

CURRICULUM IMPLEMENTATION-ASSESSMENT –MONITORING: ‘CDIO’ BASED SYSTEM

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ABSTRACT

Any educational effort may deliver its goods only if designed and implemented with care & clockwork precision. Further to maintain its validity, it need be monitored closely & continuously and evaluated thoroughly in all its aspects with precise instruments, concertedly. Thereby clearly implying that any educational program specially the one dealing with definite sciences such as Engineering must be handled with care, if it to be of any use at all to those who are taking it. This paper describes how the State Board of Technical Education, State of Maharashtra, India indulged in a series of meetings, deliberations, workshops, tasks etc., to bring up a highly coordinated internally synchronized and harmoniously built curricula for the Diploma Level Engineering courses run in the Polytechnics. The purpose of CIAAN (2004) was to enhance the effectiveness of Curriculum Implementation, Assessment of Students' learning performance and ensuring the outcomes of the curricula. It was designed to ensure the alignment of process of curriculum implementation to the preconceived goals on one hand and to the outcomes on the other. The CIAAN 2004 was designed completely in line with the principles envisioned in the CDIO 2003. It employed the systems approach, scientific methodology. The tools & mechanisms to operate at the macro and the micro level were developed in an hierarchical manner. The CIAAN has been fully implemented statewide in all its 350 polytechnic institutions that were monitored regularly through the internal & external committees, & through periodic reviews taken and documented at the regional as well as state level. The overall functioning of the institutions has been found to be benefited & enhanced after the employment of CIAAN system.

PREAMBLE

Any document on curriculum should clearly spell out the output and the outcomes, that it envisions for a specific program of study which implies great care and discretion in Conceiving, & Designing it, basing it on the needs of it immediate and later stakeholders as well as the society. A far more pressing need is to implement the curriculum so designed so as to have its pass outs reflect its quality and validity in the Knowledge, skills, and attitudes, as expected by the industries and the society.

Therefore CIAAN developed a mechanism at the state as well as at the institute level, beginning with a survey of industry needs and ending in the evaluation of students' learning performance. Every single significant aspect in the entire 'Curriculum Lifecycle', viz. Identification of the stakeholders, Identification of competencies, qualities of the future Diploma holders, vision, mission, goals, objectives and curriculum development, teaching-learning

process mechanisms, modes of assessment & evaluation through detailed monitoring mechanisms were worked out.

The State Board of Technical Education conducted a survey of industries in the State of Maharashtra. The industries covered were small, medium, & large in scale. The data was collected through a well designed questionnaire and interviews with selected industry personnel. The data was analyzed systematically to arrive at the expectations of medium scale industries mainly and the design of the curriculum was envisioned & constructed.

The design of the curriculum as visualized in CIAAN (2004) therefore embodied the systems approach, scientific methodology and is entirely in consonance with the standards stipulated in CDIO (2003). This paper focuses only on the following selected areas of the entire 'curriculum lifecycle' viz.

- **Curriculum Implementation**
- **Curriculum Assessment & Evaluation**
- **Curriculum Monitoring**

A QUICK REVIEW OF CDIO

In January 2004 the CDIO(Conceive, Design, Implement & Operate) Initiative adopted 12 standards that describe the CDIO programs .the twelve CDIO standards address program philosophy(Std.1), curriculum development (Stds. 2,3,4), design- build experiences and workspaces(Stds. 5,6), new methods of teaching and learning (Stds. 7,8), faculty development (Stds. 9,10) and assessment & evaluation(Stds. 11, 12).

ABOUT THE SCENARIO OF TECHNICAL EDUCATION IN THE STATE OF MAHARASHTRA, INDIA

The following database should give the reader an idea of the scenario of technical education in the state of Maharashtra.

TOTAL NO.OF INSTITUTES There are a total of 350 institutions

KIND OF PROGRAM: Offering the Diploma level courses in Engineering & Technology

DURATION: Three years (six semesters) duration

DISCIPLINES: Civil, Mechanical, Electrical, Electronics and Telecommunications, Computer Engineering, Information Technology, Textile Engineering, Pharmacy and a host of others

Structure of Engg. Studies (Diploma)

- Basic sciences
- Applied Sciences
- Core Technology
- Applied Technology
- Diversified courses

Pedagogical features:

- Hands-on-experience
- Lab experiences
- learner centered teaching learning
- Industry based project work

ABOUT CIAAN (2004)

The state board of technical education,(Maharashtra) has designed the curriculum for the Diploma courses in Engineering & technology by adopting the Systems approach and Scientific Methodology. The same approach has been adopted while considering the implementation of the Curricula.

I CIAAN's consonance with CDIO Std. I the Context: Program Philosophy

Below we take a case study to illustrate how the CIAAN matches with CDIO.

Case Study: Discipline Of Civil Engineering (Diploma Course) (Conceptual stage)

Curriculum is the total plan of intent, designed & implemented with predetermined aims in view & is concerned with the preparation of highly **skilled & competent** workforce, equipped with essential **qualities** of good **citizenry** and **humanitarian values**, to not only work in a particular field of vocation/ occupation/ profession & **satisfy** their functional and developmental needs but to also function in daily lives as responsible citizens & be **lifelong learners**.

II The Consonance of the CIAAN project (2004) with CDIO Standard II

[Curriculum Development: Syllabus Outcomes] (The Conceive & Design stage)

Therefore, in consonance with the Program Philosophy takes into account the following, in the given order necessarily—

1. Industry related Job-Analysis (made with the assistance of industry representatives)
2. A Description of the job (Job-profile)
3. A description of the Industry Related Professional role (in consultation with industry representatives)
4. Derivation of the Curriculum objectives from the job-description (industry reps and educationists)
5. Determination of the curriculum areas in view of the relevant technical content and essential related development Of the four Personality Domains.
6. Determination of subjects & individual subject areas
7. The horizontal & vertical organization of the curriculum areas is carried out.

8. Designing of the Graphical structure to indicate the linkages between the subjects as well as the integration of skills, & quality development into the subject content
9. Determination of the Teaching- Learning environment & processes at the curriculum level

III *The Consonance of the CIAAN project with the CDIO Standard II [Curriculum Development] [Expected Syllabus Outcomes]*

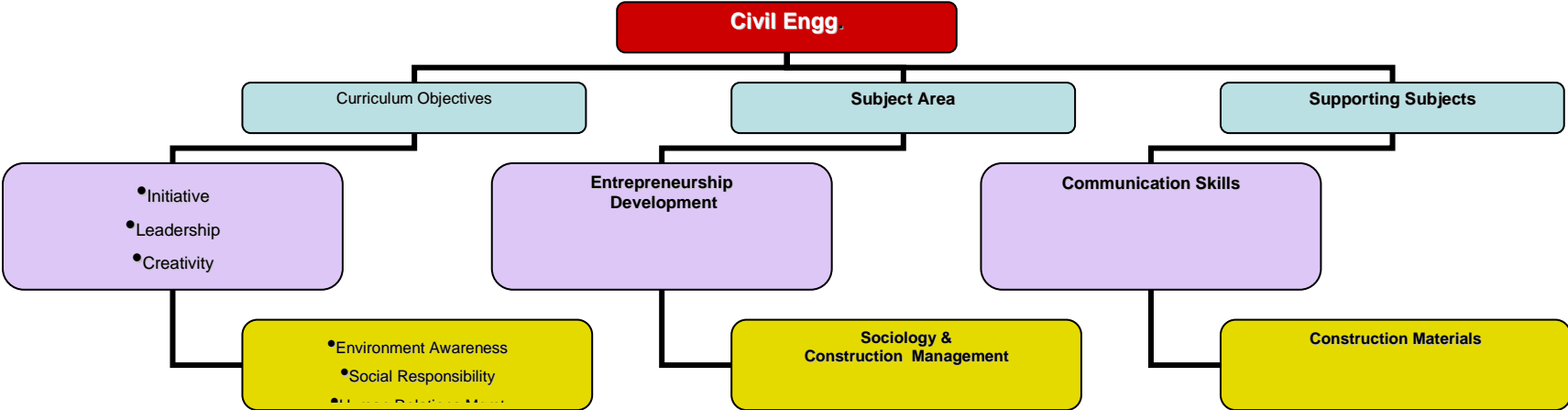
Envisages the following core skills-

1. Personal Development Domain- Creativity, initiative, leadership, honesty, alertness, safety consciousness, punctuality, work commitment, scientific attitude
2. Social Development: responsibility towards increasing the production, co-operation, communication, human relations skills, environment awareness
3. Life-long learner hood: knowledge-discovery, problem-solving skills, logical reasoning, critical thinking,
4. Industry related professional role- (the product-design –system building skills) given ahead
5. The Product-design –System Building Skills: it envisages
 - i. Core skills at the developmental stage (one skill)
 - ii. Core skills at the design stage: (one skill)
 - iii. Core skills at the production stage:
 - a) At the preconstruction stage (three skills)
 - b) At the construction stage (four skills)
 - c) At the post construction stage (two skills)
 - iv. Core skills at the repair and maintenance stage (3)

IV *CDIO Std III: Curriculum Development: Integrated Curriculum*

Fig. 1 An illustration of Integration Of Skills Into Subject Areas As given on the next page and fig.2 indicates the Systems Approach adopted for curriculum development. Fig. 3 indicates structure of State level Curriculum implementation unit

Fig. 1 An illustration of Integration Of Skills Into Subject Areas



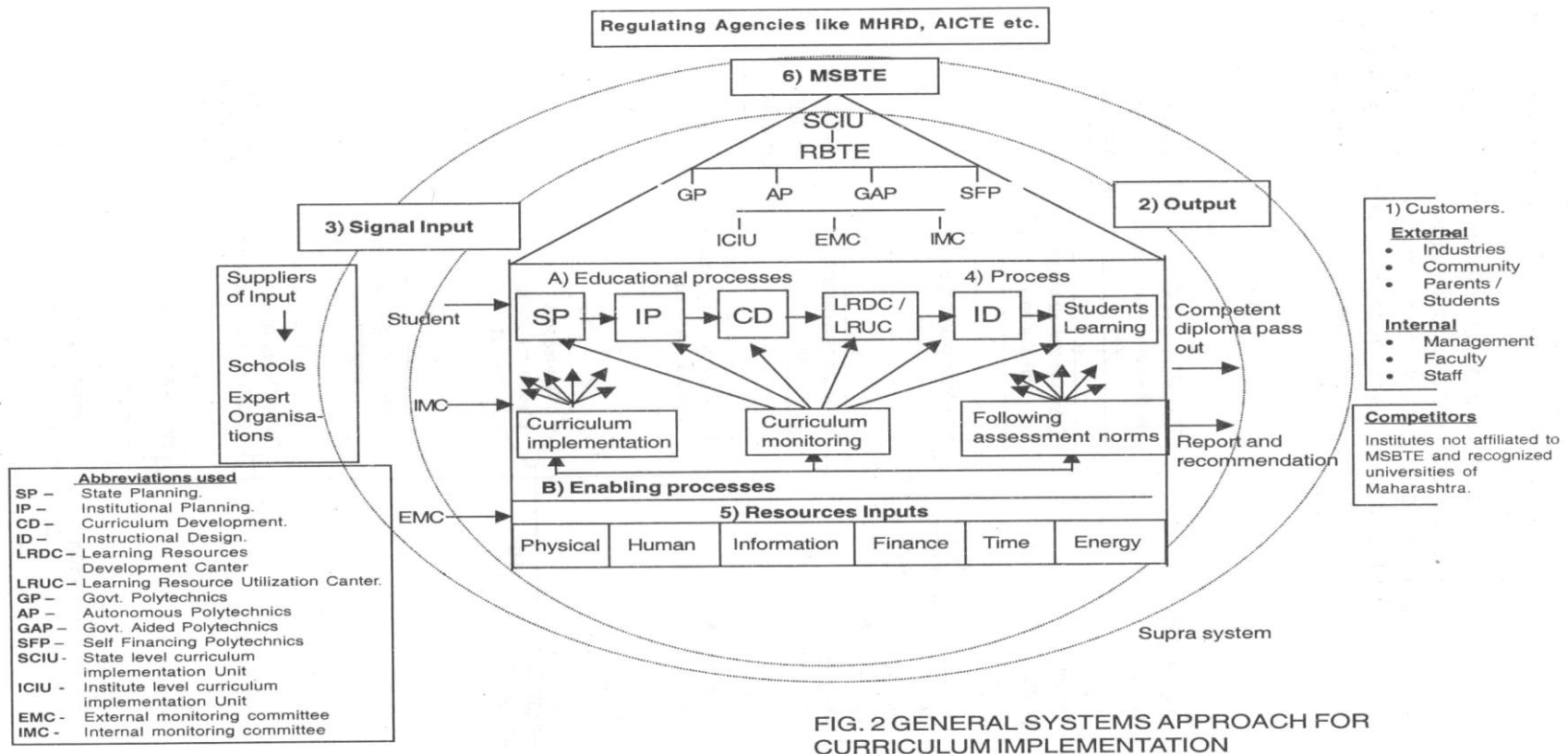


FIG. 2 GENERAL SYSTEMS APPROACH FOR CURRICULUM IMPLEMENTATION

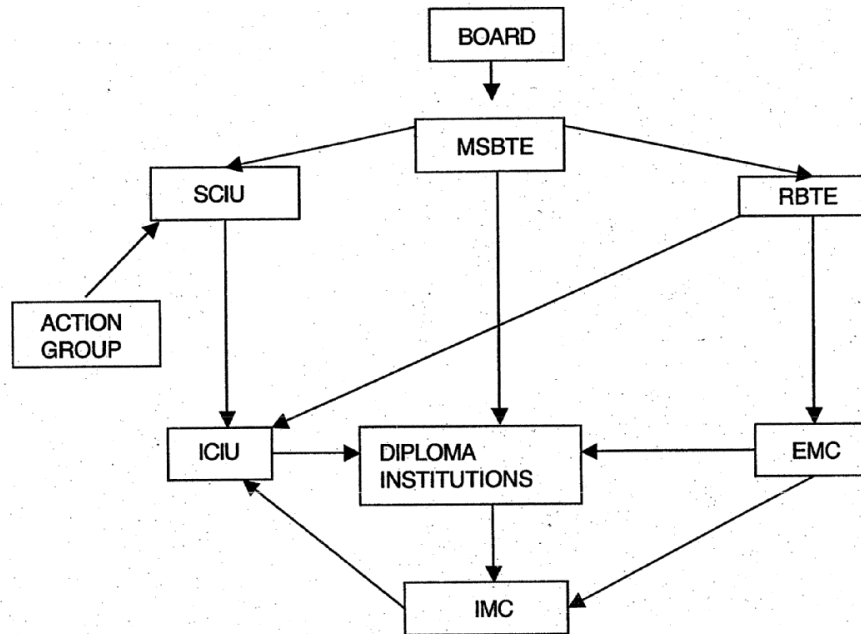
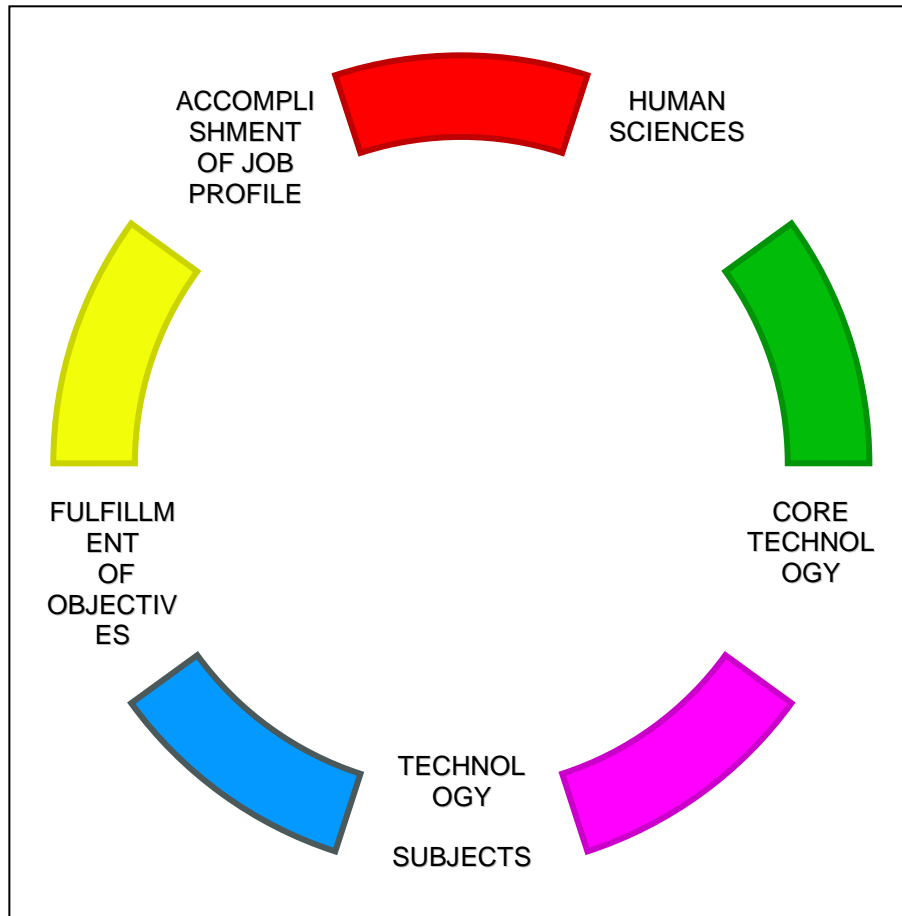


Fig. 3 Structure of State level Curriculum Implementation Unit

- BOARD - Constituted Body For MSBTE
- MSBTE - Maharashtra State Board of Technical Education.
- RBTE - Regional Board of Technical Education.
- SCIU - State Curriculum Implementation Unit
- ICIU - Institute Curriculum Implementation Unit.
- EMC - External Monitoring Committee.
- IMC - Internal Monitoring Committee.

V CDIO Std III: Curriculum Development: Integrated Curriculum : Context in the form of Block Diagram: Subject Area: Applied Chemistry



VI The Consonance of the CIAAN project with the CDIO Std. IV: Curriculum Development (Introduction to Engineering)

1. Communication activities such as written ^ oral, discussions, seminars , project work, lab work , workshop activity , independent study techniques, develop generic skills etc.
2. Cafeteria Approach has been adopted to assist the student in making well- informed choices of the Elective courses.

VII The Consonance of the CIAAN project with the CDIO Std. V & VI: [Design Build Experiences And Workspaces]

- For each significant theory topic, practical content is explicitly detailed.

- For every single practical design build activity students are taken to labs or workshops which are equipped with essential facilities, engineering equipments & latest technology & where they perform either singly or in teams.
- CAI packages have been developed for some subjects in the first year.
- 35 institutions designated as Project Institutions serve as Experimentation centers.

VIII *The Consonance of the CIAAN project with the CDIO Std. VII Integrated Learning Experiences*

- The curriculum of generic skills has been designed Whole to Part.
 - The first year focuses on personal development
 - Contents of the second year lay stress on social skills
 - Third year emphasizes on the development of professional skills through Project management
 - Information Technology has been introduced to students to help them practice Engg. Concepts well
 - IT and generic skills have been integrated in most of the subjects

IX *The Consonance of the CIAAN project with the CDIO Std IX Curriculum Implementation : [Enhancement of faculty CDIO skills]*

- There are MoU's signed between the technical education deptt. and industry for, faculty development that partake in the training sessions for the faculty such as-
- E.g. CII (Confederation OF Indian Industries)
 - CMIA (Chamber of Marathwada industries & Agriculture)
 - EDC (Economic Development Council)
 - IOE (Institution of Engineers)
 - And other similar Industrial Houses

X *The Consonance of the CIAAN project with the CDIO Std IX Curriculum Implementation [Enhancement of faculty CDIO skills]*

There are varied training programs that outsource the Industry personnel into organizing they help impart training –hands-on, lab work, workshop & work through the following-

1. Induction programs
2. Industrial training program

3. Research projects
4. Quality Improvement Program
5. Adjunct Faculty Scheme
6. Expert Lecture Series
7. Industry based Training Program
8. Curriculum Development

XI. ***The Consonance of the CIAAN project with the CDIO Std. XI & XII
[Skills Assessment & Program Evaluation]***

Mode of Students' assessment:

- Continuous Assessment Of Written Term Work
- Assessment of Lab. Performance (journals & oral)
- Practical Examinations
- Assessment of Minor & Major Projects
- Oral Exams
- Seminars & Paper Presentations etc.

XII ***The Consonance of the CIAAN project with the CDIO Std. XI & XII:
[Program Evaluation (2)]***

This is achieved through the well documented reports and feedback of the external monitoring committees, & periodic reviews taken at the state level in association with the stakeholders

CONCLUSION

The CIAAN 2004 was successfully implemented in the 350 technical education institutions, in the State of Maharashtra, and its operations are continuously being monitored and records kept in well documented form both at the level of institute and the level of the Region that may be made available any time. Thus the assertion that CIAAN successfully incorporates and implements the CDIO principles

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