Education to Employment : A critical model to bridge the gap

Sushri Samita Rout
Silicon Institute of Technology, Bhubaneswar-751024
sushri@silicon.ac.in

I. Introduction

In the recent past we have witnesses an upward spiral in the number of professional institutions offering vocational, technical and professional courses. The trend is a direct outcome for the need of huge number of Human Resources required to cater to the ever increasing demand for them in the wake of rapid Industrialization, Globalization and advancement in many other fields, especially in developing countries. India is no exception to the scenario. But having said that we cannot overlook a dichotomous situation, where there is a huge hue and cry about the burning issue of unemployment and on the other side increasing employability of the available human resource. And the major chunk of them is technically qualified. So the real issue is not unavailability of human resources but employability of those resources. Several studies have been conducted to throw light on the issue but so far there is no substantial evidence to clearly point out any particular reason or set of reasons for this menace. But some of these studies have talked about the right kind of competencies not being imbibed in the students in their formative years. Because employability is not only about being qualified, it is also about inculcating the right kind of attitudinal, behavioural, cognitive capabilities and the required competencies for a specific job and environment. There are reports which not only suggest the lack of required competencies for getting employable but also indicate non performance of those resources in the actual workplace. In this study we will try to stress on the factors that contribute to this scenario and provide information regarding the measures being taken and also propose measures which can be implemented to improve upon the situation.

This study focuses on the employability aspects and the existing gaps considering the technical resource: human resource that is technically qualified. As per the Project Implementation Plan by NPIU, Technical education in India encompasses a wide variety of courses at certificate, diploma ,degree, postgraduate and doctoral level at engineering and/or management institutes ,and the central universities, deemed universities, state universities and other private universities (National Project Implementation Unit, 2002) . The technical education covers programmes of education, research,

training in Engineering & Technology, Architecture, Town Planning, Management, Pharmacy, Applied Arts and Crafts and other related areas of Engineering & Technology. (AQIS Guidelines and process Handbook, 201314). In 1947-48 India had 38 degree level institutions with an intake capacity of around 2500 & 53 diploma institutions with an intake of 3670 and the intake for postgraduates was 70. If we compare the figure with 2012-13, the approved intake in total for UG, PG and Diploma is 3449355 . The numbers have doubled since 2009-10 when the approved intake was 1700325.This indicates that more than 3 million are graduating; technically most them having the desire to be part of the elite workforce. But the major concern is out of such a huge technically qualified workforce, a major chunk still lack the required competencies for being employable.

In this paper we present the methodology adopted for the study in section II, followed by the review of related works in section III. Section IV gives a bird's eye view about the measures that are currently being taken by concerned authorities. Section V elaborates on the specific measures that can be adopted and implemented to deal with the issues. Section VI presents the identified gaps which can be further pursued for research and study, based on the issues and the current measures. Finally we conclude in section VII, which is followed by the references.

II. Methodology

Research papers and articles published in different journals and special conferences were searched for scripting the abstract and most of them have been considered for the study. The study in this case is an amalgam of so many areas of research but the thrust will be on technical and management education and the employability aspects of those graduates. The rationale for the mentioned choice is availability of relevant literature to conduct and support the study. But having said that we cannot undermine the fact that high school and pre-university education play an equally important role in developing the required competencies in the students and also affect the career choices made by them in many ways. But there is insufficient literature to support the findings and find the gaps that exist, which directly or indirectly impact the development of the required competencies. Though some studies have been conducted considering the high schools in Southeast Asian countries, but they are not sufficient to make any generalized inference (Nugraini, Koo, Hew, 2010).

For this study the search was focused on the following e-resources and databases from the accessibility point of view.

- IEEE Xplore (IEE/IEEE)
- Open Information Systems Journal
- Business Source Premier (EBSCO)
- Communications of ACM

- Springer Link
- Elsevier

The articles that were searched for the domain of application were restricted in terms of time period. The rationale being the fast changing dynamics of the problem domain. Hence we have tried to restrict the search in terms of time period and the selection of articles was restricted to the time period of 2005 -2013, but some of the Government documents were referred which were published much earlier mostly for factual details. The purpose was to limit the number as well get updated about the latest trends and gaps in the specific domain. But for the purpose of selecting articles in the area of learning styles and classification, the search was not restricted to any time period. The reason being, unavailability of sufficient literature in the area. The mode of search was using the key words – Competency Mapping,

Learning styles, Employability, Technical Education and Classification. After the initial selection, the abstracts and the conclusions were studied for the final consideration. Based on the abstracts and conclusions, a number of articles were chosen for content analysis. After a thorough content analysis, we chose few articles for final review, based upon which we progressed our study and are presenting the final outcome. Apart from referring the literature in the extant list, we also informally discussed with some of the academic representatives of a premier engineering college of Odisha, regarding the real issues behind the problem.

III. Review of Related Literature

For this domain of study we present the review of related literature from several perspectives. They are: Issues in current technical education, challenges faced by employers, unemployability aspects, development models and research gaps (which will be presented in section VI).

For the issues in the current system of technical education in India, instead of relying on several sources we have tried to gather the information available officially from Government repositories. The reason being, the authenticity of the source and availability of compiled information from numerous other sources. As per the information provided in the *Project Implementation Plan* of the TEQIP (Technical Education Quality Improvement Programme) of the Government of India, we present below the issues in the current technical education system in India. The TEQIP "aims to upscale and support ongoing efforts of GOI to improve quality of technical education and enhance existing capacities of the institutions to become dynamic, demand-driven, quality conscious, efficient and forward looking, responsive to rapid economic and technological developments occurring both at national and international levels." (National Project Implementation Unit, 2002, p.3)

- Several control mechanism and multiple regulatory authorities curb the innovation of the Institutes in recruitment of faculty, admission of students and curricula revision.

- There is a remarkable deterioration in the quality of teaching/ learning process and the competence of faculties due to resource constraints, inefficient utilization of existing resources, and lack of sharing mechanism for physical and human resources.

- Irrelevant curricula and absence of agile methodologies for frequent revision of curriculum in response to the technological advancements and required as well as anticipated market demands.

- Inability of the Institutions to attract and retain quality personnel because of traditional recruitment procedures and failure to provide incentives for quality performance and complete nonexistence or no implementation of staff development policies at the Institute level.

- Poor or rather non involvement in relevant knowledge creation and dissemination.

- Limited or no community interaction.

As far as the challenges faced by the employers is concerned, according to McKinsey Global Institute Survey results out of 360000 engineering graduates only 25 % were employable (M S Rao, 2010) . But before probing further, it becomes imperative to indicate what employability is. As per a widely accepted definition employability refers to a person's capability of gaining initial employment, maintaining employment and obtaining new employment if required (Hillage and Pollard, 1998). Hence 25 % being unemployable is only part of the problem, because there is no data regarding the percentage of human resource not able to maintain employment or obtain new employment. Though employability skill requirements differ from country to another and industry to industry, there is some consensus regarding most of the generic competencies required at any work place apart from academic capabilities. Various surveys have indicated lack of communication skills, interpersonal skills, critical thinking, creativity and collaboration as prime contributors to the employability gap. Some organizations are concerned due to the lack of organizational and interpersonal proficiency of the employees, while others stress on the lack of team players and problem solvers. Some other employers have cited the lack of motivation, punctuality, flexibility, agility and the ability to cope under pressure as crucial to the deteriorating performance of the employees.

Apart from the issues in current technical education system and the lack of the required employability skills there is another contributing factor to the situation that is the change in business scenario and requirement. To keep pace with the changing business scenario and the global market, the required skill sets have undergone a paradigm shift. The business requirements have changed in terms of strategy where the shift has been from mass production to flexible production, centralized control to decentralized

control, in terms of production the shift has been from fixed automation to flexible automation , in terms of hiring human resources the shift has been from considering workers as a cost, to workforce as an investment and in terms of training the shift has been quite significant as earlier it was never meant for production workers ,but now training sessions are meant for everyone and broader skills are sought (Sahu and Rizvi, 2012). This shift in so many realms of business necessitates shift in the required skills of the graduates. Hence the traditional curriculum, the traditional pedagogy also needs to be revamped to suit to the changing skill needs.

IV. Measures

The needs of the industry and the various concerns related to the employability skills prompted different authorities to take necessary actions some proactive and some reactive to deal and improve upon the situation. Some of the measures that have been taken are elaborated below.

TEQIP is a Government of India, Ministry of HRD Initiative, and is being implemented as a World Bank project to improve the technical education system in India. Phase-1 of the programme was implemented in 13 states consisting of 127 institutions and was completed on 31st March 2009. Phase-II of the project is currently under implementation. (National Project Implementation Unit, 2002). Some of the important initiatives taken under TEQIP for improving upon the situation are:

- Providing central assistance to the informal sector (selected polytechnics and local community)

- Bi-directional sharing of resources with competitively selected network institutions.

- Faculty, technical and support staff development activities in many facets.

- Need based flexible curriculum development.

- Innovative student assessment techniques.

- Building infrastructure and resources for research.

- Physical resource and expertise sharing and joint ventures.

AQIS the AICTE Quality Improvement Schemes is aimed to promote quality in technical education through research and development. (AQIS Guidelines and process Handbook, 201314). As it is specifically mentioned in the Clause 1(f) of the handbook the scheme aims to "Promote an effective link between technical education system and other relevant systems including research and development organizations, industry and the community". The scheme has designed innovative initiatives to cater to the problem under consideration. Some of the specifically relevant schemes are:

- NAFETIC (National Facilities in Engineering and Technology with Industry

Collaboration) which aims to create national facilities in AICTE approved institutions in collaboration with Industry for design, instrumentation, testing and manufacturing.

-NCP (Nationally Co-ordinated Project Scheme) promotes research on themes of national and social importance which involves networking among several institutions and organizations.

Some of the other floated schemes which have a direct or indirect impact under AQIS are EDC (Entrepreneurship

Development Cell), MODROBS (Modernization and removal of obsolence), RPS (Research Promotion Schemes), and IIPC (Industry Interface Partnership Cell).

Apart from various Government Initiatives, Industries are also taking initiatives in various forms to collaborate with Academia in order to bridge the skill gap. Some of the most prominent and successful initiatives are presented below.

A. **Infosys Campus Connect** is an industry-academia collaboration initiative started in 2004 with 60 colleges which has increased to 353 in 2013. It is continuously working with policy making bodies to take steps to improve behavioural skills in technical graduates to make them industry ready. It has several components like Conclaves, Road Shows, and Faculty Enablement Programs (FEP), Industrial visits through Spark, Sabbaticals, Foundation Programs, Soft Skills Capsule Roll-out, Sponsored Events and Seminars that are tailor made exclusively to cater to effective learning.

B. **TCS Academic Interface**

Programme is an initiative of similar kind which conducts Workshop for students, Faculty Development Programs (FDP) for teachers, Student Awards to encourage healthy competition at colleges, Internship Training opportunity for students, and Global Internship programme.

C. **Delhi Technological University (DTU) and Samsung India Electronics Pvt. Ltd** has collaborated for setting up a Samsung Software Lab at DTU. Under this collaboration DTU will organize a customized BTech programme for SIEL employees. Samsung will set up a Software Lab at the DTU premises. This initiative is aimed at reducing the gap between lab level research and research required by the industry in developing new technologies to strengthen the knowledge and innovation ecosystem in the country.

D. **Times of India Employability Potential Assessment at Campus (EPAC)** is a paper based test battery which can be implemented at all

AICTE approved B Schools in the country to test the prospective candidates for communication skills, analytical abilities and managerial capabilities and provide a standard and scientific measure to the corporate for taking recruitment decisions. The major crux here is not ranking the students rather the thrust is on clustering the students into groups based on the specific requirements of the respective companies and job profiles.

E. **NASSCOM has tied up with UGC** for strengthening the IT workforce of the country by undertaking intensive faculty development programmes for upgrading skill sets and knowledge base of existing technical faculty. This will be done through mentorship programmes, workshops, seminars, projects and development of case studies which can be emulated.

Some of the other prominent initiatives are by Wipro Council for Industrial Research, ICICI Udaan, and Pantaloons Retail.

V. Proposed Measures

After analysing the various issues, challenges and problems associated with the employability gap and presenting the various measures that have been initiated by concerned authorities, we will now propose the various measures that will aim to scientifically deal with the problem. The students or the technical graduates who are the major stakeholders in this issue have to be analysed from several perspectives. The students differ in terms of their primary and secondary education, societal backgrounds, culture, ethnicity, aspirations and choices hence it would not be appropriate to generalize the acquired and potential competencies. Since the input varies in so many ways the output will vary if a standard procedure is applied to all of them. Moreover whether we will get the desired outcome is never guaranteed. Hence an agile methodology should be adopted in imparting technical education which takes care of the input differences but tries to converge in terms of required output. The methodology should consist of and implement several strategies in tandem with the requirements of the issue. Below we present the strategies which have been formulated after mapping the problems with the available techniques based on relevant literature and using tools like Root- Cause Analysis (RCA). RCA is not a symptomatic approach rather it is a systematic approach which breaks down a process into components and goes to the root of the failure. Though this technique is widely used to analyse process failures, we found this technique combined with brain storming useful to breakdown our problem into components. This method helps us understand the true problem before action is taken. This tool adopts several techniques to present the analysis, but here we will use a Fishbone Diagram to present our problem as it will visually give us an overall idea about the contributing factors to the problem.

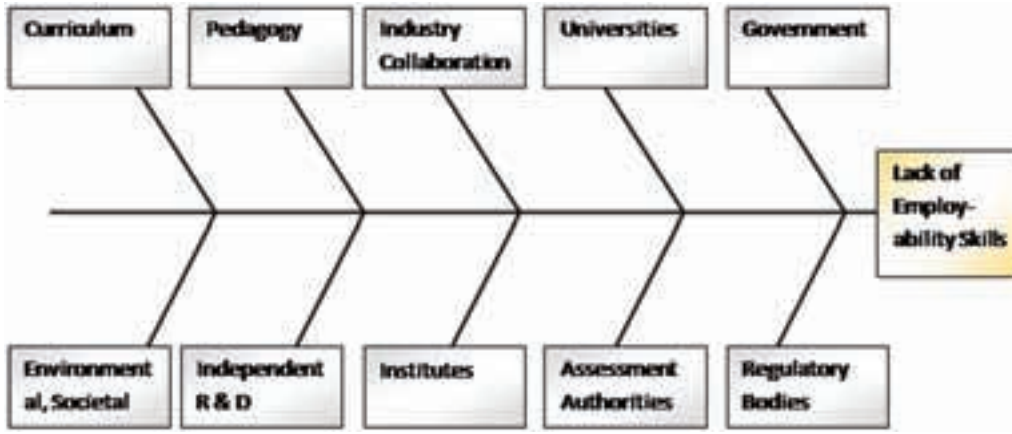

Fig-1 : Fishbone Diagram to represent the RCA for Lack of Employability Skills

Based on the available extant literature, our analysis of the problem situation and the measures already in place, we propose the following measures.

- Classify students based on learning styles. (Lagos and Zapata, 2010)

The very basic fact that learning styles differ from student to another, triggers the need to classify students based on learning styles , so that the pedagogy can be designed as per those styles. In the past there have been several studies suggesting different learning styles, but the diversity in them has offered little to base any approach on the suggested learning styles.

Lagos and Zapata in their work- *Learning Styles, A Correlational Study in Engineering Students,* considered three learning styles suggested by Kolb, Grasha Riechmann and Alonso-Gallego-Honey and tried to find the correlation between them. The results of the study revealed that there was no specific dominance categorization and the students shared two or more styles as these styles are affected by the number of semesters completed and sometimes by the individual teaching styles of the faculties. The correlation was found to be quite low < 0.5. Hence those styles have not been relied upon to base any scientific educational approach upon them. *(Lagos and Zapata, 2010).* The study of various relevant literatures suggests that the most widely accepted technique for learning style classification is Felder-Silverman Approach. Felder Silverman learning style model was developed by Felder and Silverman in 1998. The proposed model categorizes a student's dominant learning style using a scale of four dimensions: active-reflective (how information is processed), sensing- intuitive (how information is perceived), visual- verbal (how information is presented) and global—sequential (how information is understood) and based on these 4 dimensions 16 classes are created (Felder and Silverman, 1998). The most prominent

classifiers that are used to classify students into classes that are created based on the above four dimensions are Neural Networks, Bayesian Networks, Decision Trees and Genetic Algorithms (Ahmad and Shamsuddin, 2010).

- Student modeling based on Student Classification.

Based on student learning styles, preferences and other attributes like knowledge, skills, errors, and misconceptions, affective, cognitive and meta-cognitive factors, several student models have been devised namely Overlay model, Stereotypes, Perturbation, Machine Learning Techniques, Cognitive Theories, Constraint-based model, Fuzzy student modelling, Bayesian Networks, Ontology based modelling (Virvou and Chrysafiadi, 2013). Those models can be used to make pertinent student diagnostics and make predictions regarding their needs so that they can be used to make individualized courses, as a base for Intelligent Tutoring System, personalized instructions and learning materials in tandem with the students learning pace, prepare a effective learning strategy and last but not the least can be used to identify students strengths and weaknesses in order to facilitate deep learning.

- Inferences based on mining the educational data.

After classifying the students into different clusters and creating models it becomes imperative to mine and use the data to make inferences. The inferences can be made based on the gaps that exist between what has been identified and what is needed. Inferences can be made by mining data from educational databases using *apriori algorithm and k-means clustering algorithm.* Apriori algorithms find association rules and k-means algorithms are used to separate objects (students) into clusters where inter-cluster similarity is low and intra-cluster similarity is high (Parack and Zahid, 2012) . In the mentioned work they applied data mining techniques for predicting academic trends and patterns from academic databases. They proposed methods to mine data which can be used to predict behavioural patterns, predict performance, plan and construct course work, schedule classes, provide recommendation for students and predict undesirable behaviour.

- Assessment, evaluation and working upon the faculty attributes relevant to the problem.

Learner (student) modelling, pedagogical categorization cannot only solve the problem; substantial effort is required to find the appropriate resource and fit that resource in the context. As students cannot be generalized and need to be profiled, it would be appropriate not to generalize and allocate the teaching resource; rather a scientific approach should be taken while allocating the teaching load to the faculties. Instead of allocating load to faculties based only on qualification and availability, optimized allocation must be done in a manner which takes care of the required objectives and the constraints as well (Rout and Misra,

2012). The allocation must be done by profiling faculties based on faculty competencies and then mapping the right resource with the right student or cluster of students depending upon the need identified in that particular cluster. The profiling can be done by using the same association rules and clustering algorithms as mentioned above. Assessment and evaluation of the resource can be done by widely accepted techniques like Rasch's Measurement and Blooms Taxonomy (Aziz et al, 2008). Depending upon the assessment appropriate training modules can be designed to take care of the deficits in the required competencies. Moreover the load allocation process can be optimized using proven evolutionary computing techniques.

- Inclusion of appropriate authorities in the curriculum development process.

Sahu and Rizvi in their work "Trait and Skills for New Engineers in the Global Market Scenario" put a lot of stress on the importance of inclusion of the right authorities in the curriculum development process. Since students are required to fulfill the needs of the industry, it is essential that the main stakeholder that is representatives from the Industries must be involved in the curriculum development process. The curriculum development process must be scientific in the sense that it must objectively identify the stakeholders and involve them, identify their respective needs and concerns, identify the potential needs and projected skill sets required by different industries and standardize procedures for prompt, frequent and proactive revision of the curriculum.

- Institutional measures.

The identified issues, the current measures and the needed measures necessitate that the Institutes put their thrust on certain areas which can be dealt at the Institute level. Those areas have been identified as Training, Research and Development, Curriculum reforms, Instructional Resources and active Industry-Academia collaboration (Sahu and Rizvi, 2012). These thrust areas can be improved upon by regular training and development programmes, conducting workshops, seminars and conferences which serve as an excellent platform for information dissemination as well as creation and nurturing of new ideas, incorporation of required ICT (Information and Communication Technology) infrastructure to enable certain pedagogical and profiling strategies.

VI. Identified Research Gaps

1. Research to formulate strategies and devise techniques to profile students in schools and implement the discussed approaches at the very formative (School and High School) level.
2. Studies to indicate selection and implementation of appropriate student modeling strategy. Appropriate in the sense that it must be suitable to the environment (engineering, management, diploma etc) under consideration.

3. Empirical studies to indicate the amount of contribution (%) a particular factor has on the lack of employability skills.
4. There are multiple regulatory bodies having different standards and procedures, regulating technical institutions. There should be intervention at the state and national level to converge on the standards and procedures so that the institutes have clarity about the required standards. This requires considerable work to devise a standard yet customizable strategy which takes into consideration dynamic review of standards, norms and procedures.
5. Research should be carried out to find whether to standardize or not. By standardization we mean the process of recruitment of technical faculty, assessment and evaluation procedures, implementation of curriculum and pedagogy.
6. Study regarding the efficacy of the current evaluation procedures and examination systems. Strategies to revamp the system and implement innovative assessment techniques. Emphasis must be on techniques which are output oriented and which measure the performance in relative terms not absolute (Kulkarni and Shindhe, 2013).
7. Scientific approach towards curriculum development using techniques like RCA (Root Cause Analysis). Root cause analysis can be used to identify the core causes responsible for certain situations or issues. And the identified causes can be worked upon by analyzing the areas where they have a direct or indirect impact.
8. Devising innovative learning teaching paradigms which link teaching process with the industry. One such pilot project was tested in collaboration with The Boeing Company and The University of Washington (Lidtke, 1996).
9. Categorically identify the employability skills lacked discipline wise, stream wise, branch wise and industry wise, profile the attributes that contribute to the lack and suggest preventive measures.
10. Devising scientific load allocation and competency mapping procedures for sustained motivation and innovation capabilities in faculties.
11. Implementation of knowledge management frameworks for curriculum development (Agarwal, Sharma, Kumar, 2008)
12. Study regarding the skills required to maintain or sustain employment. Are they same with skills required to get employment?

VII. Conclusion

This work attempts to give a holistic view about the underlying problems that embark the journey from education to employment. We presented the issues underlying the problems, the measures that

are currently being taken and proposed several measures to bridge the gap. This work also identified several gaps that exist and can be taken up for further study and research at different levels. From the study it is evident that lot many policies, rules, regulations and strategies exist at different levels but the major problem lies with implementation. Most of the interventions are nullified because of improper implementation and lack of monitoring and control mechanisms. So the major thrust should be on researching and devising scientific techniques incorporating proper control and monitoring mechanisms. Below we present a Swim Lane Diagram representing the process flow specific to this problem, where the horizontal dashed line represents a fork which means the processes above it can be performed synchronously. The process implementation can be done at the Institute and/or Government level. The issues can also be taken up by autonomous bodies and other R&D institutions.

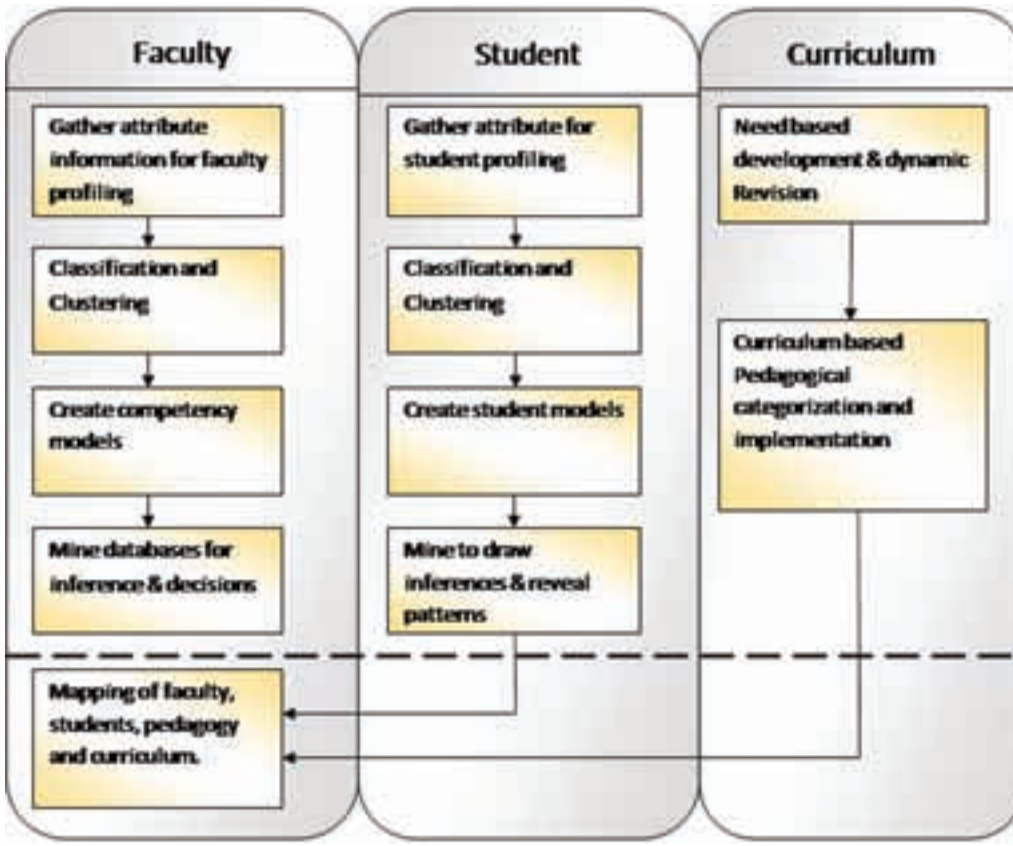

Fig-2 : Swim Lane diagram to represent the required interventions

References

National Project Implementation Unit (2002). *Technical Education Quality Improvement Programme of Government of India, Project Implementation Plan,* for Government of India, Department of Secondary Education and Higher Education, Ministry of HRD.

Rao, M.S (2010). Soft Skills: Enhancing Employability Connecting Campus with Corporate. New Delhi. I. K. International Publishing House

Sahu, M.; Rizvi, M. A., "Trait and skills for new engineers in the global market scenario," *Engineering Education: Innovative Practices and Future Trends (AICERA), 2012 IEEE International Conference on* , vol., no., pp.1,6, 19-21 July 2012

Lagos Sandoval, J.A.; Zapata, P.N., "Learning styles, a Correlational study in engineering students," *ANDESCON, 2010 IEEE* , vol., no., pp.1,9, 15-17 Sept. 2010

Ahmad, N.B.H.; Shamsuddin, S.M., "A comparative analysis of mining techniques for automatic detection of student's learning style," *Intelligent Systems Design and Applications (ISDA), 2010 10th International Conference on* , vol., no., pp.877,882, Nov. 29 2010-Dec. 1 2010

Shipin Chen; Jianping Zhang, "The Adaptive Learning System Based on Learning Style and Cognitive State," *Knowledge Acquisition and Modeling, 2008. KAM '08. International Symposium on* , vol., no., pp.302,306, 21-22 Dec. 2008

Zaina, L.A.M.; Bressan, G., "Classification of learning profile based on categories of student preferences," *Frontiers in Education Conference, 2008. FIE 2008. 38th Annual,* vol., no., pp.F4E-1, F4E-6, 2225 Oct. 2008

Felder R. and Silverman L., (1988), 'Learning And Teaching Styles In Engineering Education', *Engineering Education,* 78 (7), pp. 674–681.

Chrysafiadi K, Virvou M., (2013), "Student Modeling Approaches: A literature review for the last decade" , Expert Systems with Applications, pp. 4715-4729.

Parack, S.; Zahid, Z.; Merchant, F., "Application of data mining in educational databases for predicting academic trends and patterns," *Technology Enhanced Education (ICTEE), 2012 IEEE International Conference on* , vol., no., pp.1,4, 3-5 Jan. 2012

Aziz, Azrilah Abdul; Mohamed, A.; Arshad, N.H.; Zakaria, S.; Ghulman, Hamza Ahmad; Masodi, Mohd Saidfudin, "Development of Rasch-based descriptive scale in profiling information professionals' competency," *Information Technology, 2008. ITSim 2008. International Symposium on,* vol.1, no., pp.1,8, 2628 Aug. 2008

S Rout, B Misra, S Samanta, "Competency Mapping in Academic Environment: A Multi Objective Approach" *Information and Communication Technologies (WICT), 2012 World Congress on*, vol., no., pp.543,548, Oct. 30 2012-Nov.2012.

Kulkarni, U.P.; Shindhe, K.C., "Innovative workflow for accreditation process to ensure quality engineering education in India," *Teaching, Assessment and Learning for Engineering (TALE), 2013 IEEE International Conference on* , vol., no., pp.507,514, 26-29 Aug. 2013

Lidtke, D.K., "Educating the next generation of information specialists, in collaboration with industry," *Frontiers in Education Conference, 1996. FIE'96. 26 th Annual Conference., Proceedings of* , vol.1, no., pp.126,129 vol.1, 6-9 Nov 1996

Agrawal, S.; Sharma, P.B.; Kumar, M., "Knowledge Management Framework for Improving Curriculum Development Processes in Technical Education," *Convergence and Hybrid Information Technology, 2008. ICCIT '08. Third International Conference on*, vol.2, no., pp.885,890, 11-13 Nov. 2008

Nugraini, S.H.; Koo Ah Choo; Hew Soon Hin, "The pilot test of e-Audio Visual Biology for teaching and learning in Senior High Schools of Indonesia," *Distributed Framework and Applications (DFmA), 2010 International Conference on* , vol., no., pp.1,6, 2-3 Aug. 2010

https://campusconnect.infosys.com/

HomeDownloads/CCProgramOverview.pdf

www.aicte-india.org/downloads/Intakeseats.pdf

■■■