

3. THE NATURE AND SCOPE OF THE RESEARCH JOURNAL IN ENGINEERING AND TECHNOLOGY EDUCATION

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SYNOPSIS

The author welcomes the publication of the Journal of engineering and Technology education by the NITTTR, Chandigarh. But he stresses that the beginning should be made on the basis of the sound understanding of the nature and the scope of the Journal. NITTTR should explicitly define the purpose more clearly by identifying its customers and their needs for the information, pay attention to the selection of the content of the Journal, composition of the editorial board and its strategy to maintain focus on the objective of the Journal and the role NITTTR management should play to link faculty development programmes to the suit the objectives of the Journal.

This paper focuses on the system of formal higher technical education

1. INTRODUCTION

The author belongs to this institution right from its inception and heartily welcomes the project for publishing a "Journal of Engineering and Technology Education".

The news is indeed good, because it is for the first time the specialized institution like NITTTR working directly into the domain of higher technical education will have a forum in which it will play a central role in promoting research of various types – basic, applied and consultancy research aimed at improving quality of the technical education system.

"The quality improvement of technical education stands on its own as the specific field of research and to the best of knowledge and belief of the author, NITTTRs are the only institutions which have been assigned the task of dealing with issues facing this field. If all the

NITTTRs coordinate their efforts in the research in higher technical education, the engineering colleges and polytechnics can immensely improve the quality of learning of the students. Through them the system can improve the workplace competence in industry as well social institutions they work for. The nation as a whole can compete in the global market.

In the process of discharging the function of a teacher educator for last 35 years in the field of technical education, the author had to focus his attention on the study of psychology, learning sciences, science knowledge formation, instructional design, curriculum design educational planning, systems sciences. He tried to use these concepts to educate, train and coach the students, teachers, heads of the departments & Principals and help them in improving their educational practices.

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In this process the author has developed certain framework of concepts, principles and procedures for improving quality of technical education, especially in engineering colleges and polytechnics.

This is the basis for describing the nature and scope of the proposed research journal .

2. DEFINING THE FIELD OF STUDY OF "QUALITATIVE IMPROVEMENT IN HIGHER TECHNICAL EDUCATION"

This field of study focuses on the formal higher technical education system comprising engineering colleges and polytechnics. These institutions are governed by the state and national level authorities. These institutions educate graduates and diploma holders, who then enter the world of work and are further educated and trained to develop work place competences as apart of their continuing education.

Thus the total system comprises two separate but complementary sub-sectors:

1. Formal higher technical education system awarding degrees and diplomas.
2. Continuing education sector for those pass outs in all domains of activities after they complete their preservice education mentioned above.

For the total quality both these sectors should cooperate closely.

However, this paper focuses more on the first sector that is, the formal higher technical education sub-sector.

This is because this sub-sector lays the foundation for the competent performance of adolescents and adults in their professional, social and their personal life. Such a performance is expected to contribute to national economy and social development.

It is however necessary to be more precise in describing this sub-sector, so that the

proposed journal can play its role in promoting qualitative improvement in this sub-sector.

The formal higher technical education system operates at six levels.

1. **At level 1**, it operates at the level of students or a group of students *engaged* in the process of learning a subject or discipline. The process consists of employing a learning methods which is embedded in the consciously designed learning strategies, managed by the learner himself.
2. **At level 2**, the system operates at the level of a teacher engaged in the process of causing learning to take place in the student at level 1. This process consists of employing instructional methods embedded in the consciously designed instructional strategies and managed by the teacher and learner together.
3. **At level 3**, it operates at the level of head of the department engaged in coordinating the teaching-learning of a teams of teacher-students in all subjects / disciplines included in the given curricula over which he presides. The process of such coordination consists of employing methods of curriculum coordination embedded in consciously designed curriculum strategies and managed by the HODs.
4. **At level 4**, it operates at the level of principals engaged in the process of coordinating curriculum processes by all HODs in the institution. The process consists of employing institutional level coordination methods embedded in consciously deigned institutional level strategies of coordinating all curriculums in the institution.
5. **At level 5**, it operates at the level of state authorities (DTE, MOE, BTE, Universities) coordinating institutional

level coordination by all principals in the state. The process of coordination consists of employing state level coordination methods embedded in consciously designed state level strategies of coordinating curriculums of all institution in the state.

6. **At level 6**, it operates at the level of national functionaries (MHRD, AICTE, UGC) coordinating the state level coordination strategies of all states and central institutions. The process of such a coordination consists of employing methods embedded in the consciously designed national level strategies for coordinating educational programmes in all states and the central institutions.

In systems terminology, there are six levels of professional functionaries: learners, teachers, departmental heads, principals, state level and national level authorities..

They are termed as 'professional', because the present state of the knowledge emphasizes that the process they adopt at each level has attained the status of professional discipline. It means that these practices are based on the scientific knowledge base created by the professional researcher and professional norms of practice created by the researching professional. (Bourner Et el, 2000.)

Another feature of the (systems) functioning is that the function of an operator at every level will achieve **emergent properties** (which means that the properties which are more than the sum of its parts.) Functions achieve their emergent properties, only when:

1. They are hierarchically organized .This means each lower level is embedded within the boundaries of the higher level.
2. There exists a well designed communication among these levels designed to understand each other's working and also providing feedback

3. There exists a well designed system of control though feedback system so that any deviation from the established norms are immediately corrected (Checkland 1981 and Checkland and Scholes 2000)
4. Thus learners, teachers, HODs, principals, state and national authorities are practicing professionals in the field of the educational processes

They are called professional fields because, today learning, teaching, curriculum management, institutional management and state level management of education are based on the scientific body of knowledge base. The functionaries are expected to act as researching professional (Bourner ET all, 2000). As researching professionals they are expected to continuously refine their theoretical base and using it to improve their profession practice.

This Journal should aim at providing this knowledge base to students, faculty, managers of educational institutions and state authorities in charge of higher education.

These researching professionals will have a close cooperation of the professional researchers from the Universities and NITTTRs. NITTTRs should assume the role of professional researchers and make their finding public though this Journal.

3. SUGGESTED STRUCTURE OF THE CONTENT OF THE JOURNAL

The Journal should consist of two major sub sections:

Section 1 should deal with contributions from the professional researchers belonging to basic educational sciences and applied sciences, generating general knowledge base applicable to range of situations in the practice: self study, classroom, curriculum, institution, state and national situations. The section will contain articles from the following disciplines.

1. Theories of learning in higher education

(Ormrod 2004).

2. Theories of Knowledge formation. Bowden and Marton 1998.
3. Systems Thinking in Higher education (Norlin and Chess , (1997).
4. Theories of organization and management of education (Publications of IIEPA, Paris).
5. Theories of management of educational change (Havelock R.S. 1973 and Bennis et el 1976).

Section 2 should deal with the contributions from researching professionals from engineering colleges and polytechnics, who will employ the general knowledge to improve professional practice. In learning, teaching, curriculum management etc.

Accordingly, section 2 will contain articles from the following subjects : dealing with professional practices.

1. Self directed learning
2. Instructional design and management
3. Curriculum design and management
4. Institutional level design and management of education
5. State level design and management of education
6. National level design and management of education.

For the researching professional to be able to absorb the contents of these sections, NITTTR will have to impart concepts from both basic sciences and applied sciences. Then NITTTR s should selectively approach potential writers from the engineering colleges to contribute to section 2 of the Journal. calling from them description of experiments they have made, case studies they have encountered, innovations they have introduced in the actual

field situations.

The Journal should have a third section - dialogue section-to encourages dialogue among functionaries at all levels.

This section should contain:

1. Letters to the editors
2. Book reviews
3. New arrivals in the market
4. Glossary of terms in each of the fields of study mentioned above

There should be specific guidelines to potential contributors to both the sections of the journal to ensure that the contributor use valid sources of information and database and also appropriate use of methodology to validate their knowledge claims. These guide lines will enable the Editorial Board to maintain quality of publications and weed out superficially written publications. The editorial Board should ensure that the research outcome is the result of rigorous attention to the attributes of scholarship and not that of the popular writer.

4. COMPOSITION OF THE EDITORIAL BOARD OF THE JOURNAL

Describing the composition of the Editorial Board is difficult, particularly because the fields of study the author has mentioned are classified as the emerging disciplines in education. NITTTRs have always had the faculty, majority of who belong to physical sciences engineering and technology background. They do not possess the conceptual framework derived from educational sciences and educational technology. Neither has the NITTTR management ever thought of consciously organizing faculty development programmes to induct them into these areas before they were asked to take over the role of teacher educators. At the inception of the TTTIs, senior faculty gained their expertise though self study. Such process of learning by trial and error is however time consuming and wasteful of efforts and directionless. This should be replaced by well

organized way of education and development programmes and making coaching facilities available to the NITTR faculty.

The difficulty for the faculty of the NITTR is further compounded by the fact that even Indian universities are not geared up to deal with research dealing with higher education. And search for suitable experts for guidance is painful.

However the beginning has to be made swiftly by the NITTRs. who should develop a long term faculty development programmes to develop scientific and professional expertise in these emerging areas. Only then the NITTRs will have the in-house faculty to man the Editorial Board.

At the moment, NITTR can borrow from Universities, IITs and IIMs to assist the in-house faculty in the editorial Board. In-house faculty will have the motivation to learn these new fields if FDPs are linked to reward for attaining the competencies in the area. Only then the faculty will have the motivation, get inducted into these areas.

The Editorial Board members should be able to pay specific attention to:

Basic Sciences. :

1. Theories of learning in Higher education
2. Theories of knowledge formation in higher education
3. Systems thinking in Higher education

Applied Sciences

1. Theories of self directed learning
2. Theories of instructional design
3. Theories of curriculum design
4. Theories of institutional management of education programmes

Organizational sciences applied to higher education

1. Institutional/ state and national level management of Higher education.

5 ACTIONS TO BE TAKEN BY THE EDITORIAL BOARD

The Editorial board should take following actions;

1. Search for the external sources of expertise in every field in the country and abroad. This is a difficult process, since such experts in the country are not easily located on account of the emerging nature of these disciplines.
2. Make a conscious search and approach potential contributors to the various levels of the expertise mentioned above and invite them to contribute.
3. Encourage feedback from the readers. Invite specific experts to communicate on the articles.
4. Invite book reviews of the literature appearing in these fields from experts.
5. Diligently publish glossary of terms in every field.
6. Study how other professional Societies in UK, USA, Australia, Sweden, Hongkong, Singapore and European community function and draw conclusions.
7. Some examples are :
 - UK : Society for Research in Higher education
 - USA : Education Technology Publications, NJ
 - EU : Centre for Educational Research and Innovations
 - EU : OECD publications
 - UNESCO publications
 - IIIEP Publication

Study how Department of Education in elite Universities in UK , USA, Australia discharge their role of in-service training for development of the faculty in other departments of the University.

6. **ROLE OF NITTTR MANAGEMENT IN PROMOTING IMPACT OF THIS JOURNAL**

The Management should without delay, design faculty development programmes for their engineering and science faculty to induct them into these areas and convert them into professional researchers in basic educational sciences, with focus on its use in higher technical education. These competencies cannot be developed without a conscious plan of action. Design and implementation of training the faculty to act as a professional researchers should be consciously made.

The Management of NITTTR should encourage its faculty to provide consultancy research to the faculty of engineering colleges and polytechnics and to publish their experiences in the Journal.

The management should develop a strategy for spreading innovations in as many colleges and polytechnics and develop them as lead centres to serve as models for others to follow these innovating practices.

The Management should encourage this faculty to deeply study the example set by societies such as

1. Society for Research in Higher Education, UK.
2. Education Technology Publications in USA.
3. Centre for Educational Research and Innovations, Paris, EU.
4. Unesco publications

Most importantly it should be ensured that

the Editorial Board integrates the bits and pieces of knowledge appearing in the Journal and develop an integrated conceptual framework for conceptualizing the total system of higher technical education.

7. **SUMMARY**

The author welcome the publication of the Journal of Engineering and Technology Education by NITTTR, Chandigarh. But this Journal will be treading into the fields of research which are only emerging as scientific disciplines to make progress in these fields, NITTTRs will have to adopt an insightful approach and a long range planning first to create the knowledge base within NITTTR by promoting research by the faculty of the NITTTR and selecting carefully the content of the Journal, paying closer attention to the composition of the Editorial Board capable of ensuring publication of valid research. Finally the NITTTR management must adopt a consciously designed long range policy of in-service training for development of their main customers -engineering colleges and polytechnics.

To the best of the author's knowledge and belief, NITTTRs are the only organizations created by the MHRD .Govt of India which have been entrusted with the role of promoting quality in Higher Technical Education. It is now the time for the NITTTRs to rise to the occasion and fulfill the dream of the Government of India.

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