him and compare his level of performance with that of his colleagues of the same category, if desired.

(*x*) Use the outcome of the appraisal for meeting the purposes earlier decided.

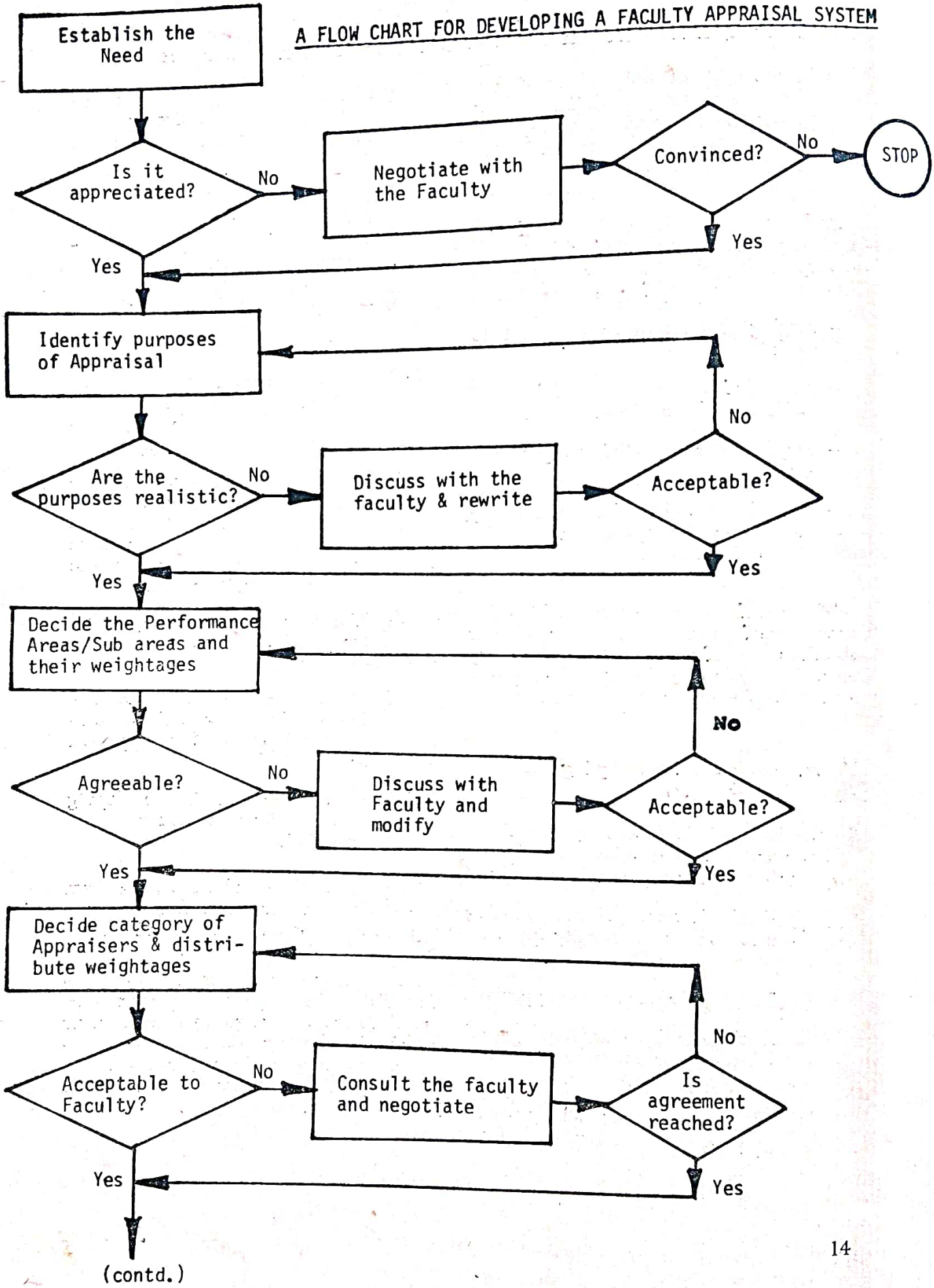
(*xi*) Consult the faculty and take them into confidence at each stage in the development of the appraisal system.

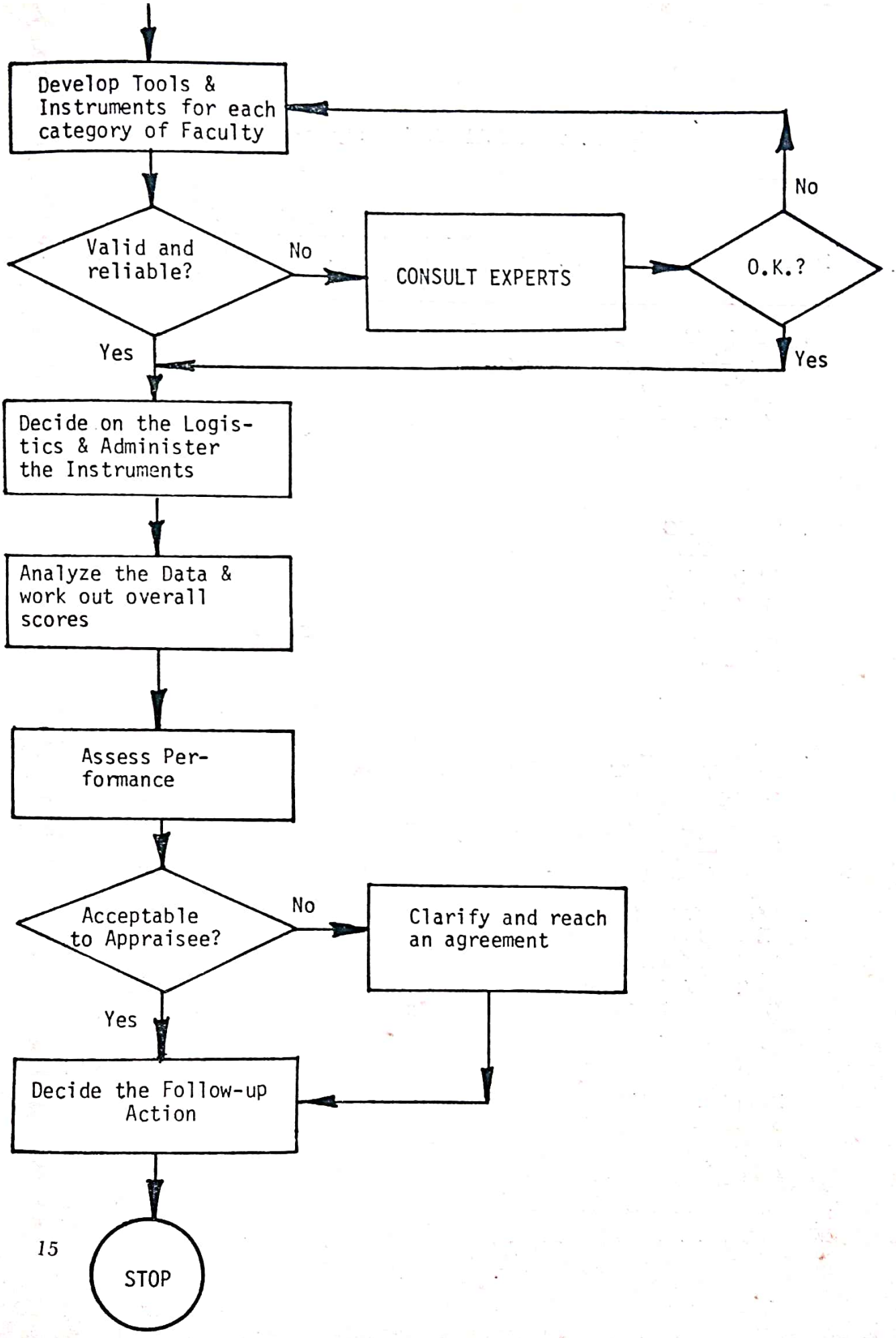
(*xii*) Consult experts in developing tools and instruments for appraisal.

These steps are articulated in the form of a Flow Chart for facilitating easy conceptualisation as on pages 14 and 15.

As an illustrative example, a Specification Table, identifying the performance areas/sub-areas, weightages and their distribution among the concerned categories, to appraise the performance of a faculty member at the level of an Assistant Professor in a Technical Institution is given on pages 16 and 17.

A FLOW CHART FOR DEVELOPING A FACULTY APPRAISAL SYSTEM




Develop Tools & Instruments for each category of Faculty
Valid and reliable?
No
CONSULT EXPERTS
O.K.?
No
Yes
Yes
Decide on the Logistics & Administer the Instruments
Analyze the Data & work out overall scores
Assess Performance
Acceptable to Appraisee?
No
Clarify and reach an agreement
Yes
Decide the Follow-up Action
STOP

Specification Table for Faculty Appraisal

Performance Area/Sub-area	Weightage	Distribution of weightages for appraisal by			
		Superiors/ experts	Peers	Students	Self
1. SUBJECT MATTER COMPETENCE	20				
(*a*) Scholarship 8					
(*b*) Modern Industrial Practices 8		3	3	10	4
(*c*) Future developments 4					
2. TEACHING EFFECTIVENESS	20				
(*a*) Planning 4					
(*b*) Instruction 8					
(*c*) Evaluation 4		2	3	10	5
(*d*) Modifying student behaviour 4					
3. RESEARCH & DEVELOPMENT	12				
(*a*) Scientific investigations 6		2	5	—	5
(*b*) Curricular innovations 6					
4. CONSULTANCY SERVICES	8				
(*a*) Quantity & quality 3					
(*b*) Financial gains 2		3	2	—	3
(*c*) Customer satisfaction 3					
5. PROFESSIONAL STANDING	10				
(*a*) Publications 4					
(*b*) Commendations 4		2	4	—	4
(*c*) Memberships 2					

6.	STUDENT & COMMUNITY SERVICES	12				
	(*a*) Guidance & Counselling 6					
	(*b*) Community/ Social work 3		2	2	5	3
	(*c*) Co/extra curricular activities. 3					
7.	MANAGEMENT AND ADMINISTRATION	10				
	(*a*) Inter-personal relationship 3					
	(*b*) Self development 3		4	3	—	3
	(*c*) Contribution to Institutional effort 2					
	(*d*) Professional ethics & Accountability 2					
8.	UNDERSTANDING OF TECHNICAL EDUCATION SYSTEM	8				
	(*a*) History, growth & development 2					
	(*b*) Philosophy, goals & objectives 2		2	3	—	3
	(*c*) Structure, administration & control 2					
	(*d*) Contemporary practices & future development 2					
	TOTAL	100	20	25	25	30

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The Curricular Practice of American Proprietary Trade and Technical Schools

SUNG-HO LEE

ABSTRACT

The purpose of this article is to describe the actual and desired curricular practices in American proprietary schools. The discussion has four points of focus. First, there is a brief introduction on the evolution of American proprietary trade and technical schools. The second part reviews major distinctions of their curricular practices. In the third part, a considerable emphasis is placed on the rationale for curriculum change in proprietary schools. The fourth part of the article attempts to illuminate certain actual and desired curricular practices and their discrepancies in selected proprietary trade and technical schools.

I. Evolution of American Proprietary Trade and Technical Schools

Proprietary trade and technical schools in the United States are privately owned, profit-making, non-collegiate, post secondary educational institutions that provide training for marketable career skills. The main segments of these schools are (1) trade and technical schools (2) business and secretarial schools (3) correspondence schools and (4) cosmetology schools

The proprietary schools in the United States have a long history of over 350 years. After entering into this century, the proprietary trade and technical schools have grown to be one of the principal sources of occupational, vocational education and training for trade and technical occupations. Their growth has been accelerated partly by the increasingly huge public commitment to vocational education in the United States and partly with the enforcement of the Vocational Education Act of 1963 and the Educationsal Amendments of 1972. The Vocational Education Act of 1963 recognised the importance of vocational training and the potential contribution of proprietary schools to meeting the demands for training was partially acknowledged. Further, the Educational Amendments of 1972 made a considerable contribution to the recognition of proprietary schools as a part of the post-secondary education system. The passage of 1976 Higher Education Amendments is also regarded as an important mark which influenced the development and growth of vocational trade and technical education at post—secondary level throughout the U.S.A.[1]

It has been reported that in 1973 the proprietary schools served approximately 3,288,000 students in 8,439 schools, producing a gross annual income of $. 2.5 billion[2]. The Bellitsky's[3] estimate made in 1966 shows that the proprietary trade and technical schools and their students are clearly the most sizable groups, accounting for 42.4 percent (3,000) of all proprietary schools and 53.4 percent (835,710) of all students. The most recent survey by Kay[4] of the National Centre for Education Statistics reports that 40 percent of all the proprietary students in 1978 were enrolled in trade and technical schools, while 42 percent were enrolled in business schools and 18 percent in cosmetology schools. This shows that a great concentration of proprietary school enrolments is still in trade and technical schools with more than one-third of the students.

Until a few decades ago, the proprietary schools had been ignored by traditional educators and research scholars, despite the growing number of proprietary schools and students[5]. To date, there have been only a dozen or so empirical research studies, and less than ten doctoral dissertations, which are at least partly related to proprietary trade and technical education. In large part, these studies were partly motivated by recently growing concern over the social value of proprietary education and partly by growing state-level concerns over the questionable ethics of some of these schools.[6] However, few answers were sought to the fundamental questions about the nature of their curricular practices and particularly about the match between education and the demands or needs of the world of work and their quality of education. It is therefore appropriate to have a review of major distinctions of curricular practices of proprietary trade and technical schools for an understanding of the status of future research problems in the area.

II. The Curricular Practices... Review of Major Distinctions.

Proprietary-schools are different from other types of post—secondary institutions in their philosophy, goals and objectives. They are characterised by single-goal, specific occupational skill training toward employment in the shortest possible time, with relatively little care about personal, academic and cultural growth of the students. Foster,[7] who studied the independent private and proprietary vocational schools in Missouri in 1974, also agrees with this primary limited objective, and he adds four secondary objectives, which are:

1. To develop a high degree of competence in a trade or technical occupation, or a cluster of related jobs.
2. To serve the needs of local employers for well trained personnel.
3. To provide instruction quickly to meet emergencies and rapidly changing demand in the labour market.
4. To serve the needs of employed adults who wish to advance or change occupations.

One of the most important features of proprietary schools is the breadth of programme offerings and their intensively specialised and concentrated coverage. A statewide inventory of proprietary school programmes by Nolfi and Nelson[8] has found that proprietary schools specialise in programmes not covered by public institutions. Belitsky[9] observes that proprietary schools were quick to pioneer developing fields and offer what non-proprietary institutions could not or would not offer.

Another feature of programme offerings is the reduced emphasis on general education and the few frills or extra-curricular activities. Since profit is imperative for any proprietary enterprise and most of the emphasis is placed on skill training, contents or subjects not contributing directly to vocational instruction are minimised.

Flexible programme operation is also a major distinction of curricular practices in proprietary schools. Year-round operations, frequent class starts and a great variety of attendance schedules are the norm. Course of instruction might be one week in length, one year towards a diploma, or fifteen to twenty-four months towards an associate degree. However, most of the courses, according to Wilm's[10] study, were short-term offerings which required a year or less to completion. The comprehensive study of roles and traits of proprietary schools by Carr[11] of 146 proprietary schools in New York State contains analysis regarding specific traits credited for the continued survival and prosperity of proprietary schools. Among these are included the following two:

1. Flexible programme and course schedules designed to increase accessibility to economically disadvant-

aged students by minimising the income lost while enrolled;

2. Flexible curricula designed to make it convenient for students to enter, exit and re-enter at different occupational skill levels, thereby increasing the probability of enrolment and completion.

A distinctive feature of instruction in proprietary schools is their practical, hands-on orientation of instruction. Most of the leading researchers of proprietary schools are in agreement in that primary emphasis is placed on simulation of actual work conditions and environments and application or functional phases of instruction. Such instruction in a practical job-stimulating setting is accordingly provided through the laboratory method, which lays considerable emphasis upon manipulated activities.

Another distinctive method of instruction provided in proprietary schools is the breakdown of a course into short, sequential units or topics. According to Belitsky[12], this practice of presenting courses in segments reflects the conviction that "Student motivation and success are encouraged lagely through a continuing sense of achievement in their vocational education".

Proprietary school classes are typically smaller in size than classes in non-proprietary schools, a feature which permits more individualised instruction, increases feedback to students and produces a more relaxed class atmosphere[13]. According to the Report on Proprietary Vocational Schools[14] by the House Republican Task Force on Education and Training, small classes and individualised instruction are the norm.

Information regarding grading and evaluation is limited. Herbert and Coyne[15] descriptively introduce the practice of grades and standards prevailing in proprietary schools as follows:

"In proprietary trade and technical schools, each school grades and evaluates students,... in a form useful to employers. Written work is usually of secondary importance. Attitude counts most. A slow student who comes every day and tries hard is going to be placed in a job. Instructors appreciate earnestness".

III. The Curriculum Change

It used to be said that proprietary schools are always ready to change due to their profit-motive feature as a business firm as well as an educational institution. However, the lag between what is taught in those schools and what is actually practised in industry seems to constitute a related problem. It is doubtful that any momentary changes to demands by consumers without rational approaches guided by basic principles and directions will contribute to their permanent survival. In this section, it is briefly discussed what factors create conditions for change of proprietary school curriculum.

The following changes in the world of work which are directly suggestive to proprietary schools can be pin—pointed:

First, Kiplinger and Barch[16] forecast that between now and 1985 about 5,000,000 job openings will be available. Two or three of these will be jobs that existed before... to be filled in the normal process of turnover and placement. The third will be brand new...an addition to what was available before.

Second, there is ample evidence that a college degree is not and will not be the best way to prepare for many of the new occupational careers. The American Foundation of Automation and Employment[17] reports that some 80 per cent of the jobs will require training and education, but not a four-year degree.

Thirdly, many of specific jobs promising substantial growth through the mid-80's, compiled by the U.S. Department of Labour[18] are fields for which proprietary schools have offered training.

Fourth, in 'A Look at Business in 1980', Amara[19] under—scored the rapid change of career requirements stating that persons in virtually all vocations will face eventual job obsolescence'.

Fifth and finally, according to Bond[20], veteran and old workers seeking retraining experiences, college graduates dissatisfied with their liberal arts education, professional personnel needing efficient and effective retraining in order to keep up with the rapidly increasing information and skills are all taking a close look at the educational services which proprietary schools provide.

These enormous changes in the world of work will place greater demand upon proprietary schools to produce the kind of products who will be able to fit in and to make American Society run. It is obvious that a manipulative approach to curriculum change is no longer adequate to deal with these changes in the world of work and to satisfy the consumers in order to stay in business. Proprietary school educators must rethink the entire curriculum, especially in relation to all that has been and should be available.

Confronted by pressures for change, proprietary schools have reacted in two ways. One common approach to curriculum change is programme additions/deletions primarily based on profit-motive. The owners, who are in large part responsible for a profitable operation, add new courses when there is demand for enrolment or delete obsolete courses when enrolment falls. Another popular method used in this approach is one which emphasises an analysis of the activities of graduates and enployers. On the basis of their response, the curriculum planner inserts some courses into the course offerings or pulls out.

While prosperity may be achieved for brief periods through intensified sales and cost-cutting business practices by easily creating and terminating some programmes, the constant and long-term success and the cherished value of a school may be assumed only when educational concerns command the highest priority. Curriculum changes must be tried to maintain standards of good training and still earn profits.

The other common approach to curriculum change is to gain accreditation. An accrediting agency adopts criteria reflecting the qualities of a sound educational programme and develops procedures for evaluating institutions or programmes to determine whether or not they are operating at the basic level of quality. To meet the standards and criteria established by the accrediting agency, schools seemingly engage in changing their curriculum and upgrading the quality of their programmes.

According to Orlans' estimate[21], only seventeen percent of the total proprietary schools were accredited in 1971. By enrolment, fifty-eight percent of the total students of proprietary schools were enrolled in accredited schools.

Proprietary schools place primary importance upon reputation and use accreditation in building reputation. On the other hand, Foster[22] reveals that many smaller schools continue to reject accreditation because of financial constraints or incompatibility between accreditation requirements and school objectives.

It cannot and should not be asserted that all accredited schools are faultless, without impeaching their efforts to maintain and improve standards and that all non-accredited schools are deficient in their educational quality. This is deemed to be why such a low percentage of the total proprietary schools are accredited and why fundamental consideration to curriculum change should be taken in proprietary schools, whether accredited or not, which have rarely benefitted from or sought the professional assistance of educators.

In order to survive and prosper, proprietary schools have to continually

strive to change curriculum to effect quality in education. The quest for profits should serve to stimulate continuous changes in curricular practices. Owners have to invest time and money reforming curriculum and conducting institutional curriculum research.

IV. A Study of Actual and Desired Curricular Practices.

A Framework for Study

In general, it is said that the process of curriculum change involves four stages — recognition of need, planning and formulation of a solution, initiation and implementation of the plan, and institutionalisation of the changes.[23] This study is limited to the first stage — recognition of need, which is "a matter of perception."[24].

In *Basic Principles of Curriculum and Instruction*, Tyler [25] offers four fundamental questions which must be answered in developing any curriculum and plan of instruction:

1. What educational purposes should the school seek to attain?
2. What educational experiences can be provided that are likely to attain these purposes?
3. How can these educational experiences be effectively organized?
4. How can we determine whether these purposes are being attained?

Tyler identified atleast the major commonplaces of currioulum — the elements about which curriculum makers must make decisions, and on which researchers must focus. Accordingly, his four questions are accepted as a basis for arranging the survey questionnaire into five parts — philosophy and objectives, planning and organization, teaching – learning process, evaluation and improvement. The last part "improvement" is with emphasis on the effort for curricular improvement of proprietary schools.

Goodlad and his associates[26] assert that for a study of curricular practice, it is useful to modify Tyler's four questions so that "is" or "are" questions are asked: What are the educational purposes? What educational experiences are provided? How are they organized? How is the attainment of these purposes or the value of these experiences being evaluated? Sarason[27]points out that the fate of the change will in some measure be a function of the discrepancy in that system between proposals made and proposals implemented, which are in this investigation conceptualized as "desired practices" and "actual practices".

Curriculum change should be goals and actions that originate in a unified sense of purpose within the proprietary school educators and the consumers, stimulated by mutual respect and by natural concern for the individual learner. In responding to the demands for specific services of the society, there is a need to keep in close enough contact not only with those insiders who would produce their products but also with those outsiders who would use those products; to sort out what they wish to do and might do in curriculum change; and to enlighten the debate and to point to needed improvements. As insiders, administators and faculty members should be invited in the process of curriculum change.

Almost every bit of literature and research on proprietary schools underscores that proprietary schools should be responsive to needs, changes and attitudes of the consumer groups — students and employers. Belitsky[28] argues that flexible accommodation to the needs and demands of students and their prospective employers is the outstanding feature of private vocational schools. One of today's challenges faced by proprietary schools is how to maximize net satisfaction of industry and the students, and to strike a balance between meeting industrial demand and the student demand. Tackling this challenge must be a co-operative venture.

Purpose of the Study

The present investigation is primarily concerned with the curricular practices of proprietary trade and technical schools. More specifically, the purpose of this study was to investigate the perceptions of proprietary school educators (adminstrators and faculty members) and consumers (students and employers) regarding actual and desired practices of curriculum and which restraining forces have prevented the change from a desired to an actual practice.

Setting and Procedures Used in the Study

The subjects were composed of 332 randomly sampled administrators, faculty members, students and employers of the sixteen proprietary trade and technical schools in the Washington, D.C. metropolitan area. The instrument developed by the researcher included seventy-five statements regarding curricular practices — philosophy and objectives, curriculum planning and organization, teaching-learning process, evaluation and curriculum improvement.

The questionnaire was designed to get responses in the following three ways:

1. To indicate "Yes" or "No" to an individual item as to whether the action or concern listed in each statement is an "actual practice" of the proprietary trade and technical school;

2. To indicate "Yes" or "No" to an individual item as to whether the action or concern listed in each statement is a "desired practice" for the proprietary trade and technical school; and

3. To identify the restraining force(s) that has prevented the change from "desired" to "actual" in the event of a discrepancy in any individual item.

The following were identified as possible restraining forces which the respondent might refer to by their number, although they were encouraged to write any other alternative restraining force from their personal experience.

1. Not within the functions of the proprietary trade and technical schools
2. Owner's or corporation's policy
3. Expertise limitations
4. Financial limitations
5. Personnel limitations
6. Space limitations
7. Time limitations.

The independent variables are categorical as determined by each subject's responses to the questionnaire items. They are the group status (administrator, faculty member, student and employer), the school's accreditation status (accredited, or non-accredited), the length of teaching of faculty members, the length of work of administrators, the student's sex, career experiences and the employer's experience of employing the proprietary trade and technical school graduates.

The total number of statements of actual practices, desired practices and discrepancies for each respondent are measured as dependent variables.

The data was analyzed using one-way- and two-way analysis of variance (ANOVA), Pearson-product moment crroelation and t-test. The significance level was set at the 0.05 level. This means that an observed significant difference would occur by chance only five times out of 100 trials under a null hypothesis.

Findings of the study

Replies from 332 proprietary trade and technical school administrators, faculty members, students and their employers revealed that the number of statements of desired practices was significantly larger than the number of statements of actual practices. Of the seventy-five statements, forty-one statements were perceived as practised actually and sixty-six perceived

as desirable, yielding the difference of twenty-five statements. Such a statistically significant difference between the number of statements of actual practices and the number of statements of desired practices was also found in any single group divided by group status, accreditation status, sex, employment experience and possible combination of group status and accreditation status.

It was found that there existed a significant difference in the perceptions of actual practices as well as desired practices among the four groups. (administrators, faculty members. students, and employers). An analysis of each part revealed that in the actual practices there were significant differences in each part among the four groups but that in the desired practices no significant differences were detected in Part II (curriculum planning & organisation), Part IV (evaluation) and Part V (curriculum improvement).

The relative effect of the accreditation status with group status (only administrators, faculty members and students, excluding employers) was tested using two-way analysis of variance, which revealed existence of significant interaction effect in none of the actual practices, desired practices and discrepancies. However, it should be noted that "accreditation status" itself made a significant difference in all those three dependent variables — actual practices, desired practices and discrepancies — among three groups. In addition, it was also found that some parts were significantly affected by interaction effect between group status and accreditation status. For example, there were significant interaction effects in Part II (curriculum planning and organization) and Part III (teaching-learning process) of actual practices.

The test using Pearson-product moment correlation coefficient on the relationship revealed no existence of significant relationship between:

1. the length of teaching experiences of the faculty members and their numbers of statements of actual practice;
2. the length of work experiences of the administrators and their numbers of statements of actual practice;
3. the length of career experiences of the students and their numbers of statements of actual practice;
4. the length of teaching experiences of the faculty members and their numbers of statements of discrepancies;
5. the length of work experiences of the administrators and their numbers of statements of discrepancies;
6. the length of career experiences of the students and their numbers of statements of discrepancies.

The survey revealed that about eighty-two per cent of the students have had full time career experiences and about seventeen per cent of the students in the survey have been full-time employed more than five years.

A comparison between male students and female students revealed that no significant difference existed in the numbers of statements of actual practices and desired practices as well as discrepancies.

A similar comparison was made between the employers who have ever employed the proprietary trade and technical school graduates and employers who have never employed them. Between them, no significant differences existed in all three dependet variables — numbers of statements of actual practices, desired practices, and discrepancies.

The area of inquiry which was most practised and desired by the total sample was that of "Philosophy and Objectives", while the area of "Curriculum Development" was the least practised and the area of "Planning and Organization" was the least desired. More than half of

the total sample (56%) felt that the actions or concerns listed in the seventy-five statements were those practised now and about ninety per cent of the total sample perceived those seventy-five statements were highly desirable practices for the proprietary trade and technical schools.

The restraining force "Owner's or Corporation's Policy" was the most frequently (30.7%) selected by the total sample of seven possible restraining forces. The second was "Expertise Limitations" (22.8%), which prevented the change from a desired to an actual curricular practice.

Major Traits of Curricular Practices

The Findings of this investigation pinpointed four major traits of the curricular practices of proprietary trade and technical schools in the Washington, D.C., metropolitan area.

The first trait showed the mean number of statements of actual practices to be significantly lower than that of desired practices. As previously discussed, the fate of the curricular change is in some measure a function of the discrepancy in that system between actual and desired practices. The relatively considerable distance between the actual and the desired practices found in this investigation is not only a problem, but also a stimulative trait in terms of curricular change. As along as the currently found discrepancy exists, the curricular practices cannot satisfy the desire for accountability and quality of trade and technical training by the educators and consumers. However, the possible effort by any means to reduce the discrepancy between actual and desired practices in a certain school will make a contribution toward the quality control of proprietary trade and technical education.

The second trait was the individual functions of group status and accreditation status, although not as an interaction, but in determining the extent of perceptions of actual and desired curricular practices. The fact that four groups reported significantly different extent of perceptions of actual and desired curricular practices suggests that the educational concerns of administrators, faculty members, students and employers were not in harmony,. To make the proprietary trade and technical education more effective and efficient, such substantially different concerns should be precisely identified and general agreement should be established.

It is one of the meaningful findings that the school's accreditation status was a factor in differentiating the extent of perceptions of actual and desired curricular practices between the subjects from the accredited schools and those from the non-accredited schools. In particular, the former obtained the higher mean number of statements of actual practices than the latter. This finding suggests that the curricular practices of accredited schools are much closer to the practices desired by their aministrators, faculty members and students than those of non-accredited schools.

Thirdly, the findings of this investigation are in extreme opposition to the belief that career and employment experiences and sex are major determinants of extent of perceptions of actual and desired curricular practices. No significant relationships were detected between the length of various experiences and the extent of perceptions of curricular practices. In addition, no significant differences were found between male and female students, or between employment experienced and non-experienced employers. Those findings make it difficult to generalize such belief reported previously by researchers of proprietary education to the subjects of proprietary trade and technical schools in the Washington, D.C., metropolitan area.

Finally, the fact that "Owner's or Corporation's Policy" and "Expertise Limitations" largely impede the change from a desired to an actual curricular practice is particularly meaningful. Both restraining forces are particularly evident for the reasons that owners largly determine

the responses of proprietary schools to various market demands, regardless of its profit potential, based mainly on the desire to maximize profits as an end in itself; and that they behave as private business entrepreneurs, and executives rather than academic educators.

In sum, this study was limited not only in scope in that it considered narrowly defined curricular practices, but also in the subject which were confined to an investigation of sixteen schools and sampled employers of the Washington, D.C., metropolitan area. However, the results might have potential to be used as a resource for curriculum change and as basic information about the different needs of their educators and consumers to the proprietary school curriculum planners. This study should be replicated in extended geographical areas with more representative sample and predispositions of the subjects and schools, after individual item-analysis and revalidation.

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Identification of Factors Facilitating and Constraining Industry–Polytechnic Collaboration*

BHAT N. R.

ABSTRACT

This is a brief report of the findings of an All-India Survey conducted by the TTTI's for the UNDP Assisted National Project entitled "Identification of Factors Facilitating and Constraining Industry — Polytechnic Collaboration". The survey has helped to make a profile analysis of the prevailing practices in the polytechnics with regard to Industry — Institute collaboration. An attempt is made to quantify the degree of collaboration and its possible association with certain characteristics of the polytechnics. The survey has shown that there is a wide variation in the degree and profile of collaboration among the various polytechnics, classified under different categories. The study has helped in coming up with certain suggestions for improving collaboration between industry and the polytechnics.

Introduction

Persons concerned with both industry and technical education have recognised the need for collaboration between industry and technical institutions. It is only through collaborative efforts that meaningful educational and training experiences can be provided for developing competent technical manpower in the country. Yet, there is a strong feeling not only in India but also in Western countries that the link between industry and technical institutions is not strong and they seem to function in isolation. It is however gratifying to note that the scenario with regard to Industry - technical institution collaboration is now slowly changing and certain efforts are being made in the country to bring about collaboration. This survey was undertaken to study the present status, extent and area of collaboration between industry and polytechnic institutions (institutions which produce technicians) in the country and come up with certain suggestions to strengthen this collaboration.

Scope of the Study

The survey proposed to identify the areas and extent of collaboration that exist between the polytechnics and the industry. It was confined mainly to institution - initiated activities and the major areas covered in the survey were:

1. Polytechnic's contribution to industry
   - * Making available faculty support
     - – Lectures to personnel in industry
     - – Working on deputation in industry
   - * Conduct of special programmes to meet the needs of industrial personnel
   - * Providing consultancy
2. Industry's contribution to the polytechnics
   - * Students

* Inter TTTI Educational Research Project, coordinated by Dr. (Mrs.) J. Indiresan and published by TTTI Madras.

- Industrial visits
- Training in industry
- Earn while you learn
- Placement in Industry
- Student aid (Scholarships/ Prizes)

* Deputing Industrial Personnel
  - For teaching
  - For curriculum development
  - Supervising Training
* Financial support
* Donating equipment
* Training faculty from polytechnics.

3. General aspects
   * Liaison
   * Social interaction

The objective of the survey was to get a profile of the collaboration that already exists between industry and polytechnics in the various areas mentioned above and to develop an index of collaboration to help make a quantitative analysis of collaboration with reference to different characteristics of polytechnics.

Methodology

(a) Tools

The data for the study was obtained by a survey of all the polytechnics in India through a specially designed questionnaire. Since no empirical study on this problem has been reported so far, items regarding possible areas of collaboration were pooled. The questionnaire included 23 items distributed among the three major areas mentioned above and one item which elicited the opinion of the institutions on the state of their collaboration with industry. Provision was also made for making free comments, if any.

The preliminary form of the questionnaire was pilot-tested in five polytechnics in Madras and the final format was evolved, making necessary modifications.

The printed questionnaires were sent to 290 Polytechnics in India through the four Technical Teacher Training Institutes (TTTIs). Finally, data were available from 142 polytechnics (48.9%) and the percentage returns from different regions were: Northern Region (42.7%), Western Region (61.7%), Eastern Region (38%) and Southern Region (52.9%)

(b) Analysis

The analysis of the survey data was mainly restricted to qualitative analysis indicating the nature of collaborative activities prevailing in different types of insitutions.

An attempt was also made to develop an "index of collaboration" and study its distribution with reference to various characteristics of the polytechnics. The following steps were used in arriving at this index of collaboration:

1. Certain dimensions and levels (a, b, c) of collaboration were identified.
2. After an extensive discussion of these dimensions and levels, operational definitions of these were arrived at.
3. Weightages were then assigned to each one of these levels (a, b, c), giving a higher weightage to the polytechnic-initiated activity.
4. In order to differentiate the impact of the various activities covered by different items in the questionnaire, a second order weightage was assigned on the basis of impact (i) — high, medium, low — of each activity on the overall collaboration. That is, the dimension totals (Σd_{1-6}) for each item were multiplied by the degree of impact weightage i (i=1, 2 or 3) to arrive at the score for each item (called Item Total Score — ITS).
5. Next, each item in the questionnaire was analysed to identify the dimensions and levels represented by each of the responses and the degree of impact of this activity.

6. An overall summation of these item total scores was taken as the final Index Score (IS) of the degree of collaboration.

i.e. $ITS = (\Sigma d_{1-6}) \times i$

$IS = \Sigma ITS$

It should be mentioned that this measure developed for analysing the overall degree of collaboration has a limitation that summation is done only for type of collaboration activity and quality and quantity of an activity is not included in the measure.

The dimensions and levels of collaboration used in the index together with their operational definitions are given in Table 1.

The degree of impact with their operational definitions are given in Table 2.

In the analysis, the mean collaboration indices of polytechnic groups based on the following characteristics are compared using the standard tests of significance (t — test and F — test)

- Type of institution – Government or Private
- Faculty strength
- Student intake
- Conducting sandwich/post diploma courses
- Regional distribution of polytechnics

Findings

(*a*) *Profile of the Industry-Polytechnic collaboration*

The responses to twenty three items in the questionnaires relating to different activities indicating various types of collaboration were analysed. The frequency and percentage of responses regarding the actual practices in these activities as indicated by the polytechnics — region-wise as well as total were calculated and the activities were ranked according to the frequency of responses.

The following profile of collaboration has emerged from this analysis.

1. There are just five activities to which more than 50% of the polytechnics have responded as practising. These are

(*i*) *Arranging industrial visits for students:* This activity gets an overall percentage of 82 and is assigned the top rank. There seems to be no regional variation in ranking with regard to this activity, as it receives the top rank in all the four regions.

(*ii*) *Industries contacting polytechnics for recruitment of students:* It is interesting to note that 69% of the polytechnics report that the industries contact them for recruitment of their students. This is indeed a welcome sign. There is a wide regional variation in response from 47% in Eastern region to 81% in Western Region. Nearly 45% of the polytechnics report that less than 10% of students get selected through this procedure, while about 12% polytechnics report that between 10% to 20% of their students get selected this way. There are just 6 polytechnics which report that more than 80% of their students get selected through campus recruitment. It is also noticed that private polytechnics report a marginally better rapport with industry than Government Polytechnics with regard to this activity.

(*iii*) *Teachers deputed to industry under Quality Improvement Programmes (QIP):* 65% of the polytechnics report that their teachers are deputed to industry under the QIP Scheme. The percentage varies from 41% in the Northern Region to 72% in the Southern Region. A greater percentage of teachers (66%) from Government Polytechnics are seen to utilise this scheme as compared to 53% teachers from Private polytechnics.

(*iv*) *Industry's participation in polytechnic functions:* Only 55% of the polytechnics report that industrialists are invited and they attend functions in the polytechnics. There is a wide regional variation in this activity from 37% in the Eastern Region to 73% in the Western Region. It is

TABLE 1: Dimensions of collaboration and levels.

Dimensions	*Level (weight in brackets)*	*Operational definitions*
d_1	a: direct (2)	The polytechnic negotiates with industry without any mediation e.g. Arranging industrial visits
	b: Indirect (1)	Negotiation through an agency like the Directorate of Technical Education, TTTI, Government of India etc. e.g. Deputation of teachers to industry
d_2	a: Pro-active (3)	Activity results on the initiative of the Polytechnic e.g. In-plant training of students
	b: Interactive (2)	Any one can initiate and the activity continues; initiative can be bilateral, mutual exchange e.g. Placement of teachers in industry and engineers from industry in institutions
	c: Reactive (1)	Institute responds to the initiative of the industry e.g. Campus interviews for selecting students
d_3	a: Antecedent (2)	Contribution by industry in advance of activity and programme in polytechnics e.g. Donation of equipment etc.
	b: Concurrent (3)	Ongoing activities e.g. In-plant training
	c: Consequent (1)	Transactions after the student learning processes are completed e.g. Getting feedback on curriculum
d_4	a: Investment (2)	Institute's contribution to the industry e.g. Organising refresher courses for technicians
	b: Return (1)	Industry's contribution to the Institute e.g. Engineers from industry giving lectures in the Institutions
d_5	a: Actual (2)	Facilities and resources being currently utilised e.g. Teachers being deputed to industries
	b: Potential (1)	Facilities and resources available, but not utilised e.g. Consultancy services
d_6	a: Point (1)	Interaction over a limited time e.g. Industrial visits
	b: Range (2)	Interaction over an extended period e.g. In-plant training

TABLE 2: Degree of impact (i)

Degree (weightage in brackets)	*Definition*
High (3)	When the activity leads to greater and long lasting influence on the collaboration process
Moderate (2)	When the activity leads to medium influence on the collaboration process
Low (1)	When the activity leads to a low key on the collaboration process

noticed that there is not much difference between the responses of Government and Private institutions. It is interesting to note that while only 5% of the Government institutions report that the industrialists 'always' attend their functions, 10% of the private polytechnics report so. 28% of Government institutions and 21% private institutions report that industrialists very rarely attend their functions. This shows that at social level, the interaction is limited and there is need to improve it

(*v*) *Talks by personnel from industry to students and teachers:* This activity gets the next highest ranking. 52% of the Polytechnics report this activity with responses varying from 21% in the Eastern Region to 70% in the Southern Region. The number of talks conducted average to 4 in a year for Government polytechnics, and 3 for private polytechnics. This again is another activity which can be encouraged for the benefit of students and teachers.

2. There are just three other activities to which nearly 40% of the Polytechnics have responded. They are

(*i*) *Polytechnics contacting industry for Placement:* 47% of the polytechnics have responded to this activity with maximum response of 65% from Western Region to just 26% from the Eastern Region. This is an activity in which polytechnics can take some initiative. The wide regional variation in response needs to be investigated. The probable facilitating factor could be the availability of industries in a region. The constraining factor may be the lack of a full time Training and Placement Officer in the Polytechnics.

(*ii*) *Passouts joining Apprenticeship Programme:* About 46% of the polytechnics report that their students join the Apprenticeship Programme of the Government of India after graduation. The Southern Region seems to be making good use of this scheme with 59% responding to this item. The response is poorest (16%) from the Eastern Region. On an average about 30% of students are reported to be joining industries under this scheme.

(*iii*) *Industrial/In-Plant training:* It is noted that only 39% of the polytechnics have responded to this item. Maximum response (57%) comes from the Southern Region, with a minimum of 16% from the Northern Region. 40% of the Government and 34% of private polytechnics provide for this activity. It is noticed that supervision of this training by polytechnic faculty is very nominal with only 18% polytechnics reporting that such supervision exists. Regarding the quality of training provided, the Government Polytechnics seem to be less satisfied than private polytechnics, with 43% Government polytechnics reporting that the quality of training is excellent/good while this figure for private polytechnics is 62%

To the question whether engineers from industry are involved in planning and review of industrial training to students, both Government (78%) and private polytechnics (83%) have indicated that there is no involvement.

Another interesting aspect is that of the 55 polytechnics responding to this item, 21 conduct sandwich programmes, where in-plant training is part of the course programme. Only 18% of non-sandwich polytechnics seem to organise any in-plant training for their students. This indicates the need for placing emphasis on this activity to promote industry-polytechnic collaboration.

It is noticed that the response to all other activities is very poor. Activities like 'Earn while you Learn', 'Adoption of Polytechnics', 'Teachers being deputed to work in Industry', 'Engineers from Industry deputed to work in Polytechnics' etc. do not seem to exist at all. Industries giving facilities for instructional purposes, donating equipment or giving scholarships etc. to students have also been reported very rarely.

Finally to the question 'What in your opinion is the state of institute-industry collaboration', nearly 50% of the polytechnics have said that the state of collaboration is poor. Only about 3% have reported it as excellent, 11% good and 36% satisfactory. There is not much difference in response between Government and Private Polytechnics.

(*b*) *Index of Collaboration*

The analysis of the collaboration index with reference to the various characteristics of the Institutions has yielded the following results:

1. *Type of institution and collaboration index:*

While 19% of the Government Polytechnics have an index between 1 and 50, there are no private polytechnics at this low end. The average index of 139 for the private polytechnics is higher than that of Government Polytechnics which is equal to 120. However the difference is not significant.

2. *Faculty strength and collaboration index:*

The polytechnics were divided into three groups — Small (No. of faculty less than 20), Medium (No. of faculty between 20 and 40) and Large (No. of faculty greater than 40). The average collaboration indices for the three groups were 103, 134 and 163 respectively; The difference in mean indices among groups is found to be almost significant. The difference between the means of small and medium institutions is almost significant and that between small and large institutions is significant. The difference in means between medium and large institutions is found to be not significant.

3. *Size of Student intake and index of collaboration:*

The institutions were classified into three groups — Small (with student intake less than 150), Medium (with student intake between 151 and 300) and Large (with student intake exceeding 300). The mean indices for the three groups were 101, 135 and 179 respectively. The difference in mean indices is found to be significant. There is a significant difference between small and medium and similarly between small and large institutions. The difference between medium and large institutions is however not significant. This indicates that a certain optimum size in terms of student strength is probably essential for building up collaboration with industry.

4. *Sandwich and Post-diploma courses and Collaboration index:*

The polytechnics were divided into (*a*) those offering either the sandwich or post-diploma or both courses and (*b*) those not offering either sandwich or post diploma courses. The mean indices are found to differ significantly between these two groups (Mean=107 for group 'b' and Mean=187 for group 'a'). This indicates that the offering of post-diploma or sandwich courses probably brings about closer collaboration.

5. *Industrial Liaison Committee and collaboration index:*

The comparison of institutions having Industrial Liaison Committees and those

not having shows that the mean indices are 219.5 and 99.0 respectively. This difference is found to be significant. It is seen that having industrial Liaison Committees seems to greatly facilitate collaboration.

6. *Regional difference and collaboration index:*

It is noticed that there is a wide variation in the mean index and the distribution of the index among the four regions. The mean indices for the four regions are Western Region: 159, Southern Region 133.5, Northern Region 92.5 and Eastern Region 56.5. Between region differences in mean index are all found to be significant, except between Southern and Western Regions. The Eastern region mean index (56.5) is significantly lower than the index of all the other three regions. The northern region mean index of 90.5 is significantly lower than that of Western and Southern mean indices of 159.0 and 133.5 respectively.

The Eastern and Northern region mean indices of 56.5 and 90.5 respectively are significantly lower than the mean index of 122.0 for the whole country. A similar comparison of the mean index of the Western Region (159.0) with the All India index shows that the former is significantly higher, while the difference is not significant in the case of Southern Region.

Though the regional differences are significant, it may not be appropriate to draw inferences based on this sample. Regional differences in industrialisation may be a probable explanation for this wide variation and the trend that has emerged here needs to be investigated further.

(*c*) *Content Analysis of Free Comments*

The content analysis of free comments provided by the polytechnics in the questionnaire has indicated the following salient trends.

(*i*) Mostly the type of help received by the Polytechnics from industries refers to facilities used for instructional purposes.

(*ii*) Polytechnic contribution to industry is limited and is mainly restricted to providing some testing facilities, use of some machines or some consultancy.

(*iii*) Collaborative activities of mutual benefit like 'Earn-while-you-learn scheme' and 'Production-cum-training activities' are seen to be undertaken only in very few polytechnics.

(*iv*) A number of polytechnics have expressed that their location in rural, agricultural, non-industrial or industrially backward areas as an important constraint in collaborating with industries.

(*v*) The Government institutions have expressed that they experience difficulty in collaboration, on account of their rigid rules and procedures and provision not being made by the Government for various schemes of collaboration.

(*vi*) Another set of constraints centre around placement of students. The response from industries for placement of students is stated as not encouraging.

(*vii*) A number of polytechnics have expressed that the lack of a full time Training and Placement Officer in the polytechnic has hindered industrial liaison work.

Some of the other comments refer to the general lack of interest on the part of industries towards collaboration. In general, there is an expressed feeling that the industry-polytechnic collaboration is quite low and there is a need to strengthen it. Some suggestions made by the respondents are

- Appointing a full-time Training and Placement Officer would go a long way in bringing about closer liaison with industry.

- There should be regular exchange of polytechnic faculty and engineers from industry.
- There should be joint associations of industries and polytechnics at each district/town level.
- In-plant training should be made compulsory.
- Polytechnics should conduct need-based programmes.
- Better collaboration with industry is needed in framing curricula, conducting examinations and involving students in industrial training.
- Industries should inform vacancies to technical institutions rather than depending on only Employment Exchanges.

Conclusion

This Survey has given a clear idea of the current status of collaboration between industry and the polytechnics. The profile and degree of collaboration existing have been identified and quantified to some extent. Certain suggestions for improving the collaboration have also emerged. As a follow-up of this study, it is proposed to locate those polytechnics having high or low collaboration and take up intensive case studies to identify the factors which led to this high or low collaboration.

Professional Competencies for Vocational Trainers in New Zealand*

NICK ZEPKE

ABSTRACT

This paper reports on a research programme designed to establish a list of competencies ideally mastered by every tutor teaching in a technical institute. The author details the competencies, describes the methodology used to select them and examines the usefulness of such a list in the development of a futures-orientated training curriculum. It is a consensus list achieved after three rounds of correspondence between the researchers and the panel of respondents. The competency list is made up of 27 major competencies ordered into nine categories: designing courses, planning for learning and teaching, managing a learning situation, using a variety of learning/teaching methods, using appropriate learning/teaching materials, evaluating learning, professional self-development, guiding and helping significant others, and working within and with educational institutions. The author examines the usefulness of such a list in the implementation of a futures-orientated curriculum. Some aspects of the systematic curriculum design model are questioned. The paper concludes with the proposition that competency-based research is most useful in designing self-development programmes.

Introduction

Twenty-one tertiary level technical institutes, polytechnics and community colleges operate in New Zealand. This institute system offers vocational training for trades people, technicians, health workers, commercial artists, journalists, accountants, secretaries and managers. Many institutes also provide a wide variety of programmes in personal and community development. To teach these courses, institutes employ more than 2000 full time tutors, while many times that number are employed in a part-time capacity.

Stevens (1980) surveyed the teaching literature available on this institute system. He spotlighted many gaps. In particular he noticed a dearth of information about teaching practices in vocational classrooms and expressed surprise that no research into this aspect of technical education had been conducted.

Given the context in which institutes currently develop, there is some urgency in filling this knowledge gap. Institutes train people for a world in change. Many vocations are being transformed by new technologies and by economic and demographic agents.

In such a time of flux, institute tutors must keep uptodate in their own subject fields while developing sound teaching skills. They require a comprehensive, ongoing professional development programme to help them cope with change-rife, money-tight and promotion-tied times.

Since 1973, a Tutor Training Unit (TTU) has provided teacher training to

* A different version of this paper was presented to the New Zealand Association for Research in Education Conference, December 1982.

tutors newly appointed to fulltime teaching positions within the institute system. In a 12 week course, organized into 4 discrete blocks, nurses and plumbers, accountants and secretaries, artists and technicians, community developers and computer programmers are together given basic instruction in educational thinking, teaching techniques, teaching aids and evaluation procedures. This is a "once only" operation. There is no known plan to create a programme of systematic, ongoing in-service training for tutors.

It is against this background that the research described in this article was undertaken. It was designed to meet three broad aims:

1. To identify a set of professional skills which, when mastered, will enable a tutor to teach competently whatever the future.
2. To establish a priority list of tutor needs by ranking the professional skills identified according to the perceptions of practising tutors.
3. To use the set of professional skills to provide stimulus material for a continuing tutor self-development programme.

The research is ongoing. The first aim, however, has been achieved. This paper now describes how this was done and sets out for discussion the completed list of professional skills. The paper concludes by exploring some issues associated with using the list.

Methodology

Assumptions

Four working assumptions about the future, training and curriculum development shaped the planning for the study.

Trist (1980), Zepke et al (1981) and Harpham (1982) have pictured the current world and New Zealand environment as turbulent. By this they mean that long cherished beliefs about knowledge, technology, economics, life styles hold true no more. Stability and security appear to be quaint comforts from the past. The first assumption was that in this environment it is not possible to plan for a rigid development of vocational education or tutor training. Educators require tools which will enable them to cope with whatever the future may bring.

A suitable training curriculum for tutors is one such tool. It was assumed, secondly, that such a tool could be devised, Drawing on the work of Tyler (1951), Krathwohl (1965), Taba (1962) and particularly on Pucel and Knaak (1975). Bloom (1976) and Blank (1982), it was decided that this tool should be in the form of a task analysis. Expressed in behavioural terms, the task analysis was to describe in systematic fashion the professional competencies to be mastered by institute tutors.

It was assumed, thirdly, that knowledge is relative, varying with construction of particular social groups (Young 1971). Thus there can never be one universally valid tutor taining curriculum. Its content must depend on the values and experience of the people who build it. Accordingly, it was decided that the task analysis should not be dominated by the ideas of curriculum or training "experts". The thinking of practical tutors was to have the greatest influence.

Shipman (1974), Gleeson (1978) and Alkin et al (1979) document difficulties, met by curriculum designers who lose touch with their audience—the people who are supposed to implement the designs. From this it was assumed, fourthly, that curriculum research is a team pursuit. As many people as could be persuaded to take an active part would be involved. As a result, the project acquired a co-researcher and an advisory committee of three. It was also decided to use a panel type research method.

Process

The task analysis was compiled in three steps. Step 1 involved building a preliminary list of competencies from the current

manuals of Tutor Training Unit course objectives. The objectives were augmented in a brain-storming session by the two researchers and the three advisory tutors. This working list was to be changed, shaped and honed by the task analysis panel.

In step 2 the panel was set up. Beyond trying to obtain a rough balance between people with and without teaching backgrounds and between the various types of institutes, no deliberate attempt was made to obtain a scientific representative sample. Of 48 people approached initially, 40 agreed to participate in the study, but only 27 took part in all the stages. Of these 27, twelve (44.4%) were primarily engaged in classroom teaching; six (22.2%) were chiefly teacher trainers; seven (25.9%) were mainly administrators; while two (7.4%) were in research and development work.

Fifteen (55.5%) share a professional background in teaching or education. Twelve (44.5%) have come to their present positions from occupations unrelated to teaching. Of these 12, four have trade backgrounds, two come from the health services and two from technician type occupations. The last four share a background in management.

Of the 21 community colleges, technical institutes, polytechnics, 18 were represented by active panel members.

Step 3 was the working phase. A variation of the Delphi panel technique developed by Helmer and Rescher (1959) and used in educational planning by Battersby (1978) and Mitchell (1981), was employed for this. Panel members were sent the provisional working list of competencies. They were told to use this to compile their own version of necessary skills to be mastered by competent tutors. It was stressed that they were expected to think in an anticipatory way by considering seriously some futuristic ideas seeded in the working list. They were also informed that the aim of the study was to develop a consensus list of competencies. Their individual responses would be analysed for disagreements. For each disagreement the researchers would suggest a consensus response. A revised list of competencies would be circulated so that each panel member could re-evaluate his/her earlier response. The whole process of submission of lists, consensus making, recirculation would be repeated until a panel consesus on most items had been reached.

The working list was circulated three times. For all rounds, the returns were analysed in four stages. In the first stage, general comments about the direction of the study were identified. In the first round there were two such comments, none in the second round and one in the third round. All questioned the validity of the results, given the fact that many panel members apparently had no experience in teacher training.

In the second stage, papers suggesting structural/conceptual alterations were looked at. From suggestions in such papers, the structure was revised. In the first round fourteen panelists wanted to revise the structure in some way. In the second round this was reduced to seven. One suggested a minor structural alteration in the third round.

In the third stage, changes made to individual competencies were analysed. Responses were roughly averaged. In the first round 747 changes were noted from 26 respondents. This mammoth total was reduced to 182 from 20 respondents in the second round and to 26 from 5 panelists in the third round.

In the fourth stage competencies were redistributed within the revised structure. A check on style of presentation was also made at this stage.

Competencies

The list of competencies which emerged from the task analysis panel is made up of 30 major competencies. These are grouped into nine categories: designing courses,

planning for learning and teaching, managing a learning situation, using a variety of learning/teaching methods, using appropriate learning/teaching materials, evaluating learning, professional self-development, guiding and relating to significant others, and working within and with educational institutions.

The nine categories in turn are grouped into three basic professional behaviours: preparing for teaching, teaching, and professional development beyond the classroom. Figure on page 31 shows how the system is conceived.

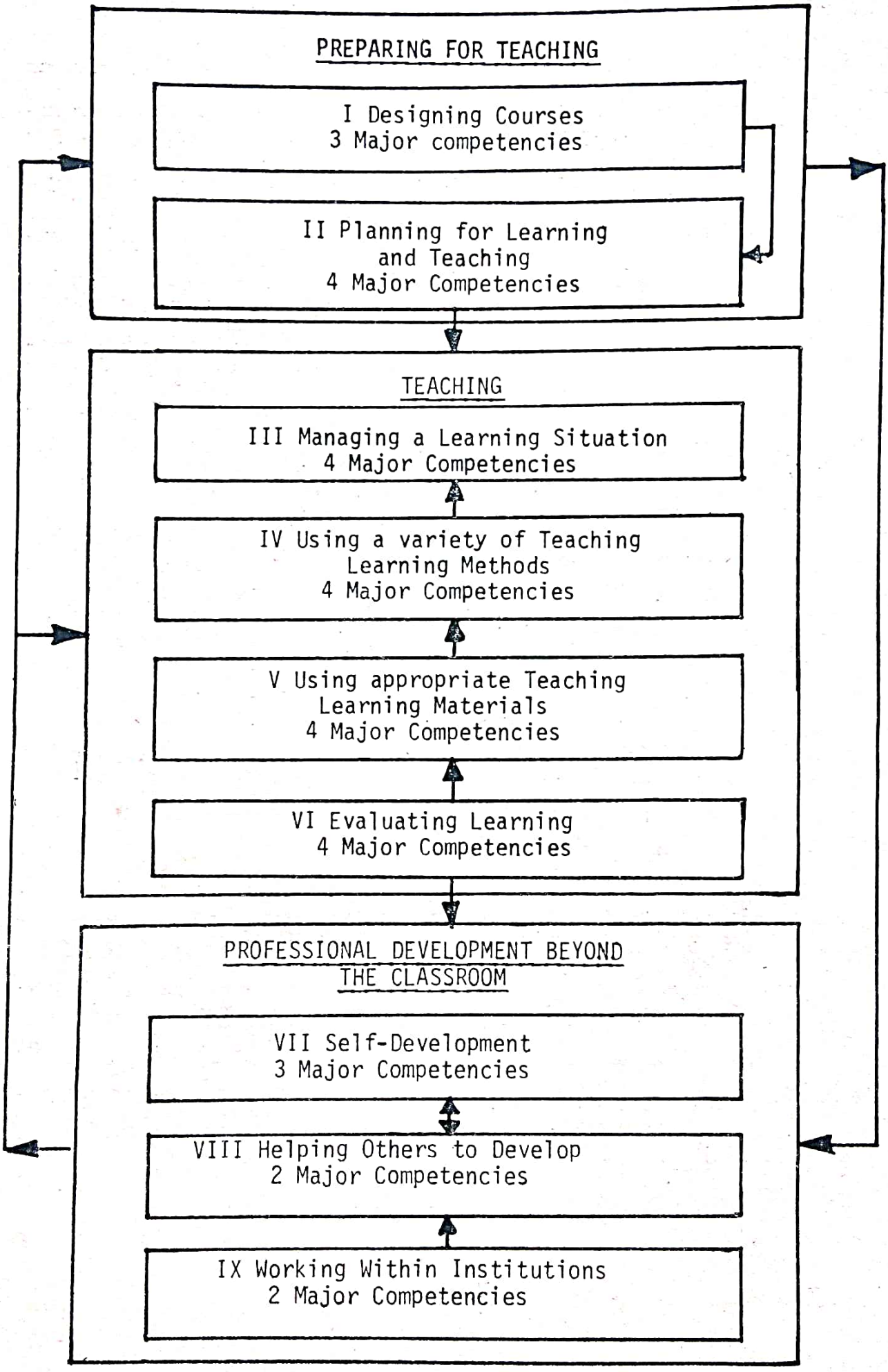
The full list of teacher competencies for Institute service follows.

CATEGORY I—IN DESIGNING COURSES, A TUTOR

1. Surveys Community/Occupational Needs
   - 1.1 Conducts occupational and/or community needs analysis
   - 1.2 Analyses the results of needs survey.
2. Uses Prescriptions and Syllabuses in Course Design
   - 2.1 Identifies and states skills and behaviours required
   - 2.2 Identifies specific examination needs from official syllabuses
   - 2.3 Integrates new developments into existing syllabuses.
3. Designs Courses
   - 3.1 Assesses likely student knowledge before course starts
   - 3.2 Develops programme goals and objectives
   - 3.3 Develops instructional goals and objectives
   - 3.4 Develops a study/teaching/learning programme
   - 3.5 Devises and conducts a follow up/evaluation programme.

CATEGORY II—IN PLANNING FOR LEARNING AND TEACHING, A TUTOR

1. Identifies Needs
   - 1.1 Recognizes personal, interpersonal, knowledge, skill needs of learners
   - 1.2 States specific skills needed by student to pass examination.
2. Identifies and Develops Units of Instruction/Learning
   - 2.1 Uses the results of community/occupational needs survey
   - 2.2 Develops student learning objectives
   - 2.3 Selects major teaching method
     e.g. lecture
     inquiry
   - 2.4 Chooses a specific teaching technique
     e.g. plans and prepares for laboratory lessons
     prepares workshop lessons
     writes self-paced learning programmes
     devises computer aided learning programmes
   - 2.5 Develops tests, assignments to evaluate learning (see Category VI for details)
3. Identifies and Selects Teaching/learning Materials
   - 3.1 Uses appropriate criteria for effective use of all teaching/learning materials
   - 3.2 Identifies new teaching/learning materials
   - 3.3 Identifies effective presentation styles for all media.
     e.g. recognizes changes in graphic designs
     recognizes changes in reading habits
4. Prepares Teaching/Learning Materials
   - 4.1 Prepares teaching/learning


PREPARING FOR TEACHING
I Designing Courses
3 Major competencies
II Planning for Learning
and Teaching
4 Major Competencies
TEACHING
III Managing a Learning Situation
4 Major Competencies
IV Using a variety of Teaching
Learning Methods
4 Major Competencies
V Using appropriate Teaching
Learning Materials
4 Major Competencies
VI Evaluating Learning
4 Major Competencies
PROFESSIONAL DEVELOPMENT BEYOND
THE CLASSROOM
VII Self-Development
3 Major Competencies
VIII Helping Others to Develop
2 Major Competencies
IX Working Within Institutions
2 Major Competencies

materials for use in classroom (see Category IV for details).

4.2 Uses the appropriate equipment to prepare teaching/learning materials.

e.g. uses spirit duplicators
uses photocopiers
uses electronic data banks and links
uses cameras and processes film
uses library and reference material
uses video equipment

CATEGORY III—IN MANAGING A LEARNING SITUATION, A TUTOR

1. Initiates Learning

1.1 Introduces a lesson

e.g. reviews previous lesson
states learning objectives
defines level of competence required

1.2 Creates an effective learning climate

e.g. creates a non-threatening co-operative classroom atmosphere
empathises with student feeling
relates to students outside the classroom as appropriate to creating a good learning situation

2. Guides Learning (Employs Interactive Skills)

2.1 Obtains appropriate student responses

e.g. asks appropriate questions
listens to and acknowledges student answers and ideas
builds on student experience and knowledge

2.2 Provides constructive feedback

e.g. gives specific feedback
gives alternative solutions and ideas
provides chance for students to rectify incompetence

2.3 Responds to individual differences.

e.g. recognizes individual variations in ability
provides challenging but attainable goals for all students
provides situations for students to help each other

3. Controls Learning (Employs Directive Skills)

3.1 Presents material logically and clearly

3.2 Obtains student responses

e.g. employs basic "control" techniques
- pauses
- showmanship
- voice-variation
- eye-to-eye contact
- timing
- mastery of material

demonstrates appropriate assertiveness (see Category VII for details).
employs positive re-inforcement techniques
- exhibits positive and supportive body language
- behaves in a consistent and fair way
- identifies individuals by name

3.3 Manages an effective learning environment.

e.g. anticipates classroom problems
organises classroom layout and seating
organises lighting and ventilation
organises equipment
organises time

maintains an appropriate noise level
employs group dynamics to aid learning
deals effectively with disturbances
ensures safety of students and equipment

4. Conducts an Ongoing Evaluation of the Learning Situation (See also Category VI).
   - 4.1 Evaluates personal performance as a teacher
     - e.g. acts from an awareness of personal strengths and weaknesses
       tests own perceptions of class mood and group dynamics
   - 4.2 Evaluates student responses
     - e.g. responds to individual needs
       responds to changes in class mood
       acts to maintain student commitment
   - 4.3 Varies methods of presentation according to feedback.
     - e.g. employs appropriate verbal/non verbal techniques
       reviews progress of lesson at appropriate time
       develops lesson at appropriate time
       recognizes and uses the "teachable" moment

CATEGORY IV—IN USING A VARIETY OF TEACHING/LEARNING METHODS, A TUTOR

1. Lectures to Large and Small Groups
   - 1.1 Demostrates skills concepts, ideas at an appropriate level of detail
   - 1.2 Conveys information clearly
   - 1.3 Poses challenging questions/problems and uses answers to develop a lesson
   - 1.4 Uses mass-media instructional programmes (i.e. TV programme)
   - 1.5 Performs/dramatises where appropriate.

2. Devises Inquiries
   - 2.1 Plans appropriate research projects and assignments
   - 2.2 Plans practical projects and assignments
   - 2.3 Organizes small-group problem solving discussions
     - e.g. uses brainstorming
       encourages information sharing
   - 2.4 Sets problems leading to seminars, panel discussions, fieldwork.

3. Develops and Uses Self-paced Learning Programmes
   - 3.1 Uses computer aided learning
   - 3.2 Uses multi-media programmed learning packages
   - 3.3 Uses self-instructional kits, books, notes.

4. Develops Vocation Roles
   - 4.1 Organizes and supervises appropriate practical sessions in workshops
     - e.g. plans projects, materials, equipment
       helps students make projects
   - 4.2 Organizes and supervises appropriate practical sessions in laboratories
     - e.g. plans experiments, materials, equipment.
       helps students carry out experiments
       helps students write up experiments
   - 4.3 Organizes and supervises appropriate practical sessions in work settings

e.g. helps students assess work problems
helps students plan work programmes and tasks
helps students carry out work programmes
helps students evaluate work programmes and procedures

4.4 Trains vocational roles through
e.g. simulations
role plays
simulation games
case studies.

CATEGORY V—IN USING APPROPRIATE LEARNING/TEACHING MATERIALS,

A TUTOR USES

1. Print Materials
   1.1 Handouts
   1.2 Textbooks
   1.3 Student exercise and note books
   1.4 Past examination test papers.
2. Audio-visual materials
   2.1 Chalk/Whiteboard
   2.2 Overhead projectors
   2.3 Slides/filmstrips
   2.4 Film
   2.5 Recorded video and TV programmes
   2.6 Microfilm/microfiche
   2.7 Taperecorders/listening posts.
3. Simulated Direct Experiences
   3.1 Vocational equipment and tools
   e.g. workshop
   laboratory
   clinical
   office
   3.2 Exhibits
   e.g. bulletin boards
   charts
   models
   paintings and drawings
   3.3 Students' actual experiences
   3.4 Visiting Speakers
   3.5 Field trips and visits.
4. Information and Communication Systems
   4.1 Libraries for student use
   4.2 Computers
   4.3 Landline links/conference phones
   4.4 Satellite systems.

CATEGORY VI—IN EVALUATION OF LEARNING, A TUTOR

1. Selects Assessment and Evaluation Methods
   1.1 Selects assessment criteria
   e.g. establishes criteria for internally assessed courses
   identifies student performance criteria, from national prescriptions, examination and guidelines
   uses information from examiner's comments from previous exams
   1.2 Translates course objectives into test and assessment criteria
   1.3 Designs an assessment programme.
   e.g. coursework
   self-assessment
   peer-assessment
2. Assesses Students
   2.1 Assesses student knowledge, skills, attitudes
   2.2 Sets tests
   e.g. true/false
   multiple choice
   sentence completion
   matching
   listing

situational (problem solving)
essay
assignment
projects
performance of a skill

2.3 Marks all kinds of tests

2.4 Scales results

2.5 Feeds back test information to students.

3. Evaluates Test Effectiveness

3.1 Analyses all tests, using statistical methods

e.g. compares tests by correlation techniques etc.
assesses the validity of tests
assesses the reliability of tests

3.2 Constructs valid tests

3.3 Constructs reliable tests

3.4 Employs tests to analyse instructional effectiveness.

4. Evaluates Course Effectiveness

4.1 Develops and uses criteria to assess the appropriateness of course content

4.2 Employs questionnaires to analyse course effectiveness

4.3 Employs questionnaires to analyse the effectiveness of teaching.

CATEGORY VII—IN PROFESSIONAL SELF DEVELOPMENT, A TUTOR

1. Develops the Attitudes of a Professional Teacher

1.1 Develops an active personal philosophy of continuing education

1.2 Develops and applies a system of professional ethics

1.3 Identifies and operates through a set of priorities

1.4 Sets personal goals for professional development.

2. Develops the Behaviours of a Professional Teacher

2.1 Develops personal effectiveness

e.g. develops leadership skills
acts with calmness and professional concern in all situations
sustains good tutor relations at all times
develops interpersonal skills
- assertiveness
- reflexive listening
- empathy

2.2 Evaluates her/his own professional effectiveness

2.3 Pursues an active, personal programme for the updating of her/his subject area

2.4 Recognizes and responds to educational trends

2.5 Explores and uses (where appropriate) new developments in teaching. learning and educational techniques

2.6 Recognizes the benefits of and attends refresher courses

2.7 Participates in and contributes to the development of curricula and the setting of examinations at the national level

2.8 Writes reports and articles for publication as opportunity and circumstances arise

2.9 Applies the findings of and carries out appropriate research into innovative teaching.

3. Seeks and Obtains a Teaching Position Appropriate to her/his Professional Interests, Abilities and Personal needs

CATEGORY VIII—WHEN HELPING OTHERS, A TUTOR

1. Helps Other Tutors

1.1 Assists other tutors in their

professional and personal development

1.2 Supports and assists tutors in their group enterprises

1.3 Is a member of and participates in the activities of her/his professional body and the New Zealand Association for Tutors in Technical Institutes (ATTI).

2. Helps Students

2.1 Applies an understanding of life-long development processes

e.g. applies a knowledge of human psychological processes
applies a knowledge of learning processes

2.2 Gathers student data using formal and informal data collecting techniques

2.3 Assists other tutors in gathering and using student data

2.4 Participates effectively in conferences and meetings directed towards meeting student needs

e.g. provides information on educational and career opportunities
assists students in applying for further education and/or employment

2.5 Supports and assists students in their group enterprises.

CATEGORY IX—IN WORKING WITH INSTITUTIONS, A TUTOR

1. Identifies and Uses Structures and Resources within own Institute

1.1 Participates in the life within own institute

e.g. uses the hierarchical structure of his/her own institute and the Department of Education
knows the function of and participates in the work of various committees within her/his own institute.
uses the procedures in obtaining new course approvals
works within the Technical Institute Regulations

- recognizes contact hour regulations.
- identifies and explains the funding of technical institutes
- understands available ancillary staffing and assistance.

1.2 Identifies and uses resources.

e.g. identifies the location of and obtains necessary learning materials
employs the community college or technical institute, organization and communication system effectively
makes effective use of colleague and supervisor support
identifies and uses the administrative procedures in obtaining teaching materials
recognises the need to work in a safe environment

- demonstrates safe teaching practices
- locates and uses appropriate first aid and emergency procedures

2. Helps in the Development of Institute-Community Relations.

2.1 Gives presentations for the promotion of continuing education

2.2 Develops brochures (as appropritate) and prepares displays for the promotion of continuing education programmes

2.3 Works with members of the community

2.4 Works with departmental and other educational groups

2.5 Works with members of own discipline.

2.6 Obtains community-based feedback concerning continuing education programmes.

Some Issues

So far it has been argued that research into institute teaching is urgently needed. The aims, methodology and progress of one study were then reported. A list of professional competencies for tutors working in technical institutes was presented for discussion. Such a discussion could well focus on the theoretical foundations used to develop the list and on its suitability for meeting the other study aims. The paper concludes by briefly examining these two issues.

Theoretical foundations

The intention of the whole research project is to obtain data to enable tutor preservice training and in-service development programmes to be designed. As an exercise in curriculum design it seems to belong to the breed variously labelled "behaviourist", "systematic", "performance-based", "scientific", "objective". As such, it seems to be yet another study in dogged pursuit of learning/teaching certainty (Hogben 1972). Certainly the project is systematic and scientific in the sense that its development is supposed to be rational. Most training is assumed to be in means-ends terms. Deliberately the competency list takes the form of a task analysis, the usual first step in the objective approach to curriculum design. A further stage will require a survey of needs based on the task analysis. In short, the study certainly owes an intellectual curtsy to the people who helped design the systematic model of curriculum development.

However, in two significant ways this competency based research distances itself from the systems model. It does not, first specify how a tutor should behave after she/he has received instruction.

The competencies are not behavioural objectives. They are seen as complex, interelated bits of knowledge. While examples of how knowledge may be used can be given and possible outcomes can be outlined, specific behavioural outcomes of instruction cannot always be predicted. For some of the competencies listed, even a range of possible outcomes could only be specified at great length, clumsily and with freed imagination. A competency like "assisting others in their professional and personal development", for example, is so complex that it would be quite impractical to specify all possible outcomes. Indeed, learning outcomes involving complex competencies do not depend on the actions of the competent tutor alone. They draw equally on the knowledge and experience of the learner. As with the application of knowledge, what will happen in the interaction between learner and tutor, cannot be predicted precisely.

Much of the literature support, given the objective model, is concerned with the accountability and the achievement of instructional certainty. Popham (1970, 1971), for example, often emphasises the mastery of skills approved by the educational and industrial establishment. This emphasis makes the instructional system of the objective model both restrictive and prescriptive. This research distances itself from this model, secondly then, by creating an open ended competency list. It could not do otherwise. The assumption cherished by the prophets of the objective model that there is one absolutely valid definition of knowledge is not shared by the writer. And any tool designed to help tutors cope with a turbulent future must be open to amendment.

So people who had no formal training in education or curriculum design were asked to serve on the panel. It was hoped that they would help counteract prescriptive thinking. They certainly helped to make the list a user's tool rather than a designer's blueprint. Beyond the third

level of reduction, for instance, competencies are cited as examples, not as mandatory dehaviours to be mastered.

Moreover, skills only on the fringes of relevance today but of probable importance tomorrow, were included. "Using landline links, conference phones and satellite systems" are examples of this. The panel also included competencies which, when mastered, ensure that tutors are able to adapt to however the future unfolds. A competency like "explores and uses (where appropriate) new developments in teaching, learning and educational techniques" is an example of this.

Suitability to meet other study aims

The strength of this hybrid is that it is a tool with many uses. It is detailed and exhaustive enough to be used to diagnose the professional training needs of tutors. A survey to do this has been undertaken. It sought to identify the professional needs of tutors by assessing which competencies they feel they have already mastered, which they would like to improve on and which they feel they ought to master in order to cope with the future. Once analysed, the information gathered from the survey will fill some of the gaps identified by Stevens (1980). It will give an insight into current teaching methods in technical institute classrooms and provide base data needed to revise the present tutor training course.

It could also provide the stimulus for the systematic development of an ongoing tutor training programme. But there are few formal in-service courses available (or planned). Yet, any tutor training which relies on pre-specification of criteria by experts has at least two serious shortcomings. Without appropriate support services, the assumption that there is one "ideal teaching profile" which a tutor must master, cannot sustain enthusiasm for, or self-confidence in self-development. A pre-specified curriculum also takes no account of changing values and life styles. Mitchell and McNulty (1981) are currently monitoring the rapid growth of a group of "inner directed" people in developed countries who insist on setting their own learning goals. Such people will not take kindly to a training curriculum developed by outside experts.

A number of techniques based on the principles of personal construct psychology have recently been developed to meet these problems. The TARGET system developed by Keen, Hopwood and Reid (1981) is one example. In this, teachers are asked to construct their own version of an effective teaching style and to compare their own style to this. Criteria to judge the effectiveness of a style are left to tutors to decide. The emphasis of the TARGET programme is on self-development through self-analysis and personal autonomy.

This writer is developing a similar, if less structured, programme with tutors at the Tutor Training Unit (Zepke 1983). Tutors are asked to identify their own current self-development needs. They use the competency list to guide and stimulate their choices. So far the list has been comprehensive enough to satisfy a wide range of needs, yet open enough to spark tutors to identify needs not included on the list. Given the uncertain social, economic and training context in which New Zealand technical institutes are currently developing, it is in the self-development area that the competency list will probably have most lasting effect on the professional development of tutors.

Conclusion

The competency list described in this paper was developed because it provided a tool which could help identify a range of professional skills required by tutors teaching vocational subjects in New Zealand's technical institutes. The list is intended as a context for course development. It allows for "systematic flexibility" in curriculum design at a time of rapid social, economic and technological change. Its utility then, is as a tool, not as a blueprint or as an end in itself. It is a tool training institutions in other parts of the world faced with similar turbulence might like to forge.

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The T.E.A.M Project and some Dilemmas of Vocational Education

A. G. SHANNON

ABSTRACT

This paper describes a curriculum development project in a vocationally-oriented institution of higher education. Although it is set within a particular discipline, it has implications beyond that subject area. To this end, the purpose and goals of the project are listed together with some of its achievements. References are cited for those who wish to pursue specific aspects of these. More importantly though, several emerging dilemmas, cross-cultural and cross-disciplinary, are touched on to encourage replies, rejoinders and other responses from those engaged in technical and vocational education.

Introduction

The purpose of this article is to outline the salient features of a curriculum development effort, the Tertiary Education in Applied Mathematics (T.E.A.M.) Project, and to go beyond mere description to discuss some dilemmas which we have not yet resolved. In this way it is hoped to communicate with other educators in vocational institutions.

There seem to be perennial problems in teaching mathematics to those students whose primary interests are not in mathematics but who need mathematics as a tool. A Canadian study by a joint committee of professional societies with interests in mathematics in a scathing report of university mathematics departments in that country says that "in most universities little systematic attention was paid" to the teaching of service courses, even though the demand for such courses is increasing while the demand for honours mathematics courses is declining (Beltzner et al, 1976). I suspect the thrust of their comments would be generally applicable to other countries and other disciplines.

The TEAM Project

In 1976 the Tertiary Education in Applied Mathematics Project was established at The New South Wales Institute of Technology to analyse learning difficulties in applied mathematics at the tertiary level. The purpose of the project is to create a milieu for the staff which favours teaching and an environment for the students which is favourable to learning. More specifically, the objectives of the project are:

1. to assess relevant levels of mathematics to be taught by determining
   (*a*) the apparent trends in the mathematical servicing requirements for courses in other Schools within the Institute,
   (*b*) the experiences of students who have passed through the Institute regarding their usage of mathematics in their employment,
   (*c*) the views of employers as to the level mathematical training they expect in their employees;
2. to identify main problem areas as related to
   (*a*) teaching of mathematics from both the students' and the lecturers' points of view,

(*b*) students' backgrounds and high school educations;

3. to determine ways of eliminating problem areas;

4. to implement results of items 1-3 by developing
   (*a*) more relevant course syllabi,
   (*b*) improved teaching methods (and specific educational material),
   (*c*) ideas for improved high school teaching.

Since its inception, the NSWIT has tried to fulfil its role of developing vocationally oriented courses pertinent to the needs of industry and commerce. Yet we still had to get to grips with some fundamental aspects of utility and applicability as well as create the right environment, especially where a bias towards research and industrial consulting exists.

As the medium of the message, thirty eight reports and six discussion papers have been prepared. The discussion papers present preliminary findings of early analyses, raise questions for which answers must be sought before a report can be presented, give indicators of difficulties being faced, and summarise issues that emerge in preliminary analyses. The reports present results, identify conclusions supported by available data, and isolate conjectures or topics for further study. There has also been a symposium for school teachers on "Mathematics, Education and Industry" which was successful enough for a demand for similar symposia in the future.

The reports are indexed in the Australian Education Index published by the Australian Council for Educational Research, and a list of their titles can be obtained from the author. Fifteen NSWIT staff have been involved in the project so far, as well as sixteen from other institutions in Australia and other countries.

The paradigm for the project has been the Delphi model (Welty, 1973) and was implemented initially by focussing on those objectives which could be most readily realised. In this way there was soon something to show for our efforts.

A mistake in such projects can be to try to attain the most important objectives first of all. Nothing succeeds like success, and in order to attract support from the funding agencies we had to show them something tangible. A description of some of our activities now follows.

Screening Test

With the aid of research grants between 1976 and 1979 a specialist in educational measurement developed four parallel forms of a screening test. The purpose of these was to identify areas of weakness in basic mathematics which, if not remedied, inhibit the understanding of tertiary mathematics.

Difficulties with basic skills may be due to forgetting after a lengthy absence from school, to not having studied some topics, or to not having mastered basic principles. We were less concerned with the reason than the result, although Elton (1980) claims that in the U.K. it is simply due to failure to memorise key material.

The construction of the item specification matrix and the development of the measuring instrument are desribed elsewhere in Shannon et al (1979). Eleven basic areas of mathematics (all but two from the first four years of high school) were identified. Various forms of these tests, suitably modified for local needs, are now in use in some other institutions.

The figures for students' responses have been disappointing and some are listed in Shannon (1983). These are students who have studied six years of high school mathematics, who are voluntarily undertaking technological and commercial studies which contain large components of quantitative reasoning, but who lack the understanding and have not had enough basic "boring" drill to utilise these fundamental rules by which mathematics operates.

Without the principles on which these rules are based you cannot exploit the applications of mathematics in technology, you cannot appreciate its occurrences in art, and you cannot develop its appearances in nature. In short, you can neither formulate mathematical problems except of the most trivial kind nor recognise them, let alone solve them, except in the most superficial cases.

Study Skills

We have also been concerned with the more general study skills which transcend subject area boundaries. Deficiencies in these skills, if not remedied early enough, can eventually act as barriers to further learning.

A "competence inventory" of study skills was constructed and administered to a sample of senior high school students in all Australian states (Shannon and Maresca-Tew, 1982).

The students in our sample rated their own efforts highly, but found it very difficult to know how to combine material, to balance the time allocation, to write clearly, to profit from feedback, and to exclude personal problems from their work. From the open-ended responses it would seem that these personal problems are part of their adolescent "highs" or "lows" and that they try to concentrate, even if they do not seem to know how.

In answer to the question "do you have a reason to strive for a certain quality of work?", most students say yes. In elaborating this in the next question, the majority of those who responded in the affirmative gave the need for good marks in examinations as the motivation for striving quality. A few, but very few, suggested personal satisfaction in a job well done or striving for excellence as reasons.

Not quite as many, but still the majority said that they had reason for striving for a certain quantity of work, and the most common was to meet teachers', or occasionally parents', requirements. Hardly any said that they did whatever was necessary to achieve a certain quality.

It was clear from the majority of responses that motivation was the dominant difficulty. Not that the students did not want to learn indeed their concern with articulating their feelings about study difficulties was a clear sign of this desire — but most of them had difficulty in identifying, formulating and clarifying their short term goals in planning their own study sessions. Initiative for doing sufficient work to master a topic is generally lacking with our mathematics students.

Other Activities

Other efforts to meet the original objectives have included (*a*) surveys of student difficulties and textbook usages, staff and student expectations of mathematics courses, and student attitudes to mathematics and its teaching, (*b*) studies of specific mathematics topics in the tertiary curriculum development, some techniques for the mathematics classroom, computer assisted instruction, and the scope and assessment of student projects in mathematics. (cf Shannon and Sleet (1978) and Shannon and Clark (1979).

To list these is not to mistake grandiose claims for achievement: we are well aware of the modest nature of most of what we have attempted. The teaching and learning milieu is improved by honest efforts though.

For example, a concepts of calculus course is being prepared by Dr. G. J. McLelland, a mathematical physicist,. It is a highly original attempt to build calculus around its applications. These all involve functions and may be said to be of two kinds: (1) methods for finding the function which relates two variables in some process; (2) methods for finding certain properties of such functions once the function itself is known.

In the normal calculus course the applications have an air of being artificial and

peripheral to the main course. Furthermore, the functions are normally given in advance and no indication is given of where the functions are obtained in the first place. The type 1 applications are the real motivation for the methods of calculus. Accordingly, this course begins with four particular problems in each of which it is required to find a function which relates two variables. Functions are treated as rules for calculating with numbers, and emphasis is placed on the fact that we do not know a function until we know how to calculate its function values and it yields numbers in agreement with experimental measurements. Thus not only is there a refreshing departure from the traditional order of topics in this course, but there is also that consistent attention to intuition which should appeal to users of mathematics. The course is still in a trial stage.

Some Dilemmas

To many, the dilemmas described below seem academic and unrelated to the everyday challenges of the classroom. Yet it is my contention that if we prefer to ignore the issues raised here then we run the very real risk of confusing means and ends, a luxury that we cannot afford as unemployment reaches epidemic proportions and becomes endemic in most cultures.

The radical rallying cry has recently been "relevance", a term which on its own is meaningless: relevant to what, relevant for whom? It has, however, forced educationists to reconsider their professional prejudices and their implications for curriculum development.

The first dilemma in technical and vocational education is that, to stay in a job ourselves, we must teach what is immediately useful so that our students are immediately employable. Yet the convergence of telecommunications and computer technology is going to change many of these skills fundamentally (Shannon, Thornton and Locksley, 1983): what is immediately useful may not be ultimately beneficial for the worker who is overtaken by automation.

Jones (1982) puts the dilemma in a more provocative style: "Middle class — first division — education puts a heavy emphasis on personal development, and working class—second division — on qualifications for income earning. Emphasis on personal development in middle class education in teaching languages, the arts and literature does not inhibit employment prospects or the capacity to generate income: quite the reverse."

The second, and related, dilemma is that significant proportions of our populations are never going to be permanently employed, are never going to experience the identity that comes from an occupation: most want an education that will give the skills for employment yet many will never utilise these skills.

Many commentators, such as Bellini (1981), point to the allied danger of an increasing gap between the "information-rich" and the "information-poor". This is not just a widening gap between countries but also within countries. For example, although 45% of Australian 15-to-19 year olds are in fulltime education, the figure is only about 15 per cent in working - class areas compared with 75 percent in middle-class areas.

Jones goes on to make the pertinent point: "More equitable access to education will not necessarily end the inequalities in society or lead to universal improvement in job status: it would deceive the poor to promise everyone better jobs as a result of more education.... We must, however, assert that education is a good thing in itself — a human right and a consumer good — and that it is better to be educated and unemployed than uneducated and unemployed." Education is neither the cause of, nor the cure for, unemployment.

The specific resolutions of these dilemmas demand a balance between the practibilities of credentialism and the ideas of recurrent and life-long education. Local

situations may call for particular solutions but the underlying paradoxes are appearing in many countries, "developed" and "post-industrial", as well as "third" and "fourth" world. More than ever before, curriculum developers must clarifiy their goals and distinguish means and ends.

Non-mathematical readers should not underestimate the mathematical difficulties of designing a mathematics course when staff have faced up to the various parameters and constraints which actually exist. Educationally the problem is to establish guidelines and feedback checks so that there is reasonable monitoring of the total course structure when the TEAM Project is finished. It would be naive to claim that the project is a panacea for all our problems in teaching mathematics at NSWIT. Nevertheless, it seems that the basic method is reasonable: clarify the educational problems involved, convince staff it is necessary and possible to tackle them, use workshops where appropriate, but above all challenge staff within the terms of their own discipline.

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RESEARCH ABSTRACTS

MALHOTRA, M. M., VOHRA, H. B. L., and MENON., P. N., Polytechnic Education for Women — A State of the art and scope for its development, TTTI Chandigarh, 1982.

Objectives

The study was conducted with a purpose to assess the present status of vocational education and training of women with particular reference to polytechnic education and formulate strategies for the optimal working of the present facilities with addition of new facilities that may augment the education and training of women leading to some gainful employment. The specific objectives of the study were:

1. To identify facilities of vocational training for women.
2. To assess the present status of education and training of women in polytechnics in respect of popularity of courses, curriculum of courses, instructional materials, students, teachers and teaching, admission procedures, planning and administration, faculty development, evaluation and certification procedures, physical resources, value of the polytechnic product and polytechnic status.
3. To identify gaps in the present working of women polytechnics and formulate recommendations for improving their working and thus the optimal utilization of the available resources.
4. To identify emerging and new areas of education and training in women polytechnics.
5. To propose strategies for expanding facilities of vocational training of women both in the rural and urban settings leading to their gainful employment.

Methodology

To gain an authentic information on the facilities available for vocational training of women, the records available with the Ministry of Education, Directorate General of Training and Employment, Planning Commission of India and the Institute of Applied Manpower Research were consulted. For ascertaining the present status of women polytechnics in the country, identifying the gaps in their efficient working, formulating recommendations for improving their working and identifying areas of diversification, extension and expansion of women polytechnics, two questionnaires — one addressed to the Principals of Women Polytechnics and the other to the faculty of these polytechnics were constructed and pilot-tested. These questionnaires were mailed to the respondents i.e. all the 35 Polytechnics in the country. The return rate was 60% (21 Polytechnics responded). The questions included in the questionnaires were of two types — Restricted response type and Free response type. The analysis pertaining to the restricted response type questions consisted of computing the frequencies and percentages of alternate responses. For the free response type of questions, content analysis was resorted to. To propose strategies for expanding facilities of vocational training of women both in the rural and urban settings leading to their gainful employment, interview as a tool of research was employed and a purposive sample of polytechnic principals, working girls from the rural and urban areas, experts in vocational and technical education, and persons engaged in the social welfare for women were interviewed. In addition, the information available on the development

of women contained in the national five-year plans as well as the literature available on women's welfare and development such as the special issue of the *TECHNICAL TEACHER* on technical education for women, 1975 were consulted.

Findings

The major findings of the study in respect of the gaps existing in the polytechnic education of women were:

1. Facilities for technician education and craftsman training for women are meagre (35 women polytechnics against 400 men polytechnics; 104 I.T.I.'s for women against 970 ITI's for men). Hardly any women polytechnic exists in the rural areas.
2. There is lack of suitable instructional materials — text books, laboratory manuals, teaching aids etc. for courses of study prescribed in the technician curricula.
3. There is an acute shortage of teaching staff of all categories.
4. The procedure adopted for admitting students to polytechnic courses is deficient.
5. Class room teaching is mostly devoid of student participation and use of educational technology. A majority of polytechnic courses do not include the element of on-the-job training.
6. Polytechnics rarely plan, organise and control systematically for the development of their staff and management of institutional activities.
7. Funds allocated for the effective functioning of women polytechnics are inadequate.
8. System of student evaluation is deficient.
9. The dropout and failure rates in women polytechnics are very high.
10. Hostel facilities in women polytechnics are inadequate.
11. There is a disparity between the scale of pay of technical and non-technical teachers. The status enjoyed by women polytechnics is lower than that of the men polytechnics. The scales of pay of some categories of staff working in women and men polytechnics is even lower than those in the arts colleges which merely turn out arts graduates.
12. There are no facilities for further education of polytechnic graduates.
13. Unhealthy climate due to trade unionism exists among the staff of polytechnics.
14 Non-availability of documents on standardized curricula of technician courses and requirements of physical facilities for effective implementation of these curicula is a problem.
15. Facilities for upgrading courses for teachers of women polytechnics in the non-engineering areas do not exist.
16. Non-provision of leave reserves creates a great difficulty in the day-to-day functioning of women polytechnics.

The study advanced a number of recommendations to bridge these gaps and thus improve the education and training of women both in the rural and urban settings, with a view to improve the utilisation of the present facilities as also to increase the gainful employment of women. □

BARKI, B. G. and BHAT, N. R., Effective Utilisation of Library Resources in Polytechnics of Southern Region, T.T.T.I., Madras, 1981.

Objectives

The objectives of the research project were

Phase I

1. To find out the facilities available in the libraries of Polytechnics of the Southern Region of India.
2. To find out the extent of utilisation of the polytechnic library by students and teachers
3. To find out the reasons for inadequate usage (if any) of the polytechnic library by students.

Phase II

1. To conduct action research (based on the survey) in selected polytechnics for better utilization of the library by students.
2. To suggest measures for improving library utilisation.

Methodology

The project has been carried out in two phases. Phase I was intended to survey the facilities available in polytechnic libraries and the extent of utilisation of library resources by students. During Phase II, an action plan was implemented in selected polytechnics to improve utilisation of library resources by students.

Phase I

In surveying the facilities available in the polytechnic libraries in Phase I, the tools used were (*i*) questionnaires to students and (*ii*) questionnaires to teachers. Ten polytechnics forming about 10% of the total number of Polytechnics in the Southern Region were selected on a stratified random basis for Phase I. All students in the final year class and the three disciplines Civil, Electrical and Mechanical Engineering were taken for the project.

A pilot study was conducted in a local polytechnic to find out the usability of the various tools prepared, the nature of difficulties and time required for collection of data and the desirability of taking up the project. The pilot study data were used to modify the questionnaires prepared.

The responses to the different items of the tools used in Phase I were analysed, mainly qualitatively using the percentage of responses. In respect of items where the choices were required to be ranked by the respondents, Friedman's Chi-squared test was used to test significance.

Phase II

A "library method of instruction" package was developed with three phases — the introductory phase, the self study phase and the consolidation phase. During the introductory phase, the teacher introduces the topic/unit to the students in a group setting, the basic concepts are explained and the tasks are set. The tasks include reading prescribed books and materials, writing of assignments, preparing for seminars and small group and individual discussions. During the consolidation phase, group discussion to find out the extent of learning is organised followed by an achievement test on the topic. During the self study phase, the students work on their own in the library. They get all support and guidance in getting the books from their teachers and students are put into small groups for purposes of reading.

For purposes of finding out the effectiveness of library method of instruction the tools used were (*i*) achievement test (*ii*) library usage index card (*iii*) library attitude inventory and (*iv*) interview.

The action plan was implemented in four polytechnics which volunteered to participate in this phase. A quasi-experimental design was used for action implementation. The final year diploma students in each of the four polytechnics were chosen for the purpose. Two groups matched in terms of their scholastic ability were formed by the teachers. Each teacher chose a topic in his area for teaching using the library method of instruction during the action period to the experimental group. The control group was taught by the traditional method.

In order to compare the performance of the students in the achievement test, Wilcoxon's T-Test was used.

The attitude inventory had three components viz. facilities, services and need with a number of items in each to be rated on a four point scale. The overall attitude score is computed for finding the changes in attitude towards library usage, if any. The Wilcoxon's T-test is used to test the significance of the differences of the above scores.

The library usage index card hasyielded data on (*i*) purpose of visit (*ii*) materials used, (*iii*) services utilised and (*iv*) total time spent during pre-action and post-action periods. The absolute scores in the case of the first three are the total frequency of each items during each period. This has been qualitatively analysed. With regard to the fourth aspect, the mean time spent per day for each student has been calculated and the comparison of mean time scores is made using Wilcoxon's T-Test.

Findings

The major findings of the two phases of the project are given below:

Phase I

1. The working hours of the polytechnic library are not convenient to a large majority of students.
2. Library is daily visited by a very small percentage of students.
3. Students experience considerable difficulty in borrowing books.
4. Students mostly use the library for writing assignments given by teachers and to prepare for periodical tests.
5. Teaching methods used by teachers are mostly teacher-centred with emphasis on preparing students for the examination.
6. Students go to the library mostly for reading newspapers and popular journals.
7. Consulting reference books and technical journals has been given the last priority by students for library visits.
8. The students do not get much guidance from teachers in regard to using the library.
9. Not much of assistance is rendered by the library-in-charge in using the library.
10. Students are not satisfied with the extent of their library use.

Phase II

1. Library Method of teaching as evolved and used by the teachers has brought about an attitudinal change in the students towards better utilisation of the library.
2. With the use of library method of instruction, the extent of utilisation of the library has increased, notwithstanding any shortcomings and discomforts in the library.

3. Emphasis has shifted to using the library for preparing for tests, assignments and extra-reading during the action period, instead of general reading.

4. Students have spent far greater time in the library during the action period.

5. In terms of services utilised, no significant difference is observed.

6. The students under library method of instruction have performed significantly better in the achievement test as compared to students taught by the traditional method.

The action plan has convinced the teachers involved that the library method of instruction is more effective for ensuring learning. However, they opine that planning for the method is very difficult and time-consuming, while there is economy in effort and time required by the teacher for implementation. It is also seen that inadequacy of library staff and shortage of space in the library may make it difficult to employ this method of instruction on a large scale in the polytechnics. □

BHAT, N. R. and INDIRESAN, J. The Correlation of Performance of students in High School Examinations with their Polytechnic Achievement, TTTI, Madras, 1981.

Objectives

The admissions to the Polytechnics in India are now based mainly upon the performance of the students in the final year High School Examination. The objective of this study is to find the extent of correlation between High School performance (marks in High School Final Examination) of students admitted to the Polytechnics with their Polytechnic achievement (marks in all examinations of the Diploma Course.) The effect of certain socio-economic variables such as occupation, income and community on Polytechnic achievement is also studied.

Methodology

The study was delimited to only Polytechnics in the State of Tamilnadu. The students who completed their 'Diploma Courses' (Civil, Mechanical and Electrical Engineering) in 1976–77 were included in the sample as complete data was available for this group. A proportionate number of Polytechnics were randomly chosen based on the following categories:

- Management (Government/Private)
- Location (Urban/Rural-Agriculture/ Industry based)

In each of the selected polytechnics, all the students who completed the Diploma course in the three branches in the year 1976-77 were taken.

The marks obtained by the students in the five subjects — Language, English, Maths, Science and Elective subjects of the Final Year High School Examination formed the independent variables and the polytechnic achievement (dependent variables) was measured in terms of marks obtained by the students in various subjects of the Pre-technical course (PTC–I Year of Polytechnic course) and semesters A, B, C and D of the Diploma course, taking internal assessment and examination marks in each subject. The influence of the following social variables on Polytechnic achievement of students was also studied.

- Economic status (Father's income)
- Father's occupation
- Social status (community)
- Urban/Rural background

As the study involved use of only secondary sources of data, a pilot study was conducted taking students who completed the Diploma course in one branch (Electrical Engineering) in the year 1979 from a local Polytechnic. The pilot study data were analysed using correlation techniques to look for suitable approaches that would be useful in the collection and analysis of final study data.

For the final study, data were obtained for a total of 406 Civil, Mechanical and Electrical Engineering Diploma students who completed their course in 1977 from five Polytechnics in Tamilnadu. The analysis involved the use of correlation techniques.

Findings

The following were the findings of the study.

(*i*) The High School mean marks have a significant correlation with mean marks of all the examinations for different branches and also for all branches put together, both in internal assessment and external examination.

(*ii*) Taking the correlations of the High School means with the means of Polytechnic examinations (all branches together), it is seen that correlation with PTC is high both in internal assessment and external marks, while the correlations with the semesters A, B, C & D are low, though significant. This is probably because the capacity of High School performance to predict Polytechnic achievement declines beyond P.T.C. level. This is as expected, indicating that high school marks probably indicate only general ability and predictive validity of high school marks is likely to improve, if measures of certain abilities required for success in technician courses are also included as selection criteria.

(*iii*) Comparing correlations of internal and external mean marks of various examinations, it is observed that the correlations of mean external marks of polytechnic examinations are higher than those of mean internal marks. This indicates that the ranking of students in various external examinations is fairly consistent. This can be expected as teachers' ranking in internal assesment takes into account many affective outcomes besides cognitive outcomes, while external examinations measure mainly cognitive outcomes.

(*iv*) The correlations of the various polytechnic examinations with their subsequent examinations are higher than correlations with the high school marks. The correlations are significant, but cannot be considered high enough to be predictors, except in the case of correlations between semesters B & C and semesters C & D. This shows that the predictive validity of examinations at different stages of the polytechnic system are poor, which is consistent with the findings of similar predictive validity studies on qualifying examinations at various stages of education.

(*v*) There is no significant difference in the performance of the students belonging to various socio-economic groups. This may be due to various reasons like (*a*) the reliability of data on social variables is questionable and (*b*) there is not much differentiation in the sample characteristics. There is need to do further replicated studies on this aspect.

The low correlation obtained between high school marks and polytechnic performance in this study has shown that high school marks, which are now used as selection criteria for admission to polytechnics are not reliable predictors of the performance of students in the polytechincs. Since achievement is a complex variable affected by a number of variables, selection of students to the polytechnics based on some other criterion like an apptitude test, along with high school marks could prove to be a better predictor of polytechnic performance than using high school marks alone. There is need to develop suitable aptitude tests and evolve combined indices for selection of students to polytechnics to improve the quality of output. □

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CALL FOR CONTRIBUTIONS

In the publication of this JOURNAL we have received encouragement from many contributors. Many more have enthused us by their good wishes and assurances of contributions to the subsequent issues. These gestures have stood us in good stead to continue to bring out this Journal as a regular half yearly publication.

Each issue of this Journal is envisaged to be devoted to a particular theme of importance in the area of technical and vocational education. Such an approach is proposed to be introduced from the FOURTH issue onwards by which time the circulation of the Journal, it is hoped, will be firmly established.

Contributions are now invited to the NEXT TWO issues on any topic relevant to the objectives of the Journal. These may be sent to the Managing Editor to reach him by MAY for the *Summer* issue and by OCTOBER for the *Winter* issue.

NOTES FOR CONTRIBUTORS

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The authors are requested to note that the Journal aims at a wide international readership of varied societal and cultural backgrounds. They are, therefore, encouraged to point out in their contributions the relevance of their results and insights to technical and vocational education systems, other than their own.

In the case of research reports, the emphasis should be on applicable research of national and international interest.

Submission of manuscripts

Manuscripts for publication should be sent to Prof. T. Subbarao, Managing Editor, by name. Only original articles will be accepted and the manuscripts should be in English. They should be typed on A-4 size paper, double-spaced, on one side only with wide margins and submitted in triplicate. Normally the manuscripts should not exceed (20 typed pages) 3,000 words.

Photographs, drawings, cartoons and other illustrations are welcome. All illustrations and tables for publication—should be submitted in separate sheets.

References

The articles/papers should be appropriately authenticated by giving the relevant bibliographical references in the standard format.

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About the authors(s)

Authors are requested to send their brief bio-data along with the manuscript of the paper/article.

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