LIST OF FIGURES

Figure 1.1 The Time Span Illustrates the Five Stages in the Evolution of Quality Control (Department of Defence, U.S.) 4
Figure 1.2 Deming's View of System, Specifying an Alignment w.r.t Consumer's Requirements (Woods, 1998) 9
Figure 1.3 The Gap Between Expected Quality and Offering 15
Figure 2.1 The Core, Quality, Tools & Technique (adapted) Brian L Joiner's model Integrated with Zbarecki's V-S-A paradigm 25
Figure 2.2 The Multi-Aspects of Balancing Act of Quality Offering (Supplier’s) & Suitability (Customer’s End). Inset: Aspects Associated with Quality Offering (Triad) Adapted from Mitra (2000) (left) vs. Dimensions adapted from Harvey and Knight (1996) (right). 29
Figure 2.3 A Schematic Representation of Between Perception (P) and Expectations (E), Between Suppliers and Customers, and The Possible Gap in ‘P’ and ‘E’, Denoted by ‘G’ (Own Research) 31
Figure 2.4 Gap Reported between Perceived Quality and Expected Quality (Kumaran & Anbazhagan, 2011), Measured w.r.t. Learning Outcomes, Responsiveness, Infrastructure, Personality and Academics 32
Figure 2.5 Steps of Process Improvement, Schematic Created from Deming. Addressing the criticality he assigns to the message to leadership exhorting to reduce variation in systems or processes. (After Summers, 2010) 44
Figure 2.6 Deming's system diagram adapted for education. In case the item(s) (top right) may be eliminated, first red and then blue, the change in overall quality status may be expected as a consequence of these vanishing controls 58
Figure 2.7 The Hidden Assumption in Many Manager's Heads. The people at the bottom have no heads. (Courtesy of MANS Organization, The Netherlands) 60
Figure 2.8 The Ideal Quality Framework In An Engineering Educational System. (Source: own research) 63
Figure 2.9 The model of Reengineering, schematic Hammer and Champy, 1993 65
Figure 3.1 The Input - Process - Output Requirement Applied To Quality in Research 78
Figure 3.2 Categorisation of Validity and reliability of Data. A focus on the requirements (accuracy) is the Validity and Dispersion is denoted by Reliability 85
Figure 3.3 Conventional Design Methodology, Adapted to Current Research Design and Methodology Planning 92
Figure 4.1 The graph graphical display of responses, plotted to identify outliers, tending to overshoot allowed Mahalanobis distance. Four of 147 points marginally positioned as outliers, were accommodated 98
Figure 4.2 Scree Plot for the 147 responses on Likert scale, received for 55 dimensions collated from Delphi exercise (recommendations and scrutiny) 113
Figure 4.3 Loading Plot of 55 Delphi Dimensions. Unrotated Condition; Involving ‘Principal Components’. 17 factors / Components of Eigen value >1 retained; Potential number of factors reflected 15. 121
Figure 4.4 Scree Plot for the 17 factors extracted in Maximum Likelihood Extraction. Responses on Likert scale, 10 factors displaying Eigenvalue >1.

Figure 4.5 The loading plot of unrotated 17 factors extracted through Maximum Likelihood Extraction tool. Maximum number of factors reflected 10. A reduction of 3 factors, but no more items, which sustain at 38 as in previous case.

Figure 4.6 The operational model correlating transformative role of Curriculum and Examination towards Total Learning.

Figure 4.7 The Cronbach’s alpha values, verifying Reliability of each of the 9 factors.

Figure 4.8 Scree Plot for the 10 factors extracted in Maximum Likelihood Extraction. 9 factors displayed Eigen value >1. Henceforth nine factor MLE shall be used in option.

Figure 4.9 Loading plot of rotated (Equimax) 9 MLE extractions through maximum Likelihood Extraction tool. Significant items evidenced as in Table 4.8 are 28. Loading plot however shows all 55 dimensions.

Figure 4.10 Screen print of zoomed and resolved version of loading plot of rotated (Equimax) 9 MLE extractions through maximum Likelihood Extraction tool. Maximum number of factors reflected 8 (9th yields no significantly loaded items).

Figure 4.11 Loading Plot of Maximum Likelihood Extraction factors - 8 nos rotated Equimax. The loadings table is shown in Appendix V.

Figure 4.12 Loading plot of 2 MLE factors extracted through maximum Likelihood Extraction tool Equimax rotated. Inset: 3 MLE, inverted, as from table 4.11.

Figure 4.13 Dendogram of factors associated with quality assurance and control, categorised as ‘Operational assiduousness’ advising general guidelines. Two additional items viz. Cu and Ex get incorporated in this list (not shown).

Figure 4.14 Matrix Plot for the 147 responses on Likert scale, differentiating the items categorised in terms of communality >0.4 (A1, I1, E2, dM, L1, ISO, C1, IQ).

Figure 5.1 Matrix Plot for the 147 responses on Likert scale, differentiating the items categorised in terms of communality >0.4 (I4, including the objective of evaluating learning focus, LF and IaC, versus FIO, PR, and 24x (communality < 0.4).

Figure 5.2 The pain versus gain of pair wise comparison method. Scalability for accuracy is highly limited by work intensiveness.

Figure 5.3 Demographical Classification of Respondents Based upon Category/Professional Status.

Figure 5.4 Demographical Classification of Respondents Based Upon Age.

Figure 5.5 Top and Minimum Responses Earned by Each Dimension, By Any Respondent. Numbers Scores Awarded By All Respondents to Each Dimension. Minimum Score Received By Any Dimension is Also Indicated.

Figure 5.6 Individuals Responding < 8 or > 9 (say < 8.5 >) For Any Individual Item, Plotted For All Items.

Figure 5.7 ‘Mean’ of the Responses w.r.t. 17 Dimensions of the Questionnaire, as the top part of (a); Response Means w.r.t Specific Respondents (top average for all respondents, with explicit standard deviation (b); Middle: for each category of respondent, display histogram (c).
Figure 6.1 Schematic layout of Factor 1 of Rotated Factor Loadings of 17 extracted factors. The shaded numerical figures are the factor loadings. 179
Figure 6.2 (b) Layout in (1a) Transposed to Emphasise Productivity. But the Relationship is Devoid of Significant Fitment. 181
Figure 6.3 The relationship between Improved Quality w.r.t Quality Outcome. The contributors are Interactive Class. The student learning focus with infrastructure and logistics contribute with a correlation of 0.918 and 0.893 respectively. 182
Figure 6.4 The need for Interactive Class for total quality analysed. Need of a faculty training is connected which is essentially motivated by Pedagogical skills and Faculty alignment with correlation of 0.75 and 0.88 respectively. 183
Figure 6.5 The schematic relationship of collated dimensions of Factor 2 and Factors 3, as determinants to another dimension in Factor 1. The contribution of predictors in response is explained to the extent of 69% in Iac, and 80% into LF, after including items of Factor 1 184
Figure 6.6 The 4 in 1 residual plots for Learning Focus, Histogram, Normal Probability plot, with residuals of Fits and order of responses. 192
Figure 6.7 Schematic Testing a Normality of Data (Normal Probability Plot for Learning Focus 193
Figure 6.8 Schematic Testing a Normality of Data (Normal Probability Plot for Learning Focus 194
Figure 6.9 The schematic relationship of collated dimensions of Factor 2 and Factors 3, as determinants to another dimension in Factor 1. The contribution of predictors in response is explained to the extent of 69% in Iac, and 80% into LF, after including items of Factor 1 195
Figure 6.10 The Schematic Relationship of Collated Dimensions of Factor 2 and Factors 3, As Determinants to Another Dimension in Factor 1. The contribution of predictors in response is explained to the extent of 69% in Iac, and 80% into LF, after including items of Factor 1 198
Figure 6.11 Assessment (as examination of Quality Functions) to determine correction/improvement actions, and continual improvement imperatives. 199
Figure 6.12 The paradigm of Daily Management and Learning Rigour 200
Figure 6.13 The Triad of Competencies of 21st Century Engineering Students and Hierarchical Functions 202
Figure 6.14 The 4 in 1 residual plots for Teaching and Learning, Histogram, Normal Probability plot, with residuals of Fits and order of responses. 207
Figure 6.15 The 4 in 1 residual plots for Examination, Histogram, Normal Probability plot, with residuals of Fits and order of responses. 209
Figure 6.16 The 4 in 1 residual plots for IQAC, Histogram, Normal Probability plot, with residuals of Fits and order of responses. 213
Figure 6.17 The 4 in 1 residual plots for Continual Improvement, Histogram, Normal Probability plot, with residuals of Fits and order of responses. 216
Figure 6.18 The Interaction model (graphical) composed on R-Sq (pred) values, within nine of the significant Output dimensions (and their responses) sifted from 55 dimensions (a) Top performers – output, (b) auxiliary items contributors o EX. 220
Figure 7.1 Typical deployment of Attendance Time versus Teaching Time and Number of Classes for one class in a semester. 225
Figure 7.2 Typical value stream map of class schedule and activities 227
Figure 7.3 The future class room of 2020 (adapted from Microsoft, Kakran et al, 2011) 229
Figure 7.4 Pareto chart showing the cases for discontent 231
Figure 7.5 Student Discontent of Teaching and Learning 232
Figure 7.6 Inter-relationship diagram for discontent because of bad teaching and bad educational learning 232
Figure 7.7 Cause and Effect Diagram Signifying Student Complaints 233
Figure 7.8 Process Flow Chart - 5 Why? 234
Figure 7.9 The dependence of process design on the customer voice and the process voice 236
Figure 7.10 The Dependence of Process Design on the Customer Voice and the Process Voice 237
Figure 7.11 Quality Function Deployment of the Faculties Voice of Operation 238
Figure 7.12 Alignment / Planning for the Achievement of Strategic Goals & Objectives 239
Figure 8.1 The Triad of Competencies of 21st Century Engineering Students Engineering a Larger Role for Process Success 243
Figure 8.2 The Collation of recommendation from Delphi’s study, PCA-17/ MLE-9 and from Pairwise comparison 250
Figure 8.3 The competency Triad leading to 21st century requirements inclusive of hierarchical roles for process success 253
Figure 8.4 Typical Distribution of Neurons in experimental (left) versus control group Ref: Fields, R. Douglas (2004), “The Other Half of the Brain” 259
Figure 8.5 Brain scan of a normal person (left). Of a person with attention deficit (right). 261
Figure 8.6 The organizational structure as in an organism (adapted). The Tip-Top condition is biologically satisfied. Evidently instability as shown in bottom third molecule (from left or right) is stabilized when supported. http://www.imprint.co.uk/wilber.htm 263
Figure 8.7 The workcells control the competencies and work in the same way as molecules in figure 8.6 263
Figure 8.8 Price Gaskills 3 Dimensional Quality Model (Price & Gaskill, 1990) 270
Figure 8.9 TQM Wheel Model of Goal/ QPC 270
Figure 8.10 The Hierarchically Distributed Activities (Generic) 271
Figure 8.11 The Quality Model signifying three vital phases Alignment, Utilisation, and Transformation (Metamorphosis) 274
Figure 8.12 The author’s view of the process of empowering manufacturing, based upon Juran’s trilogy and allowed to regress the Thareja’s AUM model with 3 ‘i’ 278
Figure 9.1 The hierarchical reasons of discontent from academic process, presupposing that the physical, infrastructural, and logistic requirements are in place. 286