

ENGINEERING EDUCATION SUPPORT SYSTEM TO DETERMINE EMPLOYABILITY QUOTIENT BASED ON LEARNING PATTERNS

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Abstract—In existing era ensuring employability quotient of the student is a foremost concern of the educational Institutes. The Employability of an individual depends on the professional skills, educational skills, expertise, innovation, Attitude, approach towards work, personality and many more. This work focuses on estimating the ‘employability quotient through various learning parameters, dependent parameters and traditional parameters. Employability quotient of a learner is predicted by maneuvering the participation of the student in various levels during his engineering journey. The designed support system focuses on parameters involving Academics, extracurricular activities and Co- curricular activities.

Keywords—Progressive assessment, employability quotient, Learning assessment parameters, Outcome based education.

JEET Category—Research/Process

I. INTRODUCTION

The present job scenario demands the workforce to be competitive and well-groomed in all the areas related to hard core technical skills as well as soft skills. “Skills refer to the level of performance of an individual on a particular task or the capability to perform a job well which can be divided into technical elements and behavioral elements” (Noe et al. 2015) [1]. Engineering education demands numerous challenges in the present context due to the difficulties posed by the placement scenario [2].

Soft skills are the skills, which complement hard skills such as interpersonal communication competence; ability to work in teams, motivation, leadership, etc. Comprehensive education curriculum should be the focus of the Educational Institutes in the present Scenario. There are organizations whose sole criteria for hiring the professionals is based more on skill sets relevant to a particular profession evaluating an individual on parameters such as attitude, leadership, motivation, team work, persuasive strategies to deal with people, communication skills, emotional intelligence, interpersonal skills, conflict management, etc. However, it is hard to quantify these traits in an individual but certainly adequate training should be provided to inculcate such attributes among the aspiring professionals. Despite the awareness of the expectations of the firms not many educational institutes offer structured courses in the desired area of people skills. There exists a gap between the expectations of the corporate sector and the modules designed by the academic sector. The growing trend of soft skills training sometimes fail in instilling an urgency among engineering students as they still consider completing the basic educational requirement as the benchmark. Büth et al. (2017) [3] quotes the AICTE, Placement, Graduates, Enrolments and Intake Statistics of Engineering Education in India. “The All India Council for Technical Education (AICTE) statistics show that the enrolment of youth for technical courses in India is lower than the available capacity and less

than 40% of the graduating students get jobs in industry. This clearly shows a mismatch between the industry requirements. This work presents a system that is designed as a support for academic institutions by exploring and assessing the learning levels of the students. The designed system focuses on four important objectives: a) Categorization of students who are academically weak and suggesting remedial strategies to uplift such students. b) Progressive monitoring of skills learned and evaluating employability quotient. c) Comparative analysis of student's progress to achieve the required employability quotient d) Personalized recommendation to students based on progressive monitoring.

II. LITERATURE REVIEW

Hard core skills are the skill sets relevant to a particular discipline but soft skills are a set of traits required for imparting a wholesome education to a professional wherein he is not only a computer engineer or a mechanical engineer but a technical graduate with a perfect hold on his dealings with the professional world and hence can be a good leader, a motivator and a person having all the necessary attributes which enable him to deliver his best in the job scenario. As defined by Hargis, technical skills are also termed as hard skills, and are “job specific tasks directly necessary for successful completion of the job,” for example, electricity, robotics, and computer technology (Hargis 2011) [4]. Various studies have been conducted which highlight the role of soft skills also known as Employability skills for a technical professional and Chaita[5] explains employability skills as “thinking skills such as logical and analytical reasoning; problem solving; capacity to identify access and manage knowledge and information; personal attributes such as imagination; creativity and intellectual rigor; values such as ethical practice, persistence, integrity and tolerance, problem solving, team working, communication, leadership”.

On the other hand, another scholar Dorsey compares employability skills with medicine which one has to gulp in order to survive in the job market. He highlights the vital nature of employability skills by terming them to be unavoidable and thinks that they “are often times the area that will determine failure or success for many in the workplace in personal life as well as individual contractor. Some of the most important people in the world are failing, because though they have mastered the hard skills, they can't cope with the world that is fuelled by soft skills.” (Dorsey 2004)[6].

In addition to the above stated perspectives on employability skills it has also been defined by Keller, Parker, and Chan as an assorted array of knowledge, skills, and attributes that are relevant for the workplace (Keller et al. 2011)[7].

In [8], the authors propose an empirical algorithm based on students performances to estimate the correlation between the CO and PO. Employability skills include two categories of skills: technical and soft skills (Omar et al. 2012) [9]. Employability of the students is a major concern and depends on various parameters [10-13].

III. PARAMETER IDENTIFICATION AND CLASSIFICATION

For skill assessment and to check the employability quotient of the students following methodology is proposed.

Step 1) Identification of conventional parameters: - Engineering entry level score, psychometric test evaluation score, urban /rural category etc.

Step 2) Classification of dependent parameters

1. Gender
2. Scholarships
3. HSC/Diploma result
4. Parent's Income
5. Parent's Education
6. Participation in extracurricular activities
7. Participation in co-curricular activities
8. Physical/Psychological illness

Step 3) Assigning UID (Unique Identification Number)

At the time of admission to the university, the student receives a special identity. The administration division uses this number to keep track of and track the progress of the student's academic record. The designed system uses this number to track the student for estimating his performance index and for calculating the employability index

Step 4) Listing the activities held at various Engineering Institutions and the learning parameters exhibited from these activities. Table 1 portrays the name of the activity and the learning parameter this activity exhibits.

Table 1 Activities exhibiting Learning Parameters

Activity	Learning Parameters exhibited from the Activities
Regular internal and external Assessments	<ul style="list-style-type: none"> • Knowledge • Time Management • Ability to think • Problem solving skills • Ability to demonstrate • Ability to investigate • Adoption of Ethical measures
Programing Competitions	<ul style="list-style-type: none"> • Time Management • Ability to think • Problem solving skills • Adoption of Ethical measures • Problem Analysis • Design & Development of Solutions • Ability to take Initiatives
Project Competition	<ul style="list-style-type: none"> • Adoption of Ethical measures

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	<ul style="list-style-type: none"> • Problem Analysis • Design & Development of Solutions • Communication skills • Team Work • Time Management • Ability to think • Problem solving skills
Poster Presentation	<ul style="list-style-type: none"> • Creativity • Originality • Team work • Adoption of Ethical measures • Active learning
Hackathons	<ul style="list-style-type: none"> • Time Management • Ability to think • Problem solving skills • Adoption of Ethical measures • Problem Analysis • Design & Development of Solutions
Paper Publication/ Presentation	<ol style="list-style-type: none"> 1. Time Management 2. Adoption of Ethical measures 3. Problem Analysis 4. Design & Development of Solutions 5. Communication Skills
Technical Workshop participation	<ul style="list-style-type: none"> • Learning new technologies • Knowledge enrichment
Technical Event Organization	<ul style="list-style-type: none"> • Team Work • Leadership Skills • Time Management
Social activity participation	<ol style="list-style-type: none"> 6. Time Management 7. Awareness of global issues
Sports Activity Participation	<ul style="list-style-type: none"> • Team Work • Time Management
Member of Students clubs	<ul style="list-style-type: none"> • Team Work • Leadership Skills

	<ul style="list-style-type: none"> • Time Management
Cultural Events Participation	<ul style="list-style-type: none"> • Presentation Skills • Time Management • Team Work
Interdisciplinary activities participation	<ul style="list-style-type: none"> • Team Work
Internship	<ol style="list-style-type: none"> 8. Problem Analysis 9. Design & Development of Solutions <ul style="list-style-type: none"> • Presentation Skills • Time Management • Team Work

IV. FEATURES OF THE SYSTEM

Fig1 depicts the workflow of the designed system. The students are assessed with the learning parameters he/she gains since entering this institution. Following are the features of the system.

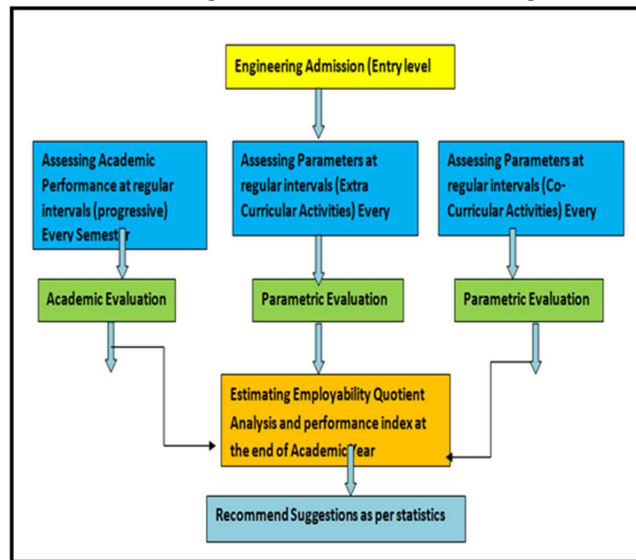


Figure 1 Workflow of the System

a) Determining Learning Parameters

The educational experiences of students can be significantly influenced by assessment of learning. Making sure that the learning objectives, instructional strategies, and learning activities are closely related is one of the biggest problems of effective assessment. The assessment parameters are used to determine whether learning goals have been fulfilled, and it is intended to meet learning objectives.

b) Parametric Evaluation

Overall Progression of students is done considering additional learning parameters. Above table shows various activities in which students can participate and learning parameters. These activities can be academic related or extracurricular activities which boost the student's overall development. The learning parameters can have measured as per the student's participation Employers utilize specially created tests called skills assessment tests to evaluate candidates' skills and abilities during the hiring process. Tests of skill assessment are made to determine the extent to which a candidate possesses particular desirable attributes. Using objective criteria

that produce precise results while being impartial, they assess strengths, weaknesses, skill sets, and personality. The tests can be psychometric test, domain test, communication test, technical tests, behavioral test, aptitude test etc.

c) Progressive monitoring of skills learned and evaluating employability quotient

Current best practice includes evaluation which is aligned to learning goals which focus not only on content knowledge but also on process and capabilities. Successful evaluation task is one which assesses students' achievement of the learning outcomes. Learning outcomes are required to be precise and clear, learning experiences are designed to assist student achievement of those outcomes, and carefully designed assessment tasks allow students to demonstrate achievement of those outcomes. Regular revision of assessment strategy can be even more fruitful.

Identifying different levels of performance in quantitative (University examination) and qualitative (Participation in various activities)

d) Personalized recommendation to students based on progressive monitoring.

The designed system finds the need as per evaluated parameters periodically and suggests recommendations to improve on the parameters required to enhance the employability quotient. It also does the categorization of the students who are academically weak and suggesting remedial strategies to uplift such students

V. RESULTS AND DISCUSSIONS

Sample Case Study:

The system is tested for a sample of 283 students graduated from the institution for an academic year. Their performance for all years of graduation is evaluated based on academic performance and on their learning parameters. Following are the observations and comments on the employability quotient from the various clusters formed during the evaluations:-

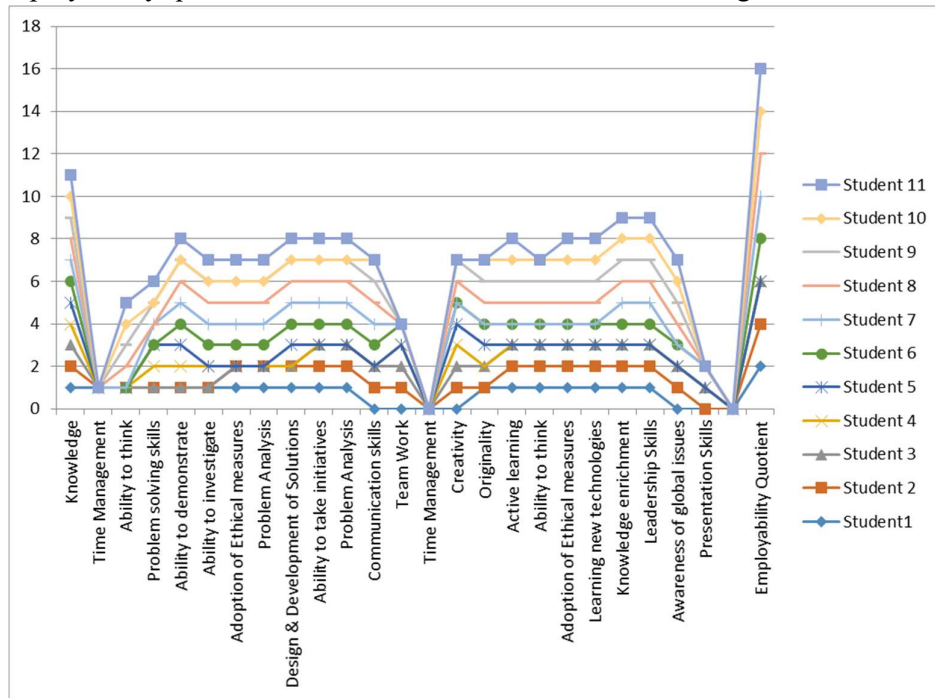


Figure 2 Sample parameter evaluations vs. Employability Quotient

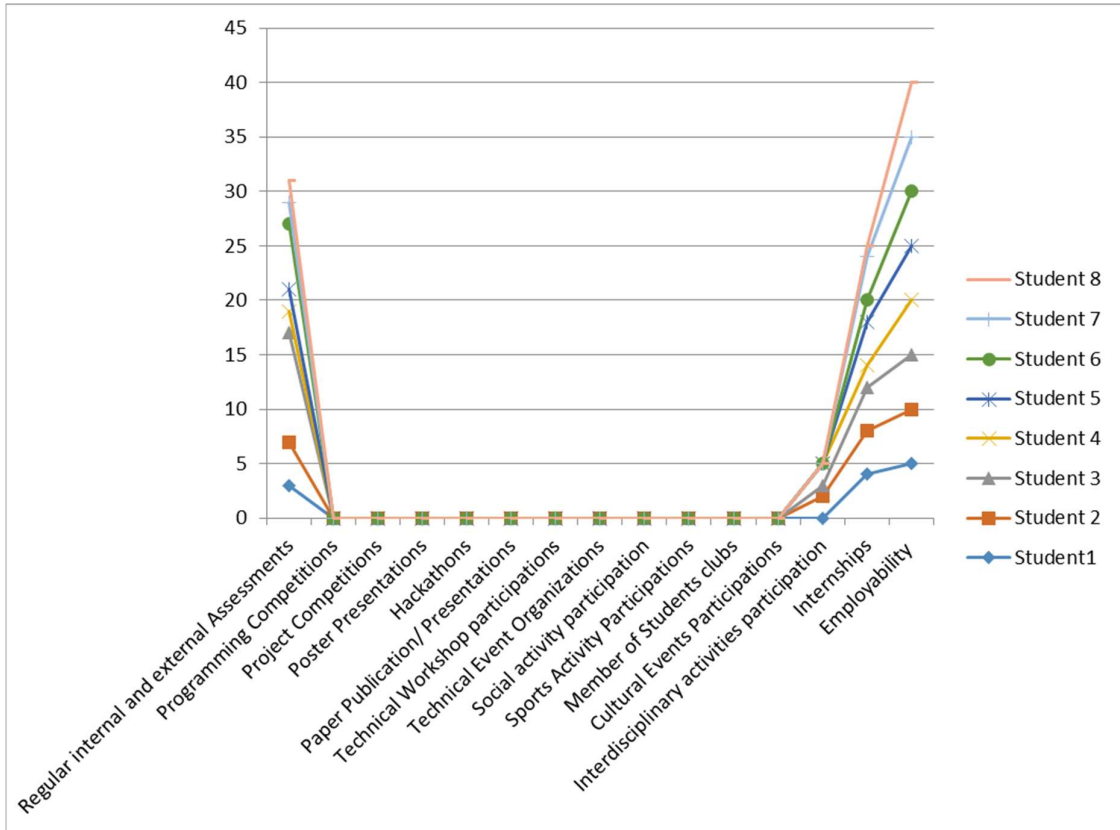


Figure 3 Activity Participation vs Employability Quotient

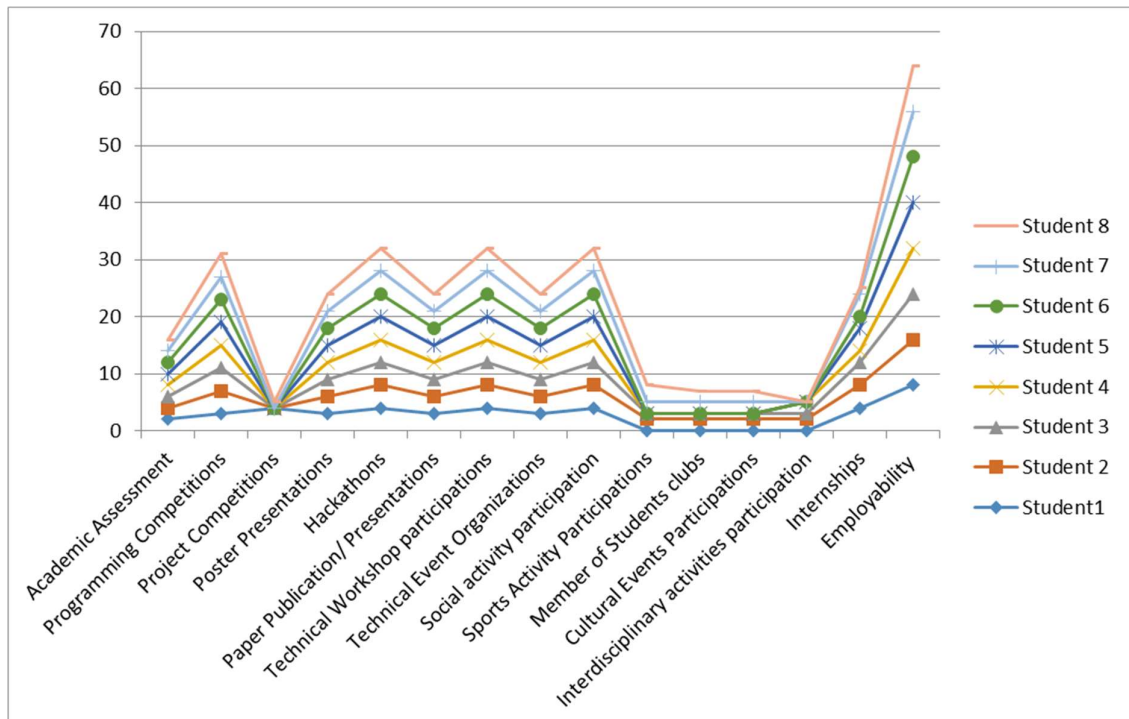


Figure 4 Employability quotient of Academically average students exhibiting learning parameters

- a) Figure 2 shows the cluster sample of the students, exhibiting the curve. It can be stated that the employability quotient of the student is raised if he has gone through maximum learning parameters. The more the learning parameters exhibited the better is the employability quotient.
- b) From the cluster mentioned in Figure 3, it is concluded that if the students are academically good and they have acquired the required technical skills by doing internships then their employability quotient is high
- c) From the cluster mentioned in figure 4, it is concluded that even if the student is academically weak if he has acquired the learning parameters from the activities his/her employability quotient is increased

VI. CONCLUSION

Study of results of undergraduate students and their participation in various academic and nonacademic platforms is done. This study concludes that employability quotient of 40 percent of student's is very high as their focus is on target since admission till graduation. Monitoring students overall progress shows that outstanding 25 percent of students are having above employability average as their academic performance is average but still their skill sets are in line with overall performance. This aids them for overall success in their career. Remaining 35 percent students have lesser amount of skills as mentioned as per parameters evaluation resulting in low employability Quotient. Residual 10 percent of the students opted higher studies as their goal.

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