

Mechanical engineering program in state universities and colleges in region VIII

Ramil S. Catamora

Northwest Samar State University, Calbayog City, Samar, Philippines

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*Corresponding author: ramilcatamora@yahoo.com

ABSTRACT

Utilizing the descriptive-evaluative method of research, a set of questionnaires was distributed to the respective respondents. The data were analyzed using frequency counts, percentages, mean, standard deviation and one-way analysis of variance (ANOVA) to determine the status of mechanical engineering

program in SUCs in Region VIII, as perceived by the respondents. With an over-all rating of "satisfactory," all provisions or conditions considered there were no significant differences in the perceptions of the administrators, faculty members, and students on the status of the Mechanical Engineering Program. Thus, an improvement plan should be made to address the problems encountered by SUCs in Region VIII.

Keywords

Mechanical Engineering, Program, Curriculum, Assessment, Status of Mechanical Engineering Program, Admission of Mechanical Engineering, Retention of Mechanical Engineering, Attrition

Introduction

The Commission on Higher Education (CHED) has long been supporting the thrust of the education sector. CHED Memorandum Order (CMO) No. 25, series of 2005 specifically provides that every engineering program or course shall define its vision, mission, goals and objectives along these general objectives: "(1) To produce graduates with the necessary theoretical knowledge of mathematics and natural sciences as well as the background knowledge needed by them to acquire the experience and practical skills required of professional engineers; (2) To educate students for their careers as engineers, to enable them to contribute to the development effort of the country as entrepreneurs or competent professionals; (3) To educate students imbued with good moral and ethical values and the acute sense of awareness of conserving the environment for the sustainable development of the country; (4) To provide students instruction in both theoretical and practical aspects of engineering and exposure to industrial setting

in the form of field experience." State Universities and Colleges in Region VIII already made the necessary revisions to their curriculum; thus, following the minimum requirement set by CHED per CMO No. 09, s. 2008.

ASME International Council on Education (2004) stressed that as an inclusive discipline with the flexibility to accommodate broad interests, mechanical entering a mechanical engineering program. Their education should embrace new technologies and emphasize technical breadth and flexibility while providing a rigorous grounding in the discipline's core fundamentals. Innovations in mechanical engineering education will prepare these students to pursue their individual interests well beyond the perceived boundaries of the discipline's traditional roles. They may wish to enter any among a wide variety of career paths for which a mechanical engineering background would constitute a desirable foundation. In addition, such programs should place increased emphasis on

conveying to prospective students the breadth of opportunities and the associated excitement and personal satisfaction associated with the profession. Moreover, the government has very much supported the advancement of quality education and technology. As pointed out by President Benigno S. Aquino III in his message to the PSME 58th Annual National Convention 2010:

“Our administration relishes the chance to work with you as you cultivate the skills necessary to rebuild our nation. We are glad to have you with us as we pursue our vision of an organized and widely-shared rapid expansion of our economy, empowered by a government dedicated to honing and mobilizing our people’s skills and energies.”

Mechanical engineers have their mission to share their talents in improving the quality of education in the Philippines and the field of science which is the backbone of industrialized nation. Students should learn the basics of science by providing adequate equipment in schools for them to investigate certain facts by experiment, to grasp science more easily and eagerly, rather than letting the students memorize those technical terms which they do not understand much less make them bored.

Catamora (2012) stressed that students’ scholastic performance plays an important role in producing the best quality graduates who will become great leaders and the manpower of the country; thus, they will be responsible for the country’s economic and social development. The performance of students in universities should be a concern not only of the administrators and educators, but also of corporations in the labor market. After all, scholastic performance is one of the main factors considered by the employer in recruiting workers, especially the fresh graduates. Thus, students have to exert their greatest effort in their studies to obtain a good grade to fulfill the employer’s demand.

Moreover, retention of engineering students was an issue of the ongoing concern across the country. A number of studies had been conducted to determine the causes for

student attrition. Research indicated that the majority of students who left engineering did so in the first two years of entering an engineering program (Della-Piana, et al., 2003; Spring & Schonberg, 2001). Students left the engineering field for a variety of reasons, including lack of interest in the coursework (Seymour & Hewitt, 1977), lack mathematical preparation (Klingbeil, Mercer, Rattan, Raymer & Reynolds, 2004) desire to graduate in four years (Borrelli, 2002), student perception of the workload (Spring and Schonberge, 2001) and lack of integration of social and academic aspects of university life (Della-Piana, et al., 2003). Data had also been reported linking performance in science courses to retention in engineering (Zhang, Thorndyke, Ohland & Anderson, 2004) as well as the effect of math preparation on retention (Alting & Alser, 2006). While general conclusions about student retention could be drawn it was also clear that each institution faced unique challenges in retaining engineering students.

Pascarella (2000) spelled out several steps that organizations should take in order to produce effective retention programs. First, retention efforts must be systematic throughout organization. One effective method to achieve this is to develop college-wide task forces pertaining to retention to ensure that efforts remain pervasive throughout the organization. Second, ongoing research pertaining to student behaviors must be conducted. Rather than just proposing ideas or theories regarding student behaviors, the organization must find out what students are actually doing. Third, the institution must determine which factors in the organization correlate to student persistence or withdrawal. Administrators need to find the specific, unique factors influencing retention at their institution. Fourth, retention interventions need to be developed and their implementation verified. Fifth, the retention interventions should be evaluated with attention given to both the indirect and direct effects of the programs. Lastly, it is important for organizations to realize that not all factors related to attrition are negative. For example, many students who enroll at community colleges intend to

transfer to other institutions, in which case attrition is considered positive.

The researcher believed that to obtain a good picture of an effective mechanical engineering program, an analysis of its various components, such as admission and retention requirements, mission, vision and objectives, curriculum development, faculty development, instructional program quality, research activities and community extension services may be deemed necessary. This inquiry will help obtain a correct perspective for the mechanical engineering program.

Statement of the Problem

This study attempted to assess the Mechanical Engineering Program of State Universities and Colleges in Region VIII with the end view of formulating proposal for improvement.

Specifically, the study sought to answer the following questions:

1. What are the characteristics of the Mechanical Engineering Program of State Universities and Colleges in Region VIII in terms of:
 - 1.1 students characteristics as to
 - 1.1.1 enrolment for the last three years;
 - 1.1.2 school passing percentage in the licensure examination for the last three years; and
 - 1.1.3 number of graduates for the last three years;
 - 1.2 faculty members' characteristics as to
 - 1.2.1 number of core faculty;
 - 1.2.2 highest educational attainment;
 - 1.2.3 number of relevant trainings;
 - 1.2.4 academic rank of core faculty; and
 - 1.2.5 teaching experience as core faculty;
 - 1.3 administrators' characteristics as to
 - 1.3.1 highest educational attainment;

- 1.3.2 academic rank;
- 1.3.3 experience as administrator;

1.4 years of existence of the program; and

1.5 level of accreditation of the program?

2. What is the status of the Mechanical Engineering Program in State Universities and Colleges in Region VIII, as perceived by the administrators, faculty members, and students in terms of:

2.1 admission and retention requirements;

2.2 vision, mission, goals and objectives;

2.3 curriculum development;

2.4 faculty development;

2.5 instructional program quality;

2.6 research activities program; and

2.7 community extension program services?

3. Are there significant differences in the perceptions of the administrators, faculty members, and students on the status of the Mechanical Engineering Program?

4. What are the problems encountered in the implementation and the recommendations made by the respondents along the seven major components of the Mechanical Engineering Program in Region VIII?

Method

This study utilized the descriptive-evaluative method of research to assess the mechanical engineering programs of the main campuses of state universities and colleges in Region VIII offering Bachelor of Science in Mechanical Engineering. Furthermore, this

study assessed the status of the mechanical engineering program as perceived by the deans/heads, faculty members and students in terms of admission and retention requirements, vision, mission, goals and objectives, curriculum development, competence of faculty, instructional program quality, research activities program, and community extension program and services.

Frequency counts, percentages and analysis of variance were used in analyzing the data gathered in Part I, Part II for the faculty and students respondents, and Part III for the administrator respondents of the questionnaire.

For the data gathered, the one-way analysis of variance was used to determine whether there was significant difference in the over-all perception among the three groups of respondents on the status of the Mechanical Engineering Program in State Universities and Colleges in Region VIII, on the basis of the seven major components of the program. The acceptability level of significance was set at 0.05.

Results and Discussions

Below are the salient findings of the study:

1. In terms of student characteristics as to enrolment for the last three years. Naval State University has an average enrolment of 9.4 percent, Palompon Institute of Technology has an average of 9.92 percent, Southern Leyte State University has an average of 28.55 percent, Northwest Samar State University has an average of 6.67 percent, Eastern Visayas State University has an average of 31.11 percent, and University of Eastern Philippines has an average of 14.35 percent. This finding implies that enhancement of the course should be done to attract more enrolment in the program.
2. As to students characteristics in school passing percentage in the licensure

examination for the last three years, Naval State University has an average passing percentage for September of 68.15 percent; Palompon Institute of Technology an average passing percentage for September of 57 percent; Southern Leyte State University has an average passing percentage for September of 66.81 percent and March, 77.78 percent; Northwest Samar State University poses an average passing percentage of 69.45 percent and March 50 percent; Eastern Visayas State University an average passing percentage for September of 26 percent and March 40 percent; and University of Eastern Philippines has an average passing percentage for September of 63.37 percent. This finding implies that improvement of the curriculum should be done and the teaching capability of the mechanical engineering instructors improved.

3. As for students' characteristics in the number of graduates for the last three years, Naval State University has an average graduates of 3.33 percent; Palompon Institute of Technology an average graduates of 8.89 percent; Southern Leyte State University an average graduates of 12.22 percent; Northwest Samar state University with an average graduates of 5.56 percent; Eastern Visayas State University an average graduates of 54.44 percent, and University of Eastern Philippines an average graduates of 15.56 percent. This finding implies that laboratory equipment and apparatuses should be provided to the students to be more competitive and to attract more enrollees and produce quality graduates.
4. As regards faculty characteristics in the number of core faculty, Naval State University has a core faculty of 11.11 percent; Palompon Institute of Technology 11.11 percent; Southern Leyte State University 3 or 16.67 percent; Northwest Samar State University has a core faculty of 11.11 percent; Eastern Visayas State University 33.33 percent,

and University of Eastern Philippines 16.67 percent. Such data imply that the enrollees of the mechanical engineering program should be improved in order to hire more competitive ME instructors.

5. In relation to faculty characteristics in the highest educational attainment, 33.33 percent held bachelor's degree holders, 33.33 percent bachelor's degree with MA/MS units, 22.22 percent MA/MS degree holders, 5.56 percent MA/MS degree holder with doctoral units, and 5.56 percent doctorate holder. This finding implies that administration should admit ME instructors who have already graduated from their graduate studies in line with their field of specialization.
6. As for faculty number of relevant trainings, only 71.43 percent faculty have 1-5 relevant trainings, only 14.29 percent have 6-10 relevant trainings, only 7.14 percent has 11-15 relevant trainings, 0 between 16-20 relevant trainings, 0 between 21-25 relevant trainings, and only 7.14 percent has 26-30 relevant trainings. This implies that the administration should provide appropriate budget for the attendance of the faculty members to seminars and training relevant to the mechanical engineering practice to keep abreast with the recent technology and practices.
7. As regards characteristics as to academic rank of core faculty, 44.44 percent are instructor 1, 1.56 percent is instructor 3, 16.66 percent are assistant professor 1, 5.56 percent is assistant professor 2, 5.56 percent is assistant professor 4, 11.11 percent are associate professor 1, 1 or 5.56 percent associate professor 2, and 5.56 percent associate professor 5. This implies that faculty training and development program of each SUCs should be active to send faculty members to enrol in further studies; thus, budget preparations should be planned.
8. In terms of faculty teaching experience as core faculty, 44.44 percent of faculty have an experience of 1-5 years of teaching, 5.56 percent as experience of 11-15 years of teaching, 22.22 percent with 16-20 years, 16.67 percent 21-25 years, and 11.11 percent 31-35 years. This finding implies that trainings and seminars related to enhance the teaching skills of the instructors should be attended to improve the teaching and learning process that every students should acquire.
9. As to administrators' highest educational attainment, 8.33 percent is bachelor's degree holder, 8.33 percent is bachelor degree with MA/MS units earned, 16.67 percent are MA/MS graduates, 8.33 percent is MA/MS with doctoral units earned, and 58.34 percent of the deans/chairmen are doctorate holders. This implies that the administration should designate a faculty to a deanship/chairmanship position if the faculty member is equipped with management skills.
10. In terms of administrators' academic rank, 16.67 percent are instructor 1; 16.67 percent are instructor 3; 16.67 percent are assistant professor 1; 8.33 percent is associate professor 4; and 41.73 percent are associate professor 5. This implies that administration should encourage administrators to complete their graduate studies to be more qualified to the position designated to them.
11. As for administrators' administrative experience, 25 percent have an experience of 1-5 years, 58.34 percent has an experience of 6-10 years, 8.33 percent have an experience of 11-15 years, and 1 or 8.33 percent has an experience of 21-25 years. This implies that faculty should enrol and finish their studies to be more qualified to be designated as administrators.
12. Regarding years of existence of the program, Naval State University (NSU) has 10 years; Palompon Institute of Technology (PIT) 6 years; Southern Leyte

State University (SLSU) has 17 years of existence; Northwest Samar State University (NwSSU) 28; Eastern Visayas State University (EVSU) 50 years, and University of Eastern Philippines (UEP) 47. This finding implied that since the SUCs or Region VIII has been offering the BSME course for a long time; thus, it has to improve the course offering, prioritizing a procurement plan for the much needed laboratory equipment to attract more students to enroll in the program.

13. In terms of level of accreditation of the program, Naval State University (NSU) has not yet accredited for level 1 just like Palompon Institute of Technology (PIT) and University of Eastern Philippines (UEP) while Southern Leyte State University (SLSU) has passed level 1 in its accreditation; Northwest Samar State University (NwSSU) and Eastern Visayas State University (EVSU) have reached level 2. This implied that BSME program should undergo accreditation to know their strengths and weaknesses to improve the program.
14. As to the status of the Mechanical Engineering Program in SUCs in Region VIII, as perceived by the administrators, faculty members, and students on: a) admission and retention requirements, b) vision, mission, goals and objectives, c) curriculum development, d) faculty development, e) instructional program quality, f) research activities program, and g) community extension program services, are as follows:

Overall, the respondents gave a uniform rating of “satisfactory”, indicating that provision or condition is present, but moderate to admission and retention requirements, vision, mission, goals and objectives, curriculum development, and faculty development.

15. As to the perceptions of the administrators, faculty members, and students on the status of the Mechanical Engineering Program in SUCs in Region

VIII, admission and retention requirements described as “highly significant”. This is followed by the vision, mission, goals and objectives with the computed described as “not significant” with the curriculum development, “not significant”. Faculty development, described as “highly significant”; instructional program quality “not significant” and research activities, “significant”, but community extension services “highly significant”. Over-all, the respondents’ perception on the status of the mechanical engineering program in SUCs in Region VIII was interpreted as: “not significant” to imply the best need of initiative or coming up with prioritization program to improve their academic offering.

16. The respondents viewed the seven major components of the Mechanical Engineering Program in Region VIII, in these results.

The administrators encountered these stumbling blocks in implementing the mechanical engineering program in SUCs of Region VIII: ranking first, teachers are too loaded heavily to conduct research and extension programs, and no separate engineering library; no regular programs, and no separate engineering library ranked first; no regular consultation of curriculum with the industries/stakeholders, inadequate funds for faculty development, and few students enrolled in the program due to lack of library facilities ranked second; there is no consistent encouragement program for engineering instructor to conduct research ranked third; admission and retention policies are improperly implemented with no proper dissemination on admission and retention requirements/policies ranked fourth; VMGO should be developed and well-understood by the students’ parents or stakeholders ranked fifth; and no engineering personnel in the admission ranked last.

The administrators gave these recommendations about the problems encountered in implementing the mechanical engineering program in SUCs in Region VIII:

Proper teaching load should be taken into account to enable the faculty to undertake research and extension activities and provision for a separate engineering library ranked first; industry sectors and other stakeholders should be formed; source out fund for faculty development, and the college/department of engineering be prioritized budget for laboratory facilities ranked second; administration should encourage engineers to conduct research ranked third; the implementation of admission and retention policies should be strictly done in all levels and in all the engineering programs; and there should be standard policies & procedures on the admission processes ranked fourth; stakeholders should be involved in formulating the VMGO ranked fifth; and there should be an engineering faculty in the admission office in-charge of the admission of engineering students ranked last.

The problems encountered by the faculty members in the implementation of the mechanical engineering program in SUCs in Region VIII: Institute's FPD (faculty development program) is not functional, teaching load is too heavy for the conduct of research activities and extension activities ranked first; limited students' hands-on activities in some of the major subjects ranked second; not so responsive to communication received for training and conventions ranked third; no specific/standard passing requirement for the applicants during entrance examination ranked fourth; sufficient floor area in the laboratory shop ranked fifth; and GWA requirement is not appropriate ranked last.

For their part, the faculty members recommended that in the implementation of mechanical engineering program in SUCs in Region VIII the following need to be attended to: review institute's FDP and install a new personnel competent/knowledgeable to handle the task, deload instructors for the conduct of research activities, and extension activities rank first; embed relevant hands-on exercises in order to transform students' theoretical knowledge to actual application ranked second; give communication for

trainings and seminars to the concerned faculty members ranked third; set a higher passing (score) requirement for entrance exam ranked fourth; set a GWA requirement in entrance exam, and construct a separate laboratory building that could meet the standard requirement as stipulated in CMO 9, S. 2008 ranked last.

Comparably, the students encountered these problems in implementing the mechanical engineering program in SUCs in Region VIII insufficient laboratory apparatuses and books at the library are not updated with the latest version ranked first; instructors teaching capability ranked second; lack of books and computer units ranked third; insufficient field of learning ranked fourth; lack of classroom ranked fifth; lack of mechanical engineers to teach professional subjects ranked sixth; very slow process in enrolment/payment ranked seventh; methods used by the instructors are way beyond what other institutions are doing ranked eighth; and lack of retention policies ranked last.

As to students' recommendations in implementing the mechanical engineering program in State Universities and Colleges in Region VIII: provide complete mechanical engineering equipment/apparatuses for us to be globally competitive and update library holdings ranked first; send ME instructors to actual training and schooling to be more competitive with the new technology ranked second; provide recent edition books and procure more computer units ranked third; expose students to field training like field trips and industry immersion fourth; provide classrooms/engineering building ranked fifth; add more PME/RME to handle professional subjects sixth; plan for effective MIS system for enrolment and cashiering seventh; send faculty to seminars and training programs eighth; and, develop and implement strictly a clear guide on retention and admission policies ranked last.

The above-cited problems encountered and recommendations given should be addressed to improve the program, to cope with CHED standards, as stipulated in CMO No. 9, series 2008.

Conclusions

Based on the above findings, these conclusions were drawn:

1. The low enrolment rate of the mechanical engineering program of different SUCs in Region VIII required intensive and proper information and dissemination to the administrators and concerned faculty for curriculum mapping for them to come-up with a strategic plan for increasing enrolment, especially in mechanical engineering.
2. The low passing percentage of the mechanical engineering program of different SUCs in Region VIII required updating for the curriculum to coincide with the CHED standards per CMO no. 9, series 2008.
3. The low rate of graduates of the mechanical engineering program of the different SUCs in Region VIII demanded that the administration look into such problem as revealed in this study. More pointedly, the need for installing more laboratory/equipment to be globally competitive, for enhancement of learning, seminars and trainings of mechanical engineers to keep them abreast with the new technologies.
4. The less number of core faculty of the mechanical engineering program in different SUCs in Region VIII, posed a problem because of the low number of enrollees in the program.
5. The low educational attainment of the majority of faculty was traced to their not enrolling in graduate studies; hence, the administration need to make the faculty members globally competitive enough incentive to encourage more enrollees in the program.
6. The less number of relevant trainings of faculty members was linked to administration failure to prioritize the budget for such trainings.
7. The greater number of instructor positions made faculty members discourage to pursue higher education program relevant to their field of specialization.
8. The greater number of frequency for teaching experience between 1-5 years showed that most faculty members of the mechanical engineering program were new entrants.
9. The highest educational attainment attained by the administrators was a doctorate that made them capable of holding such position.
10. The greater number of associate professor rank of the administrators showed that the designated administrators are qualified for the position.
11. The greater number of the administrators had an experience of 6-10 years that helped them perform their jobs relatively well.
12. Most of the SUCs offering mechanical engineering program had existed for more than ten (10) years.
13. Some SUCs had yet to reach the level 1 accreditation, while some were in the level one with two (2) SUCs in level 2.
14. The status of the Mechanical Engineering Program in State Universities and Colleges in Region VIII, as perceived by the administrators, faculty members, and student as regards: a) admission and retention requirements, b) vision, mission, goals and objectives, c) curriculum development, d) faculty development, e) instructional program quality, f) research activities program, and g) community extension program services were "satisfactory".
15. The over-all perception of the administrators, faculty members, and students on the status of the mechanical engineering program in State Universities

and Colleges in Region VIII was “not significant”.

Recommendations

In light of the data gathered, these researcher recommendations are given:

1. Since enrolment plays a vital role for program to exist, information dissemination is important and open admission be allowed provided qualifying examinations were imposed strictly.
2. State Universities and Colleges should provide adequate laboratory equipment/apparatuses.
3. SUCs should send faculty members to seminars and trainings and encourage them to study in post-graduate programs in line with their specialization.
4. There is a felt need to revisit the curriculum and include review classes as one of their elective classes. SUCs should follow the CHED curriculum for Bachelor of Science in Mechanical Engineering Program and enhance the teaching strategies of their instructors.
5. The administration should inform students and inculcate the importance of education. Again provision of laboratory or hands-on activities as well as industry immersion should be prioritized. Moreover, the capability of faculty members be enhanced positively for them to be more competitive.
6. Admission, retention policies and procedures be clearly defined, widely disseminated and well-understood by faculty and students.
7. The cooperating agencies, linkages, alumni, industry representatives, and other concerned groups be made aware of and generally accept the VMGO.
8. The curriculum be made realistic in scope and coordinated with its available

laboratory facilities and equipment, taking into account the local needs.

9. The administration should allocate adequate budget for faculty development and well-utilized for its intended use.
10. A separate engineering library should be provided and equipped with the latest edition of books required by CHED, and the provision of the internet access.
11. SUCs should allocate funds for the conduct of faculty and student research activities.
12. Periodic monitoring and evaluation be conducted to provide feedback on the program.

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