

# **Improvement to the Vaughn College Faculty Course Assessment Report Template to Facilitate ABET Accreditation Process and Curriculum Success**

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## **ABSTRACT**

Faculty course assessment report (J. K. Estell, 2005) have been established to measure the success of course outcomes based on ABET outcomes requirements. The EGMU indicator is used to measure success of each course outcome based on the assigned tasks and it can be used to assess program outcome achievement and afford a direct link between course outcome and program outcomes as one aspect of curriculum change and improvement.

The EGMU indicators is implemented for the assessment of student and program success based on ABET criteria (ABET- EAC, 2005) and (ABET-TAC, 2005). Applying the data from the EGMU indicators, the program can alter the weak elements to increase the productivity of the program. The outcomes assessment is used as an ongoing process for improving student learning through the program and provides faculty members to assess the level of achievement for each course objective.

However to facilitate ABET accreditation process, the FCAR should also include data from the class roll-book, as a direct assessment measure, which could be arranged in two tables as students assignments and exams grade sheets as well as a graph of FCAR summary results vs. ABET outcomes. These changes not only facilitate the ABET process for the evaluators but also provide instructor with a tool to check the weak part of the course outcome and create necessary changes to the relevant tasks to improve the course outcome.

To facilitate the FCAR process, a template has been developed to import data from the class roll-book (SONIS, Excel, or others) to FCAR. The tables and graph are designed based on Microsoft word and it is easy to insert or delete rows and columns from template. The X-axis of the graph is designed based on ABET outcomes a through k and Y-axis based on EGMU scores. By clicking twice on graph icon we can assign EGMU scores to any ABET outcomes.

## **KEYWORDS**

FCAR Template, Case Study, Continuous Improvement

## **1. INTRODUCTION**

The FCAR been developed to assess the success of course outcomes based course tasks. In the field of engineering and engineering technology the course outcomes are assess based on ABET outcomes requirements a through k (Vaughn College, 2003). To close the loop on the FCAR assessment process, the rubric score, EGMU

indicator, is used to measure course outcome vs. ABET outcomes. The EGMU data offers an assessment of the assessment process itself and suggest where improvements can be made in both meeting of outcomes and in using the FCAR system for the department.

The Vaughn College FCAR template will also include the imported data from the class roll book (assignments, exam, and attendance rosters). These additions to the FCAR, will facilitate the assessment process and will provide the instructor a direct link to identify the weak part of the course outcome and make the necessary changes to improve it. A FCAR graph has also been added to measure course outcomes vs. ABET outcomes based on EGMU score. The improved Vaughn College **FCAR template** will include the following items

1. Course Description
2. Modification Made to Course
3. Course Outcome Assessments
4. Program Outcome Assessment
5. Student Feedback
6. Instructor's Comments
7. Class roll book
  - a. Assignment roster
  - b. Exam roster
  - c. Attendance roster
8. FCAR Graph (EGMU score vs. ABET outcomes)

## **2. EGMU INDICATOR**

The EGMU data based on rubric scores for the Vaughn College of Aeronautics and technology are developed as follow to close the loop on the FCAR assessment process ( Vaughn College, 2007) and ( NYIT, 2006).

**"E = 3"** Demonstrates an excellent understanding of the course materials – Excellent. E can be used for a grade of B+ and A.

**"G = 2"** Demonstrates a good understanding of the course materials with no significant errors – Good. G can be used for a grade of C+ and B.

**"M = 1"** Demonstrates an incomplete understanding of the course materials – Minimal. M can be used for a grade of D and C.

**"U = 0"** Demonstrates unsatisfactory. U can be used for a grade of F.

**The EGMU score of 1.5 is a C, average, represents what a student would need in order to satisfy the requirement for graduation.**

A typical EGMU score for a class with 8 students in which the task is the first exam might be (4,1,2,1). The score of such EGMU can be evaluated as follow

$$\frac{4X3 + 1X2 + 2X1 + 1X0}{8} = 2.0, \text{ which is good.}$$

The EGMU score indicators measure the success of course objectives and it can be used to assess program outcome achievement and afford a direct link between course outcome and program outcomes as one aspect of curriculum change.

The EGMU indicators is implemented for the assessment of student and program success based on ABET criteria. Applying the data from the EGMU indicators, the program can alter the weak elements to increase the productivity of the program. The outcomes assessment is used as an ongoing process for improving student learning through the program and provides faculty members to assess the level of achievement for each course objective.

The Vaughn College faculty course assessment template that are arranged in form of two tables and a course assessment chart will include all important data relevant to the course to satisfy ABET criteria 3. The first table is student class roll-book data, which can be imported to the template from SONIS, Excel or other database management programs. This table will include grades related to the course tasks and EGMU of each course task. The second table is known as course assessment table and it will include all materials related to the faculty course assessment report (J. K. Estell, 2005). This table will provide the detail of the course assessment process with adequate corrective action plan to improve the low EGMU performance tasks. This table will also assess selected program outcomes based on assigned course tasks.

As a case study, The Faculty Course Assessment Report (FCAR) template for the EGR220-01 (strength of materials) has been shown to provide readers with a clear understanding of FCAR process and results.

## **CASE STUDY**

### **3. FACULTY COURSE ASSESSMENT REPORT (FCAR) EGR 220-01, STRENGTH OF MATERIALS FALL 2006**

#### **3.1 Catalog Description**

This course deals with the concept of stress and strain in members under the action of axial and shearing forces, bending and twisting moments. The course content includes analysis of stress and strain, Hooke's law (stress-strain diagram), thermal stresses, torsion and beam analysis. Computer application is required for the homework assignments and laboratory projects.

Prerequisite: EGR115 and MATH215

#### **3.2 Modification Made to course**

Based on the low EGMU result for CO-4 and CO-6 of previous FCAR, a total of 5 hours of problems solving session has been added to improve student performance for these course outcomes.

#### **3.3 Program Outcome Assessment**

The course may be selected to assess the following ABET outcomes:

(a) An ability to apply knowledge of mathematics, science, and engineering.

Developing and solving equations for stress and deformation analysis in axial loaded members, torsional members, and members in bending requires the knowledge of mathematics and engineering (statics).

(d) An ability to identify, formulate, and solve engineering problems:

Every parts of this course, students are required to formulate and solve engineering problems.

(j) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Students are required to use computer for the homework assignment and projects.

### 3.3 Class Roll-Book Data

TABLE 1  
 ASSIGNMENT SHEET

#### Homework Sheet for EGR220-01

Student	HW #1	HW #2	HW #3	HW #4	HW #5	HW #6	HW #7	HW #8	HW #9	HW #10	HW Ave.
	6	-	6	-	-	-	-	-	-	-	1.2
	8	9	8	8	8	7	8	8	7	8	7.9
	8	9	10	9	9	8	7	8	8	8	8.4
	7	7	8	7	7	7	6	7	6	7	6.9
	10	9	10	9	9	10	9	9	10	10	9.5
	-	-	-	-	-	-	-	-	-	-	0

EGMU (1,2,2,0) (3,0,1,0) (2,2,1,0) (2,1,1,0) (2,1,1,0) (1,1,2,0) (1,1,2,0) (1,2,1,0) (1,1,2,0) (1,2,1,0)

#### Grade Sheet for EGR220-01

Student	Exam 1	Exam 2	Final Exam	20% Exam1	20% Exam2	40% Final	20% HW	Total	Grade
	-	-	60	0	0	24	2.4	26.4	F
	75	80	62	15	16	24.8	15.8	72	C
	75	90	80	15	18	32	16.8	82	B
	60	62	60	12	12.4	24	13.8	62	D
	86	87	100	17.2	17.4	40	19	94	A
	-	-	-	0	0	0	0	0	F

EGMU (1,2,1,0) (2,1,1,0) (1,1,3,0)

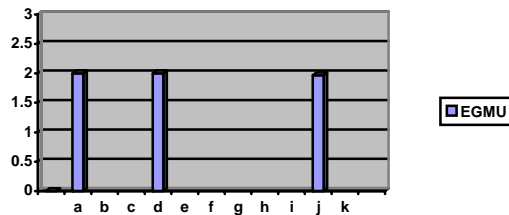
### 3.4 Course Assessment

TABLE 2  
 COURSE ASSESSMENT

Course Outcomes	Task	EGMU Score for Selected Program Outcomes		
		A	D	J
CO-1: CO-1 Understand concepts of normal, shear, and bearing stresses	HW#1	1.8		
CO-2: Application of Hooke's law and understand concept of axial strain, shear strain, axial deformation, Poisson's ratio, and stress concentration.	HW#2	2.50	2.5	2.50
	HW#3	2.2	2.2	2.2
	Exam#1	2.0	2.0	2.0
CO-3: Understand the concept of torsion and analyzing the stress and strain in members of circular cross section subjected to twisting couples, or torques.	HW#4	2.25	2.25	2.25
	HW#5	2.25	2.25	2.25
CO-4: Stress analysis for members in pure bending	HW#6	1.75	1.75	
	Exam#2	2.25	2.25	
CO-5: Development of shear and moment equations / diagrams and understand the use of flexure formula	HW#7	1.75	1.75	
	HW#8	2.00	2.00	
CO-6: Shearing force; bending moment and stress analysis for the member under transverse and combined loading	HW#9	1.75	1.75	1.75
	HW#10	2.00	2.00	2.00
	Final	1.60	1.60	1.60

### 3.6 Instructor's Comments

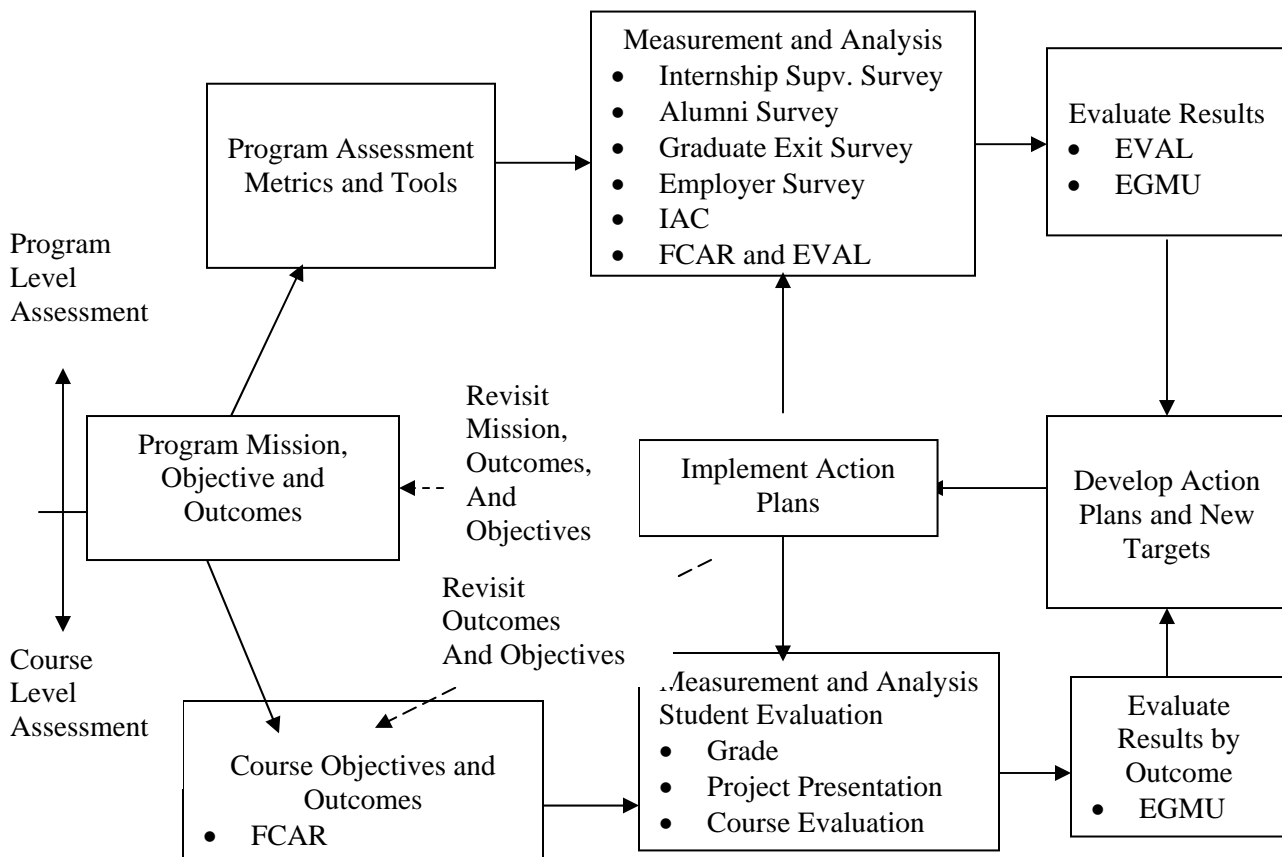
The instructor analyzes course and program outcomes based on EGMU score and introduces a corrective action plan to improve low EGMU outcomes in future terms. The outcome's corrective action plan can be introduced as part of the modification to the course in the future course assessment template. Analysis of students outcomes measured indicates that the course objectives were related to program outcomes.



### 3.5 Continuous Improvement Proc ABET OUTCOMES

A continuous quality improvement process chart can be developed based on both course and program level assessment results. Based on this chart, the Engineering Technologies department will conduct an ongoing review of both curriculum and syllabi based on the EGMU results of course and program.

### MECHANICAL ENGINEERING TECHNOLOGY CONTINUOUS QUALITY IMPROVEMENT PROCESS CHART



#### **4. CURRICULUM REVIEW**

The Engineering and Engineering Technologies Department will conduct an ongoing review of both curriculum and syllabi based on the EGMU results of FCAR.

- When appropriate modify the course and program tasks to improve the curriculum
- The ongoing review is necessary to maintain technical and academic currency while assuring that ABET standards are adhered to. The advantages of an on going review will also
  - Reduce student attrition, especially in the 1<sup>st</sup> and 2<sup>nd</sup> semester
  - Encourage and support faculty to attend professional conferences, workshops, seminars, etc. To exchange curriculum ideas with other technology educators.

Curriculum review is central and essential to the successful implementation of all programs. The program curriculum affects all aspects of the educational process.

#### **5. CONCLUSION**

The EGMU results indicate where improvement can be made and where faculty needs to focus attention. The FCAR implementation based on EGMU indicator will help faculty members improve their course outcomes performance by adding necessary changes to the course. The low EGMU score tasks alert the instructor to take adequate actions to improve the course outcomes for future terms. Some of these corrective actions that have been implemented by the instructors at Vaughn College of Aeronautics and Technology to improve the performance of their course outcomes are as follows:

1. Add an hour of problems solving session
2. More quizzes through the course
3. The course may require additional Co or Pre-requisites
4. The course may require hands-on engineering application type problems
5. Computer implementation and application to coursework.
6. Referring low performance students to tutoring center.

The required changes based on instructor's suggestion can be added as part of a modification to the FCAR. The success of these changes can be reflected in future FCAR based on students performance in the course. In summary, the benefit of FCAR results can be observed as

1. Helping instructors to improve their course outcomes by adopting the necessary changes to the course
2. The suggested corrective actions by instructor may improve students performance through the course and program
3. Provides a direct link between course outcome and program outcomes as one aspect of curriculum change and improvement.

## **7. REFERENCES**

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