

COMPETENCY MANAGEMENT

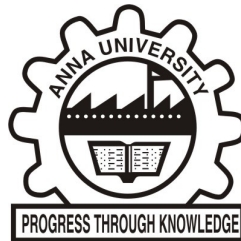
A THESIS

Submitted by

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in partial fulfillment of the requirements for the degree of

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FACULTY OF MANAGEMENT SCIENCE

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CHAPTER 8

RESULTS, DISCUSSIONS AND CONCLUSION

8.1 GENERAL

The findings of the current research, which has followed the case methodology have been discussed for the following areas:-

- Competency based education and training implemented in an automotive company.
- Competency based engineering education implemented in a polytechnic and an engineering college.
- Integration of the competency management framework with the enterprise management system
- Overall business results

Analysis of the research results were done using Hypothesis testing (2T test, paired T test, Chi-square test, ANOVA etc.), Stratified box plot / histogram, and Scatter diagram/correlation/Regression. A short description of the tools used for analysis is given in Appendix A.8.1.

8.2 COMPETENCY BASED EDUCATION AND TRAINING

The structured process developed as part of this research was used to implement role and competency based education and training, initially in

8.3 COMPETENCY BASED ENGINEERING EDUCATION PROGRAMME

The Collaborative Education Programme (CEP), established as a part of this research was a unique experiment. It was the first of its kind in India with an active collaboration between the Industry, Academia, Students and Parents. An initial experiment was carried out in a polytechnic and an engineering college, both located in the state of Tamil Nadu in South India. The polytechnic programme has delivered three batches of students who have been through a three year diploma programme in mechanical engineering. In the engineering college, the first batch of undergraduate mechanical engineering students will complete the programme and join the automotive company in June, 2014. This approach has shown significant differences in the way the students belonging to the CEP are motivated, get actively engaged and perform in their academics when compared with their peers (Kovaichelvan 2014). The first batch of undergraduate program students in electrical and electronics engineering will complete the programme and join the company in June, 2015. While there are several common aspects between the polytechnic and engineering college programmes, there are also a few differences. One major aspect is the admission process. Admissions to the engineering colleges are carried out by a single window approach in each state by the Technical University. The process is merit based and uses a state wide rank list of students' marks in higher secondary school examinations. Whereas in the polytechnic, the admission is done in the polytechnic itself on merit.

8.3.1 Diploma Programme in the Polytechnic

The students and parents in urban and semi-urban areas do not consider a diploma programme as being aspirational. Even if they do join the programme, they consider it as a stepping stone to get lateral admission for an

undergraduate programme in engineering. Hence, polytechnic education does not attract top quality talent. The number of students who applied to the CEP for the diploma programme was significantly lower in the first three years. Then an outreach programme was conducted to attract the students from rural areas. It took two years for the CEP to become popular among the parents and students in the rural areas. With the outreach programme, the response to CEP increased multifold and attracted students with the right aspiration and commitment. Figure 8.1 shows the number of students who applied for the CEP programme and the number of students who got selected.

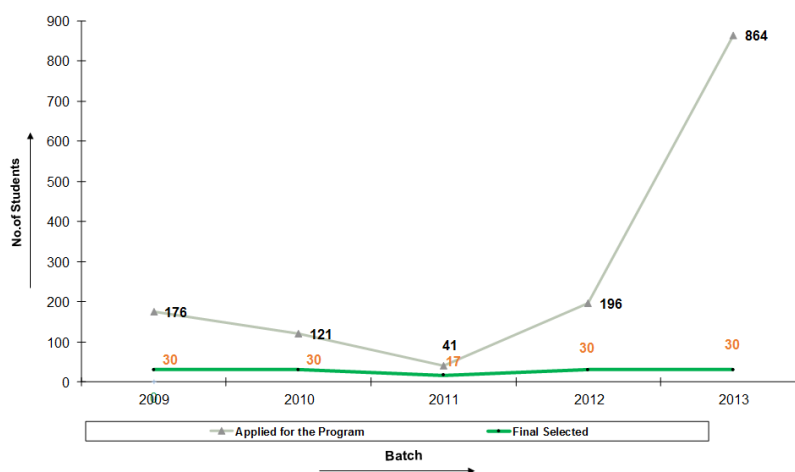


Figure 8.1 Number of students applied and selected for the diploma programme

As a result of CEP's reach out initiative, the programme attracted a large proportion of talented students from rural areas, who were in the top percentile of the rural schools. They don't score marks in the board examinations on par with their counterparts in the urban/semi-urban areas as they have constraints with regard to the quality of teachers, parents' coaching, and quality of peer group. It was found that the innate ability of students who were selected for the CEP programme from the rural areas is improving with the outreach initiative. With a plan to get more CBSE students through the

outreach program during next academic cycle, it is expected that the quality of students selected would further improve. The mean motive and trait scores of four batches of students over years is shown in Figures 8.2 and 8.3, indicating that the quality of input in terms of quality of students is steadily improving over the years. A hypothesis test was carried using one way ANOVA. As the 'P' value < 0.05 , there is a significant improvement in the motive and trait scores of students selected over years.

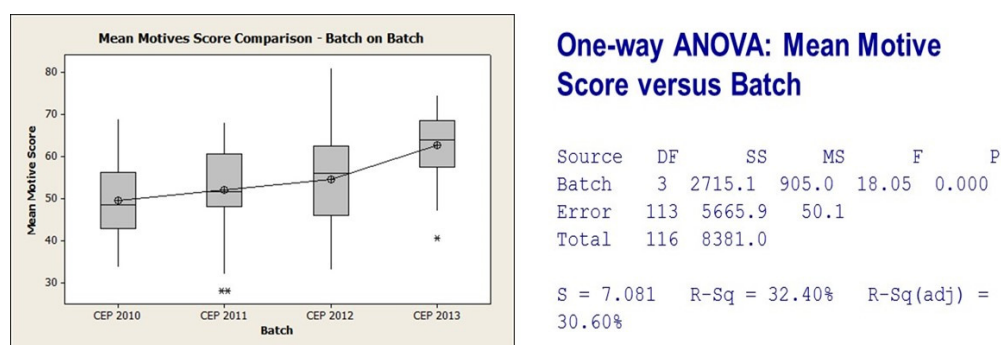


Figure 8.2 Mean motive score trend and hypothesis testing

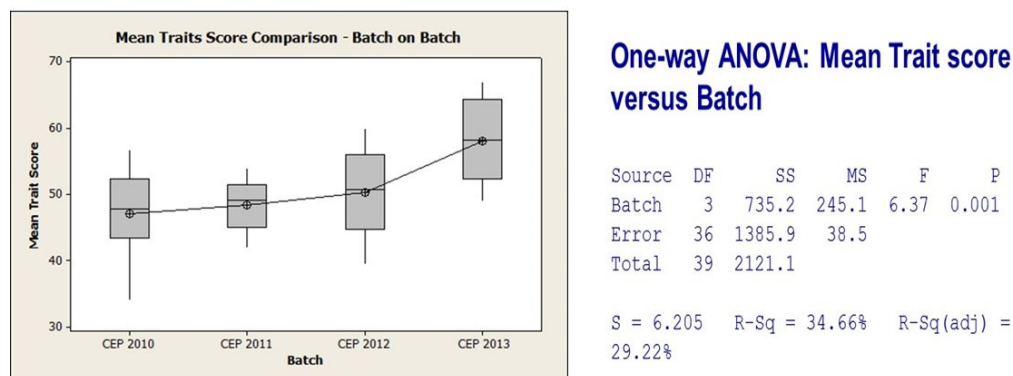


Figure 8.3 Mean trait score trend and hypothesis testing

It was found that their academic performance steadily improved with every batch, with the 2013 batch performing significantly better than any other. There is only one data point for 2013 as the students are still in the first year (Figure 8.4).

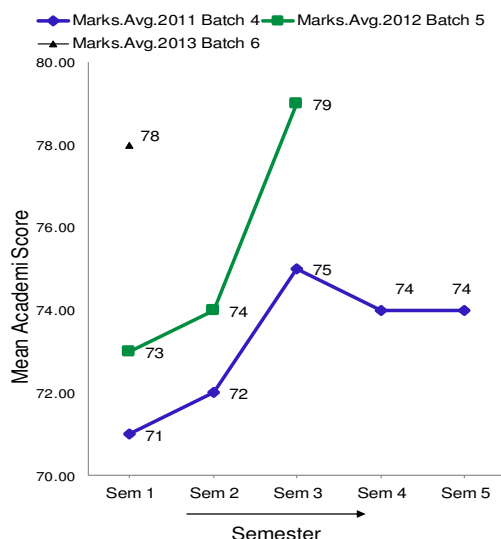


Figure 8.4 Academic performance of three batches

It was observed that the traits and motive scores were increasing significantly along with the academic scores with each passing batch. Hence, a regression analysis was carried out to check the correlation between them. Figure 5.6 shows the fitted line plot between mean motive score and mean academic score. A fair correlation can be observed between the mean motive scores and academic scores of the students as the P value observed 0.005 with R Square adjusted value of 49% at 95% confidence level.

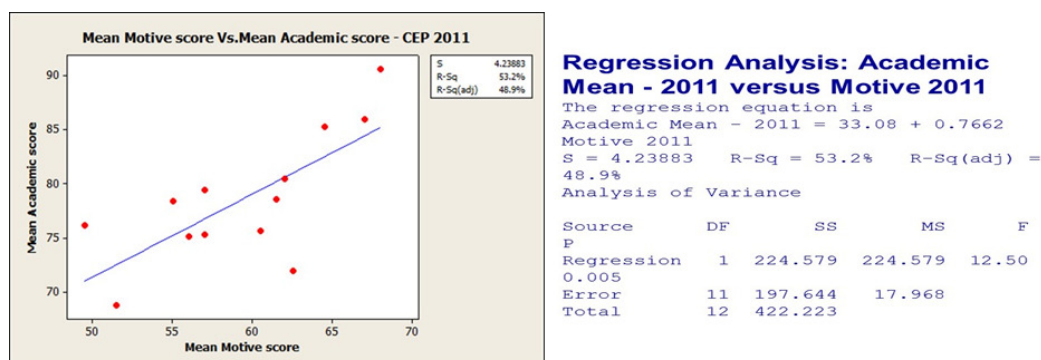


Figure 8.5 Mean motive score vs academic mean

Figure 8.6 shows the fitted line plot between the mean trait scores and the mean academic scores. A fair correlation can be observed between mean the trait scores and academic scores of the students as the P Value observed 0.028 with R Square adjusted to a value of 31% at 95% confidence level. The Mean motive score of a student has better co-relation with the academic score than with the trait score.

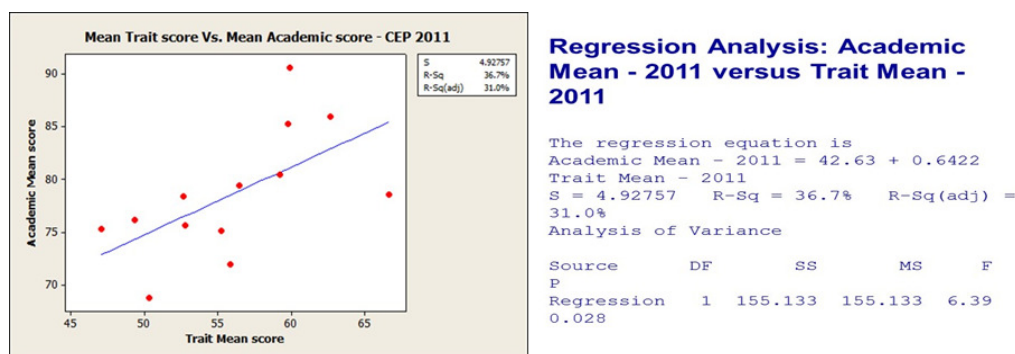


Figure 8.6 Mean motive score vs mean academic score

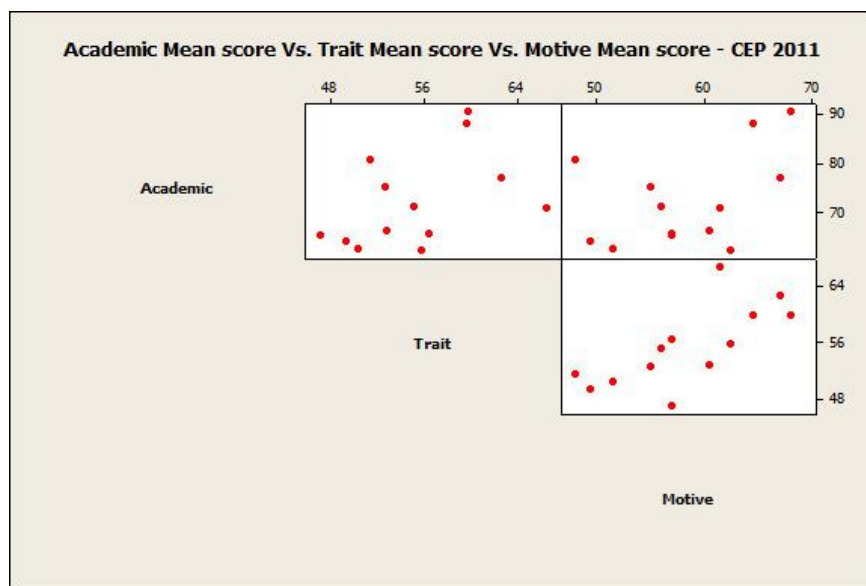


Figure 8.7 Correlation of academic vs traits vs motive score

From Figure 8.7 it is also evident that there is a correlation of Academic vs Traits vs Motive score.

Academic performance of CEP diploma students was compared with that of the other diploma students in the polytechnic (2011 batch and 2012 batch). The mean academic scores as well as Standard Deviations (SD) of the CEP students were found to be significantly better than that of the other students in the polytechnic (Figures 8.8 and 8.9).

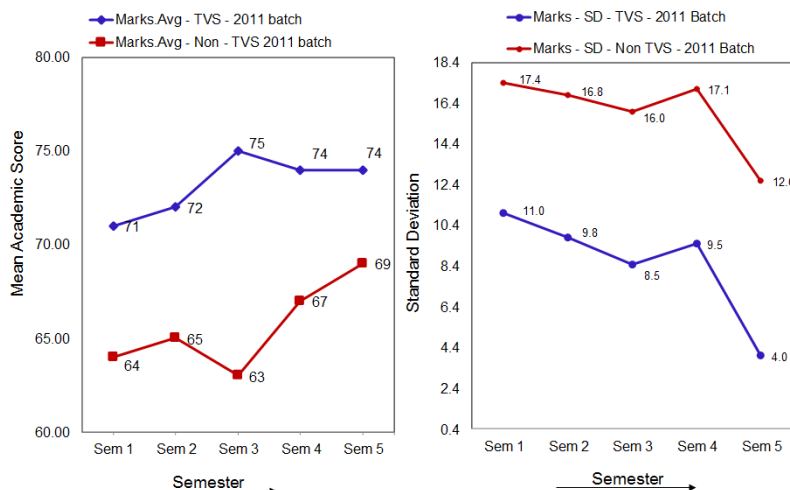


Figure 8.8 Academic scores and standard deviations of CEP 2011 students vs others

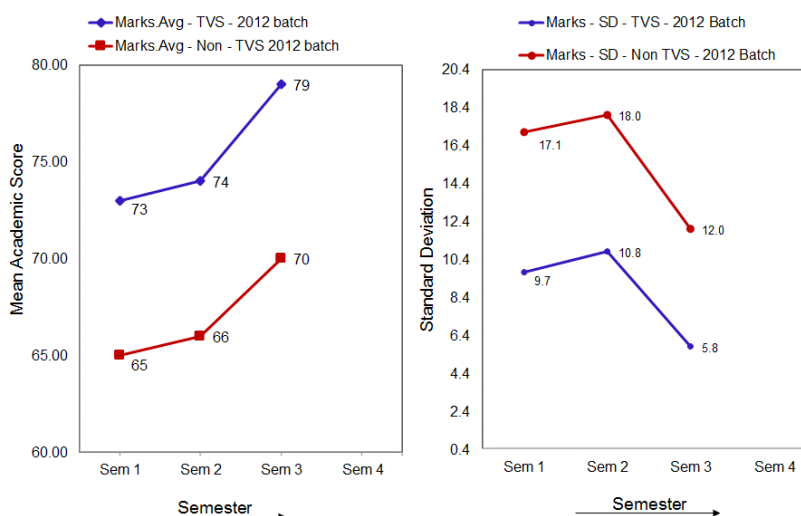


Figure 8.9 Academic scores and standard deviations of CEP 2012 students vs Peers

The Positive health program established for CEP students is showing a positive trend over years. A health index was co-created with Svyasa University and an applied psychologist, based on dimensions such as Physical, Mental, Social, Spiritual and Vocational wellbeing (Appendix A.4.32) was applied to the students, as discussed in the previous chapter. The health index of the 2011 batch was measured in May 2012 and May 2013 along with their academic scores in the corresponding year. The distribution of the health indices and academic scores are shown in the Figure 8.10. It is evident that both the health indices and the academic performances improved in one year. This measurement was started a year back and with availability of more data points in the next two years, it will be possible to check the co-relation between the health indices and academic performances of the CEP students.

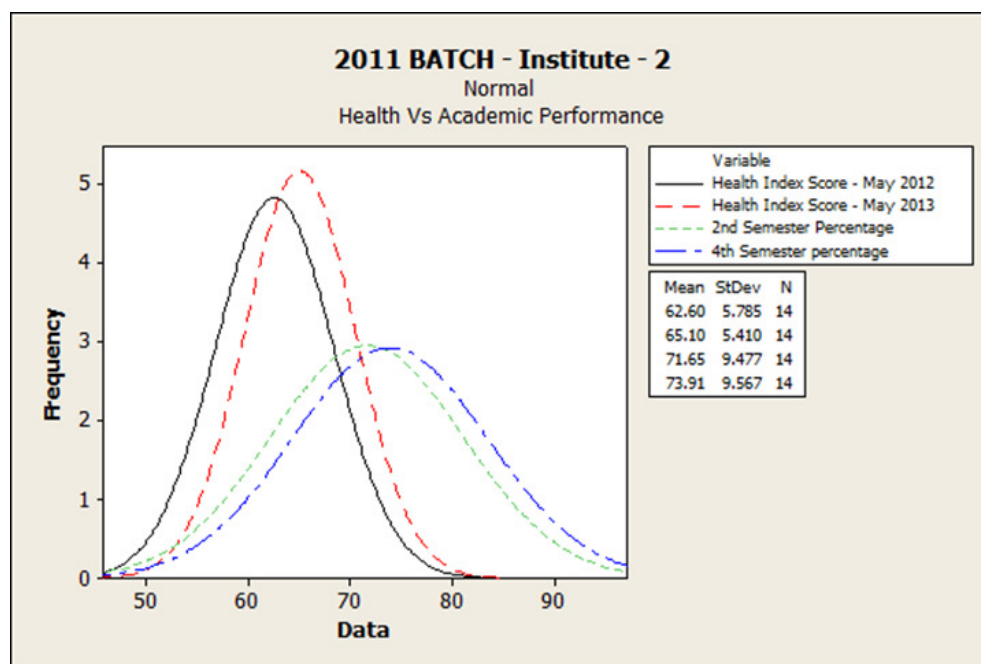


Figure 8.10 Health indices and academic performances of CEP diploma students

On completion of the academic program, the CEP diploma students worked on three projects aligned to their target roles. Using their performance in these projects, a Role readiness score was arrived at – A maximum of a 150 points can be obtained with a weightage of 50 assigned for achieving project outcome, 25 for behavioural competency assessment, 25 for adherence to process, 25 for functional competency, 25 as internal marks. The students who met a minimum score of 70% were qualified for the role. A final review of each student was carried out by a team comprising the HOD (Head of the department) of the polytechnic, line managers, and programme manager for CEP. The role readiness score of 2011 batch is shown in Table 8.8.

Table 8.8 Role readiness score CEP 2011 batch

Sl. No.	Roll Number	Project Deliverable Achievement (Max 50)	Behavioural Assessment Score (Max 25)	Adherence to Process (Max 25)	Functional Competency Score (Max 25)	Internal Marks(OJT) (Max 25)	Total (Max 150)	% (Required 70% Minimum)	Rank	PASS - first time
1	10MS25	45	24	19	21	24	132	88	1	PASS
2	10MS13	43	23	21	20	24	131	87	2	PASS
3	10MS29	42	22	23	19	24	130	87	2	PASS
4	10MS27	43	23	24	18	20	128	86	3	PASS
5	10MS22	43	23	20	19	23	127	85	4	PASS
6	10MS10	41	21	24	19	22	127	85	4	PASS
7	10MS03	42	24	19	20	22	127	85	4	PASS
8	10MS15	40	22	24	18	21	126	84	5	PASS

An engagement survey is conducted every year using a third party in the company. The demographics of the respondents is captured during the survey, with which it is possible to get the score of any segment of people whose number is more than ten. The first batch of engineers from the polytechnic have participated in the survey and their scores are shown in Figure 8.11. The CEP diploma engineers' engagement score is better than the company score and peer score.

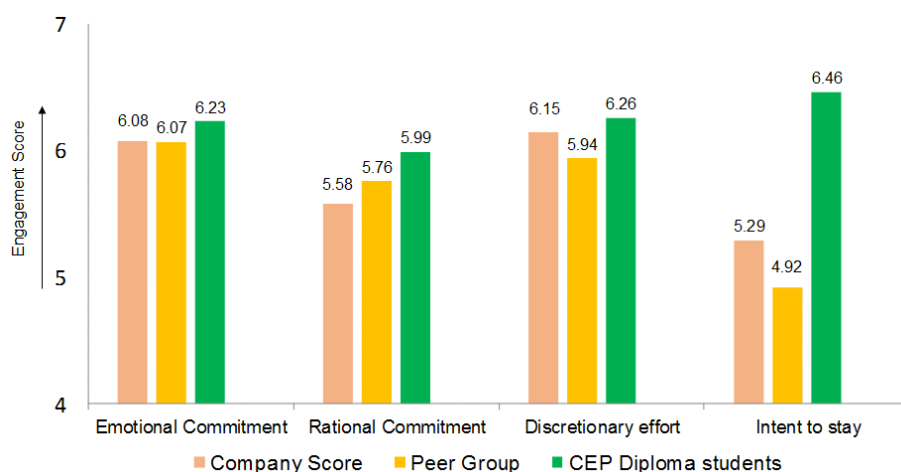


Figure 8.11 Engagement score of CEP 2008 vs peer and company

The performance management system in the organization uses the following five point performance rating scale:

EP – Exemplary performance

EE – Exceeded Expectations

ME – Met expectations

PM – Partially met

NM – Not met expectations

Every employee has six targets for each year. Based on the achievement of these targets, a performance rating is established. Figure 8.12 shows the distribution of performance ratings achieved by CEP diploma engineers and their peer group (other polytechnic students). 56% of CEP engineers obtained the top two performance ratings (EP&EE) as compared to 25% for their peers, in the 2008 batch. Top two performance rating of CEP engineers accounts for 59% as compared to 28% for peers in the case of 2009 batch.

2008 Batch				
Sl.No	Rating scale	Company Norms	CEP Diploma Engineer	Peer group
1	Exempler performance	5%	2(11%)	2(1%)
2	Exceeded expectations	10%	8(45%)	32(24%)
3	Met expectations	60%	7(39%)	87(67%)
4	Partially met	10%	1(5%)	7(6%)
5	Not met the expecations	5%	0	1(0.7%)
Note: In 2008 batch there are 18 CEP Engineers & 129 Diploma engineers(Peer Group)				

2009 Batch				
Sl.No	Rating scale	Company Norms	CEP Diploma Engineer	Peer group
1	Exempler performance	5%	1(5%)	3(6%)
2	Exceeded expectations	10%	12(54%)	10(22%)
3	Met expectations	60%	9(50%)	25(55%)
4	Partially met	10%	0	6(13%)
5	Not met the expecations	5%	0	1(2%)
Note: In 2009 batch there are 22 CEP Engineers & 45 Diploma engineers (Peer Group)				

Figure 8.12 Performance rating distribution for 2008 and 2009 batch

In order to accomplish sustainable high performance, a workshop was conducted for goal setting. When six targets are decided for each year, the employees aim to achieve the targets. Unless the employee aims to accomplish more than what is expected by the company or the manager, achieving a performance rating of EP (Exemplar performance) or EE (Exceeded expectation) is not possible. During this workshop, the CEP engineers were oriented to set their own goals higher than what was expected

of them. Appendix A.8.2 shows a sample target setting form where a 'self target' was established by the CEP engineers. This was shared with their managers with whom they also articulated the means of achieving the targets. The reviews of two batches by the end of the financial year showed that CEP students surpassed several targets.

8.3.2 Undergraduate Programme in the Engineering College

Admission for the undergraduate programme is administered by the state government through a Single window system that is managed by the Technical University of the state. This university computes a cut-off mark based on scores in Mathematics, Physics and Chemistry with a weightage of 100, 50 and 50 respectively. Based on the cut off marks, the university ranks all the students who apply for engineering programmes in the state, and then holds a counselling session for the parents and students to pick their choice of institute and branch of study. For the CEP, the students were selected after their first semester, based on their consistent academic performance, technical tests and assessment of innate abilities. The engineering college attracts students with a minimum score 195 out of 200 in the higher secondary school examinations. On the day of admission at the engineering institute, an orientation session regarding the CEP is conducted for the parents and students of mechanical engineering and electrical & electronics engineering programmes. Active recommendation by the first few batches of CEP students is generating a good response for the CEP. Hence the quality of students selected for the CEP programme has steadily gone up in the last two years, which is evident from the steady increase in the cut off marks of the selected students (Figure 8.13).

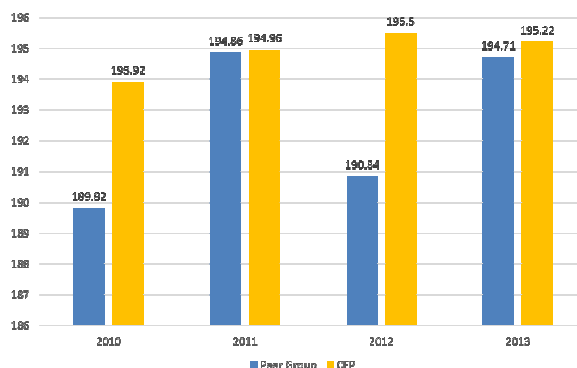


Figure 8.13 Mean cut-off marks of selected students vs the rest

It was observed that the mean trait score of the selected students is getting better over the years as shown in the Figure 5.13. A hypothesis test was carried out and found that for $P < 0.05$, there is a significant improvement in mean trait scores over years.

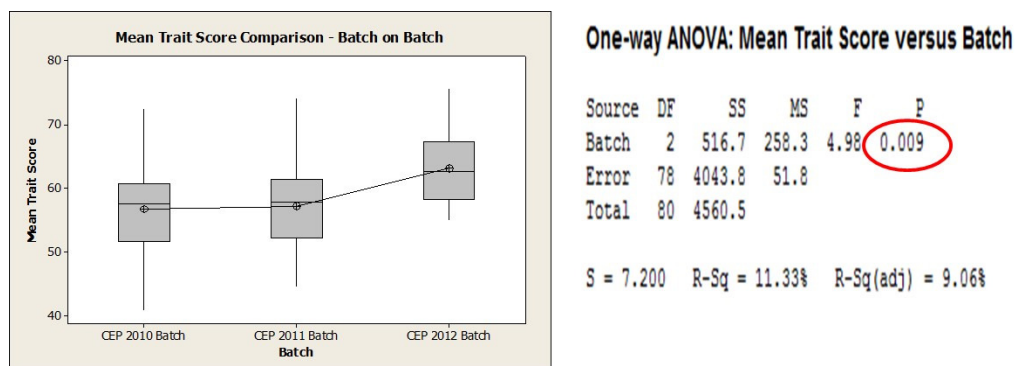


Figure 8.14 Mean trait score trend

The Figure 8.15 shows the mean cut off marks and CGPA at the end of the seventh semester of the CEP students and also those of the other students. Clearly, even though there is no significant difference between the students selected for CEP based on the cut off marks, the academic performance of CEP students is significantly better than that of the rest of the students.

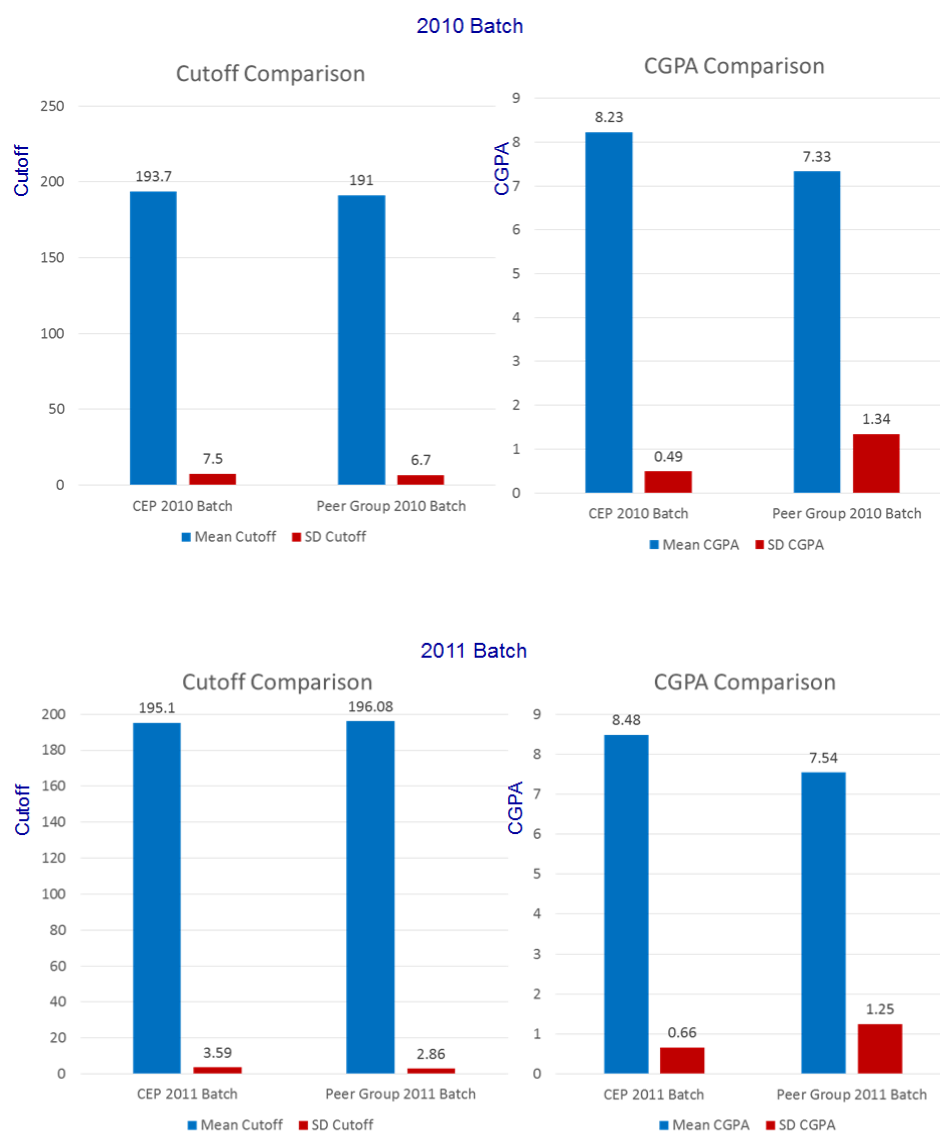


Figure 8.15 Cut off marks and CGPA of CEP students vs the rest

Figure 8.16 shows the cut off marks of CEP students vs the rest of the students for the 2010 and 2011 batches. In both the batches, when $P > 0.05$, there is no significant difference in the cut off scores of CEP students and those of the rest.

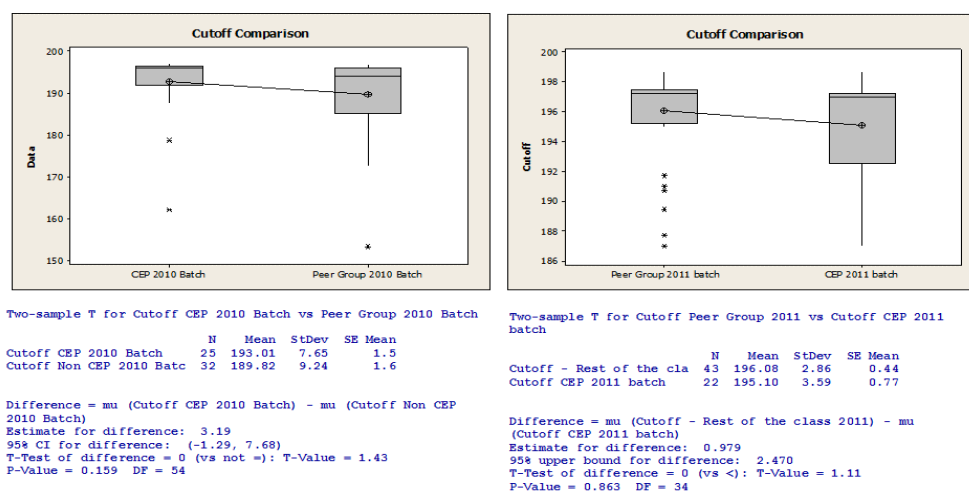


Figure 8.16 Mean cut off marks of CEP 2010 and CEP 2011 batches vs rest

The Figure 8.17 shows the mean CGPA of the CEP students of the 2010, 2011, and 2012 batches as compared with that of the rest of the students. It was found that the CEP students consistently perform better than their peers in terms of mean CGPA and standard deviation. Since $P < 0.05$, there is a significant difference in the mean scores of the CEP students in 2010, 2011 and 2012, as compared with those of the rest of the students. (Both academic scores and standard deviations are better for CEP students compared to rest of the class at 95% confidence level.)

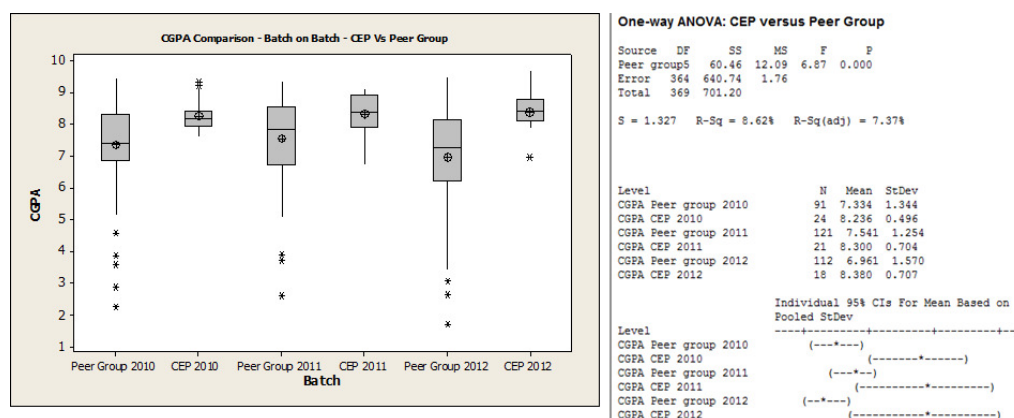


Figure 8.17 Batch to batch to comparison of CGPA score

The relative performance of the CEP students with respect to that of the rest of the students in the same programme was reviewed for each semester. The performance of the CEP students was consistently better in every semester, and this held true for every batch also. This proves that the CEP students consistently outperform their peers.

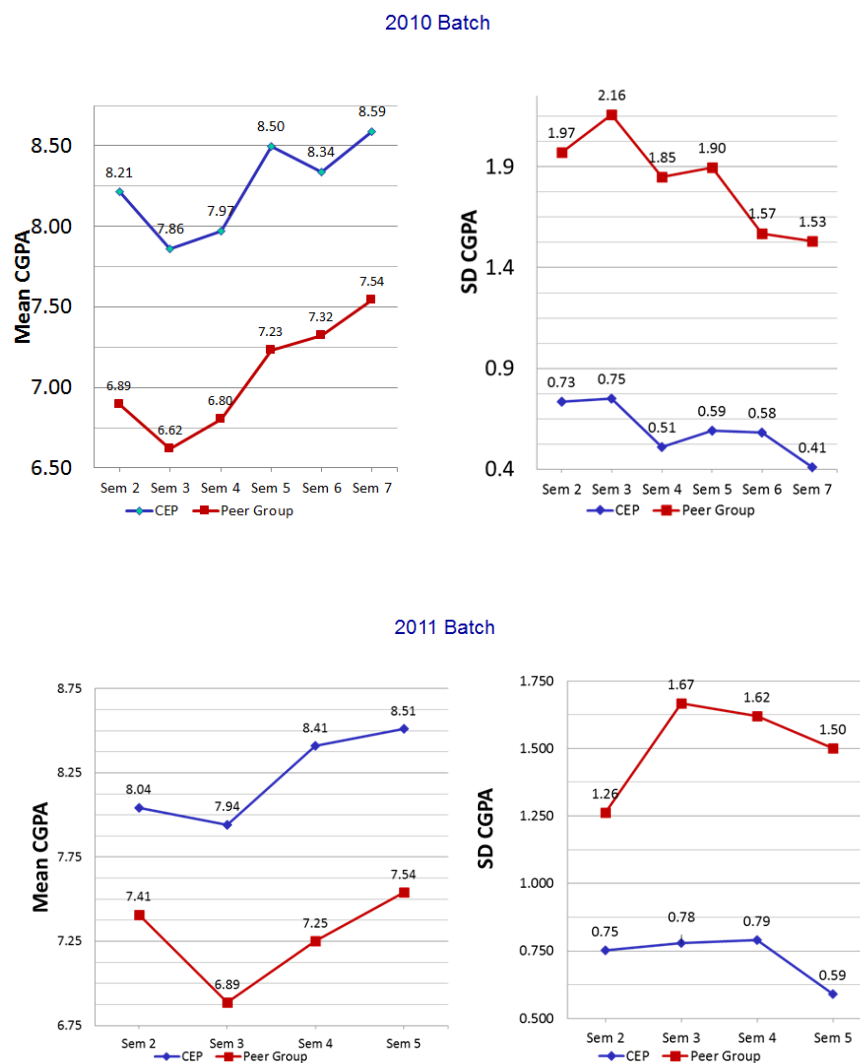


Figure 8.18 Mean GPA and standard deviation by semester

Behavioural programmes were designed such that the assessment is carried out prior to the programme and post the programme to check their

learning. Figure 8.19 shows the pre-test and post-test scores. It is evident that the post test scores are significantly better.

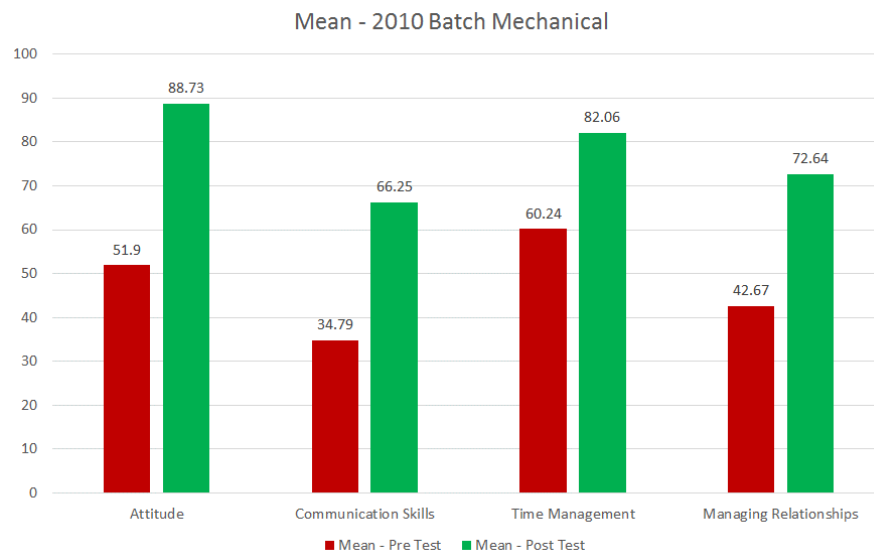


Figure 8.19 Pre-test and post-test score of behavioural programs

8.3.3 Evaluation of Positive Health

According to Vedanta and Yoga philosophy, people possess three types of gunas, or intrinsic personality traits, namely Tamasic, Rajasic and Satvic. Tamasic means being lethargic or sleepy, Rajasic means excited overly and active, Satvic means centred and focused. The CEP students' physical wellbeing was evaluated using a questionnaire developed by Svyasa University. This was adopted as one of the dimensions of evaluating physical health. It is possible to validate the observations by observing the students periodically. Figure 8.20 shows how the students start being Tamasic in the first year. This guna comes down over the years and gradually the Rajasic gunas increase. Developing a Satvic guna requires considerable efforts and a high level of self-awareness.

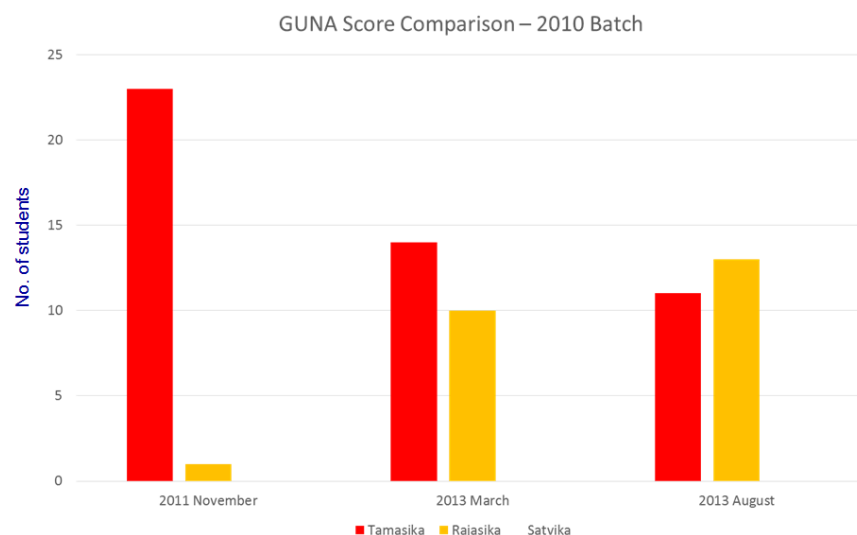


Figure 8.20 Number of students possessing three types of gunas

Figure 8.21 shows the health index of the undergraduate students of the 2010 batch, measured in Nov 2011, Mar 2013, and Aug 2013. It can be seen that there is a positive shift in their health index over these periods. Consequently, their academic scores also improved steadily.

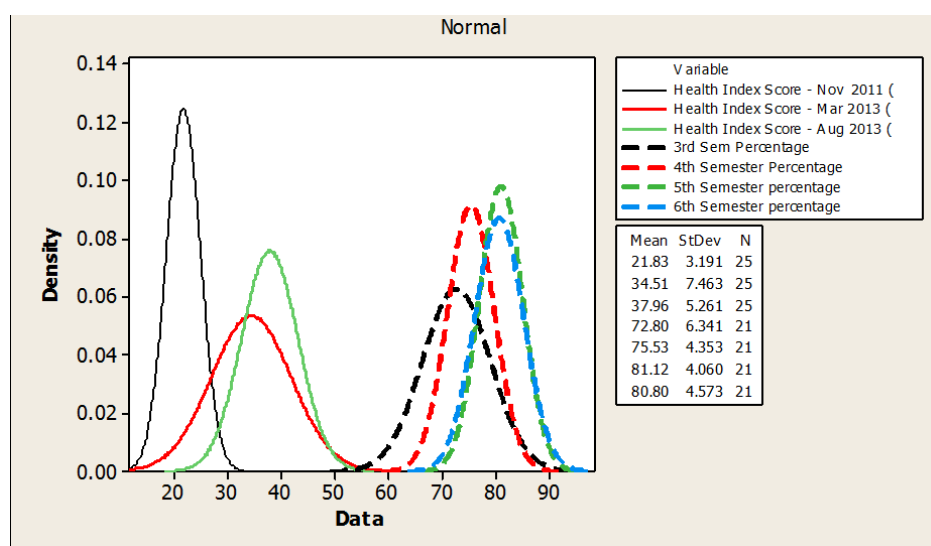


Figure 8.21 Health index for the 2011 batch of undergraduate students