
Review of Book on

QUALITY ASSURANCE IN TECHNICAL EDUCATION

By Dr. S.K.Bhattacharya

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1 OVERVIEW

This book by Dr S. K. Bhattacharya on "Quality assurance in Technical Education" is written as a reference book for teachers, HODs, principals, state level managers handling Technical Education (TE).

This is a welcome effort by the author, because this is for the first time that an effort has been made to present to key personnel of the technical education system an overview of core concept, principles, and procedures constituting the discipline of Technical Education. It should now be clear to engineers and scientists that when they work in Technical Education System they are not merely engineers, but **educational professionals**. Education is not that practical field where tricks of the trade can be learned on the job. Technical Education is today a broad discipline comprising several component disciplines based on educational sciences, management sciences, information sciences and systems sciences. Substantial amount of analysis, design, development, is necessary before the educational programmes are implemented and evaluated for its efficiency and effectiveness.

The book consists of four sections. each section dealing with broad themes:

Quality Assurance, Process Design, Educational Innovations, and Accreditation

Section A is on "Planning for Sustenance" gives an overview of Technical Education System, impact of GATT on the TE in India, need for TQM in TE for improving its competitiveness with foreign universities and importance of educational technology to improve quality.

Section B on "Process design for Quality Assurance" gives an overview of "Enhancing Employability, nature of the new Workplace, Curriculum development, Teaching a subject, Learning higher cognitive Skills, Students Motivation, Use of CAI and Multimedia in teaching and learning, Experiential learning, Tutorials, Examination reforms, Feedback on student's performance".

Section C is on "Innovations in Curriculum Design, Development, and Implementation". It gives an overview of different innovations in curriculum design, through the use of ETV, concept of Virtual teacher training Institute, Educational management information system, Non- formal education, Vocational education and training, competency based flexible modular education for technical teachers, Interactive teaching learning system in TE

Section D on "Accreditation" describes accreditation process being adopted in India by AICTE through its agency NBA. And is based on contents given in NBA Manual.

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2 COMMENTS

Chapters in section A and B are logically arranged.. Detailed comments on the topics handled in these sections are given in section 3 of this review to avoid duplication.

Section C only lists various innovations with no apparent relationships among them. They are supposed to be applications of the principles enunciated in section A and B. and use of ICT, information system design not only in formal diploma and degree Programmes but also non formal education, vocational education and training and technical teacher education and training.

This section does not clearly state when and where in India these innovations were actually designed and later evaluated for its effectiveness and wider applications. It appears that some schemes like Virtual technical teacher training institute, EMIS, Competency based flexible modular education for technical teachers, Interactive teaching learning system in TE are hypothetical cases and are not designed and experimented upon in India. However, this does not reduce the importance of the topics., since many of these aspects have been designed and implemented in advanced countries.It is good to know that such innovations are possible.

Section D is reproduction of NAB Manual

Much of the contents of this book appear to be based on the papers published by Dr Bhattacharya in various journals in the past.

For the first time since 1967, when TTTIs were established by the GOI (Now NITTR) to serve as a service institute to the polytechnic education and later for degree education, an attempt has been made by the senior NITTR faculty to write a reference book on Quality Assurance in TE. Faculty who joined TTTI at its inception were only primarily qualified engineers without formal education as teacher educators. Neither there was any scheme of faculty

development programmes for TTTI faculty. for obtaining disciplinary and professional knowledge in educational domains .. One had to be a **learner entrepreneur** to fill up these knowledge gaps, if one had to succeed as a teacher educator. This required Herculean efforts by these learner entrepreneurs. And even more efforts are needed to write a handbook of this scope.

Dr S.K. Bhattacharya, who also faced all these constraints, deserves congratulations for writing this reference book. This is indeed a very difficult task. Such efforts are, however, urgently necessary to create awareness among higher Technical Institutes, if they want to launch quality assurance programmes in their institutions, and face accreditation committee's queries on scientific and professional grounds.

3 SUGGETIONS FOR IMPROVEMENTS IN FUTUERE EDITIONS.

Contents of the book need to be substantially upgraded, if it has to serve as a genuine handbook for teachers. Some of the aspects to be attended to are as follows.

a) Use of Systems Thinking

The theme of "Quality assurance in Technical Education" is a complex subject. This handbook has already dealt with these aspects through its various chapters.

Technical Education is, however, **not the sum** of total number of institutions conducting diploma and degree programmers. Institutions are **not the sum** of number of courses conducted. . A degree course is **not the sum** of subjects being taught. And student learning a subject is **not the sum** of individual topics taught. Every institution has customers needing different product and services. To produce these products and services, the institution needs inputs from the environment, which in turn needs to be transformed through a transformation

process into desirable outputs. To install such an input - process - output system one requires resources and a management structures. Management has to ensure that the installed system actually functions as designed. This it does through a well-planned feedback system. *Important thing to remember is that it is the inter relationship among input - process - output, resources, management and feedback system that gives the system emergent properties to the products and services it produces.*

Quality assurance also **is not the sum** of sequential list of steps identified in each chapter of this handbook. The Technical education system operates **at five levels**: Student, classrooms, curriculum, institution, and state levels.

Understanding the complexity of the system requires that an educationist not only understands the interrelationship of the system at every level, but also the interdependence among these five levels. Besides every social system is dynamic. It grows in complexity depending on its achievement in the past, its working in the present and its goals in the future. Its complexity also increases with its reach in space and its openness to the environmental changes.

Systems thinking is a discipline in its own right and it has to be learned by all educationists. The interrelationship among various components of the TE are visible only through systems diagrams and system development cycles.

It is important that the contents of at least sections A and B are presented in terms of systems view of technical education through explanations of the systems concepts and visualized through systems diagrams

b) Theories of learning

Section B deals with curriculum design, teaching- learning system, and educational technology. Quality movement originated in business and management. and manufacturing. Sectors. The products and processes in these sectors are visible , observable and can be measured, and analyzed.

Quality movement in education lagged behind, because the core processes like 'learning ' and knowledge formation" did not have the support of mature disciplinary and professional base and are not observable and cannot be clearly specified. . (Bowden and Marton.)

Till 1990, learning theories were dominated by three schools of thought:. Behaviorism, Social Learning theories and Cognitive. They coexisted as separate theories. Since 1990 onward, there have been attempts to develop comprehensive unified theories of learning, integrating important aspects of each theory. (Ormond ,2004)The advent of neural sciences has given further support to the findings of the learning theories. Learning theories are heading towards the status of a mature discipline capable of improving educationist's capability to categorize learning events, predict consequences., and plan for designing appropriate learning systems to achieve desired learning objectives..Knowledge of these theories will provide scientific foundation for many chapters in section Band C

c) Theory of knowledge formation (Eraut-1988, Bowden-1998 and Ormrod - 2004)

Knowledge formation is the result of learning and closely related to learning theories. Scientists, professional, and consultants

organize knowledge in different ways. Scientists in the process of seeking to understand patterns in natural phenomena generate scientific disciplinary knowledge. Professionals in their quest for providing useful products and services to the society organize knowledge combining disciplinary and procedural knowledge. Consultants organize knowledge around specific problems of their clients. All these are the constituents of the **professional knowledge base**. (Eraut-1988) This is explicit and public knowledge.

There are people who generate knowledge in the process of doing things. This knowledge is called **personal knowledge** and is mostly implicit.

In today's changing environment, educational systems have to help people possessing personal knowledge to adopt increasingly products and processes based on professional knowledge base. To do this they have to help the learners to acquire the third kind of knowledge i.e. **Process Knowledge**. The components of process knowledge are: *acquiring new information, assessing one's own skilled behavior, deliberations for integrating new information to modify their unproductive current skilled behaviour, communicating the new behaviour to others, and practicing self control.*

It is vital for every educationist to know theories of knowledge formation; which explains not only how every individual generates knowledge and also the interrelationship among professional knowledge base, personal knowledge and process knowledge. These theories will provide a better scientific foundation for curriculum design and process of educational change and innovations.

To conclude, in any process involving innovations in education and training. Knowledge of Systems thinking, Theories of Learning and Theories of Knowledge formation are indispensable for ensuring quality in education.

d) Educational innovations

Section C deals with "Innovations in Curriculum design, development and implementation".

Chapter 1 deals with "Changing strategies in Professional education". And lists 8 innovations in "Curriculum Design and 2 in curriculum Implementation. On reading one gets an impression that all these innovations can be designed independent of each other. Combining both logical and psychological approaches in curriculum design, competency based learning objectives, choosing between theory followed by practice and practice followed by theory. Project method of curriculum design creating personal set of competencies, education and training to do right thing or doing things right. Holistic engineering cannot be handled independently. Nor is it possible to separate curriculum design from curriculum implementation.

e) Teacher Education

Chapter 2 in this section deals with Virtual technical teacher education and training. Teacher education, is one theme, which should have been given dominant place in the handbook. Success in educational reforms described in Sections A and B depends entirely on the Teacher preparation. The term "Teacher" here, is used in a generic sense to include all those responsible for learning, teaching, curriculum development, institutional development and state level educational development. Not only should staff be responsible for individual function but should be prepared professionally for their respective functions; they must all be educated and trained as professionals **simultaneously**. There are three phases for professional development - Initial, induction and in-service. The title of the chapter "Virtual Technical Teacher Training" is based on the assumption that there is already some conceptual framework of teacher training available, and is implementable in traditional campus based form. All that the term 'Virtual' means is that the so called teacher

training programmes now institution based can be made virtual by removing the barriers of time and space by use of information and communication technology. To improve access of the programme to all who otherwise cannot have it. The fact is that there is no conceptual framework in spite of 4 NITTRs being in existence for the last 35 years and 5 Review committees appointed to review their functioning. The entire higher technical education is still functioning under the illusion that there is no teacher preparation necessary for functioning in the system. The tricks of the trade can be learned on the job. However Unesco has already formulated a scheme for teacher preparation. There also exists a scheme for enabling any qualified professional to become a recognised teacher in the European Union. The idea is picking up in advanced countries. This aspect of TE should more emphatically be elaborated in the next edition of the handbook.

f) Accreditation

Section D only describes what AICTE is doing to accredit institutions and their educational programmes through their agency of NBA.

As it stands, the accreditation procedures focus more on assessment of quality through external agency. Efforts are being made in advanced countries to make autonomous universities accountable by taking advantage of the documentation produced by teaching teams of the University in their normal process of bringing about quality improvement. Universities do not produce special reports for the visiting committees. It is being increasingly recognized that the accreditation by the external teams should be based on the documentation prepared by the **institutional level in-house quality assurance system** designed to improve quality of teaching and learning by the teaching teams attending to various elements of curriculum design: learning, teaching, assessment. course material, The outcomes and processes are fully documented for each course. Teams are

encouraged to keep records, not by special 'quality document' but through a normal process such as minutes of the meetings, filing of working papers copies submitted to the working committees using Intranet. The institutional level coordinating committee called 'academic Development group provides policy and resource support to ensure that improvements are soundly based on pedagogic considerations.

AICTE's accreditation process should encourage internal quality assurance documentation.

g) References

References in a handbook of this type has a special meaning References listed at the end of each chapter as well as the end of the handbook should serve as an evidence that the handbook has given the latest state of the art description. of the field of study. These references must also be cited in the body of the text. Further there should be 'References for further reading' for those who want to study some aspect in greater detail.

References for section B needs total revision to include latest literature available on ' theories of learning, theories of knowledge formation. systems thinking as applied to education., educational technology and curriculum design and development. The hand book must also give a list of journals currently available in the field. These constitute primary sources,

h) Team effort

Teams of experts generally write professionally written handbooks. It is always a team effort. Dr Bhattacharya deserves appreciation for bringing out such a handbook almost single handedly. It is suggested that he now involves his NITTR colleagues to produce every five years an updated version of this handbook. If all NITTRs join this effort, so much the better. Creation of such a handbook every few years will serve as **a research object**, round which; all NITTR academics can

cooperate to develop a national level unified view of technical education as professional field of study

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