CASE STUDY

NOVEL METHODOLOGIES TO IMPROVE THE CAREER OF ENGINEERING STUDENTS

By

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ABSTRACT

It is a well known fact that present day economies are governed by globalization, privatization, and liberalization. Technical education plays an important role in the spectrum of human resource development, and assists us in improving academic standards and qualities of student education which in turn lead towards improvement of the standard of the country. The planners accorded high priority for this sector by realizing its importance [4]. This paper deals with engineering education in private sector under present and future scenario. There is tremendous demand for technical education in engineering which results in isomorphic growth in private organizations or engineering colleges. The advent of FDI and world class campuses in India, twinning programs and faculty exchange programs, promises lucrative prospectus in the future of engineering education. With the initiatives, there are some challenges which are to be faced with difficult situation. The paper tries to elaborate on the challenges and discuss some of the problems with solutions. A case study was also conducted, with both a pre-test and post-test (n=700). The pre-test showed 43% to 54% improvement. And the post-test showed results of 52% to 91%, resulting in marked improvement in knowledge gain.

Keywords: VST, Proctor, Spectrum, Human Resources.

INTRODUCTION

Over the past two decades there have been many drastic and dramatic changes in Indian higher education, two of which included an increase in engineering institutions and private organizations. These changes resulted in many challenges and issues which are seen in recent reports on engineering education [12]. The main challenges listed - were shortage of quality faculty, poor language proficiency, absorption capacity of students, less exposure to real time analysis and finally lack of interest or motivation [6].

Since the independence of India there has been an exponential growth in higher education, and the number of colleges increased from 700 to 18,064, plus student strength and enrollment increased from 0.1 to 11.2 million [5]. Considering this growth of higher education in post-independence, the number of universities in 1949-50 started at 25 and increased to 346 by 2008-2009. This growth of higher education in post-independence undertook two distinct phases. Within the first phase from 1947 to 1980, a steady growth was observed which resulted in geographic dispersal of higher education facilities and laid a broad foundation for higher education. In the second phase from 1980 onwards a large expansion was made by private initiatives [13]. Then from 2000 onwards, it was found that a large consolidation of private initiatives had taken place, especially in the professional courses of higher education, all of which led to the broad and widened dimension of the education sector [10].

To this end, a need was recognized and termed "Human

well-being". The need led to the creation of academic systems and organizations which capture thought processes and translate them into practice through that of good curriculum writing and the teacher - learner process [9]. The relation between instructor and learner is shown in Figure 1.

In this paper the authors discussed issues, such as: Popping up issues, Framework of teaching techniques, Development of curriculum, new courses and classroom materials, Keys to grasp concentration of students, Practical sessions, Building technocrats with technical skills, Examination fundamentals, Interview preparation, and Scope after the Bachelor in technology. With these issues in mind and the list from the above techniques, a case study was conducted and results obtained. Thus the aim of the paper was fulfilled by introducing the problems, discussing the solutions, and analysing the experimental results [8].

1. The Challenges

In the field of global education there is a dramatic growth of teaching and learning. And, as our knowledge increases we connect more and more as a global society through information and communication technology which brings change even faster. Several issues are questioned on how society should move to a greater flux i.e., especially making India in the name of modernisation [2].

This modernization is coupled with an increasing global population, particularly in developing nations like India. Sustainability is at stake, and our knowledge is driven and connected to a society - where society, skill, and resources are globally required [5]. The buzz words are "Outsourcing" and "Offshoring". The trust is on market driven economy and this is guides our public policies, with a need for open source and transparent processes. Free market driven philosophies decide investments which result in increasing regional imbalance and tension, and social divide, and disparity in society [3]. Thus, it is our responsibility to head for a technology driven society as we address and bring sustainability, security, and equity with well being as a core trait. To overcome these is to give proper orientation and training to potential engineers, which is the biggest challenge in front of all of us.

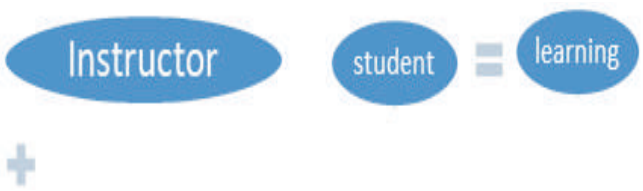

Figure 1. Relationship between Instructor and Learner

2. Issues

Some of the past issues that popped up are as follows:

- Existing educational institutions were created in order to meet the needs of a society which is fast disappearing.
- Wrong selection of career option for existing students.
- Teaching techniques do not match student's learning style.
- Outdated courses are followed which do not match the needs of industry and the workplace.
- Lack of motivation in students: which results in poor attendance, hostility, and dropouts
- Teacher and student relationship gap.
- Lack of absorbing capacity of students, along with lesser exposure to reality.
- The use of sub-standard engineering curriculums which do not meet the needs of industry.

3. Proposed Teaching Techniques

Teaching style may also be defined in terms of the answers

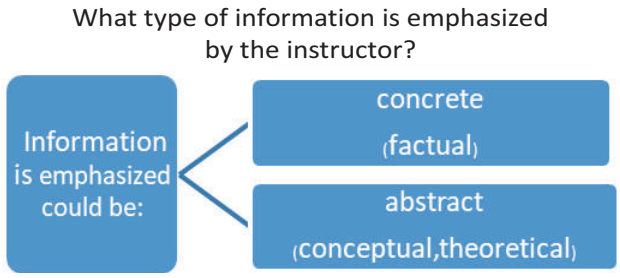

Figure 2. Information by the Instructor

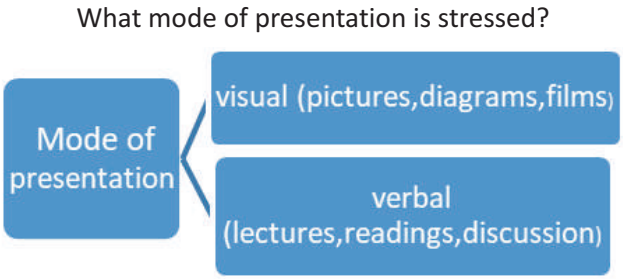

Figure 3. Mode of Presentation to Students

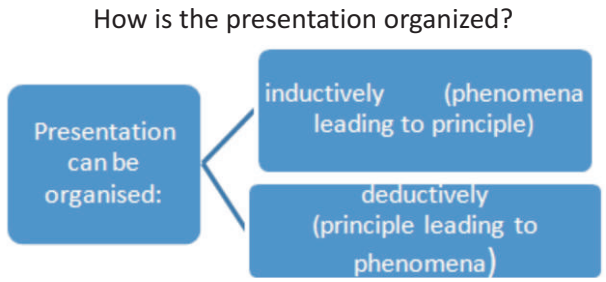

Figure 4. Organization of the Presentation

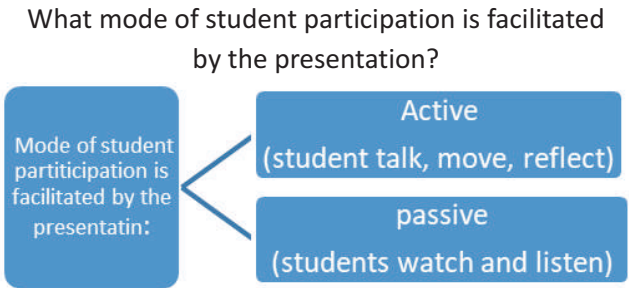

Figure 5. Mode of Student Participation

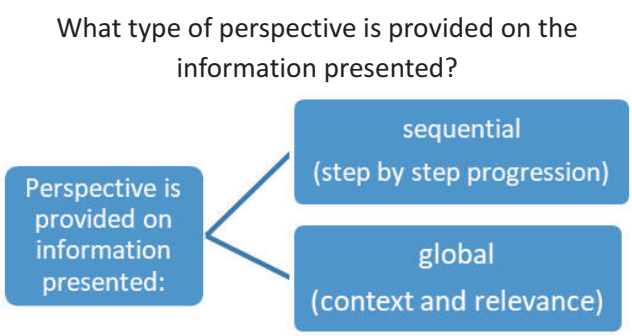

Figure 6. Perspective on Information to Students

to the five questions which are shown in Figures 2 to 6.

Some of the techniques to address learning styles include:

- Motivational Learning: Relating the material being presented to what has come before and what is still to come in the same course, particularly relating it to a student's experience.
- Maintaining a balance of concrete or tangible information and abstract information.
- Following scientific method in presenting theoretical material, and thus provide concrete examples of the phenomena the theory describes or predicts. Then develop the theory or formulate the models and show how the theory can be validated in order to deduce its consequences.
- The use of pictures, schematics, graphs, and simple sketches liberally before, during and after the presentation of verbal material. Plus the use of films, and hands-on demonstrations if possible.
- Do not fill every minute of class time lecturing and writing on the board. Provide intervals-however brief for student to think about what they have been told.
- Provide opportunities for students to do something active besides transcribing notes. Small-group brainstorming activities that take no more than five minutes are extremely effective for this purpose.
- Assign some drill exercises to provide practice in the basic methods being taught but do not overdo them. And come up with some open-ended problems and exercises that call for analysis and synthesis. The assessment process should capture innovation, and be different from rote memorisation.
- Provide students the option of teamwork and cooperating for homework and assignments to the greatest possible extent. Active learners generally learn best when they interact with others, if they are denied the opportunity to do so, they are being deprived of their most effective learning tool [8]
- Applaud creative solutions, even incorrect ones.
- Motivate students to prepare, attend and participate with the materials.
- Interactive learning or content helps to prevent fatigue and sluggishness.

4. Development of Curriculum, New courses, and Classroom materials

- Weekly Curriculum: To create a smart and fruitful class some extra curriculum could be included, such as weekly understanding test, theory classes, practice classes, discussion classes. If in a week minimum five classes are dedicated to a subject then classes could be divided to three theory classes, a discussion class and a problem practice class. The understanding test could be conducted in any of the theory class or discussion class for 15-20 minutes. Weekly timetable should be clear and particular. For example- Monday, Tuesday, Wednesday can be dedicated to theory classes while Thursday and Friday are for practice and discussions respectively.

- Importance of Books: Students should be aware of the importance of books. Students should be motivated to carry a book or soft copy to the class.
- Discussion Classes: To extract a good value from the discussion classes, these classes should be scheduled. Example- topics would be given before a week like a small project kind and on which we have to present our individual ideas [14]. Class will not only be on presenting and sharing ideas, Comments of critics and cross questions on the existence of the ideas in certain condition and situations could also be discussed.
- The understanding test is a test that is taken to understand the depth of understanding of each individual. Questions prepared by the teacher should be limited to weekly topics. Students could take this test using their electronic gadgets example mobile phones or tablets. The procedure of the test will be similar to the test series conducted online. The authors could develop an app for this test. As feedback, the results will be instant.
- Syllabus should be relevant and updated to industrial, social and global needs.

There is a dramatic change in the generation of oral to written, and words to images, such as: TV's, computers, and smart gadgets [1]. Traditional teaching in classrooms, blackboard, chalk, and duster are gradually reducing. The students born in digital world are enthusiastic in interaction and digital learning [16]. Also, one more thing which is to be followed is notes in hard or soft copy should be provided to students, transcribing time could be saved and more time can be devoted for lectures, discussions, practical demo, applications of theories, videos on new innovations, inventions, and technologies [15].

5. Essence of Communication

Every cycle should be completed with feedback. Feedback can improve performance, and provide motivation which is a tool for flawless progress. Understanding the value of the word, a process is followed or evolved. The process is named proctor system. In this a faculty member or a teacher is assigned to some of the group of students to carry the process. The motto of this concept is to link each and every student to the management indirectly, and the pathway is the proctor.

The proctor forms a pathway for solving problems. Thus discussions on any kind of problems related to studies, personal, professional, health issues can be discussed and solved by the proctors assigned to the students [11]. Moreover personality development classes should be provided to make students know and learn the etiquettes of professionalism [17].

6. Keys to Grasp Concentration of Students

A student's learning style may be defined in large part by the answers to five questions which are represented in block diagrams as shown from Figures 7 to 10.

Howard Gardner describes the different ways a teacher

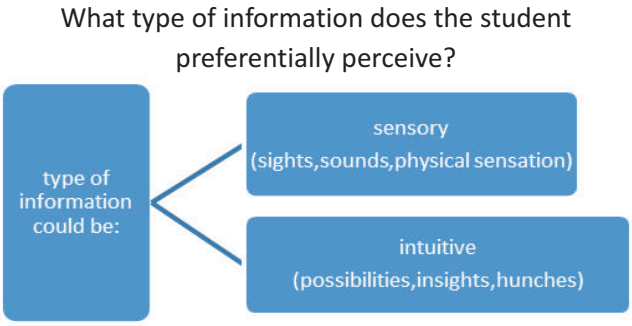

Figure 7. Types of Information

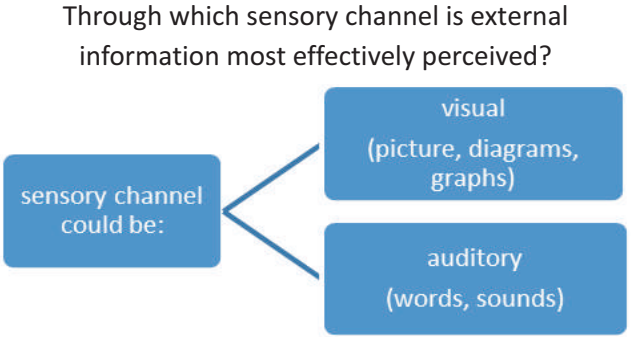

Figure 8. Sensory Channel

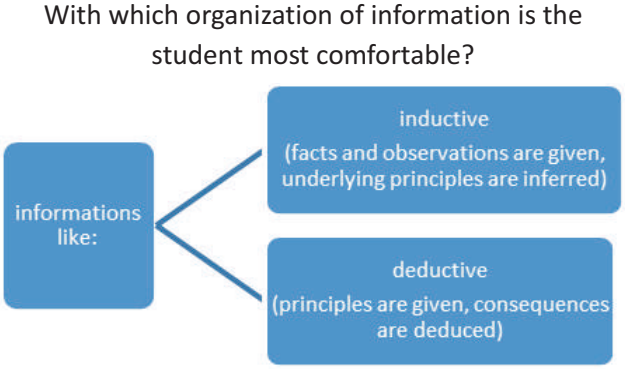

Figure 9. Organization of Information

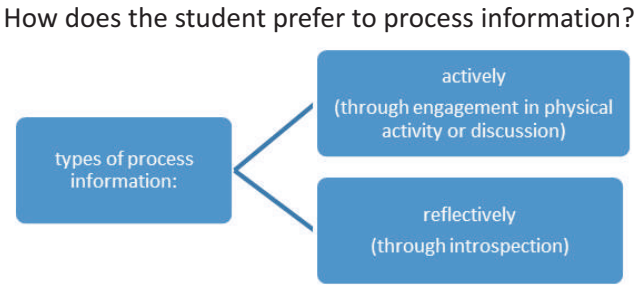

Figure 10. Types of Process Information

can approach a topic so that students, regardless of their unique blends of intelligence, experience, and interest can find pathways for becoming involved with disciplinary content. Some of the approaches can be:

- The narration entry point allows access to a topic using a story or narrative related to concept. For example- the story of the light bulb's invention by Edison, the story of how the speed of light was first measured, and theory of relativity by Einsten.
- The logical-quantitative entry point employs quantitative methods or logical reasoning to understand the topic. For example- measuring the brightness of light, comparing the reflective indices of different materials [7].
- The existential/foundational entry point considers the philosophical aspects of the concept. For example- considering questions such as: Does the use of electric light improve people's lives? Why is light used as a symbol in so many religions? Could life exist without light?
- The aesthetic entry point emphasizes appreciation of the topic's properties through beauty, forms, and relationships. For example- reflecting on ways how different colour lighting affects audiences responding to dramatic scenes, experimenting with polar filters to make a work of art [18].
- The hands-on/experiential entry point invites an approach to a concept through hands-on investigations. For example-finding a method to bend light, separating the different wavelengths of light using a prism, examining the dilation of the pupil when light levels change.
- The interpersonal entry point allows access to a topic through a social experience. For example- working collaboratively to design and present a light demonstration, teaching others about light through demonstrations and posters.

7. Case Study

An important challenge of higher education is to integrate the acquisition of domain specific knowledge with practical knowledge and skills, such as social skills, communicational and technological skills and further to encourage students to apply their knowledge to solve problems and to tackle problems at higher levels. In practical-oriented curriculum, such as those in the study of engineering and technology, the importance of the practical point of view is highlighted because professional expertise develops mainly in authentic working life conditions and it is dependent on how it is learned and how it is used. This also encourages team work activities and promotes students' confidence and encouragement [1]. The aim of quality lab/practical education is to find the factors of behaviour, understanding and reasons that govern such behaviour.

7.1 Role of Administration

- Arrangement of the necessary practical equipment according to the subject.
- To update/maintain equipment in the laboratory as well as to provide enough practical equipment and supporting devices.
- To keep the supervisor informed of activities to be carried out in supervising unit.
- To observe the assignment schedule for each week of the course.
- To review practical session policies for attendance, grading, participation and performance.
- To frequently discuss and ask questions about assignments and computer problems.

7.2 Role of Faculty

- Justify the need for studying practical session.
- Find the most suitable methodologies to explain the concept.
- Discuss various tools for the practical session.

- Identify the slow learners, concentrate on them additionally.
- Frequently ask the students whether practical findings have any effect.
- Prepare students for equipment handling skill.
- Design of instructional activities that will guide the students into online learning situations.
- Promote genuine interactivity, such as communication, participation, and feedback.
- Motivate critical thinking skills in times of emergency.
- Develop a detailed syllabus for each session. The syllabus plays a vital role in helping students understand teachers expectations.
- Arrange the industrial training / industrial camp.
- At the end of the session, provide an evaluation questionnaire on an area for reflection.
- Allow active participation as a mentor and also identify learning pressures on the students.

7.3 Role of Students

- Should have to find the difficult part of the practical learning.
- Before a practical is conducted a student should have a complete knowledge about the experiment.
- Should practice interacting with the faculty.
- Should learn from their mistakes and errors by rectifying at the same time.
- Should attend the practical session regularly.
- Adequate feedback from their teachers is necessary.
- Students should practice as independent learners.
- Should involve in group practical activities and should write scientific reports in which they justify their conclusions.
- Should design and do their own open ended investigations.
- Should complete their task within the stipulated time.

8. Building Technocrats with Technical Skills

The basic quality an engineer requires is their technical training education which is a key factor. And it is one of the main and fundamental requirements to accomplish engineering, mathematical, scientific, or computer-related duties, as well as other specific tasks relating to technology. Engineering education is what makes it relevant and responsive to current societal demands.

8.1 General Tips

- Consider basic engineering principles and theories needed in utilizing professional roles.
- Work actively under different technical clubs.
- Expose students to media, internet and keep them up to date.
- Provide technical classes to the students and also assign small projects on each class.
- Attend workshops, seminars, and motivational session.
- Participate in various technical competitions as necessary.
- Gain experience in industrial training.

9. Examination Fundamentals

- Micro time table
- Smart preparation notes
- Flow charts developments, presentation in the exams
- Weekly class tests

10. Scopes after Bachelor of Technology

- Competitive examinations for public and private sector
- Higher education in technical line
- Entrepreneurship
- Consultancy engineering
- Quality control editors

11. Future Engineers

Future engineers have to be "Global Citizen Engineer" and "Honest Advisor" at heart. This comes from their training and learning. This process has to be a multidisciplinary, flexible learning. Fundamentals are important, such as skills in communication, team work, adaptation, social, and environmental consciousness which are essential for success. Adaptability should be the passion and ability to drive change should be the motto. The dream should be life-long learning and maintaining an excellent

communications skill should be a pre-requisite. Technical skill should be mandatory, the systematic problem should be essentially solved using interdisciplinary approach. The engineer should understand "Multi Stake Holder" "Multi objective" decision making and should be an agent to create optimal solutions to societal issues. Global perspective, ability to innovate and integrate knowledge across disciplines is the target for tomorrow's engineers.

The decision making process will be built on the principles of 3 model SPERM which is shown in Table 1. The principles form the cornerstones of modern engineering education.

To train an engineer is the biggest challenge we face today. Effective teaching is the goal of all educational institutions pursuit, especially private organisations. The engineering pool produced should include skilled, competent, and capable engineers, who can provide holistic and systematic solutions to societal problems and are truly "Global Citizen Engineers".

12. Case Study

A case study was undertaken to look at the quality of education. The case study team worked on ways to produce higher quality education as mentioned before. Agenda was prepared for a semester. A batch of 700 students was considered (n=700).

12.1 Initial Steps

- Provide a new schedule with an updated syllabus.
- Convert classroom teaching into smart classroom teaching.
- Increase practical classes.
- Provide regular work on projects with old or new innovations.
- More importance was planned and given on the study tour for students to various industries, plus, project based learning, and regular conduction of workshops, which all helped the students improve their core knowledge, and improve results, and placement.
- The teaching procedure was also changed as mentioned above. Class room teaching was made more practical oriented through the use of visual and audio aids. This helped students learn faster and teachers had more time to explain the topics in class.
- Provide one on one interaction for students who did not perform well in their examinations. The HOD, Proctor, and class teacher would counsel the student personally and at regular intervals, thereby nurturing the student into devoting more time for their studies and improve their results and performance.
- Enhanced communication and presentation skills in the English Language Lab were carried out to improve students linguistics. The authors also held regular English tutorials which helped build up student's confidence, so they could learn to write, speak, and understand the language at a higher level.
- Students were divided into groups and each group prepared a topic from the syllabus and presented a seminar on it. The authors grouped students according to their different abilities and varying language skills, which was useful. Yet the topics of the groups varied. For example: some topics were different and other topics the same – in the latter, students would present for 10-15 minutes each. This would show how an issue can be looked at from different perspectives or how different evidence can be collected. This method generated curiosity within the students, so they started to learn with renewed interest and enjoy the subjects. This activity was also conducted regularly.
- Assignments, VSTs (Very Similar Test), surprise tests, tutorial classes, and quiz were conducted regularly in planned manner for improvement of results.
- Module wise handouts were given to students for each subject, immediately after completion of the module which helped them to prepare better for the subject.
- Regrouping of the students with fast learners and slow learners, special classes for the slow learners to clear doubts and more practice of subject contents in the

S	Society	Security	Sustainability
P	Profit	Production	Productivity
E	Energy	Environment	Efficiency
R	Resource	Recovery	Recycle
M	Material	Money	Manpower

Table 1. SPERM - Abbreviation

class room helped a lot for their examination preparation.

- After following the above schedule and methodology of teaching, the first internal examination was conducted. Total 689 students appeared out of 700, with a result of 54%. Figure 11 shows the percentage improvement of students before and after the mission, percentage has increased by 11%.

12.2 Problem Faced Initially

- Higher number of absentees.
- Irregular and careless attitude toward the viva, presentation, and project.
- Low quality work of students.
- Communication gap between the lecturers and NRI student.

Problems were eased and organised by dividing the 700 students into two groups. (a) The group of students who scored above 70% and (b) The group of students who scored below 70%. The group scoring above 70% continued the same schedule, whereas more focus was given to the group scoring below 70%. Out of 700 students 267 (n=267) students scored above 70% and the rest were below the margin. The graphical representation of group division is represented in Figure 12.

The overtime schedule was organized for the group scoring below 70% (where n=433). A different methodology with more concentration was adopted for the students below 70% which is shown in pie chart in Figure12.

- Motivational sessions aspired at making students understand about the target and aims of the project.
- Reducing the percentage of absentees by imposing new rules and regulations.
- Increasing clarity of the students to each and every activity that was conducted.
- Remedial classes were provided on a daily basis.
- Doubt clearing and discussion classes were also conducted after remedial classes.
- Regular feedback were taken from students for improvement.

After a month another internal exam was conducted, which showed remarkable results. The group ratio of students securing more than 70% increased, and more subjects were added to the group above 70%. The different methodologies included as regular feedback, with regular monitoring of the students. Remedial classes were conducted and monitored, and the improvement of students percentages and 30% of students with same marks are shown in pie chart in Figure 13.

The procedure was carried on for the third and last month of the semester to prepare the students for the final examination. The results finally increased to 91% of the original. And showed a success of the mission that was started for a semester. The effort, teamwork, and the schedule that was planned brilliantly and sincerely followed had a strong effect in the result shown in Figure14.

When the authors compared the results and final methodology of the semester long project, it showed a

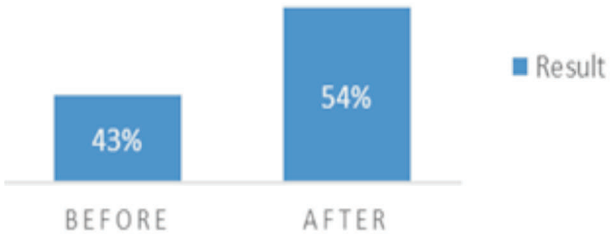

Figure 11. Improvement of Students Percentage before and after Mission

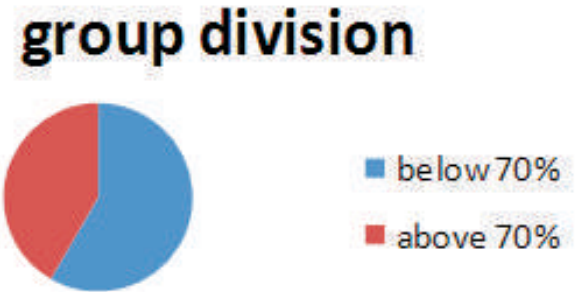

Figure 12. Pie chart showing Percentage of Marks of Students

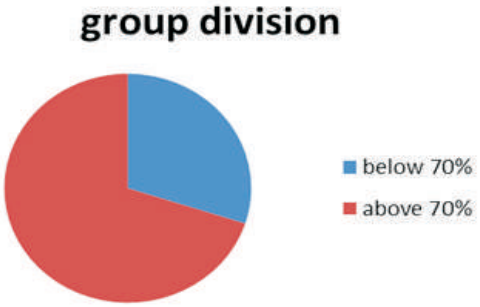

Figure 13. Improvement in Grades of Students after Application of Methodology

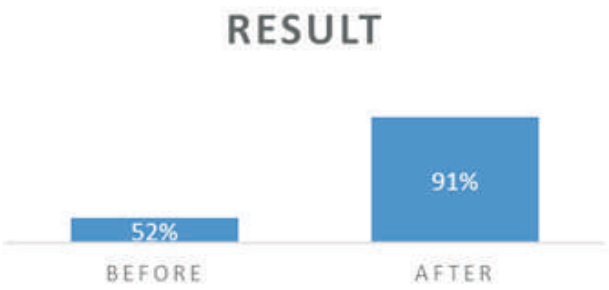

Figure 14. Final Result showing the Success of Mission

dramatic change in overall performance. The elevation in the graph shows the pass percentage of students before the implementation of the methodology as 52% and after the implementation it increased to 91%. The result is shown in Figure14.

Conclusion

There are many challenges present in technical education which the author had to overcome in order to meet global standards and competence. Engineering education needs to be reworked to a higher level, both to improve standards for students entering the competition of the global arena and also allow our students to reach higher expectations. These higher standard levels, in turn would improve the engineering standards of the country, and produce a more effective, efficient, and proper technical education which is discharged to the youth. There has been a tremendous growth both in the number of Engineering colleges and students, but the average standards of colleges and graduated students in technical education is a big concern which needs to be considered. In most of the private engineering colleges, engineering standards have to be followed as per the rules and regulations, such that quality of student is not degraded and does not stifle the country's economy.

The present study was on the Indian system of engineering and technical education. And some of the leading and established organizations have been adopting standard research and object oriented engineering in technical study programmes. A few of the programs are innovative which offer many advantages to universities and lead to improvement in student education. The main advantage to students is that of relating theory with practice, which in turn allows students to gain confidence in decision making, provide an increase in job opportunities, and realise responsibilities; plus provide an opportunity to work with latest technology and equipment along problem solving capacity for an existing number of problems.

Finally, it can be concluded that all the Organizations, Universities, Institutions should implement object oriented engineering which should be connected with research organizations and industries to solve the present scenario problems and meet the future challenges of the fast growing technological changes and industrial development.

References

[1]. Ardeleanu, M. E., & Stanescu, D. G. (2016, June). A new research concerning some influence factors in the orientation of high school graduates towards higher technical education. In *Fundamentals of Electrical Engineering (ISFEE), 2016 International Symposium on* (pp. 1-5). IEEE.

[2]. Atesh, M., Ward, T., & Baruah, B. (2016, September). Analyzing the perception, judgment and understanding of Ethics among Engineering students in Higher Education. In *Information Technology based Higher Education and Training (ITHET), 2016 15th International Conference on* (pp. 1-7). IEEE.

[3]. Banks-Hunt, J. M., Adams, S., Ganter, S., & Bohorquez, J. C. (2016, October). K-12 STEM Education: Bringing the engineering maker space, student-centered learning, curriculum, and teacher training to middle schools. In *Frontiers in Education Conference (FIE), 2016 IEEE* (pp. 1-5). IEEE.

[4]. Budny, D., & Newborg, B. (2017, March). First year student career conference to promote advising. In *World Engineering Education Conference (EDUNINE), IEEE* (pp. 18-23). IEEE.

[5]. Castro, M., Tawfik, M., & Tovar, E. (2015). Digital and Global View of Engineering Education using Remote Practical Competences. *IEEE Revista Iberoamericana de Tecnologias del Aprendizaje,* 10(3), 126-133.

[6]. Chan, R. Y. Y., Ho, K. M., Jia, S., Wang, Y., Yan, X., & Yu, X. (2016, December). Facebook and information security education: What can we know from social network

analyses on Hong Kong engineering students?. In *Teaching, Assessment, and Learning for Engineering (TALE), 2016 IEEE International Conference on* (pp. 303-307). IEEE.

[7]. Gabriel, B., Valente, R., Dias-de-Oliveira, J., Neto, V., & Andrade-Campos, A. (2016, October). Methodologies for Engineering Learning and Teaching (MELT) approach: A way to bring young people to science (and science to young people). In *Engineering Education (CISPEE), 2016 2nd International Conference of the Portuguese Society for* (pp. 1-5). IEEE.

[8]. Groh, J. L. (2016, October). Academic coaching tools for increased retention: Empowering engineering students in their education. In *Frontiers in Education Conference (FIE), 2016 IEEE* (pp. 1-2). IEEE.

[9]. Li, K. F., Fagan, J., & Bourguiba, I. (2016, December). Teaching professional practice and career development to graduate students. In *Teaching, Assessment, and Learning for Engineering (TALE), 2016 IEEE International Conference on* (pp. 398-402). IEEE.

[10]. Madhav, N., & Joseph, M. K. (2017, January). Cloud for Engineering Education: Learning networks for effective student engagement. In *Computing and Communication Workshop and Conference (CCWC), 2017 IEEE 7th Annual* (pp. 1-4). IEEE.

[11]. Malik, Q., Zafar, N., & Khan, M. J. (2016, October). Actualizing students' prior knowledge in engineering education. In *Frontiers in Education Conference (FIE), 2016 IEEE* (pp. 1-7). IEEE.

[12]. Mehta, K., & Gorski, I. (2016, October). Preparing engineers for careers in social innovation and sustainable development. In *Frontiers in Education Conference (FIE), 2016 IEEE* (pp. 1-5). IEEE.

[13]. Naz, A., Lu, M., Hatipoglu, K., & Rambo-Hernandez, K. (2016, October). Employing project-based learning to address the Next Generation mathematics standards in high schools. In *Frontiers in Education Conference (FIE), 2016 IEEE* (pp. 1-5). IEEE.

[14]. Ochoa, J. L. R., Pérez, J. L. B., & Berrio, J. A. (2016, October). Student acceptance and performance of a virtual platform for training and evaluation of Statics course. In *Frontiers in Education Conference (FIE), 2016 IEEE* (pp. 1-6). IEEE.

[15]. Paulson, J. L., Kajfez, R. L., & Kecskemety, K. M. (2016, October). Examining engineering students' major selection: Developing baseline quantitative results to investigate major selection and change. In *Frontiers in Education Conference (FIE), 2016 IEEE* (pp. 1-5). IEEE.

[16]. Pears, A., Nylén, A., & Daniels, M. (2016, October). A critical analysis of trends in student-centric engineering education and their implications for learning. In *Frontiers in Education Conference (FIE), 2016 IEEE* (pp. 1-7). IEEE.

[17]. Sullivan, W. G., Daghestani, S. F., & Parsaei, H. R. (1996, November). Multivariate analysis of student performance in large engineering economy classes. In *Frontiers in Education Conference, 1996. FIE'96. 26th Annual Conference Proceedings of* (Vol. 1, pp. 180-184). IEEE.

[18]. Wang, N., Chen, X., Lan, Q., Song, G., Parsaei, H. R., & Ho, S. C. (2017). A Novel Wiki-based Remote Laboratory Platform for Engineering Education. *IEEE Transactions on Learning Technologies,* 10(3), 331-341.

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