THE IIOAB JOURNAL

www.iioab.org

THE IIOAB JOURNAL

www.iioab.webs.com

| ARTICLE | OPEN ACCESS |

TOTAL QUALITY MANAGEMENT ASPECTS OF IMPLEMENTATION AND PERFORMANCE INVESTIGATION WITH A FOCOUS ON HIGHER EDUCATION BY USING QFD & STATICSCAL ANALYSIS IN MECHANICAL ENGINEERING

Abhishek Soni[1], Nitin Shrivastava[2], Sameer Vaidya[3], Sanjay Soni[4]
[1]*PhD Research Scholar(Mechanical) AISECT University Bhopal. (M.P) INDIA*
[2] *Assistant Professor Mechanical Engineering Department UIT Bhopal. (M.P) INDIA*
[3]*Professor Mechanical Engineering Department H.C.E.T, Jabalpur (M.P) INDIA*
[4]*Asstiant Professor Industrial Production Engineering Department JEC JBP. (M.P)INDIA*

ABSTRACT

Aim: Education is of numerous types and patterns. There is for example, the arts teaching, the scientific education, the religious education, the physical education. In India, as in other countries, much stress has been laid on the endorsement of technical education since the attainment of independence. India's economic ills are sought to be overcome through a course of Industrialization for which, in turn, technical education is very essential. In other words, technical education is a vital prelude to India's property. The scope of technical education is very comprehensive. It slots in within itself all subjects of study in engineering and technology. Civil engineering, Mechanical engineering, Electrical engineering, Mining engineering, Aeronautical engineering, Metallurgical engineering, Industrial engineering, Chemical engineering, Agricultural engineering, Production engineering, and a host of other fields of engineering form part of technical education."Quality in technical education is a complex concept that has eluded clear definition". There are a variety of stakeholders in higher education including students, employers, teaching and non-teaching staff government and its funding agencies, a creditors, valuators', auditors, and assessors (including professional bodies).Each of these stakeholders has a different view on quality, influenced by his or her own interest in higher education. For example, to the committed academic, the quality of higher education is its ability to produce a steady flow of people with high intelligence and commitment to learning that will continue the process of broadcast and advancement of facts. To the government, a high quality system is one that produces skilled scientists, engineers, and architects, doctors and so on in numbers judge to be required by the public.The present work enlightens same path, so as to fulfil the demands of market and to improve quality of education in the present work some quality tools such as linear programming, quality function deployment, with chi square testing and mat lab, have been used. Basic main tool used is QFD which helps in converting demand of customer to action. It helps in understanding understood needs of customer which are desperately needed to be fulfilled. In this upgrading work main focus was on improvement of labs and teaching staff, for maintenance of labs & improvement in teaching, use of quality circle is stressed with concept of TPM and Kaizen approach. Most interesting thing of using these tools was that they helped in achievement of desired target without much added resource, only refinement of procedure; moreover maintenance helps in gaining knowledge with saving extra spending. This also helps in up shade of quality of products which satisfies external client.

*Corresponding author: Email: abhishek.soni.jbpindia@gmail.com

INTRODUCTION

India's higher education system is the world's third major in terms of students, next to China and the United States. Contrasting China, however, India has the advantage of English being the primary language of higher education and research. India educates approximately11 per cent of its youth in higher education as compared to 20 per cent in China. The main governing body at the tertiary level is the University Grants Commission (India), which enforces its principles, advises the government, and helps coordinate between the centre and the state. Universities and its constituent colleges are the main institutes of higher education in India. At present in 2011, there are 227 government-recognized Universities in India. Out of them 20 are central universities, 109 are deemed universities and 11 are Open Universities and rest are state universities. Most of these universities in India have affiliating colleges where undergraduate courses are being trained. According to the Department of higher Education government of India, 16,885 colleges, including 1800 exclusive women's colleges functioning under these universities and institutions and there are 4.57 lakh teachers' and99.54 lakh students in various higher education institutes in India. Apart from these higher education institutes there are a number of private institutes in India that offer various specialized courses in India. Distance learning is also a feature of the Indian higher education system.

COMPUTER SCIENCE

| Guest Editor | Prof. B. Madhusudhanan|

REVIEW OF LITERATURE

All of the research review supports the theory that student act depends on different socio-economic, psychological, environmental factors. The findings of research studies focused that student presentation is affected by different factors such as learning abilities because new paradigm about learning assumes that all students can and should learn at higher levels but it should not be measured as constraint because there are other factors like race and gender that can affect student's performance. Some of the researchers even tried to explain the link between students achievement, financial conditions and the risk of becoming a drop-out that proved to be positive (Goldman N., Haney W., and Koffler S.,1988, Pallas A., Natriello G., McDill E., 1989, Levin H., 1986) B.A. Chandrashekhar and A. Mishaeloudis (2001), explain the effects of age, qualification distance from learning place etc. on student presentation. The performance of students on the module is not affected by such factors as age, sex and place of residence but is associated with qualification in quantitative subjects. It is also found that those who live near He University execute better than other students. Yvonne Beaumont Walters, kola sahib,(1998) further elaborated that student performance is very much dependent on SEB (socio economic back ground)as per their statement, "High school students' height of performance is with statistically significant differences, linked to their gender, grade level, school location, school type, student type and socio-economic background (SEB)."Kirby, Winston et al. (2002) alert on student's impatience (his time-discount behaviour) that influences his own academic recital. Goethe found out that weak students do better when grouped with other weak students. (As implied by Zajonc's examination of older siblings (1976) it shows that students' performance improves if they are with the students of their own kind. There are often dissimilar results by gender, as in Hoxby's K-12 results (2000); Sacerdote (2001) finds that grades are higher when students have unusually academically strong roommates. The outcome of Zimmerman (1999, 2001) were somewhat contradictory to Goethe results but again it proved that students performance depends on number of different factors, it says that weak peers might reduce the grades of middling or strong students.

METHOD

Statistical techniques including regression analysis were used as a methodology. Data collected was primary through a well-defined questionnaire. A sample of private college students was taken where these variables were recognized and response was clear and understandable. Public sector educational institutions were not the focus of the study. A sample of 30 students was taken from a group of colleges. Students were grouped in a classroom they were briefed clearly about the questionnaire and it took on average half an hour to fill this questionnaire. Selection of students was at random. Out of these students only those were selected at random who were voluntarily willing to fill the questionnaires. The data was collected using a questionnaire administrated by the Research team in the 3rd month of 3rd year. The questionnaire dealt mainly with student profile based on his attitude towards Study, Strictness, Attendance, Age, Previous academic achievements, Daily life, etc. All 6 questionnaires were filled with the response rate of 100%.
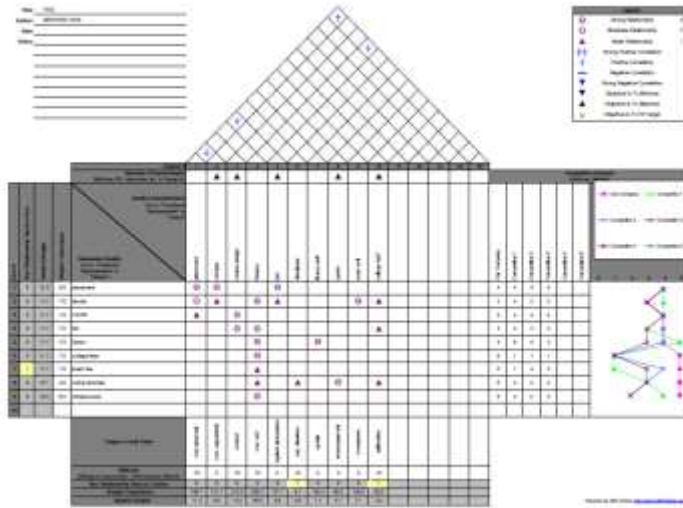
The sample age composition was from 18 years to 22 years of age at maximum because Rajiv Gandhi Technical University of does not allow students over 22 years of age to be admitted in graduate classes.

Basic Ideology

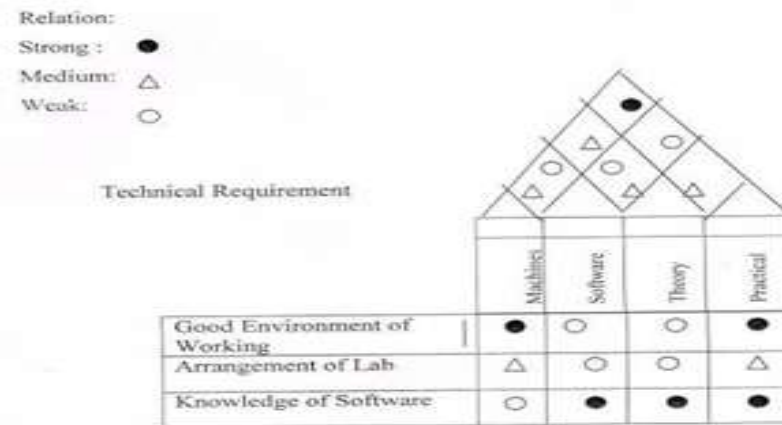Student I/P(RM) → INSTITUTE (PROCESSING) → Finished (O/P) (TCR)

Fig 1 **Basic Ideology**

QUALITY FUNCTION DEPLOYMENT

Quality Function Deployment (QFD) is a style for building the "Voice of the Customer" into product and service design. It is a team tool which captures customer necessities and translates those needs into characteristics about a product or service.

STAGEE 1

Relation:
Strong : ●
Medium: △
Weak: ○

Technical Requirement

HOUSE OF QUALITY

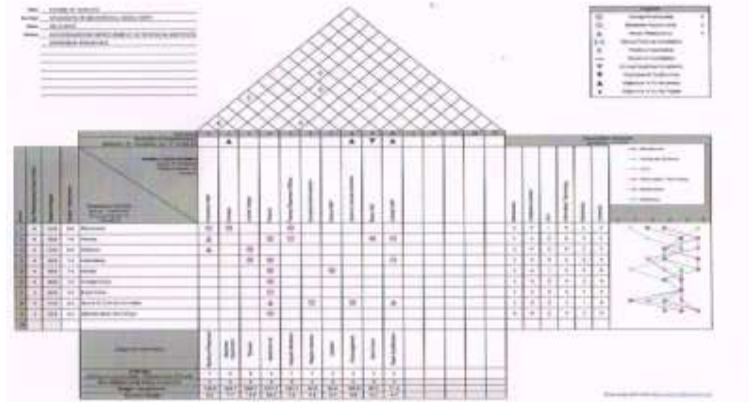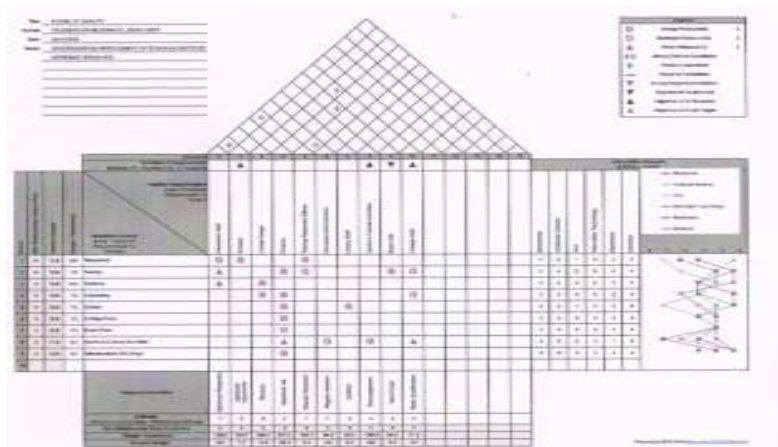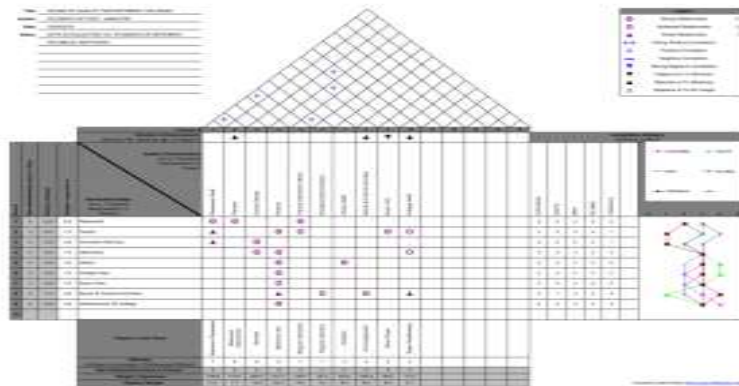|	Machines	Software	Theory	Practical
Good Environment of Working	●	○	○	●
Arrangement of Lab	△	○	○	△
Knowledge of Software	○	●	●	●

OUTCOME OF STAGE 1

CAMPARISON OF STAGE 1

STAGE 2

STAGE 3

STAGE 4

OUT COME OF STAGE4

ANALYSIS OF DATA(MECHANICAL IV TH SEM)

N	RESULT	SGPA	CGPA	Compartment (SUBJECT)	Family income (Lakhs)	Attendence	Reference book/ Question Bank	Hosteler/Day scholar	Study Hours per day	Type of study
1	FAIL	6.06	6.76	ME403	4.20	82%	Reference book	Day Scholar	1.75	Group
2	FAIL	6.63	6.91	ME404	3.2	90%	Question Bank	Day Scholar	1.75	Group
3	PASS	6.31	6.66		3.4	70%	Reference book	Hostler	2	Individual
4	FAIL	6.13	6.26	ME403	3.3	71%	Question Bank	Hostler	1.5	Group
5	PASS	6.63	6.52		5	75%	Reference book	Day Scholar	1.5	Individual
6	FAIL	3.88	3.88	BE401, ME403, ME405	3	65%	Question Bank	Hostler	near test	Individual
7	FAIL	4.06	5.71	BE401, ME403, ME405	3.5	64%	Question Bank	Day Scholar	near test	Group
8	PASS	6.88	6.89		5	78%	Question Bank	Day Scholar	2	Group
9	PASS	7.75	7.15		3.6	79%	Question Bank	Hostler	2	Individual
10	PASS	7.5	7.70		2.5	82%	Reference book	Day Scholar	2.5	Individual
11	PASS	8.19	7.74		3.6	84%	Reference book	Day Scholar	2.5	Individual
12	FAIL	3.88	5.16	ME403, ME404, ME405	2.8	61%	Question Bank	Day Scholar	near test	Group
13	FAIL	6.19	6.29	ME403	2.3	68%	Question Bank	Hostler	1.5	Group
14	PASS	7.00	7.39		3.7	84%	Question Bank	Hostler	2	Individual
15	PASS	7.31	7.35		3.2	61%	Reference book	Day Scholar	2	Individual
16	PASS	7.31	7.16		3.9	80%	Question Bank	Hostler	2	Group
17	PASS	7.19	6.76		2.3	81%	Question Bank	Day Scholar	2	Group
18	FAIL	4.94	4.82	ME403, ME404	2.1	66%	Question Bank	Day Scholar	near test	Group
19	FAIL	5.19	6.31	ME403, ME405	3.8	67%	Question Bank	Day Scholar	1.5	Individual
20	PASS	7.31	7.03		2.5	84%	Reference book	Day Scholar	2	Individual
21	PASS	7.69	7.43		4.1	88%	Question Bank	Day Scholar	2.5	Individual
22	PASS	5.94	6.71		2.8	60%	Question Bank	Day Scholar	1.5	Group
23	PASS	6.13	5.86		2.3	58%	Question Bank	Day Scholar	1.5	Group
24	FAIL	4.88	5.89	ME403, ME405	2.5	67%	Question Bank	Day Scholar	near test	Individual
25	PASS	7.56	7.66		4	78%	Refferance Book	Day Scholar	2.5	Individual
26	FAIL	3.88	4.97	BE401, ME403, ME405	2.4	58%	Question Bank	Hostler	near test	Individual
27	FAIL	5.06	6.01	ME403, ME405	2.7	55%	Question Bank	Hostler	near test	Individual
28	PASS	7.50	7.36		3.4	78%	Question Bank	Hostler	2	Group
29	FAIL	4.13	4.58	BE401,	2.6	55%	Question	Day	near	Individual

				ME403, ME405			Bank	Scholar	test	ual
30	FAIL	6.63	6.08	ME403	2.2	78%	Question Bank	Hostler	1.5	Individual

COMPARISON OF EXPECTED RESULTS AND RESULTS OF THE STUDY-

Variable	Expected Relationship	Explanation	Results Of study
Attendance in class	Positive	A regular student is more serious in studies	Positive
Family income	Positive	It is assumed affluence gives more facilities to learn	Negative
Study hours per day after college	Positive	It is assumed that more study hours results in good grade/division/performance	Negative
Book referred	Positive	More books referred results in better grasp of the concept	Positive
Type of study	Positive	Group study results in healthier studying environment, hence better result	Negative
Hosteller/Day Scholar	Positive	Hostellers are found to be more dedication in their studies	Positive

Chi square solution for validation of result

parameter	A	B	C	D	E	Total
Family income	4.2	3.20	3.40	3.30	5	19.10
Study hours	1.75	1.75	2	1.50	1.50	8.50
sgpa	6.06	6.63	6.31	6.13	6.63	6.63
TOTAL	12.01	11.58	11.71	10.93	13.13	59.36

ALCULATION FOR CHI SQUARE (x^2)

$(x^2) = (o-e)^2/e$ d.o.f=(m-1)(n-1)
Expected frequency is calculated as
$E_{r,c} = (n_r * n_c) / n$

o	e	o-e	(o-e)2	(o-e)2/e
4.2	3.86	0.34	0.1156	0.03
3.2	3.73	-0.53	0.2809	0.075
3.4	3.77	-0.37	0.1369	0.036
3.3	3.52	-0.22	0.0484	0.014
5	4.23	0.77	0.05929	0.014
1.75	1.72	0.03	0.0090	0.005
1.75	1.66	0.09	0.0081	0.004
2	1.68	0.32	0.1024	0.061
1.5	1.57	-0.07	0.0049	0.003
1.5	1.89	-0.39	0.1521	0.08
6.06	6.43	-0.37	0.1369	0.021
6.63	6.20	0.43	0.1849	0.03
6.31	6.27	0.04	0.0016	0.002
6.13	5.85	0.28	0.0784	0.013

COMPUTER SCIENCE

6.63	7.03	-0.40	0.1600	0.022

(χ^2) =(o-e)^2/e   =0.536,<TABULATEDVALUE, (χ^2)**0.05**=15.51
Therefore, hypothesis is accepted

Chi-Square Distribution

Degrees of Freedom(df)	Probability (p)										
	0.95	0.90	0.80	0.70	0.50	0.30	0.20	0.10	0.05	0.01	0.001
1	0.004	0.02	0.06	0.15	0.46	1.07	1.64	2.71	3.84	6.64	10.83
2	0.10	0.21	0.45	0.71	1.39	2.41	3.22	4.60	5.99	9.21	13.82
3	0.35	0.58	1.01	1.42	2.37	3.66	4.64	6.25	7.82	11.34	16.27
4	0.71	1.06	1.65	2.20	3.36	4.88	5.99	7.78	9.49	13.28	18.47
5	1.14	1.61	2.34	3.00	4.35	6.06	7.29	9.24	11.07	15.09	20.52
6	1.63	2.20	3.07	3.83	5.35	7.23	8.56	10.64	12.59	16.81	22.46
7	2.17	2.83	3.82	4.67	6.35	8.38	9.80	12.02	14.07	18.48	24.32
8	2.73	3.49	4.59	5.53	7.34	9.52	11.03	13.36	15.51	20.09	26.12
9	3.32	4.17	5.38	6.39	8.34	10.66	12.24	14.68	16.92	21.67	27.88
10	3.94	4.86	6.18	7.27	9.34	11.78	13.44	15.99	18.31	23.21	29.59
	N										

Validation through matlab(taking 3*3 matrix)

```
[x,y,z]=solve('4.2*x+3.2*y+3.4*z=10.8','1.75*x+1.75*y+2*z=5.50','6.06*x+6.63*y+6.31*z=19')
[p,q,r]=solve('4.2*x+1.75*y+6.06*z=12.01','3.2*x+1.75*y+6.63*z=11.58','3.4*x+2*y+6.31*z=11.71')
%subplot(2,2)
%subplot(2,1,1);
%hold on
x
y
z
p
q
r
%i=[x y z];
%j=[p q r];
%plot(i,j);

%subplot(2,1,2);
%plot(y,q);
%subplot(2,2,1);
%plot(z,r);
```
Value obtained x=y=z=p=q=r=1

DISCUSSIONS

The objective of this study was to quantify the relationship between the different factors that are considered responsible of affecting the student performance along with providing base for further research regarding student performance. Selecting these combination of variables do have some objectively like, It was expected that relationship between dependent variable and student attitude towards attendance is positive because regularity shows the effort and seriousness of student about his or her studies. It is believed that the relationship between dependent variable and student family income is positive because money can buy you all comfort that you need to concentrate on your studies but the result could not prove this relation because   student belonging to more prosperous/affluent family do not give proper weight to studies although this value is very small but still it reflects

the insignificance of affluence that is affluence cannot make a student serious about his studies or if a student want to study then affluence is not a prerequisite but still it requires more research to explain the phenomenon It is still believed strongly that relationship between dependent variable and student attitude towards time allocation for per day after college are positively related but the result could not prove this relation because more study hours are not significant as far as student performance is concerned. It may depend on intelligence level, intellect, memory or method or learning of the student although this value is very small yet it reflects of personal characteristics of student. Further research is required to explore this relation. It is believed that book reference also has great effect on performance of students that if students are referring to books it helps in increase of concepts and deep knowledge about the topic, and if one is studying form question banks then he cannot grasp more knowledge; yes but he can touch every topic with little knowledge. Selecting a type of study .i.e. between Group and Individual affects the student performance. It is believed that Group studies have more impact over individual studies. If a student is studying in group he is scoring better marks that him who is studying individually. One more important attribute is Day scholar or Hosteller. It is found that student that are Hosteller perform better than Day scholar.

CONFLICT OF INTEREST
The authors declare no conflict of interests.

REFERENCES

[1] Akao Y [1983]'QUALITY FUNCTION DEPLOYMENT', QUALITY PROGRESS.BENNETT DC (2001) 'ASSESSING QUALITY IN HIGHER EDUCATION', LIBERAL EDUCATION. 87(2): 40-4

[2] BA CHANDRASHEKHAR, A. MISHAELOUDIS (2001)

[3] GOLDMAN N, HANEY W, KOFFLER S. [1988]PALLAS A, NATRIELLO G, MCDILL E. [1989], LEVIN H., 1986

[4] Kirby, Winston Et Al. [2002] Hoxby's K-12 Results (2000); Sacerdote (2001zimmerman (1999, 2001

[5] THAKKAR J, DESHMUKH SG [2006] 'TOTAL QUALITY MANAGEMENT (TQM) IN SELF-FINANCED TECHNICAL INSTITUTIONS A QUALITY FUNCTION DEPLOYMENT (QFD) AND FORCE FIELD ANALYSIS APPROACH' QUALITY ASSURANCE IN EDUCATION. 14(1): 54-74.MANAGEMENT. 6(5/6):457-4 67

[6] SONI ABHISHEK (2013)'IMPROVEMENT OF QUALITY OF TECHNICAL INSTITUTE THROUGH QFD'. INTERNATIONAL J. OF MULTIDISPL. RESEARCH & ADVCS. IN ENGG.(IJMRAE), VOL. 5, NO. IV (OCTOBER 2013), PP. 133-149

[7] SONI ABHISHEK. [2013] ' TOTAL QUALITY MANAGEMENT IN EDUCATIONAL PROCESS FOCUSED ON QUALITY IMPROVEMENT OF INSTITUTE WITH CUSTOMER SATISFACTION & TEACHING IMPROVEMENT' INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCHTECHNOLOGY 2(11)PP3195-98

[8] SONI ABHISHEK. [2014] ' APPLICATION OF TQM IN HIGHER EDUCATION FOCUSED ON IMPROVEMENT OF TECHNICAL INSTITUTE VIA QFD' INTERNATIONAL J. OF ENGG. RESEARCH & INDU. APPLS. (IJERIA).7(I) : 123-136

[9] SONI ABHISHEK. [2014]' QUALITY IMPROVEMENT OF TECHNICAL INSTITUTE BY USING QUALITY CIRCLES', NATIONAL JOURNAL OF EXCEL EDUCATION 1(2) PP04-06..

COMPUTER SCIENCE