Role of Internal Assessment on Realization of Strengths and Weaknesses of Mechanical Engineering Department of Islamic Azad University, Qazvin Branch (Iran) Based on Faculty Members’ Viewpoints

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Abstract: The main purpose of this study was the implementation of internal evaluation in Mechanical Engineering department of Islamic Azad University, Qazvin branch and also providing a comprehensive analysis of the existing groups’ quality and offering suggestions for improving and upgrading the assessment. In this regard, the sample population including faculty members, department managers, students and groups took part in the experiment and data were collected and statistical analysis have been conducted. Descriptive (the central tendency measures such as mean and dispersion measures such as standard deviation, skewdness, minimum, and maximum and for inferential statistics for analysis of research questions (ONE-WAY ANOWA) were done. In addition the SPSS software used for analyzing, data processes, and data gathering. Reliability with coefficients determination for different groups were $r_a = 0.80$, $r_a = 0.83$ and $r_a = 0.83$ for department manager, faculty members and students, respectively based on that There existed a high internal correlation among questions in the questionnaire, Questions were optimal and reliable and finally Reliability was high. The result showed that there exists a relation between quality education and setting standards and criterion, and between faculty members’ participation in setting standards and improving the quality of related groups standards, albeit students experienced a minor relationships than department managers and faculty members and also there is a relation between internal assessment and increasing accountability towards the performance of department managers and faculty members. finally the internal evaluation has impact on realizing the strengths and weaknesses of training groups. Based on results some recommendations proposed for each group in order to enable them to employ strategic planning to compensate for weaknesses and promote quality of their group.

Key words: Educational evaluation • Quality • Accreditation • Internal evaluation • Mechanical Engineering

INTRODUCTION

Today, science, technology, and trained labor to suit the needs of the community along with development in communications relations have a special role in the community development. The import of technology and human resources require exorbitant costs and consequences of cultural and other social problems made it currently impossible in our country, therefore the higher education as the main producing sector of knowledge and training human resources in the country is responsible for the serious task [1].

Higher education with a history of more than eight centuries is regarded as a key institution to nations and governments. Having access to advanced technology and knowledge, which can have an effective role on achieving social and economic progress, could only be achieved by strengthening higher education and quality and quantity programming. Hence, universities as macro-system of higher education in the developmental process of a country and as centers for training and preparing efficient and skillful human resources to be able to address the real needs in different aspects of society have vital roles and responsibilities, because universities have stepped into developmental stages by their outputs (graduate students) and universities with respect to their role and status and high sensitivity of the public for their performance should both keep the quantitative and qualitative growth at harmonious and balanced state[1-2].

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On the other hand, human and material resources limitations have led to the needs to investigate universities performance. A glance at developments in the country's higher education system in the past two decades in terms of students' population showed the quantity growth and lack of sufficient attention to improving and promoting the universities qualities. It is of urgent attention that improving quality requires establishing an appropriate mechanism of assessment [2].

Recently, improving the quality of higher education system through internal evaluation approach has received much attention from officials and ministry officials. On the other hand, the quality of universities and higher education institutions is not equally developed like its quantitative growth which has caused some problems for the country higher education system. Regarding the characteristics and implementation process, internal evaluation can respond to this issue and can pursue higher education continuous quality improvement. Therefore, this research is to seek internal evaluation (assessment) process with the faculty members' participation of Mechanical Engineering Department of Qazvin Islamic Azad University conducted along with the various stages of implementation to reach the main purpose of internal evaluation, which was getting awareness of their status [3].

**Statement of the Problem:** 21st Century with its economic and global trend have seen drastic changes in science and technology such as optical telecommunications, personal computers, alternative energies, biotechnology and Nanotechnology the results of which are the developments and the emergence of complicated era of organized knowledge and technology.

The origin and starting point of this knowledge and technology are undoubtedly universities and research centers (multi-institutional Universities, Adult Universities, virtual universities, and distant-learning universities. The results of such changes have created new qualitative and quantitative expectations for higher education.

Consistency and durability of quality and quantity expectations also have given rise to insights, techniques and strategies which crave to qualitatively and quantitatively ensure absolute safety factor of achieving the mission and educational, research, vocational growth, quality growth, professional services, international cooperation, Innovation and need creation standards because higher education comparative studies show that universities are considered successful which have a university life cycle system that is a planning and developmental system, evaluation and maintenance system and production and distribution accreditation system [4].

This system considers evaluation and accreditation as a key factor in restoring university life cycle [5].

An educational system (Department / College / University) is considered to have a high quality (to be valid) when no shortcoming or deviation is found because this perversity and shortcomings in a system is regarded as defects and the desired results as outputs or outcomes will not be provided. In order to set aside the deficiencies in any system, the first step is to spot the failure and its causes, and therefore evaluation is an effective mechanism by which this failure and defects can be realized and for the continuous improvement of the university system, an effective evaluation system must be established upon which improvement of the quality of teaching and research along with improving the whole university system which is based on the necessary characteristics of this system is achieved [5].

The Results of previous experiments about the use of internal evaluation (assessment) approaches can be used for this purpose. Because the internal evaluation serves as an identifier of the function of an institution or an educational group, determines the quality of that system, and makes the system set its activities and planning in line with productivity and quality improvement of their performance [6].

In recent years, along with the quantitative growth of universities, little attention has been given to quality, therefore, with the efforts of the Ministry of Science and Higher Education and budgeting, conducting the internal evaluation with the aim of establishing an internal quality assurance was assigned to training and assessing organization (Sanjesh) and with their coherent and purposeful activities the internal assessment could readily be conducted through collaboration with faculty members in education and research fields and professional services departments in universities upon which deficiencies are identified and necessary planning to resolve them could be established, so by means of this a continuous way towards ensuring quality with maximum efficiency and effectiveness will be established. Therefore, regarding the importance of the matter, the researcher sought to evaluate this issue and provide the scientific and practical solutions obtained through the experiments to university senior managers [4-5].
RESEARCH QUESTIONS

- Is there a relationship between internal evaluation and increasing accountability towards Department performance (management and faculty members)?
- Does the internal evaluation have any effect on realizing Department strengths and weaknesses?

Research objectives: The main purpose of this study are “assessing the internal evaluation of improving educational quality in mechanical engineering department of Qazvin Islamic Azad University.

In addition to the above main objective, the following sub-objectives for Mechanical Engineering departments’ internal evaluation of Qazvin Islamic Azad University are to be considered:

- Evaluating the role of internal evaluation on the increasing accountability in response to education departments’ performance
- Evaluation and identification of strengths and weaknesses in Mechanical Engineering departments
- Providing scientific and practical strategies for school managers to establish the internal evaluation

The Necessity of Internal Assessment in the 21st Century: internal evaluation is the first stage in accreditation model applications. In this stage, the university system for assessing its status will attempt to evaluate different aspects of its strengths and weaknesses and attempts to ameliorate weaknesses. At this stage of evaluation, the university system (Department / college / University / members) will categorize evaluation questions and determine the methods to gather information and after analyzing, they will decide on their own situation [6].

According to some studies, the term self-assessment (internal evaluation) is a concept that was given birth out of several activities. It is a survey that focuses on working with real and concrete materials, and a research, which seeks its emphasis on philosophical directions, objectives and programs, or a qualitative method, which mainly focuses on the thinking and analysis.

Internal Evaluation is based on the theory of change. This theory emphasizes the changes for improvement. In other words, internal evaluation of higher education in a department is a way for applying changes to improve the quality of higher education [7].

Planning (Pre-Implementation Stage): At this point and preparations for the process and conditions for the implementation will be prepared. This stage includes the following eight steps:

- to familiarize members with the necessity, philosophy, and internal evaluation performance process.
- Forming the internal evaluation strategic committee for the system under evaluation.
- Specifying system mission and objectives.
- Defining and developing evaluation factors.
- Defining and approving the appropriate criteria for each factor.
- Defining and approving the appropriate markers for each criterion and defining judging criteria (goals realization) for each indicator.
- Specifying required data to measure markers.
- Designing and developing data collection tools [6-7].

Administration: At this stage, the primary and pre-programmed activities, and requirements for implementation has been prepared and ready. This phase includes four following steps:
• Required data collection.
• Analyzing, interpreting and decision-making on the gathered data.
• Preparing the internal evaluation preliminary report.
• Preparing the internal evaluation final report.

Implementation and Follow-up: compared with other patterns and routine assessment, the most common characteristic of internal evaluation approach, is its applicability. At this stage, the system based on the results of internal evaluation and upon specifying the strengths, weaknesses, opportunities, and threats takes actions to improve the department condition.

• Planning for applying the results of internal evaluation is done at this stage that we referred as 13th step.

Considering the subject of the research, internal evaluation reports of studies at foreign universities have been studied of which some will be presented here.

In another Research two main goals were sought that were Creating a favorable system to measure and control the quality of the University and the second Creating an appropriate, relevant and effective information System for determining the management technique. Results of this study were organizing the library equipments; increasing educational to political goals.

Another Research has introduced assessing factors including objectives, structure and organization, educational programs, faculty members, students, physical facilities, other sources and scientific innovation). The report also specified the required assessment of groups’ strengths and weaknesses and prioritized the needed changes in-group future planning [9]. We can see the self-assessment process in the Fig. 1.

There have been different ideas in the field of internal evaluation purposes and functions. Some data introduced and recapitulated five main purpose of such assessment, which are as follows:

1) Feedback: that is relating the consequences of program with the goals and objectives in order to prepare and provide a form of quality control.

2) Control: that is the link between education and programs for organizational activities (cost and effectiveness)

3) Research: determining the relationship between program outcomes, teaching and learning and transferring them to professional work and its application in practice.

4) Intervention: the results of evaluation affect the field being conducted.

5) Power games: it is termed as skillfully applying the evaluated data to organizational policies that range from educational to political goals.

The main point in the internal evaluation is the willingness of Department faculty members to cooperate to conduct the affairs and provide improving and upgrading for the evaluated department; therefore, in

Fig. 1: Stages of self-assessment process
defining the internal evaluation, it can be described as a mechanism through which academic community based on cooperative and interactive processes investigate and evaluate their real condition. The internal evaluation approach is beneficial for the development purposes, so if done well, it would be predicting, preventive, active, and dynamic process. The Impact of internal evaluation on an organization can be seen in Fig. 2 [10-14].

From long ago, most higher educational institutions in developed countries have chosen internal evaluation as an appropriate approach and mechanism for organizational excellence, increasing productivity and ensuring their universities quality and have reached successful experiences in this regard. Increasing systems quality in higher education is an issue, which is bringing new challenges in educational systems and has made them to go for structure and function evaluation and maintaining internal processes and external outcomes. In this regard, accreditation model serves as a reference model for the evaluation of universities and higher education institutions in most countries. The model is divided into two parts of internal evaluation and external evaluation and carried out to accredit the higher education institutions [9,14].

Evaluation with the emphasis on the observation aspects has been carried out in some Iranian universities since several years ago, but the scientific approach of evaluation to promote and quality assurance has been
started since 2001 and in line with assessment budgeting and scientific evaluation of institutions and higher education systems was given to the Ministry of Science, Research and Technology [9]. In general, quality assessment efforts in different countries and their experiences can be briefly described in Fig. 3.

Currently, regarding the efforts carried out in Iran, it can be said we advanced through the fourth stage providing background and inclusive realization of the fifth stage of and completing the existing structure and the reason for this claim is the attention to quality in higher education, based on the early experience in Medical University and plans to do Research, design patterns suitable for internal and external evaluation of higher education, forming the central council of internal evaluation, conducting internal evaluation process in more than 600 departments and 50 universities of the country and external evaluation in some volunteer groups. Now, in line with the efforts and in completing and maintaining its stability, it is obvious and logical to complete the appropriate structure evaluation and quality assurance [9,14].

**MATERIALS AND METHODS**

**Sample population and research Methodology:** The population in this study is given the following Table 1.

Statistical population of this survey consists of undergraduate students in the field of mechanics (solids design), alternating (2 years studying) undergraduate students in the field of mechanics (solids design), producing, and manufacturing students (machine tool and molding), faculty members, and department manager in these fields at Qazvin University in the academic year of 2010-2011. With regard to subject and objectives of the research, the descriptive survey method as well as documents and the library procedures were adopted. In order to determine the students’ sample size, the Cochrane formula was used. In this study, data collection was as follows:

Libraries and documentation, using books, dissertations, publications and domestic and foreign journals as well as field research and also considering the subject, objectives and research questions, the researcher has used three types of questionnaires made by the researcher.

Descriptive and inferential statistics were used for analyzing data. In descriptive statistics the central tendency measurements such as (mean) and measurement dispersion such as (standard deviation, skwedness, minimum and maximum) and in the analysis of research questions one-way variance analysis test (ONE-WAY ANOVA) has been used. It is worth noting, however, that in order to analyze the data and data processing the SPSS software was used.

To determine the validity, first in various sessions with (department Manager, professors, faculty members, students and experts, we talked about internal evaluation purposes and developed standards and markers with their help and finally for each of them a questionnaire was prepared. With coefficients determination the reliability of different groups were as follows: (department manager, ra = 0.80; faculty members, ra = 0.83; students, ra = 0.83, respectively, which revealed the fact that There, existed a high internal correlation among questions in the questionnaire, Questions were optimal and reliable, and Reliability was high.

<p>| Table 1: The study population and sample size studied |
|---------------------------------|---------------------------------|---------------------------------|</p>
<table>
<thead>
<tr>
<th>Statistical population</th>
<th>Mechanic (solids Design)</th>
<th>Producing and Manufacturing (Machine Tools)</th>
<th>Producing Manufacturing (Molding)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduates (4 years studying)</td>
<td>Population</td>
<td>733</td>
<td>150</td>
</tr>
<tr>
<td>Undergraduates (2 years studying)</td>
<td>Population</td>
<td>322</td>
<td>66</td>
</tr>
<tr>
<td>Faculty members</td>
<td>Population</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Department manager</td>
<td>Population</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>Population</td>
<td>1064</td>
<td>225</td>
</tr>
</tbody>
</table>

| Table 2: Calculated one-way variance analysis test (One-Way ANOVA) among the three groups’ comments of department manager, faculty members, and students on question 1 |
|---------------------------------|---------------|---------------|---------------|---------------|
| Variables                      | Calculated F | df            | Significance level | Critical value | Results                          |
| Comparing the viewpoints of department manager, faculty members and students on question | 12.76         | 2.266         | %1             | 4.61          | There is a significant different  |
Table 3: Calculated one-way variance analysis test (One-Way ANOVA) among the three groups’ comments of department manager, faculty members, and students on question 2

<table>
<thead>
<tr>
<th>Variables</th>
<th>Calculated F</th>
<th>df</th>
<th>Significance level</th>
<th>Critical value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparing the viewpoints of department manager, faculty members and students on question</td>
<td>12.76</td>
<td>2.266</td>
<td>%1</td>
<td>4.61</td>
<td>There is a significant difference</td>
</tr>
</tbody>
</table>

**Data Analysis:** This section analyzes the data using statistical tests intended to review the issue of whether differences are statistically significant or they are based on sampling errors. Hence, the measurement level of calculated variables, one-way variance analysis test (One-Way ANOVA) was used; this study sought to compare the viewpoints of the department managers, faculty members, and students answering the research questions.

**RESULTS AND DISCUSSION**

The results of this study considered based on question 1 and 2.

**Question 1:** Is there a relationship between internal evaluation and increasing accountability towards Department performance (management and faculty members)?

The results of calculated one-way variance analysis test (One-Way ANOVA) among the three groups’ comments of department manager, faculty members, and students on question are shown in the Table 2. Because the calculated F (F = 5.95) with df = 2,266 is greater than critical number with the significance level of 1%. Thus, there exists a significant difference between the comments of department manager, faculty members, and students on the first research question; as the results have shown, the average score of the viewpoints of department managers is 18.3, for faculty members is 26.4 and among students is 16.5. Therefore, internal evaluation has effects on locating the strengths and weaknesses in all departments, for the students’ case in comparison with those of department managers and faculty members we have observed a weak relation.

**Question 2:** Does the internal evaluation have any effect on the Department strengths and weaknesses?

The results of calculated one-way variance analysis test (One-Way ANOVA) among the three groups’ comments of department manager, faculty members, and students on question 2 are shown in the Table 3. Because the calculated F (F = 48.41) with df = 2,266 is greater than critical number with the significance level of 1%. Thus, there exists a significant difference between the comments of department manager, faculty members, and students on the second research question; as the results have shown, the average score of the viewpoints of department managers is 18.3, for faculty members is 26.4 and among students is 16.5. Therefore, internal evaluation has effects on locating the strengths and weaknesses in all departments, for the students’ case in comparison with those of department managers and faculty members we have observed a weak relation.

**CONCLUSION**

This study aims at achieving the above-mentioned objectives at the Islamic Azad University, Qazvin branch. For this purpose, the researcher used a descriptive survey, and because to faculty members and department managers were easy to the whole counting, method has been used. However, since it was not easy to get access to all students due to economic cost, therefore, students' sample size determination was done Cochrane formula by and 256 students were selected. The most important results shown in below.

Results regarding the department managers have shown that the age average was 44 years all the managers in the study have a doctorate degree. Their average work experience was equivalent to 6.7 years. The age average of faculty members was 32 years and all faculty members in the study have doctoral degree. Their average work experience was about 3.6 years and just one of them has experience of teaching abroad.

In response to the first research question “is there a relationship between internal evaluation and increasing accountability towards Department performance (department manager and faculty members)? Results have shown the further role of internal evaluation and increasing accountability regarding the department performance of department manager and faculty members such as:

**From the Department Managers’ Viewpoint:**

- Trying to communicate with the relevant technical Community outside the university (66.7 %).
The group consideration to changes in the course objectives and curriculum based on the community vocation requirements (66.7%).
The department ability to make possible the exchange of information and interaction with professors via email-home page (66.7%).

From the Faculty Member's Perspective:
- Trying to communicate with the relevant technical Community outside the university (70%).
The group consideration to changes in the course objectives and curriculum based on the community vocation requirements (90%).

Students' Perspective:
- Little attention to changes in the course objectives and curriculum based on the community vocation requirements (53.9%).
- Little efforts of faculty members for a patent resulting from research projects conducted by students and professors (46.5%).

In addition, comparing the comments of department managers, faculty members and students on the first research question using one-way variance analysis test shows that there exists a significant relationship between the internal evaluation and increasing accountability towards the department performance (faculty members and department managers) at 1% level. So, a significant difference have been counted among the comments of department managers, faculty members and students on the first research question; as the results have shown, the average score of the viewpoints of department managers is 27.0, for faculty members is 21.1 and among students is 16.5. Therefore, there is a significant relation between the internal evaluation and increasing the accountability regarding the department performance (department manager and faculty members), of course, for the students’ case in comparison with those of department managers and faculty members we have observed a weak relation.

Some investigators [10-13] have also confirmed this relationship. In response to second research question "whether the internal evaluation has any effect on realizing by the department's strengths and weaknesses results have shown that the following issues have helped the internal evaluation to have effect on realization of strengths and weaknesses in all departments. Then From the viewpoints of the department managers, we found that prioritizing the goals at a high level (66.7%) and too much satisfaction from funds allocated to research groups (66.7%).

Also from the perspective of faculty members, we got prioritizing the goals at a high level (90 percent) and then too much satisfaction from spending too many on resources for the research group (90%).

Finally, Students Perspective showed that weak faculty members’ participation in educational and research activities (75.7 %), Create mechanisms for little familiarity of the group of students with the goals of the study (70.7%) and little satisfaction of goals and activities of the group (52.7 %).

In addition, comparing the comments of department managers, faculty members, and students on the second research question using one-way variance analysis test shows that internal evaluation has an effect on realizing the department's strengths and weaknesses at significance level of 1%. Therefore, there is a significant difference between the comments of department managers, faculty members, and students regarding second research question. According the results, the average score of the viewpoints of department managers is 18.3, for faculty members is 26.4 and among students is 16.5. Therefore, internal evaluation has effects on locating the strengths and weaknesses in all departments, for the students’ case in comparison with those of department managers and faculty members we have observed a weak relation.

This relationship has been approved by other studies [9-13].

Research Suggestion: After reviewing the situation, the mechanical engineering department's weaknesses were recognized and suggestions in order to improve the quality of school education and groups’ level were offered which are as follows:
- First based on the monthly gatherings between department managers and faculty members, the suitable ground to perform the necessary changes is provided, then the changes should be applied in the group, then this stage should be evaluated from the perspective of department managers and faculty members and students and if it is confirmed the department performance can be increased and also desired goals and condition will be achieved.
• We should support the Research activities of faculty members such as the authorship of their books and other research activities and research activities of the students.

• First, proper evaluation groups should be formed at universities, these groups should collect data by a systematic and scientific method and should also be able: a) to use statistical methods to analyze the appropriate and correct data, b) to identify strengths and weaknesses, c) to identify the strengths and weaknesses of departments by using Delphi method trying, d) Finally, contributing committee will be formed, e) to try to integrate the efforts of the group and finally, f) take initiatives and practical action plans.

• The allocated Research financial resources of the group: (a) should be increased proportionally to the effectiveness and efficiency of group activities and B) the cost should be correctly planned [12-13].

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