

Integrated Faculty Course Assessment Report (FCAR) Model with Traditional Rubric-Based (GR) Model to Enhance Automation of Student Outcomes Evaluation

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Abstract— This workshop presents the latest development in the integration of the two prevailing assessment models, the rubrics-based GR model and the Faculty-Course-Assessment-Report (FCAR) model, to further streamline the process of assessment, evaluation, and generation of action items to close-the-loop for program improvement. It demonstrates ways for faculty involvement in and ownership of the assessment process that will NOT substantially burden the teaching commitment of the faculty. It provides an active question-and-answer session after each sub-topic is presented and discussed. Faculty and program chairs alike will walk away with the know-how on each of their roles and contributions that are required for an effective assessment process.

Keywords—*Rubrics, Outcomes Assessment, FCAR, EvalTools, ABET*

I. GOALS

Goals of the pre-conference workshop:

- To disseminate the latest work on integrating the best practices between GR and FCAR assessment models
- To allow faculty to gain insight into aligning and streamlining their teaching delivery with program assessment
- To enable program chairs to gain proficiency on streamlining the program evaluation process

The traditional rubric-based assessment model has been used widely by many universities in various formats [1,2]. By and large, the major contribution in engineering accreditation is attributed to Dr. Gloria Rogers' work and workshops. This workshop will term the traditional rubric-based assessment model as the GR Assessment Model. The essence of the GR model lies in classifying the courses in the curriculum to three levels: introductory, reinforced, and mastery. It is customary for the GR assessment model to include only courses in the mastery level for the program outcomes assessment. The drawbacks of looking only at the courses at the mastery level are: (1) lack of information needed at the lower level to identify the root cause of the deficiency when the symptom occurs in the higher level

courses; (2) lack of the mechanism to compute a clear indicator such as the Student Outcomes (SOs) performance index based on Performance Indicators (PI) of that SO in order to facilitate the automation of the evaluation process. In this workshop, a brief summary of the essence of the GR methodology is first discussed in Sessions 1 and 2, followed by the comparison to the essence of the FCAR methodology in Session 3. In Session 4, a refined and tested implementation is presented to demonstrate how a GR approach can be integrated with the FCAR assessment approach to allow computation of the SO performance index from roll-up data based on the weighted average of the relevant PIs for three different levels of courses. Ultimately, each SO is assessed to determine whether the performance meets expectations, exceeds expectations, or is below expectations. Customarily, for the FCAR methodology, heuristic rules are used to gauge results on how the SO performance is measured up for the final three expectations. Results of how the SO performance index can be used to address the overall attainment of the SO expectation are discussed.

Session 5 gives a workout session for participants to structure a syllabus based on guidelines that forms the foundation component to the integrated assessment model to work in their home institution. A well-form syllabus is the key to get faculty involved and buy-in early on in the assessment process.

II. ESSENCE OF GR ASSESSMENT MODEL

Session 1: The essential elements of assessment

Goals:

- To gain better understanding and eliminate the confusion of commonly used terminology and the language of assessment
- To prepare for a more thorough discussion of assessment techniques and best practices

Duration: 15min

GR assessment model begins with aligning Program Education Objective (PEO) to the Mission of the University. Student Outcomes align with PEOs. Performance criteria or

3 shows a sample of a PVT for an SO. The data presented in each PVT is evaluated through the use of two heuristic rules [5].

Ability to apply knowledge of mathematics, science, and engineering

Heuristic: FCAR reports from the following courses summarize the necessary evidence in meeting this specific outcome.

Item	Course	Item	E	A	M	U	Average
1	ECE_111_01	Intro to C Programming	4	7	0	1	3.61
2	ECE_140_01	Digital Logic Design	3	4	1	0	3.75
3	ECE_229_01	Circuits 1 Lab	3	3	1	0	3.81
4	ECE_321_01	Electronics I	3	7	1	2	3.79
5	ECE_326_01	Automatic Control	4	0	1	0	4.23
6	ECE_330_01	Signals & Systems	5	7	1	1	3.57
7	ECE_403_01	Power Electronics	2	3	1	0	3.61
8	ECE_474_01	Artificial Neural Networks	3	0	0	0	5

Fig. 3. A performance vector table (PVT) for a SO

These rules are given in [5] and will be presented in the workshop in detail. A more typical process of deploying FCAR methodology will be presented and discussed. At this point, participants will be asked to identify the essential differences between the GR and FCAR assessment models.

IV. INTEGRATION OF GR AND FCAR ASSESSMENT MODELS

Session 4: Integration of GR and FCAR Models

Goals:

- To understand better how the best of both assessment models are integrated
- To gain an understanding of the impact of breadth and depth of performance indicators on assessment process
- To understand how heuristics rules can be replaced by performance index for evaluation

Duration: 30min + 15min workout

The challenge now is how to integrate the strengths of the GR assessment model into the FCAR assessment model to give appropriate course level classification, and yet retain/enhance the existing FCAR assessment model to achieve the following goals:

- Track each performance indicator (PI) assessment with the PVT comprising courses including introductory and/or reinforced in addition to mastery level. This is to help capture the root causes of concern if these should occur at the introductory or reinforced level.
- Evaluate the SO from the roll-up data of its corresponding set of PIs, and yet be able to have an aggregate average for each PI and the aggregate average as the performance index for the SO that is consistent with the heuristic rules that were used in the FCAR assessment model.

The full details of work on integrating GR and FCAR assessment models are reported in [8]. In Session 4, we will discuss the essential elements of how the integrated model works. Participants will be tasked to work in group to evaluate a SO based on an enhanced PVT results. The intent is to give participants clear understanding of the application of the integrated GR/FCAR assessment model.

V. PROGRAM EVALUATION

Demo Session: Program Evaluation by EvalTools®

Goal:

- To realize the feasibility of automating program assessment
- Duration: 15min

In Session 4, participants are tasked to evaluate SO from the roll-up data of its corresponding set of PVTs. This demo session is to further illustrate the evaluation process for each PI can be much simplified with an online assessment tool. For example, how to conduct the review of PIs; use of heuristic rules vs. computed PI performance index based on data analysis; items to be reviewed for assessing the levels of expectation for PI; generation of the action items to close-the-loop for program improvement will be illustrated with the use of EvalTools®. In particular, items such as automating the generation of the executive summary report and how to deal with or track action items that are beyond the course level will be best illustrated with EvalTools®.

VI. PLANNING-TEACHING-ASSESSING PROCESS

Session 5: Faculty Involvement: Planning-Teaching-Assessing process

Goals:

- To develop skills in structuring a well-formed learning plan by taking the entire assessment into account
- To gain know-how in identifying justifiable key assignments

Duration: 20min + 15min workout

Faculty is central to the assessment process. Without faculty buy in, it will be difficult to have an effective assessment process. However, the assessment process should NOT be a burden to faculty's workload, but should be ideally a natural part of the daily teaching activities. To support further the implementation of the integrated assessment model and the early buy-in from faculty, an embedded course assessment is recommended to (1) teach topics aligned with the student outcomes, (2) ensure the right level of challenge, (3) focus teaching based on the learning needs of each student, and (4) implement instructional strategies to increase student achievement. For any given course, the process of achieving these goals always involves planning for the course, conducting teaching and learning, and evaluating the effectiveness of teaching and learning. The effectiveness of each individual embedded course assessment will later impact the overall effectiveness of program evaluation. FCAR is particularly suited for this purpose. However, augmenting the effectiveness of the FCAR, a well-formed syllabus that allows faculty to plan the expected activities ahead of time of is essential.

A. Planning: Criteria Mapping Process

The workshop will illustrate, with an example, the process to walk through a systematic way of constructing a well-formed syllabus that will aid in streamlining the assessment process. The steps involve: (1) define course outcomes, (2) define ABET criteria satisfied and map course outcomes accordingly, (3) understand judging/grading criteria in meeting outcomes, (4) examine all assignments and identify key assignments, (5) define justifiable key assignments, (6) finalize objective evidences in meeting outcomes, (7) finalize syllabus. This process was reported in [7].

B. Learning: Building Course Portfolio

We will discuss the differences between *Student Portfolios* and *Course Portfolio* for direct assessment. A *Student Portfolio* contains information that students see fit for their own professional development which may or may not align with the student outcomes that we target to measure. The *Course Portfolio*, on the other hand, contains students' key assignments as a means to directly assess their attainment of course outcomes which in turn correlate to student outcomes. In addition, we present a workflow of activities during the semester, how mapping a key assignment to relevant COs or PIs becomes an integrated part of the daily teaching activities.

C. Evaluation: FCAR

The use of FCAR is for both formative and summative evaluation of the teaching delivery by examining the self-composed color-coded EAMU performance vectors for each key assignment. There are three elements of FCAR that needs faculty's inputs for aiding in program evaluation. They are: (1) reflection on course delivery, (2) closing out old-action items, (3) suggesting new action items. We will present and discuss on a template for writing reflection, closing out old-action items, and suggesting new-action items. By adopting a template for writing reflection and suggesting new action items provide consistency among faculty and streamline the process to eliminate unnecessary stresses for faculty as well.

VII. WORKSHOP MATERIAL

The following are supplemental material will be available as soft copies at the workshop. Participants are expected to come with a laptop to participate in some of the assigned activities.

- A set of PowerPoint slides
- Assessment model template – to identify participant existing assessment process
- Workout sheet for a sample student outcome evaluation
- Key-assignment justification write-up template
- Action-item write-up template
- Sample of syllabus with clear assessment plan
- Sample of FCAR

VIII. TAKE-AWAY SKILLS

This workshop presents the latest development in the integration of the two prevailing assessment models, GR and FCAR, to further streamline the process of assessment, evaluation, and generation of the action items to close-the-loop for program improvement. It demonstrates ways for faculty involvement and ownership of the assessment process that will be an integrated part of the daily teaching delivery. In particular, it provides a template for faculty to construct a syllabus that helps in planning for assessment and the collection of objective evidence. From the standpoint of the program level, it demonstrates how the performance index computed from roll-up data from FCARs can be used in place of the usual heuristic rules for gauging the attainment of SOs. Faculty and program chairs alike will walk away with the know-how related to their roles and contributions required for an effective assessment process.

IX. QUALIFICATIONS OF PRESENTERS

Fong Mak has been a chair for 14 years (2001-2014) and completed two successful ABET accreditations for the department in 2005 and 2011, respectively. He was assigned as co-chair for Middle-States self-study at Gannon University to lead a group of 9 committees with 104 team-members that included board members, administrative staff, faculty and students. He developed an outcomes-based approach for the self-study process and successfully led the University to achieve the best Middle-States accreditation results in 2013. He provided consultancy on ABET accreditation to the Engineering programs of Frostburg State University, University of North Dakota, and the Islamic University of Madinah. He has offered workshops in the Best Assessment Symposium organized by Rose Hulman in 2004, 2005, 2006, 2007, 2009, 2010 and 2012; and in 2009, 2010, 2011, 2012, 2013 of ABET Symposium. He is the chief architect for EvalTools®, an online assessment tool.

Ramakrishnan Sundaram has been a faculty member in the ECE Department at Gannon University for the past fifteen years. He has been actively involved in the ABET accreditation process by participating within the department as well as by conducting workshop presentations at the ABET symposium, the ASEE and the FIE conferences in the past few years.

X. ANTICIPATED AUDIENCE

Faculty members who are interested in aligning their teaching with program evaluation, and program chairs/individuals who are responsible for accreditation. The workshop provides intervals of Q&A sessions for each sub-topic. The ideal size is 20 and participants are expected to bring their own laptops and a copy of course syllabus that they are currently teaching.

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