Adoption of an Instructional Quality Management System at the Mapua Institute of Technology

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ABSTRACT

The manner of organizing and strengthening of the existing system of processes of the Mapua Institute of Technology is described in terms of the components of a comprehensive and effective instructional quality management system (IQMS), namely: (1) Curriculum, (2) System of Learning Processes, (3) Organizational Structure, (4) Responsibilities, (5) Processes, and (6) Resources. Each existing control of instruction processes is also described and the gap analysis technique is applied to identify deficiencies in the existing system of processes and those in the quality management system relative to its components. From the analysis, it is concluded that control of instruction processes is not clearly defined; not all the requirements of the IQMS are complied with; and there exist processes that need to be modified in order to conform to the IQMS requirements.

Keywords: instructional quality management system, quality education, accreditation

I. INTRODUCTION

In 2003, the Mapua Institute of Technology took the first steps to meet established international education standards prior to mounting efforts to exceed such standards to pave the way towards global excellence. Since then, Mapua Institute of Technology has been determinedly pursuing certification for its engineering and I.T. programs by the Accreditation Board for Engineering and Technology (ABET), the only organization authorized to accredit engineering and I.T. programs in the USA. To attain this goal, MAPUA has espoused continuous quality improvement (CQI) initiatives in order to gain substantial equivalency recognition for some of its engineering and I.T. programs by ABET.

The CQI initiatives of MAPUA have produced favorable results. This is largely due to the installation of systems and processes that provide the necessary details for their successful implementation. Since 2003, numerous processes have been adopted and implemented on the understanding that they will complement the CQI initiatives. Critics however have cited that many of these processes are deemed non-value-adding. They have also claimed that there are functional areas in the organization that do not have or do not follow a systematic process for both its internal and external customers. Moreover, the linkages of these activities cannot be established.

Although the Plan-Do-Check-Act (P-D-C-A) framework is applied to its processes, MAPUA has yet to identify and manage numerous linked activities for it to function effectively. MAPUA is deemed puny in terms of (1) understanding and meeting requirements, (2) needing to consider processes in terms of added value, (3) obtaining results of process performance and effectiveness, and (4) continual improvement of processes based on objective measurement.

As part of its Institutional Plan, though, MAPUA vigorously pursues its accreditation under the Philippine Association of Colleges and Universities – Commission on Accreditation (PACUCOA) and the recognition of its programs as Centers of Excellence (COE) under the Commission on Higher Education (CHED). The Institute at present enjoys Autonomous Status accorded by CHED in 2003. Institutional autonomy means that MAPUA is recognized as a

premier institution of higher learning and is considered as independent and self-determining as regards its academic aspects and the general administration of its educational programs or courses. These are all invaluable to MAPUA's advancement toward quality improvement and the attainment of university status. To retain its Autonomous Status and in order to acquire COE recognition for its programs, there is a need to adopt a process-based quality management system that not only ensures the implementation of processes that add value, but also guarantees that these processes are consistently being performed and that the results of this process performance and its effectiveness are obtained for continual improvement based on objective measurement. The adoption of a process-based quality management system shall likewise help in enhancing customer satisfaction by meeting customer requirements. This case study therefore shall focus on recommending a strategic plan to design and install a quality management system related to the delivery of quality education in MAPUA. Moreover, this case study shall feature a detailed description of the present condition of MAPUA, particularly its systems and processes related to the delivery of quality education. Results of the gap analysis shall be included to identify areas in the existing system that needs improvement.

II. METHODOLOGY

A. Data Collection

Data collection for the case study involved the audit of the present system of MAPUA related to the delivery of quality education against the requirements of a process-based quality management system. To do this, the departments whose processes could be linked to form the envisioned quality management system, as well as audit areas within these departments, were identified. The identification of audit areas was done in accordance with the requirements of a process-based quality management system. This approach facilitated the identification of gaps. Processes done by departments which were not required in a process-based quality management system were excluded from consideration.

Actual audit was done by checking on the documents and records of the departments concerned. Processes performed by the department could be established through these objective evidences.

Coverage of the process, its interaction or link with other processes within the department (intra-department linkage) and/or interaction with processes of other departments (inter-department linkage) were also established through documents and records maintained by the department concerned. This approach provided a clear picture of the extent of the processes performed by the department concerned and whether such processes were necessary or important. Since the primary intention of setting up a quality management system is to meet customer requirements, an audit of the department was done to determine whether or not this goal was being achieved. The departments have as their internal customers other departments within the organization. Meeting the requirements of the other departments should be one reason why the department audited is functioning and is part of the quality management system.

Complementing the audit was the interview of process owners or department heads to validate the information gathered from the documents and records of the department concerned. Interview was done while doing document audit or, in some cases, after the document audit. Interview of process owners or department heads established the consistency of information. Reference materials were also used as sources of data. It is quite important in a quality management system that personnel performing the processes are aware of their relevance and importance and how they contribute to the achievement of established quality objectives.

Process review was done to establish the processes and identify any existing system of processes related to the delivery of quality education in the Institute. Process review enabled the description of the processes and system of processes, as well as the linkages of these processes. A clear view of the system of processes of the Institute facilitated the identification of deficiencies based on the requirements of an effective quality management system.

B. Data Analysis

Data collected through the document audit of departments and validation interview with process owners and department heads were analyzed to establish gaps between the needs of the present systems of MAPUA and the requirements of a

process-based quality management system. Analysis entailed the identification of existing processes that were required as well as the identification of processes that were not performed but were required in the process-based quality management system. The gap analysis also generated results leading to the identification of processes that were deemed mere duplication and/or non-value adding.

In general, the gap analysis is used to: (1) assess compliance with standards, (2) identify missing elements required by the standard, (3) determine if resources are adequate to complete the implementation of the process-based quality management system, (4) identify training needs, (5) define how best to proceed with the process-based QMS implementation, (6) determine how to address the requirements of the standards, (7) assess the efficacy and completeness of records and documented procedures

III. CASE STUDY ANALYSIS

Presentation of Case Facts
A. Institutional Plan

Dr. Reynaldo B. Vea, President of the Institute, laid down an Institutional Plan in 2001 that defined the major initiatives for the next nine (9) years. These initiatives are:

- **Unifying Initiative**
  - Attain University Status

- **Accreditation**
  - Get ABET Certification of Substantial Equivalency
  - Elevate PACUCOA Level II programs to Level III; attain applicant status for other non-accredited programs
  - Elevate CHED Centers of Development to Centers of Excellence; attain COE status for other programs

- **Quality of Education**
  - Focus on MAPUA's classroom/laboratory as the convergence point of all quality improvement efforts
  - Emphasize strong fundamentals in the curriculum
  - Incorporate more aspects of emergent technologies into the curricula of concerned disciplines

  - Develop further the academic programs in IT
  - Implement an English proficiency program
  - Develop further the graduate programs
  - Develop significant research capability
  - Strengthen community extension services

- **Academic Expansion**
  - Establish new academic degree programs, including one in biotechnology

- **Geographic Expansion**
  - Establish other campuses

- **Cyberspace Expansion**
  - Develop feasible e-learning models

- **Organizational Expansion**
  - Establish an arm to engage in engineering consultancy services with the eventual aim of competing for international projects
  - Establish an arm for engaging in IT businesses
  - Establish a science high school
  - Develop local and international linkages with industry, academic institutions and multilateral agencies

Focus is given on initiatives for quality education. There are components and processes to ensure quality of instruction that are necessary to assure quality of education. Effective execution of these initiatives shall contribute to the attainment of the unifying initiative of the Institute to attain University Status.

B. Existing System

Through process review and internal quality audit of the existing system of processes related to the delivery of quality education in MAPUA, the following facts were gathered, viz.:

1. Curriculum

There is an existing practice to design and develop curricula in MAPUA. The school offering a program is responsible for the design and development of the curriculum. The following information on curriculum was collected:

Process	Findings
Curriculum design and development	• There is an existing practice. A manual on curriculum development is drafted. The general process description of the curriculum development cycle as lifted from the Curriculum Development Manual is attached as Appendix B.
Curriculum review	• Done with inputs from stakeholders, such as faculty, students, industry and alumni. • General process is documented. However, no documented guidelines are available.
Curriculum implementation	• Curriculum is approved at the school level. • The school concerned and the Office of the Registrar jointly implement the curriculum.
Monitoring and Evaluation	• Assessment is done on the curriculum through the various courses it covers. • Results of assessments are applied during the review of the curriculum although no documented clear-cut guidelines are being followed by the schools/departments. • The Office of the Registrar monitors the curriculum.
Revision	• Results of the various course assessments and other assessments done are applied in the review of the curriculum. • There are documented clear-cut guidelines on the revision of the curriculum particularly on what, when, and how it can be revised as reflected in the newly drafted Curriculum Development Manual.

2. System of learning processes

The following components comprise the system of the learning process in the Institute:

A. Instruction

The importance that the Institute gives to this aspect of school operations is demonstrated by the theme of the 2nd Faculty Congress, "B to C: The Classroom – Front and Center". The initiatives agreed upon along this line are: (1) Reinforce intellectual excitement to enhance performance, (2) Improve interpersonal rapport with students to facilitate learning, (3) Enrich classroom learning through related learning experience, (4) Use appropriate methodologies to match student learning styles, and (5) Maximize learning outcomes with effective course designs.

Through instruction, students get to perform the following activities where their performances are evaluated:

a. Examinations - A number of lecture courses in the program rely heavily on examinations as the basis for computation of the student's academic grade. Examinations carry a major weight in the computation of the student's final grade.

b. Classroom Performance – Aside from the major examinations taken by students as course requirement, a fraction of the student's final grade is accounted from other academic efforts in the class, which include recitation, homework, board work, seatwork, reports, and others.

c. Documentation Reports – Some lecture courses and design courses require students to conduct company visits to draw the line between the theories learned in class and the skills required in the industry.

d. Skills Examination – For laboratory courses, part of the students' evaluation is the completion of a practical examination, wherein the students are required to solve an engineering problem related to the topics covered in their respective courses.

e. Laboratory Reports – Aside from the skills examination, part of the students' final grade

in the laboratory course are the laboratory reports which students are required to submit after completion of every laboratory exercise or experiment.

f. Design Projects – Students enrolled in major design courses are given design projects to apply the theories discussed in major lecture courses. Students are evaluated based on the merits of the project like the mechanics and organization of the documentation, a functional prototype that conforms to realistic constraints like health and safety, economic, manufacturability and environmental considerations; and the ability of the students to respond to questions during their presentation of the project.

g. Reaction Reports – Students enrolled in the Seminar and Field Trip courses are expected to attend technical seminars and conduct industry visits after which evaluative and reaction reports are to be submitted as part of their completion of the course.

B. The Outcomes-based approach

An outcomes-based approach to assessment is implemented in the Institute to encourage continuous quality improvement in the area of instruction. MAPUA has been implementing this since 2003 as an offshoot of the ABET Certification initiative.

Initially, the Institute defined the objectives of each academic program in terms of what the graduates should be able to do a few years after graduation. Moving backwards, a set of desired outcomes were defined.

Each course in a program was assessed based on its relevance to the desired outcomes. Then, the syllabus of each course was fine-tuned to assure the attainment of the desired outcome. Some faculty members even devised an outcomes-based assessment method of grading their students.

This approach has kept the faculty members focused on the objectives of instruction. The repeated implementation of the feedback loop, where everything, including the program objectives and desired outcomes are evaluated, is a significant learning experience for the Institute. In this feedback process, external parties are involved.

C. The Integrative Courses

The Institute has brought back integrative courses in the final year of the students to help them take a second look at the professional courses, make connections, and design their appreciation of the course contents. In the short run, this aims to help them pass the licensure exam and, in the long run, helps them cope with the demands of professional practice.

D. The Quarter System

MAPUA initiated a shift to the Quarter System (QuarTerm) to allow students to better focus on their studies. Instead of taking 7 or 8 courses in any given academic term, students under the QuarTerm just take 4 or 5 courses.

The QuarTerm also offers greater flexibility to students and parents because the programs are offered in two tracks, namely, the Regular Track and the Accelerated Track. Under the Regular Track, students can easily manage the academic load. It allows students to take up a very manageable load of up to 12 units per term, thus accumulating a maximum of 48 units in 1 year. With 3-4 courses per quarter, students can finish a program within the usual 4 years (for IT, Business and Psychology programs) or 5 years (for Engineering and Architecture programs)

The students may also opt for the Accelerated Track whereby students can complete the whole program a year less than the Regular Track. The Accelerated Track allows students to take a maximum of 15 units per term. Hence, they earn a maximum of 60 units of credit in one year. The students can then graduate from their respective programs in either 3 years (for IT programs) or 4 years (for Engineering and Architecture).

E. The Research Program

Encouraged by the PACUCOA process and the CHED COD/COE concept, MAPUA has taken significant steps in developing its research capability. Of late, there has been a flowering of research activities in the Institute. Research colloquia and contests are now a fixture of campus life. It is quite evident that research is a vital component of instruction. Research

encourages students to apply the principles and theories learned during classroom instruction.

As of 2005, paper presentations and publications have flourished as shown in the following tables:

Paper Presentation:

Venue of Presentation	Total Number of Papers Presented				
	2001	2002	2003	2004	2005
Institutional Research Colloquia	None	None	32	24	38
Local Conferences	3	4	30	29	20
International Conferences	4	7	4	10	8
TOTAL	7	11	66	63	66

Paper Publication:

Type of Publication	Total Number of Papers Published				
	2001	2002	2003	2004	2005
Proceedings (Local/ National Conferences)	None	4	11	6	7
Proceedings (International Conferences)	3	6	4	6	6
Journals (Refereed)	None	None	1	8	9
TOTAL	3	10	16	20	22

F. The Extension Services

In line with the Institute's mission to disseminate, generate, preserve, and apply scientific, engineering, architecture and IT knowledge, and with its vision not only to impart expertise but also to inculcate ethics, MAPUA has developed a structure to optimize the Institute's engineering and IT expertise for the benefit of the community. Accordingly, MAPUA develops, plans and implements programs to harness the scientific, engineering and IT expertise of the Institute's faculty, non-teaching personnel, administration and students by offering free extension services resulting in a lasting positive change in its client communities. Extension service complements classroom learning by students

G. The Student Advising System

The MAPUA Student Advising System is composed of three integral parts: (1) Academic Advising, (2) Peer Advising, and (3) Personal Advising. Academic Advising is the first of the triune that involves the faculty, as academic advisers, and all MAPUA students starting from batch 2004.

The system involves assigning academic advisers (faculty members) to students to assist them during their residence in the Institute. The academic adviser monitors the academic performances of the students. However, the students may also seek the adviser's assistance in other concerns as MAPUA students. The advisers are trained to handle different situations and to endorse students to the proper offices/channels for other concerns that are beyond their capabilities.

Peer Advising (PA) is the second of the triune that involves selected faculty members and student achievers coming from different student organizations and student councils.

PA Coordinators provide the expertise and the needed empowerment of peer advisers through tutorials. They also conduct random visits during peer advising to monitor the quality of performance. Peer Advisers come from student organizations and student councils and are screened by the advising head. Selected peer advisers undergo special training/orientation in preparation for peer advising. Their tabulated schedules are posted and they are expected to report at the PA Centers for their duty hours. Peer Advisers are expected to check on their advisees who should be encouraged to avail of the services of other SPS units, such as the Academic Advising and the Personal Advising.

Personal Advising is the third of the triune that involves the guidance counsellors and some selected student volunteers.

3. The Organizational Structure

The organizational structure of MAPUA shows two groupings of departments: the Academic Group and the Operations.

The Academic Affairs department of the Institute assumes the lead role in the academic operations of the Institute. It is mainly responsible for the formulation of academic policies and guidelines. For check and balance, an Academic Council is created to deliberate on and to approve academic policies and guidelines. The Academic Council is composed of the President, the EVP for Academic Affairs, the VP for Student Affairs, the Deans, the Subject Chairs, the CQI Director, and the Office of Instruction Director. It convenes bi-weekly. The counterpart of the Academic Council is the Operations Group, which provides the administrative support including financial, facilities and institutional support to the academic programs, plans and initiatives of the Institute. Members of the Operations Group are the President, the EVP for Academic Affairs, the EVP for Administration and COO, the VP for Finance, the VP HRD and Legal, the VP for Student Affairs, the Registrar, the Development Office for Information Technology (DOIT) Director, the Admissions Director, the Asst. Treasurer, and the Controller.

A new office was created in the Institute and was given the mandate to oversee the development of instructional guidelines, and to develop systems of learning processes and initiatives. This is the Office of Instruction and is headed by a Director.

The Institute also has a Faculty Development Office that prepares and administers the Faculty Development Program of MAPUA. It monitors the implementation of the program, evaluates its performance and uses results of the evaluation to improve the program.

To ensure that academic policies and guidelines are strictly complied with by all concerned, a scheduled internal quality audit is conducted by the Continuous Quality Improvement Office (CQIO). The CQIO is headed by a Director who is assisted by two (2) Technical Staff who also act as Auditors.

4. Responsibilities

As documented in the Administrative Manual of the Institute, the following positions in the Institute and their corresponding documented responsibilities significantly contribute to the delivery of quality education.

The President

The President is the Chief Executive Officer of the Institute and heads the administration and direction of the day-to-day business affairs of the Institute.

The Executive Vice President for Academic Affairs

The position serves as the chief academic officer for the Institute and is responsible for promoting academic excellence and overseeing the development of general goals and directions for the academic programs of the Institute. The EVPAA serves as the executive in charge of both academic and student affairs.

The Dean

The School Dean is responsible for the development, organization, management, control and operation of his/her School. The Dean should have a strong record of leadership and scholarship in teaching, research and professional practice. The Dean is responsible for the planning and implementation of various programs and projects and the enforcement of approved academic and administrative policies, procedures, rules and regulations involving the School, its faculty members, non-teaching staff and students.

The Subject Chair

The Subject Chair is responsible for providing professional support and assistance in the implementation of various programs and projects and enforcing approved academic and administrative policies, procedures and rules and regulations involving the Department, its Faculty members, non-teaching staff and students.

The Faculty Members

Although the fundamental responsibility of every faculty member is "teaching", they are also involved in other activities that enrich instruction

such as, among others, the preparation of course syllabus, course review and improvement, and participation in community extension activities.

The Faculty Development Program Administrator

The position is responsible for planning, implementing, and evaluating the plans, programs, policies, procedures, and activities governing the Faculty Development Program Office (FDPO).

The CQI Director

The CQI Director is responsible for planning, designing, organizing, establishing and leading the Institute's quality improvement and assessment initiative through the application of CQI principles that will help and guide departments/operating units develop strategic plans, improve on their key processes and assess performances through key performance metrics. The CQI Director reports directly to the President and supervises the CQI Technical Staff.

The Office of Instruction Director

The Office of Instruction Director is a new position in the Institute. The office is still in its organizational stage and its function is still being established. At its inception, the Office of Instruction Director is envisioned to be responsible for the design and formulation of instructional guidelines and innovative and effective teaching methodologies.

5. Processes

Results of the audit reveal that there are processes being used in the Institute that are deemed necessary to ensure quality of education. The following processes were observed to be implemented:

- Curriculum Development – initiated by the concerned school offering the program. Design and development are done by the Schools through their respective Deans and Subject Chairs. CHED and ABET requirements are considered in the design of the curriculum as well as in the program's educational objectives.

Approval for implementation is rendered by the Dean concerned. A recent initiative of the Institute is the creation of the Curriculum Oversight Committee (COC) which aims to check and review the designed curriculum.

- Course Syllabus Preparation – done by the concerned School and Basic Studies Departments. Faculty members develop and prepare the course syllabi. Assignment of preparation is based on the specialization of the concerned faculty member. Approval for implementation is rendered by the Dean or Subject Chair. Once approved, authorized copies are distributed to all faculty members handling the course. The original copy is kept on file with the School/Department. Review and revision are done as a result of the Focus Group Discussion (FGD) conducted by the Course Cluster. Other inputs from the FGD are the results of course assessment, course portfolio analysis, departmental exam item analysis, etc.

- Course Assessment – conducted by the concerned School and Department. Course Assessment by students and by faculty members are the two types of assessment done on the course. A pre-printed form is used for the course survey to assess the effectiveness of its delivery and to determine whether course outcomes are attained. Results of the course assessment serve as one of the inputs during the FGD for the review and improvement of the course.

- Quality Audit – scheduled and conducted by the Continuous Quality Improvement Office (CQIO). Audit is done to check compliance with approved SPGs, CHED CMOs, and accreditation requirements. Schools and departments audited are required to formulate corrective and preventive action (CA/PA) to address the audit findings. CA/Pas are provided in a Quality Audit

Progressive Report (QAPR), a report issued by CQIO to report the audit findings noted. The formulation of the CA/Pas ensures improvement both in the documentation as well as in the processes adopted by the School or Department. Evidences in the

conduct of the quality audit are maintained on file with CQIO.

- Faculty Training Needs Survey and Analysis – done by the Faculty Development Committee of the School and/or Department on the department level and consolidated by the Faculty Development Office for the development of an Institution-wide faculty development program.

- Faculty Performance Evaluation – performed every end of the third quarterm. Faculty performance evaluation is done by students, peers, and the Dean or Subject Chair. Performance bonus is given to faculty members based on the results of the evaluation of their respective performance by their students, peers, and Dean or Subject Chair.

- Student Advising – administered by selected faculty members (for the academic advising), students (for peer advising), and guidance counsellors (for personal advising). Student advising is a relatively new process in the Institute. Forms and records to evidence the conduct of the advising are maintained by the Center for Student Advising, an office under the supervision of the Vice-President for Student Affairs.

- Faculty Consultation – done by faculty members and monitored by the School or Department. Consultation schedules are posted outside the faculty room and consultation monitoring forms are maintained to record consultations done by students.

Moreover, it was observed that some of the processes are documented while others are not. The documentation, however, does not guarantee that the processes are implemented as prescribed. It was observed further that the processes particularly those performed by the schools vary from school to school. Processes which are performed by academic-support departments for the Schools, to some extent, follow the prescriptions in the process documentation. For these reasons, the effectiveness of these processes cannot be fully substantiated and the linkage (if any) of one process to another cannot be established.

6. Facilities and Resources

The Institute adequately provides the necessary facilities and learning resources to ensure the delivery of quality education. The MAPUA main library exists to support the teaching, research and extension functions of the Institute. It serves the needs of students and faculty members through equitable access to high quality information, resources and services.

Aside from the library, the Institute also provides adequate classrooms, laboratories, drafting rooms, and shops necessary for prompt delivery of quality instruction. A standard classroom can accommodate forty (40) students and almost 90% of these are air-conditioned. Laboratory equipment and apparatuses are provided to allow grouping of students into five members per group during the performance of experiments.

Delivery of instruction is further facilitated through the use of Audio-Visual rooms and equipment. These are made available to the students and faculty members as scheduled. Seminar Rooms and Classrooms for plenary lectures are also fixtures in MAPUA.

To ensure the effective delivery of student services in line with the Student Advising System of MAPUA, the Institute has provided an advising room located at the 3rd floor of the North Building where Academic Advising, Peer Advising and Personal Advising are conducted.

C. Control of Instruction Processes

A review of the instruction process in MAPUA reveals that some controls of instruction processes are not in place. These controls are needed to ensure the delivery of quality education and are identified as: (1) instructional needs analysis; (2) instructional design; (3) instructional development; (4) delivery of instruction; (5) instructional evaluation; (6) educational faculty organization development; and (7) operation of libraries, shops, and laboratories.

As noted in the audit, not all of the seven controls mentioned above are practiced and documentation of these processes is also not available. Of these seven controls, (1) and (2) have never been implemented. The performance of processes (3) to (7) can be summarized in the following table:

Control of Instruction Process	Findings
Instructional Development	• Instructional materials are developed through the efforts of the Course Cluster of each School. These include textbooks and laboratory manuals.
Delivery of Instruction	• The process is observed by faculty members. • The process is documented through the course syllabus which is available for every course offered in each of the program offerings of the Institute. • Evidences of compliance with the delivery of the instruction process are available and collected through the course portfolio.
Instructional Evaluation	• There is an existing evaluation process in the Institute. • Evaluation is done through the Course Evaluation Survey (CES) by students and faculty members. • Results are used in the Focus Group Discussion of the concerned Course Cluster to improve the course. • Faculty members are also evaluated to gauge performance in terms of delivery of instruction. • The Dean/Subject Chair conducts classroom visitation of all faculty members for evaluative

	purposes.
Educational Faculty Organization Development	• A Faculty Development Committee is one of the standing committees in each school in the Institute. • This committee conducts training needs survey and analysis to design a faculty development program for the school. • The Institute has a Faculty Development Office (FDO) that develops and promotes projects/activities on faculty development related to formal and non-formal education.
Operation of Libraries, Shops and Laboratories	• The Library Department of the Institute has a Library Service Manual that details the services offered by the department. • Guidelines on the use of laboratories and related equipment are documented in the laboratory manual for students.

Results of Analysis

The audit of MAPUA's system of processes related to the delivery of quality education reveals several gaps with reference to the QMS requirements. Only those QMS requirements where gaps or where non-conformance exist for the MAPUA system are included in this study. The analysis is presented herein following the Plan-Do-Check-Act (P-D-C-A) framework.

The "PLAN" Component of the P-D-C-A Framework

Management Responsibility and Provision of Resources

QMS Requirement: Management Commitment

- "Top management shall provide evidence of its commitment to the development and implementation of the quality management system and the continual improvement of its effectiveness by
    a. Communicating to the organization the importance of meeting customer requirements as well as statutory and regulatory ones,
    b. Establishing the quality policy,
    c. Ensuring that quality objectives are established,
    d. Conducting management reviews, and
    e. Ensuring the availability of resources."

Analysis:

The Institute has no quality policy and objectives. Management reviews are not conducted. No communication plan is available for review and follow-up to ensure the visibility of the commitment and values of top management.

QMS Requirement: Quality Policy

- "Top management shall ensure that the quality policy
    - is appropriate to the purpose of the organization
    - includes a commitment to comply with requirements and continually improve the effectiveness of the quality management system
    - provides a framework for establishing and reviewing quality objectives
    - is communicated and understood within the organization, and
    - is reviewed for continuing suitability."

Analysis:

The Institute has no documented quality policy which top management can use for guiding and leading the decision-making of the personnel involved in the continual improvement of the education process

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QMS Requirement: Quality Objectives

- "Top management shall ensure that the quality objectives, including those needed to meet requirements for product, are established at relevant functions and levels within the organization. The quality objectives shall be measurable and consistent with the quality policy."

Analysis:

The Institute has no documented quality objectives. Quality objectives should be integrated in the

educational organizations' overall objectives, support service specifications, and should include performance measures or indicators.

QMS Requirement: Quality Management System Planning

- "Top management shall ensure that
    a. The planning of the quality management system is carried out in order to meet the requirements for general requirements of a quality management system, as well as the quality objectives, and
    b. The integrity of the quality management system is maintained when changes to the quality management system are planned and implemented."

Analysis:

Strategic planning is conducted in the Institute. However, it does not conform to the specified requirements of the Quality Management System. No records are available that could otherwise disprove this observation. As required, quality management system planning should consist of activities and resources needed to achieve the educational organization's objectives.

QMS Requirement: Management Representative

- "Top management shall appoint a member of management who, irrespective of other responsibilities, shall have responsibility and authority that includes
    a. ensuring that processes needed for the quality management system are established, implemented and maintained,
    b. reporting to top management on the performance of the quality management system and any need for improvement, and
    c. ensuring the promotion of awareness of customer requirements throughout the organization."

Analysis:

Considering that there is no formal quality management system in the Institute, this QMS requirement is not complied with. However, the Institute has a CQI Director that plans, coordinates and oversees programs and initiatives related to continuous quality improvement.

QMS Requirement: Internal Communication

- "Top management shall ensure that appropriate communication processes are established within the organization and that communication takes place regarding the effectiveness of the quality management system."

Analysis:

Although internal communication is evident and functioning in the Institute, it cannot be established if

this is effective and efficient. It has been observed that policies and guidelines, documented via the Standard Practice Guides (SPGs), are formulated without any records of consultation done with Schools/Departments that would be affected by their implementation. This approach has even resulted in conflicts or inconsistencies among supposedly related SPGs.

QMS Requirement: Management Review

- "Top management shall review the organization's quality management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness. This review shall include the assessment of opportunities for improvement and the need for changes in the quality management system, including the quality policy and quality objectives."

Analysis:

No quality management system review is conducted and no records of such are available or maintained. Review inputs and outputs, as required in a QMS, are also non-existent. As required, a review of the quality management system should include the scheduled periodic review of the instructional and support systems, customer satisfaction, assessment criteria, evaluation results, and documented improvements.

QMS Requirement: Provision of Resources

- "The organization shall determine and provide the resources needed
    a. to implement and maintain the quality management system and continually improve its effectiveness, and
    b. to enhance customer satisfaction by meeting customer requirements."

Analysis:

The Schools and academic-support departments in the Institute prepare their respective annual budget. However, it cannot be determined if they have established information inputs for detecting the needs for resources, for performing resource planning at short, medium or long term, and for carrying out the follow-up of verification and assessment tasks. No records are available to disprove this finding.

QMS Requirement: Competence, awareness and training

- "The organization shall
    a. determine the necessary competence for personnel performing work affecting product quality,
    b. provide training or take other actions to satisfy these needs,
    c. evaluate the effectiveness of the actions taken,
    d. ensure that its personnel are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives, and
    e. maintain appropriate records of education, training, skills and experience"

Analysis:

Although it was noted that training needs survey and analysis involving faculty members should be done by the Faculty Development Committee of each school, there is no evidence that these activities are performed. The Faculty Development Office of the Institute has several records to show that it performs Training Needs Analysis (TNA). However, it cannot be established if systematic actions are carried out for detecting competence needs by comparing curricula requirements with current personnel competencies.

Competency issues are also observed in the course syllabus preparation. Majority of the faculty members in the Institute are engineering graduates with no background in education. However given this observation, the faculty members are involved in the preparation of course syllabi for the courses they handle which require knowledge and competency in learning domains or in taxonomy of educational objectives. Faculty members still have to undergo training for this.

The "DO" Component of the P-D-C-A Framework

A. Curriculum and Related Processes

QMS Requirement: Planning of Product Realization

- "The organization shall plan and develop the processes needed for product realization. Planning of product realization shall be consistent with the requirements of the other processes of the quality management system"
- "In planning product realization, the organization shall determine the following, as appropriate:
    a. quality objectives and requirements for the product;
    b. the need to establish processes, documents, and provide resources specific to the product;
    c. required verification, validation, monitoring, inspection and test activities specific to the product and the criteria for product acceptance;
    d. records needed to provide evidence that the realization processes and resulting product meet requirements"
- "The output of this planning shall be in a form suitable for the organization's method of operations."

Analysis:

Educational organizations should plan, as minimum requirements, the different stages of instructional design, development, delivery, evaluation and support services, resource allocation, evaluation criteria, and improvement procedures to achieve desired results. Not all of these components are observed in the MAPUA system particularly in the curriculum and its related processes.

QMS Requirement: Design and Development Planning

- "Design and development planning. The organization shall plan and control the design and development of product."
- "During the design and development planning, the organization shall determine
    a. design and development stages,
    b. the review, verification and validation that are appropriate to each design and development

stage, and
   c. the responsibilities and authorities for design and development."
- "The organization shall manage the interfaces between different groups involved in design and development to ensure effective communication and clear assignment of responsibility"
- "Planning output shall be updated, as appropriate, as the design and development progresses."

Analysis:

In designing and developing the curriculum, it cannot be established if the Institute considers entrance to the next grade to be the exit level from the present grade or competence level. Design and development stages are not determined in the same manner that review, verification and validation processes appropriate to the design and development of the curriculum are not established and thus are not consistently done.

QMS Requirement: Design and Development Input

- "Inputs relating to product requirements shall be determined and records maintained. These inputs shall include
   a. functional and performance requirements,
   b. applicable statutory and regulatory requirements,
   c. where applicable, information derived from previous similar designs, and
   d. other requirements essential for design and development."
- "These inputs shall be reviewed for adequacy. Requirements shall be complete, unambiguous and not in conflict with each other."

Analysis:

While it was noted that the inputs to the design of curricula such as prerequisites for courses, certification, licenses or occupational requirements, and difficulty level of objectives are identified by the Institute, other essential inputs such as results on effectiveness of instructional materials; data on research of student learning capacity; and the required competence of teachers are not included as inputs. Moreover, no documentation is available to show that the said inputs to the design of curricula are considered.

QMS Requirement: Design and Development Review

- "At suitable stages, systematic reviews of design and development shall be performed in accordance with planned arrangements
   a. to evaluate the ability of the results of the design and development to meet requirements, and
   b. to identify any problems and propose necessary actions"
- "Participants in such reviews shall include representatives of functions concerned with the design and development stage(s) being reviewed. Records of the results of the reviews and any necessary actions shall be maintained."

Analysis:

It cannot be established if there is a systematic review of design and development of curricula at the

level of the School concerned. The Curriculum Oversight Committee (COC) convened by the Institute has the mandate to review and correct the curricula. This review process, however, is done on currently offered curricula with the objective of enhancing it for its implementation on the following academic year. The COC documents the actions to be taken to correct the curricula and accordingly informs the School concerned for appropriate action. These actions on correcting and enhancing the curricula are presented in the Academic Council meeting.

QMS Requirement: Design and Development Verification

- "Verification shall be performed in accordance with planned arrangements to ensure that the design and development outputs have met the design and development requirements. Records of the results of the verification and any necessary actions shall be maintained."

Analysis:

No design verification has been performed on the curricula of the Institute when the QMS requires it to be performed in one or several stages according to the design and development plan. This activity could have been performed either internally by any specialist who has not participated in the design and development verification, or externally. It is to be stressed that the design and development output stage should match the design development input specification.

QMS Requirement: Design and Development Validation

- "Design and development validation shall be performed in accordance with planned arrangements to ensure that the resulting product is capable of meeting the requirements for the specified application or intended use, where known. Wherever practicable, validation shall be completed prior to the delivery or implementation of the product. Records of the results of validation and any necessary actions shall be maintained."

Analysis:

This process is carried out to ensure that planned product characteristics are met by the resulting curriculum. Validation should be performed generally on the final design stages. In the case of MAPUA, it cannot be established if this process is being performed. No records of validation are available.

B. System of Learning Processes

QMS Requirement: Planning of Product Realization

- "The organization shall plan and develop the processes needed for product realization. Planning of product realization shall be consistent with the requirements of the other processes of the quality management system.
- "In planning product realization, the organization shall determine the following, as appropriate:
    a. quality objectives and requirements for the product;

b. the need to establish processes, documents, and provide resources specific to the product;
c. required verification, validation, monitoring, inspection and test activities specific to the product and the criteria for product acceptance;
d. records needed to provide evidence that the realization processes and resulting product meet requirements"

- "The output of this planning shall be in a form suitable for the organization's method of operations."

Analysis:

Although the Institute has an Office of Instruction, its functions are not clearly defined. Moreover, it cannot be established if there are processes for product realization related to instructional needs assessment, instructional design, development and delivery. It cannot be determined also if control methods are part of the management review to ensure that instructional specifications are met and that such control methods are consistent with accepted quality practices. No documentation is available for major processes of product realization related to instruction.

QMS Requirement: Design and Development Planning

- "Design and development planning. The organization shall plan and control the design and development of product."
- "During the design and development planning, the organization shall determine
    a. design and development stages,
    b. the review, verification and validation that are appropriate to each design and development stage, and
    c. the responsibilities and authorities for design and development."
- "The organization shall manage the interfaces between different groups involved in design and development to ensure effective communication and clear assignment of responsibility"
- "Planning output shall be updated, as appropriate, as the design and development progresses."

Analysis:

Among the various learning processes in the Institute, it was noted that there is no needs assessment performed for the instruction process. Needs assessment should be done to include student achievement and organization effectiveness and should likewise include potential or actual performance requirement to determine: (1) how instruction can help students to become competent; (2) how new requirements can be met; (3) specific measures of instructional effectiveness; and (4) if skills to be taught match curricular requirements. These assessments could provide information that can be used in the instruction review process (which is not also done in the Institute). No needs analysis report (that could provide input to the instructional design process, describe the results of the needs assessment and state the goals of the design) was available during the conduct of audit.

QMS Requirement: Design and Development Review

- "At suitable stages, systematic reviews of design and development shall be performed in accordance with planned arrangements

> a. to evaluate the ability of the results of the design and development to meet requirements, and
> b. to identify any problems and propose necessary actions"

- "Participants in such reviews shall include representatives of functions concerned with the design and development stage(s) being reviewed. Records of the results of the reviews and any necessary actions shall be maintained."

Analysis:

It cannot be determined if the Focus Group Discussion (FGD) conducted by the Course Cluster of a school comprehensively covers instruction review. Moreover, criteria for acceptance, in terms of readiness for use in instruction, are not specified. Acceptance criteria may include: (1) approval of content accuracy by one or more subject-matter specialists who have not participated in the development of instruction, (2) approval of the prose, illustrations, and appearance by editorial and graphics specialists; (3) approval, if appropriate, of technological soundness by a technology specialist; trials held on both the instruction and the criterion-referenced assessments using students from the target population, and revisions made based upon the experience of students; and (4) at least one of the trials should be done in an environment similar to that in which the instruction will be conducted, provided with the support materials for students as well as the procedures and support materials to prepare instructors for their tasks.

The "CHECK" Component of the P-D-C-A Framework

Quality Audit

QMS Requirement: Measurement, Analysis and Improvement

- "The organization shall plan and implement the monitoring, measurement, analysis and improvement of processes needed
    - a. to demonstrate conformity of the product ,
    - b. to ensure conformity of the quality management system, and
    - c. to continually improve the effectiveness of the quality management system."
- "This shall include determination of applicable methods, including statistical techniques, and the extent of their use."

Analysis:

Although it was noted that MAPUA established its Course Assessment process for collecting appropriate information including the identification of information sources, it could not be established if collected data were effectively and appropriately used to ensure the effectiveness of the teaching/learning process.

QMS Requirement: Analysis of Data

- "The organization shall determine, collect and analyze appropriate data to demonstrate the suitability and effectiveness of the quality management system and to evaluate where continual improvement of the effectiveness of the quality management system can be made. This shall include data generated as a result of monitoring and measurement and from other relevant sources."

- "The analysis of data shall provide information relating to
    a. customer satisfaction,
    b. conformity to product requirements,
    c. characteristics and trends of processes and products including opportunities for preventive action, and
    d. suppliers."

Analysis:

Instructional processes often have qualitative as well as quantitative characteristics. Many quantifiable factors outside the "classroom" setting also influence the effectiveness of instruction. Data for some of these factors, such as degree of parental or employer interaction with the organization and frequency and severity of violent incidents and accidents, should be gathered as part of the improvement process.

MAPUA should analyze data from various sources to assess performance against plans and goals and to identify areas for improvement. The Institute should consider the use of statistical methods for data analysis, which can help in assessing, controlling, and improving performance of processes.

The "ACT" Component of the P-D-C-A Framework

Continuous Quality Improvement

QMS Requirement: Improvement

- "The organization shall continually improve the effectiveness of the quality management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review."

Analysis:

MAPUA should continually aim to improve the effectiveness of its quality management system and educational processes by allowing personnel to identify and establish improvement projects within their scope.

Appropriate methods used to identify potential improvement are based on, but not limited to, quality analysis methods using information gathered from sources such as: (i) internal evaluation of quality policy understanding by the organization personnel; (ii) achievement of quality objectives; (iii) performance outcomes; and (iv) inputs from customers and other identified interested parties – parents, industry, government and society.

Obviously, the Institute has no defined quality policy and objectives, thus, improvements through quality analysis methods cannot be implemented. On the other hand, performance outcomes are identified in the present management system of MAPUA in the same manner that inputs from customers and other interested parties are generated. These are the only sources of information for continual improvement in the academic programs of the Institute.

V. CONCLUSIONS

The following conclusions are drawn from the data gathered for this case and its analysis:

1. The present instructional quality management system of the Institute does not conform to a process approach when developing, implementing and improving the effectiveness of its quality management system.

2. Quality policy and objectives are not defined. Their definition in relation to the mission and vision of the Institute is vital since they shall provide consistency and direction in terms of the quality improvement initiatives of the Institute.

3. Quality of instruction is ensured through the implementation of a quality management system focusing on instruction that has the following components: (a) Curriculum; (b) System of Learning Processes; (c) Organizational Structure; (d) Responsibilities; (e) Processes; and (f) Resources.

4. Although the cited components exist in the present system of the Institute, their compliance with the requirements of a comprehensive quality management system is somehow not evident.

   Moreover, the linkage of the processes involving these components is not clear.

5. Existing controls of instruction processes are not extensive and effective enough to ensure the delivery of quality education.

V.   RECOMMENDATIONS

It is recommended that the Institute design and implement an instructional quality management system that will be appropriate to its needs, objectives, products provided, the processes employed, and the size and structure of the organization. The instructional quality management system to be designed and implemented should be effective and must include the continuing assessment of the curricula and educational processes that support instruction to ensure the effectiveness of the learning process. It is recommended that the ISO9000:2000 standard shall be used as guide in setting up the instructional quality management system for MAPUA.

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