CURRICULUM DESIGN FOR INDUSTRY RELEVANT AND INTERDISCIPLINARY POSTGRADUATE PROGRAMMES IN ENGINEERING AND TECHNOLOGY

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Abstract

Innovative methods of curriculum development based on the reverse system approach coupled with national engineering qualification framework provide promise to develop industry relevant postgraduate programs in engineering technology. By close collaboration with the association of companies, one can design programmes which would enable the candidates industry ready. The programmes would meet the career developments of the candidates. The industry requirements could be assessed through various advertisements of companies who carefully plan job specifications. The programme educational objectives are to be planned to meet the designed job specifications.

Keywords*: Curriculum development process. Reverse system approach, enhancement of the relevance of postgraduate programmes*

I.INTRODUCTION

Most of the universities and autonomous colleges adopt traditional approach to design new programmes or to revise the obsolete programmes.

A Board of Studies would be constituted for each programme which may consist of four or five senior faculty members and one or two industry representative(s). The Board usually gets limited period and funds for this. In one or two sittings the board has to complete the draft document and submit to the academic council for its consideration. The program may not have detailed list of program educational objectives (PEO), credits, electives and industry relevant advanced courses and industry specific dissertation works. Once in ten years, the programme would be reviewed by another board that may add some new courses or delete a few courses. There is no radical innovation in the curriculum design process.

According to Finch and Crunkilton [4] curriculum development should be based on the following rationale:

Data based: Student characteristics and community related data should be considered.

Dynamic: Frequent evaluation on the effectiveness, removal of obsolete topics and courses has to be done.

Explicit outcomes: Well defined programme educational objectives are to be specified.

Fully articulated: Sufficient basic, core, applied and advanced courses are to be included.

Realistic: Should offer sufficient industry oriented planning, and manufacturing skills.

Student oriented: Should meet student career needs.

Evaluation –Consciously built in to the programme.

Future oriented: Future industrial needs are to be assessed and incorporated.

World Class –Focused.

Hence, all these rationale issues are to be incorporated in the postgraduate engineering curricula.

Michael G.Dolence advocates learner centered curriculum (LCC) model [5]. This consists of seven interrelated components as follows:

1. Learner populations served
2. Objectives they seek
3. Provider models available
4. Learning theory, methods and principles appropriate to successful learning
5. Overall curriculum architecture providing the full scope of programmes and approaches
6. Specific curriculum configurations designed to meet learners' needs
7. Services required by learners to meet their objectives

This model could be used to evaluate the designed curriculum.

II. REVERSE SYSTEM APPROACH

It starts with synthesized programme educational objectives (PEO), planned course outcomes, desired products of the program, continuous programme improvement through improved instructional change process, needed inputs from the faculty, industry, educational administrators, national commissions, and councils and students.

It is essential to prepare programme educational objectives which will be taken as base for getting the accreditation later, and to compare the skills and competencies of the graduates with those of industry standards.

In the last ten years many global initiatives have been well established in Europe, Russia, Australia and USA. They focus on the high end competencies in product planning, testing, improving and manufacturing to provide maximum assistance to their companies. Every industry publishes the desired skills and competencies of the employees. These are to be considered as standards for developing the curricula.

III.RESEARCH STUDIES ON THE PROGRAM PLANNING AND EVALUATION

Considering the dynamism of industrial growth, All India Council for Technical Education has could constitute research teams through state universities, National Institutes of Technology and well performing autonomous colleges to conduct research on the needs of the industries, and evaluating the existing curricula.

Such studies could be planned once in four years and snap studies every alternate years.

After completing the studies, a working group consists of senior faculty and representatives of industry could be constituted to review the draft curricula and suggest needed changes.

Then the curricula could be placed before the academic councils and based on their approval they may be implemented.

Tamilarasu (6) studied] the effectiveness of curriculum of three year diploma programme in civil engineering and its implementation in affiliated polytechnics in Tamil Nadu. Based on

his research, he recommended more focus on the construction technology.

Sivanesan [7] studied the existing mechanical engineering curriculum offered by the affiliated polytechnics in Tamil Nadu and suggested to implement industry based diploma programme in manufacturing technology to meet the human resource needs of Chennai industrial hub.

Mathew [8] developed an industry relevant flexible credit based four year degree programme in building technology and management.

Subbaraj [9] evaluated the effectiveness of present mechanical engineering curricula with specific reference design competencies and recommended to add many advanced courses and electives to meet the industries as well as the students career needs.

Sheeba Rani(10) evaluated the existing post graduate programme in embedded system technology and suggested industry relevant advanced courses.

Srividya [11] evaluated the existing programmes in computer science and engineering and suggested many industry relevant courses.

All these research works indicate the scope of refining various programmes which will enhance the quality of the candidates. This will assure industry ready candidates and bring very good success in the industrial production and economy.

IV. FACULTY ORIENTATION TO THE NEW CURRICULA

The faculty has to be systematically oriented to the new curricula and based on their feedback, they have to be developed to implement the changes and new courses. They have to be exposed to the industries to have a firsthand experience on the modern industrial processes.

V. RESOURCES DEVELOPMENT FOR THE IMPLEMENTATION OF THE NEW CURRICULA

Most of institutes are to be modernized to implement the curricula. Necessary funds could be offered by the central government since the institutional development could reflect on the industrial performance and economy.

VI. RESEARCH AND DEVELOPMENT

Many studies reflect that India is spending more in research and development (nsf.gov-Globalization of Science and Engineering Research)[1]. There is a need to couple post graduate programs with research programs. Academic productivity has to be increased through research papers product design, and patents [Phillip G Altbach, 3]. The post graduate programmes are to be evaluated against the National Engineering Qualification Framework.

VII. PROMOTING EXCELLENCE IN POST GRADUATE PROGRAMS

This really call for creating an enabling environment for promoting excellence which will need administrative and procedural reforms [2]. As per Ministry of Human Resource Development, project has been established to offer grants to engineering colleges and deemed to be universities to become centers of excellence. Hence, the institutions have to prepare proposals for getting such grants.

VIII. SUMMARY

The current method of planning and improving various curricula of engineering programmes need improvement. Many research workers have brought out many innovations in the curricula planning and development. Reverse system approach would assist the faculty in stating programme educational objectives which will meet the needs of the industry. It is suggested to provide funds for enhancing the quality of the faculty and the resources. There is a need for active collaboration between the government, universities and industry in planning industry relevant postgraduate programmes.

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