Best Quality Practices in an Educational Institution (A Case Study)

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ABSTRACT

Educational institutions make a major share of service industry. Quality of service provided by educational institutions is as much important as quality of manufacturing a product. At times, control of service quality becomes more difficult than quality control during manufacturing of a product due to fragile nature and concurrent production and provision of service.

Generic quality parameters for service can be presented as criteria set. However, the criteria set can not be used as such for assessment of educational institutions, as it requires a tailored and modulated approach.

Off-line service quality control is only segregation of bad product from good one. A low grade qualified student normally gets a low grade and low paid job in the industry and has fewer chances for career progression in comparison to a high grade qualified student who has a high market value. ‘ON-LINE PROCESS CONTROL’ is as much important in service industry as it is in the manufacturing industry.

A case study of ‘on-line service process control’ of an Engineering Educational Institution is presented in this paper. This is the first practice of on-line process control which has resulted in high performance. Other educational institutions of the country can follow this practice to carry out on-line process control of their institutions for providing excellent service quality. Action plan can be formulated, after gap analysis, to convert all, if possible, off-line processes control to on-line control so as to stop production of non-conforming products/service.

KEY WORDS: Service Quality Parameters, Off-line/On-line Process Control, Educational Institutions

1. INTRODUCTION

Quality is customer’s demand in every walk of life, may it be of a product or service. Quality of service provided in educational institutions is as much important as quality of manufacturing a product. In past, the bias of attention on quality was towards manufacturing industry. However, quality culture in service industry has gained its momentum. Service industry also provides more employment opportunities than the manufacturing industry. Only in the United States of America, the ratio of
employment in service and manufacturing industry is almost 74 to 26 (VINCENT & JOEL, 1995, P.15).

The quality of service is more fragile in nature and at times of shorter life than a product. Hence, control of service quality is much more difficult because it is produced and served concurrently. Mostly, there is no time and opportunity to apply corrective measures during the service production and provision. At time, it is impossible to separate the production and provision of service. For example, mood, style, behavior, courteousness, promptness, body posture, voice pitch and tone of the receptionist at the time of saying welcome to the customer such as “Mr” or “Ms” at the front counter can either make the customer delighted or compel them to curse on their selection for availing services there (EVANS & LINDSAY (1999, P. 609-613). Such mishap can occur despite the best efforts put in by the top management in providing specialized training and best working environment at the front counter. Corrective and preventive measures can be applied but in-process control is not possible while service is being offered to the customer.

2. SERVICE QUALITY PARAMETERS

Different quality proponents and experts have presented service quality parameters (VINCENT & JOEL, 1995, EVANS & LINDSAY, 1999, BESTERFIELD et al. 1999, SADIQ, 1995, DAHLGAARD, 1998, NIST, 1998, and NIST, 1998a). Generic service quality parameters indicated by researchers like EVANS & LINDSAY (1999, P. 156) are shown in Table 1. However, these parameters are neither comprehensive nor specifically tailored to the education sector only. Also, it does not put emphasize on the ‘on-line’ process control.

<table>
<thead>
<tr>
<th>S. No</th>
<th>GENERIC SERVICE QUALITY PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reliability. The ability to provide what was promised, dependably and accurately. Examples include customer service representatives responding in the promised time, following customer instructions, providing error-free invoices and statements and making repairs correctly the first time.</td>
</tr>
<tr>
<td>2</td>
<td>Assurance. The knowledge and courtesy of employees, and their ability to convey trust and confidence. Examples include the ability to answer questions, having capabilities to do necessary work, monitoring credit card transaction to avoid possible fraud, and being polite and pleasant during customer transactions.</td>
</tr>
<tr>
<td>3</td>
<td>Tangibles. The physical facilities and equipment and the appearance of personnel tangibles include attractive facilities, appropriately dressed employees and well designed forms that are easy to read and interpret.</td>
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<tr>
<td>4</td>
<td>Empathy. The degree of caring and individual attention provided to customers. Some examples might be the willingness to schedule deliveries at the customer’s convenience, explaining technical jargon in layperson’s language, and recognizing regular customers by name.</td>
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<tr>
<td>5</td>
<td>Responsiveness. The willingness to help customers and provide prompt service. Examples include acting quickly to resolve problems, promptly crediting returned merchandise and rapidly replacing defective products.</td>
</tr>
</tbody>
</table>

Table 1. Generic Service Quality Parameters Criteria Set

A generic Quality Management System (QMS), like ISO 9000, can be used for assessment of quality in a service enterprise. Also, a more comprehensive, specific and modular approach such as TQM Education Quality Excellence Model (NIST, 1998) is available which can be used to assess the service quality of an educational institution. Summarized parameters and relative scores of this model are shown in Table 2. Item 6 (EDUCATIONAL AND SUPPORT PROCESS MANAGEMENT) of the
model deals with the processes but no specific emphasis has been laid on ‘on-line / in-process process control’.

<table>
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<tr>
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<td>2.2 School Strategy</td>
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<td>STUDENT AND STAKEHOLDER FOCUS</td>
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<td></td>
<td>3.1 Knowledge of Students Needs and Expectations</td>
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<td></td>
<td>3.2 Students and Stakeholder Satisfaction and Relationship Enhancement</td>
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<td>7.3 Faculty and Staff Results</td>
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<td>TOTAL POINTS</td>
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Table 2. Education Quality Excellence Model

3. PROCESS CONTROL

Process control can be divided into two main types; off-line (off-process) and on-line (in-process) control. Off-line control is now a phenomenon of the past in the industrialized countries when bad products were segregated from the good one. Off-line control cannot correct the process variations during its occurrence. Off-line process control only adds cost to the product/service due to rework, down grade and scrape (like a student with low grade has either to repeat the course or dropped out as a failure-scare). In ‘on-line’ process control, optical and laser sensors with automatic actuation mechanism is the normal phenomena in today’s modern manufacturing (EVANS & LINDSAY (1999, P. 569 - 571). Introduction of advanced technology in the service industry has also made it more precise and competitive, such as in the field of electro-medical equipment or air transportation auto piloting mechanism. A CNC machine applies the requisite compensation factors during operations to correct the variation so as to produce a conformed product only. However, at time, it may be difficult in service operations due to non-separable nature of its production and provision. Education sector has
also benefited from technological developments. Conventional class room lecturing is no more the only way of imparting education/training. Self-learning through audio and video tutor, simulators, diagnostic centers, cyber net and teleconferences are the new ways of learning. However, the on-line process control management system can give excellent results if properly implemented and practiced.

4. A CASE STUDY

The case study describes the service quality control in an Engineering Educational Institution, which is ISO 9000-1994 QMS certified and is in process to adopt ISO 9000:2000 QMS. ISO 9000 QMS certification indicates that sound QMS practices exist in an institution. ISO 9000 QMS certification is also considered to be as ‘Foundation’, ‘Stepping Stone’, ‘First Step’ ‘As well as an integral part of TQM’ continual improvement philosophy (WIELE et al. 1995, WIELE et al. 1996, HO and FUNG, 1994 and HO and FUNG 1995).

The service quality plan of the institution is shown in a flow diagram in Annex A. Discussion of complete plan is not possible due to space and time limitations. However, the ‘core education processes and its controls’ are briefed here in regards to on-line process control.

5. PROCESSES AND ITS CONTROLS

The institution has established and maintained documented procedures for Process Control. The entire process, in which all students have to undergo, is outlined in Annex A which includes the followings activities:

- Student’s nomination by Head Quarters.
- Reception of students by the Institution.
- Training of students (according to his/her nomination) as per planned program.
- Examinations of all types (academic and physical etc).
- Evaluation of each student as per laid down procedures.
- Disposal of each student (qualified/unqualified and successful/unsuccessful as per instructions of Head Quarters.

All the training / academic activities of the Institution are planned in advance at the beginning of each year/course. The schedule of complete year for each department/course is prepared as follows:

- Phasing chart of each course.
- Requirement of additional faculty from other organizations/institutions.
- Requirement of equipment not held by the Institution.
- On the Job Training (OJT) at different organizations/institutions.
- Subject-wise planning of faculty held by the Institution.
- Allocation of classes/laboratories for all courses.

The Institution Head Quarter strictly monitors the co-ordination and supervision of these training academic activities. Members of the top management pay regular and / or unscheduled visits / checks to ensure the compliance of scheduled/planned processes. Each group / department/ branch/ cell is required to maintain the records for all activities related to process control as its quality record.
6. INSPECTION AND TESTING (EXAMINATIONS)

General. The Institution has established and maintained documented procedures for examinations for various courses. In case of the army courses, the respective department deals with the examination and results. Whereas in case of under/post engineering degree courses, the Examination Cell of the Institution deals with the examinations, results and issue of results related documents.

RECEIVING INSPECTION AND TESTING (ENTRANCE EXAMINATION)

- Entrance examination is carried out for a few courses by the institution. The result of these examinations are recorded and included in the consolidated result sheets. In case of failure in the entrance examination, students are rejected.
- For other courses, the Institution receives the list of selected nominated students from the Head Quarters that conduct such tests. Cases where Institution is not involved in the process of selection nomination have to rely on the customer supplied product.

IN-PROCESS INSPECTION AND TESTING (SEMESTER/SUBJECT EXAMINATION)

In all the courses, the phasing chart of course is given to students, which includes the complete schedule of the examination and other examination related activities. All the examinations are conducted and the teaching staff compiles the results of subject / course according to the phasing. In case of under / post graduate engineering degree courses, the semester examination results are prepared and kept by the Examination Cell, which are conducted at the end of each semester.

FINAL INSPECTION AND TESTING (CONSOLIDATION OF RESULTS)

The examination / test / practical of subjects and semester examination results are compiled at the end of each course. On the basis of this result the students are declared pass or fail.

INSPECTION AND TEST RECORDS (EXAMINATION RECORD)

The Institution has established and maintained documented procedures for preparation, handling, and security of examination records. Each group / department is required to maintain the records for all activities related to Inspection and Testing as its quality record.

7. CONTROL OF INSPECTION, MEASURING AND TEST EQUIPMENT

General. The faculty / instructional staff of the Institution is prime source of process control. Their performance / ability are controlled by selecting the faculty of appropriate qualification and by exercising the feedback system. The top management and Heads of the Departments carry out strict control on conduct / performance of faculty.

- The control of inspecting, measuring & test equipment is also exercised with the help of moderation of question papers, which is done by the top management / Heads of the Department.
- Most of the equipment used in the Institution is for demonstration / practice of the students whereas selected equipment is used for the research purposes by the faculty / students. The equipment used for research is maintained and calibrated according to documented procedures.
Top management / Heads of the Department exercise the control over, the faculty by interviewing them at the time of induction/posting to the department. After the interview, the new faculty members are kept under probation till the time, top management / Heads of the Department deems necessary. During this time if the individual is found unfit for instructional job, (s)he can be returned/dehired by the department with the approval of the top management.

CONTROL PROCEDURE FOR NON-CONFORMING PROCESSES

The top management and Heads of Departments continuously monitor all the processes. The process, which is not providing good/positive results, are modified/changed. If the process still fails to produce desired results in any course, then the process is redesigned.

- **Visits of Top Management / Heads of the Department.** The top management visits in the ongoing classes at any time, unannounced to sees the quality of instruction. The visitors can give task to the concerned Heads of the Department verbally or in writing for improvement.
- **Feedback from Students (at the end / during the subjects / semesters).** The Institution has established a comprehensive system of receiving feedback from the students. The students are required to fill up subject and course critique Proforma at the end of each subject and at the end of each course. On the basis of such feedback, the processes are analyzed and control actions are taken.
- **Feedback from Outgoing Students during Interviews on Termination of Course.** The top management interviews the students of outgoing courses. These students provide valuable feedback/information about different aspects of training/administration activities which may be included in the system. The concerned authority reviews the information and any applicable suggestions are included in the system/process.

CONTROL PROCEDURE FOR TEST EQUIPMENT

The processes are controlled and monitored by each department and they have documented procedures for the maintenance and calibration of the test equipment held by departments in various laboratories/shops. The Officer Incharge Laboratory regularly inspects the equipment and any observation/problem is immediately communicated to Head of Department. Subsequently, the problem is addressed according to the documented procedure. Besides this, the calibration is carried out for all the equipment on a regular basis as per requirement. Each group/department is required to maintain the documents for all activities related to Control of Inspection, Measuring and Test Equipment as its quality record.

INSPECTION AND TEST STATUS

The groups/departments have documented procedures for maintaining the record of examinations at all levels/stages. The subject/semester results are compiled at the end of each course and based on the final results and laid down rules/regulations, the students are either declared pass or fail. After each subject, the staff concerned updates both consolidated result sheet and dossier. The consolidated result sheet includes identification number, name, marks obtained, weighted marks, percentage, grade, class position and pass/fails remarks. Their dossier/consolidated result sheet serves the purpose of inspection status. Performance/status of each student can be checked anytime from start to end of the course.

In case of under/post graduate engineering degree courses, the subject faculty gives number of ‘class tests and quizzes/assignments, to the class and maintains the results till the time they are compiled and endorsed in the final results sheet after the final examinations. After the results of the semester
have been finalized, the concerned faculty hands over the result sheet to the training officer of respective group through the Head of the Department for onward submission to the Examination Cell where the record will be retained.

The documented procedures are strictly followed at all levels and only those students are passed who secure the required percentage of marks in the course. Each group / department is required to maintain the documents for all activities related to Inspection and Test Status as its quality record.

8. **CONTROL OF NON-CONFORMING PRODUCTS**

**General**. The Institution has established and maintained documented procedure for the control of non-conforming products. As the Institution is running different courses and their terms and conditions are different therefore, the detailed procedures are documented by the respective groups / departments according to courses being conducted there. These documented procedures dictate that the non-conforming students should not pass the course / examination / process.

**REVIEW AND DISPOSITION OF NON CONFORMING PRODUCT**

The Institution has established and maintained documented procedures for review and disposition of non conforming product (students). Accordingly, the non-conforming products (students) are processed. Different procedures are documented for different courses according to the applicable rules / regulations. Each group / department is required to maintain the documents for all activities related to Control of Non-Conforming Products as its quality record.

9. **CORRECTIVE AND PREVENTIVE ACTION**

**General** The Institution has established and maintained documented procedures for the Corrective and Preventive Action. The Corrective and Preventive Actions are taken to eliminate/ minimize the causes of actual or potential non-conformities. Subsequently, the concerned groups / departments make the changes which are essential in the follow up of Corrective and Preventive Action, in the procedures.

**CORRECTIVE ACTION**

The corrective action is taken according to complaints/feed back/suggestions from customer, faculty/ staff and students. Investigation for causes of non-conformities is carried out. These are analyzed and effective corrective actions are taken.

**PREVENTIVE ACTION**

Preventive Actions are taken to prevent the potential non-conformities in other potential areas. The information for preventive actions is gathered through customer complaints, reports of recurring non conforming products, the processes, which cause non-conformities, audit results and quality records. These are processed/analyzed and problem areas are detected for effective preventive action in order to eliminate potential causes of non - conformities. Concerned authorities take action needed to deal with any potential problem requiring preventive action. Initiation of preventive action, control for ensuring its effectiveness and relevant information of actions taken is submitted for management review. Each group/ department is required to maintain the documents for all activities related to Corrective and Preventive Action as its quality record.
10. IMPROVEMENT

The Institution was certified to ISO 9000 QMS in October 1998. Statistical data shown in Table 3 and Table 4 relates to BSc Electrical and Mechanical Engineering Degree ‘X’ and ‘Y’. BSc Engineering Degree ‘X’ was conducted before ISO 9000 QMS certification where as BSc Engineering Degree ‘Y’ was conducted after ISO 9000 QMS certification. Grade Point Average (GPA) was taken as criteria for comparison. All other variables for both the BSc Engineering Degree Courses ‘X’ and ‘Y’ was presumed constant. The data indicates improvement trend i.e % strength shift from lower GPA class to upper GPA class in the overall results (quality improvement of the products – student’s final grading) due to effective and efficient on-line process control as already discussed.

Another analysis of a single BSc Mechanical Engineering Degree Course ‘Z’ is shown in Annex B. Almost half of this degree course (semester 1-4) was conducted before ISO 9000 QMS certification and the rest (semester 5 – 9) after certification. The improvement trend is clearly visible from the fact that the strength has shifted from lower GPA class to upper GPA class. Data shown in Table 3 and 4 is also represented in Figure 1 and Figure 2 respectively.

<table>
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<tr>
<th>S. NO</th>
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<th>BSc ENGINEERING DEGREE -X</th>
<th>BSc ENGINEERING DEGREE -Y</th>
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TABLE 3. COMPARISON (% BASIS) BETWEEN BSc ELECTRICAL ENGG DEGREE X & Y

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<tr>
<th>S. NO</th>
<th>CUMULATIVE GPA RANGE</th>
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TABLE 4. COMPARISON (% BASIS) BETWEEN BSc MECHANICAL ENGG DEGREE X & Y
Figure 1 Comparison (% basis) between BSc Electrical Engineering Degree X and Y.

Figure 2 Comparison (% Basis) Between BSc Mechanical Engineering Degree X and Y

11. LESSON LEARNT

Other education institutions of the country can follow this approach of establishing on-line (in-process) service quality control. They should use the on-line service quality control approach rather than off-line service quality control. This shall result in improvement of product’s quality and avoid production of non-conforming products. Improvement plans can be made to convert all, if possible, off-line process controls to on-line process quality control.
12. REFERENCES

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AUTHOR’S BIODATA

L

Col Dr Nawar Khan is a professional Mechanical Engineer. He has graduated from the University of Engineering of Engineering and Technology Peshawar in 1981. He did his MSc Mechanical Engineering (Specialized in Production Engineering) from the University of Engineering of Engineering and Technology Lahore in 1995. Dr Khan has completed his Ph.D under a split Ph.D program of MoST from the University of Engineering of Engineering and Technology Lahore and De Montfort University, Leicester UK in 1999. His field of specialization is Total Quality Management (TQM), particularly the ‘QUALITY AWARDS’. He is author of a number of nationals and international research papers. Presently he is serving as Associate Professor at the College of Electrical and Mechanical Engineering, National University of Sciences and Technology, NUST Rawalpindi.
QUALITY PLAN OF AN ENGINEERING EDUCATIONAL INSTITUTION

- Contract Review Head Quarters 4.3
- Induction of Students 4.7
- Students Reports Allocation of Identification 4.8
- Boarding and Lodging 4.15
- Syllabus/ Course Design 4.4

- Managing Review 4.1
- Internal Quality Audit 4.17
- Corrective and Preventive Action 4.14
- Control of Non Conforming Products 4.13

- Purchasing 4.6
- Training 4.18
- Control of Customer Supplied Product 4.7
- Document and Data Control 4.5
- Control of Inspection, Measuring and Test Equipment 4.11
- Handling Storage, Packaging, Reservation and Delivery 4.15

- Process Control
  - (Training of Students) (Technical & Physical) 4.9
- Internal Quality Audit 4.17
- Control of Non Conforming Products 4.13

- Statistical Techniques 4.20
- Control of Quality Record 4.16

- Inspection and Testing 4.10
- Inspection and Test Status 4.12

- Rework

- Handling, Storage, Packaging, Preservation and Delivery
## ANNEX - B

### COMPARATIVE ANALYSIS

**BSc MECHANICAL ENGINEERING DEGREE ‘Z’**

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