CLO ACCREDITATION TOOL: SUPPORTING THE MEASUREMENT OF CLASSROOM LEARNING

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Abstract — Accreditation of a university by a national or international body can either be seen as a difficult process, a necessary evil or an opportunity for growth and evolution. In this paper, we explore methods of enhancing our ability to understand student performance in the classroom while at the same time meeting the needs of the local IE department and international accreditation bodies. Our case study is taking place at the American University in the Emirates (AUE) in Dubai. Here we examine a specific tool for the measurement of course learning outcome CLOs, namely, Alta CLO Analysis tool. We argue this is a useful tool to better understand student learning and achievement in the classroom in the first instance but has much to offer also in terms of institutional measurement. We explore the literature and conduct a case study of the tool in action of preparing for an accreditation visit in the AUE. We present findings from this exploratory study, which aims at examining learner achievement across all courses of our university. We would argue that Alta CLO Analysis tool can be employed in a wide variety of institutions and is particularly well suited for institutions participating in accreditation across a number of fronts.

Keywords-university accreditation, ICT tools, course learning outcomes, international accreditation, Alta CLO Analysis tool.

INTRODUCTION

Almost no where in the world at present are universities changing and growing at the rate they are in the United Arab Emirates. Tied closely to the measurement of classroom performance is the process of internal and external accreditation. Most institution need or chose to apply to at least one external evaluation body and many universities are now seeking separate accreditation for their different programs at both the national and international levels. If carried out appropriately accreditation can serve as a method for strengthening the institution and encouraging professors to better understand the effectiveness of their teaching and learning.

THEORETICAL BACKGROUND

The effective measurement of classroom outcomes is of course of great interest to those involved in education. The ancient Greeks would have studied under a famous orator, such as Socrates; there was no formal qualification as such. Those who attended such seminars would have used their skills in reasoning and public speaking as part of their civic life. The rise of the power of the church in Europe saw a process by which applicants could receive a doctorate which was essentially a license to teach. The early scholars would have had to pass a test as well as a pay a fee and swear an oath of allegiance to the church. As scholars banded together universities formed, the University of Bologna recognized as the oldest in the world is recorded as having conferred degrees in law from the 12th century. The earliest ideas of educational quality would have been linked to the professor or scholar and their writings but as the number of universities and colleges multiplied some type of stamp of approval was needed. The governing body of the institution, in some cases the church in others the government, usually inspected the institution making recommendations and in time establishing rankings.

Accreditation in the USA took a different route, and is run instead by non-profit organizations that seek to be independent of the American government. For over 100 years American accreditation has remained independent so as to preserve academic freedom and autonomy in addition to peer and professional review. Interestingly this has given accreditation a certain cachet with institutions outside of American applying for accreditation and as well international accreditation bodies, such as the AASCB, accrediting specific programs rather than whole institutions. Given the interest in getting value for money in terms of the large amounts of government funding supplied to students in America, the accreditation process is increasingly rigorous and demanding. Murray (2012) thus defines accreditation as an assurance that the standards that define institutions are adhered to in order that solid value is produced from the increasingly high cost of higher education. Thus while accreditation is voluntary most institutions subscribe and at present over seven thousand institutions of higher education and twenty thousand programs with over twenty-four million students are accredited by nineteen institutional accreditors in the USA. Internationally the Organisation for Economic Cooperation and Development (OECD) conducts an assessment of Higher Education Learning Outcomes (AHELO). Ewell (2012) reviewed a 17-country initiative of the (OECD) aimed at assessing student knowledge and abilities in higher education and found that international standardized testing is ‘flattening’ the academic world.

One of the main concerns for accreditation is measuring the performance of students. The assumption is that if a university or program is accredited that this provides students with information that will help them choose the best program for them and thus reducing

uncertainty in the market (Cret, 2011). Grady and Kimberley (2012) argue that while the evidence of expectations for higher education are to be found in reports, the themes of conferences, guidelines for accreditation, and regulations the wide variety of stakeholders do not necessarily agree on what constitutes "evidence" of accountability.

Traditional testing was by oral examination and in many old European Universities, such as the University of Evora in Portugal the entire town is invited to witness the student's viva or oral defense. Over the centuries students began to write dissertations or thesis and their work was then judged on the basis of that document. Testing thus took place essentially only at the end of the work towards a qualification and this may not have been entirely successful as in the University of Cambridge it was said that historically a third of the students, graduated, a third did not finish and the others died. The proliferation of degrees and subjects gave rise to shorter courses and the need for a variety of measures or tests of student knowledge. This combined with the increasing need to report on student progress has combined to develop a wide variety of work in the area of classroom based research and reporting (Givens Rolland, 2012).

The process of quality assurance in education has been carried out for over 100 years in the United States and is consistent with the key academic values of that nation's higher educational system, including academic freedom and autonomy in addition to peer and professional review. In America, over seven thousand institutions of higher education and twenty thousand programs with over twenty-four million students are accredited by nineteen institutional accreditation bodies and sixty-one program accreditors. Accreditation is non-governmental and voluntary depending also on volunteers for peer and professional review.

Accreditation reflects three core values of higher education, all essential to academic quality: institutional autonomy, academic freedom, and peer and professional review. Pomey *et al.* (2010) also argues that while accreditation may not initiate change per se, the process is: effective in stimulating and accelerating change. Given the potential for the process of accreditation to benefit the institution, researchers have begun to explore ways to enhance and strengthen the outputs.

Standardized tests have been a popular way to test all students and are used locally, nationally and internationally to compare student performance in mathematics, language etc. especially at the K-12 level (Vincent-Lancrin & Pfotenhauer, 2012). While the idea of an exit exam is gaining in popularity for higher education standardized tests are not often applied at the university level given the wide variety of courses and fields of study. A lack of common procedures explains in part of the popularity of Bloom's Taxonomy of critical thinking developed in 1948 by educational psychologist Benjamin Bloom and several of his colleagues. Bloom *et. al* (1956) had the idea to classify or rank educational goals for student performance evaluation. Although many modifications have been suggested over time, the taxonomy is still popular today as it involves a measure of intellectual skill development that has the potential to create a common ground for educators both to design and to test what is taking place within their classrooms.

Bloom's Taxonomy originally contained six developmental categories: knowledge, comprehension, application, analysis, synthesis, and evaluation. Many universities subscribe to the use of these or related taxonomies to classify their objectives for student learning – called course learning objectives or COLs for short. Using such a taxonomy has two main advantages – first that professors design their learning environments to provide a rich learning experience and secondly that they can now assess their students on a variety of course learning outcomes that can be aligned to either local, provincial, and/or national standards.

Pomey *et al.* (2010) also argues that while accreditation may not initiate change per se, the process is: effective in stimulating and accelerating change. Given the potential for the process of accreditation to benefit the institution, researchers have begun to explore ways to enhance and strengthen the outputs. With many educators focused around the same goal a wide variety of resources is also being developed for professors including information on designing tests using appropriate verbs, to tools that enhance the measurement process and now the best apps to use for a students iPad. We seek to examine how tools, appropriately used, can aid the professor to effectively measure student performance in course learning outcomes.

TOOLS TO AID IN MEASURING OUTCOMES

A number of techniques and tools have been used to measure classroom learning with specific reference to accreditation. Cret (2011) used in-depth interview and spoke with over 180 faculty and administration in both French and English business schools as well as interviewing members of related quality assurance agencies. Jideani and Jideani (2012) studied the alignment of assessment objectives with instructional objectives using a revised Bloom's Taxonomy on nine food science and technology education courses. The research technique they employed is entitled conjoint analysis and they adapted this statistical technique used to measure the different value people place on different features of learning objectives, specifically the area of cognition, knowledge and attributes. Vockley and Lang (2009) used Webb's "Depth-of-Knowledge" Model for Alignment to compare the assements systems of the American National Assessment of Educational Progress (NAEP) and those of specific US States. There are fewer technological tools designed specifically to aid in the measurement but some institutions, especially in the medical sciences, have tied accreditation to research objectives and developed instruments to specifically measure the data that is not only needed for accreditation but also of fundamental use to the institution or organization itself. Groene, Alonso, and Klazinga [7], for example, have explored the development and validation of the World Health Organization (WHO) self-assessment tool for health promotion in hospitals and they tested the tool in 38 hospitals in eight countries. One commercial tool on the market is entitled Compliance Assist which uses preloaded templates and data bases designed to produce reports in line with the expectations of accreditation bodies. Such tools are extremely useful but are designed more for administrators than for faculty. What is needed is a simple tool for individual faculty members to measure the learning of their students in relation to the stated course learning objectives. Properly designed such a tool will produce data that will inform the individual faculty member, the department or college and the university as a whole. We present our research with respect to measuring classroom learning at the American University of the Emirates.

THE CLO MEASUREMENT TOOL

Here we consider Alta CLO Analysis tool as a specific method for examining the process of classroom teaching and explore the potential for its uptake within the university setting with specific reference to reporting to accreditation bodies.

The Alta CLO Analysis tool uses a straight forward unified approach to measure all in-class assessment achievement in terms of the respective course learning outcomes. The CLO is widely accepted as the central and pivotal way to direct and run the educational process especially at the university level (Vincent-Lancrin & Pfotenhauer 2010).

The problem with the learning outcomes is that they are hard to quantify, they are qualitative descriptions of what an institution is aiming for in their respective program or course. Hence for self assessment processes and analysis, one needs qualitative measurements in order to facilitate and aid those processes. Since student marks are still the predominant method for scaling and assessing student performance, the easiest and most useful way to do quantify the LO is through the use of students grades. The authors do not claim that this the only way nor it is the best, nevertheless institutions have used grades for hundreds of years to quantify the students performance and this tool thus tries to capitalize on what is already in use. This step is needed for analysis purposes and it represents a forward step not a backward step. The rubrics can still be used in various ways as we shall show later.

SO HOW THE TOOL WORKS?

We will walk through the tool by using one example to make the idea more immediately accessible. Assume that we have some course with the learning outcomes:

	CLOs STATEMENTS
CLO 1	1. Apply the current IT architecture mechanisms to understand new mechanisms in IT Architecture
CLO 2	2. Understand Viewpoints and Views and how they can applied in a context of large systems architecting
CLO 3	3. Understand the difficulties arises from large system design and methods and techniques to overcome them
CLO 4	4. Distributed and collaborative systems design and methodology
CLO 5	5. Understand architectural frameworks

Each course has a number of assessments in its syllabus. Those assessments occupy the total mark (100% normally) horizon proportionally see example below, assume that we have some course with the following distribution:

Participation	Project	Case Study	Assignments	Mid Term Exam	Final Exam
10	20	10	10	20	30

Each individual assessment has its own characteristics, the tool will not interfere in the way each assessment is measuring the student performance it will simply take advantage of the marks assigned to each student to quantify the learning outcomes. The desired outcome of the tool is to assign each course learning outcome a percentage of achievement reflecting how well the learning outcomes have been comprehended by the students or covered by instructor. The interpretation depends on the situation as we shall show later.

CLO 1	CLO 2	CLO 3	CLO 4	CLO 5	AVERGAE
75%	**73%**	**74%**	**75%**	**75%**	**74.4%**

CALCULATING THE MAPPING EASILY

After designing the assessment subparts, the first step in the CLO achievement calculation is to map the assessment subpart (ex. questions) and the CLO. Here we chose a simple strait forward mapping. The idea is that if the assessment subpart covers a certain CLO then the instructor declares that in two ways; either by specifying a percentage that says to what extent the CLO is covered in the assessment subpart, or by simply putting X in the corresponding square hence it is considered a wrapping for a full percentage covering, i.e. 100%. We will use the later throughout this paper.

CLO QUESTIONS MAPPING

	Q1	Q2	Q3	Q4	CLOs Mapping %
CLO 1	X				20%
CLO 2				X	20%
CLO 3				X	20%
CLO 4			X		20%
CLO 5		X			20%
SUM					100%

Assuming uniform distribution of the assessment mark over the subpart (questions Q1, Q2 etc…) when a subpart covers more than CLO then the percentage is kept the same while if the CLO is covered by more than one subpart then the percentage will increase as below.

CLO QUESTIONS MAPPING EXAMPLE 1

	Q1	Q2	Q3	Q4	
Max Mark →	10	10	10	10	80
Max Mark % →	25 %	25 %	25 %	25 %	CLOs Mapping %
CLO 1	X				20%
CLO 2				X	20%
CLO 3				X	20%
CLO 4			X		20%
CLO 5		X			20%
SUM →					100%

CLO QUESTIONS MAPPING EXAMPLE 1

	Q1	Q2	Q3	Q4	
Max Mark →	10	10	10	10	40
Max Mark % →	25 %	25 %	25 %	25 %	CLOs Mapping %
CLO 1	X				17%
CLO 2			X	X	33%
CLO 3				X	17%
CLO 4			X		17%
CLO 5		X			17%
SUM →					100%

The next step is to fill in the student marks

Students' Marks	Q1	Q2	Q3	Q4
Student 1	6	0	6	3
Student 2	8.5	5	9.5	6
Student 3	6	6	9.5	7.5
Student 4	9	6	6	6.5
Student 5	6	7	9	10
Student 6	9.5	8.5	7	6.5
Student 7	8.5	0	10	8
Student 8	10	7	10	10

Now the tool calculates the CLO achievement according to the following formula:

Get the percentage of the student mark

$$Mark_{(s,Q_i,a)_{\%}} = \frac{Mark_{(s,Q_i,a)}}{Max_{(Q_i,a)}} \times 100 \qquad i = 1 \cdots k, a = 1 \cdots f, s = 1 \cdots p$$

Where k is the number of parts, f is the number of assessments and s is the number of students, in our example $k = 4, s = 8, a = 3$. Then take the student percentage vector and use it to calculate the CLOs achievements for a certain student s:

$$CLO(j,s,a) = \frac{\sum_{i=1}^{k}\left(Mark_{(s,Q_i,a)_{\%}} \times CLO_{(j,Q_i,a)_{\%}}\right)}{\sum_{i=1}^{k} CLO_{(j,Q_i,a)_{\%}}} \quad j = 1 \cdots m\,, a = 1 \cdots f, s = 1 \cdots p$$

Where m is the number of CLO, in our example $m = 5$.

Now after we calculate the $CLO(j,s)$ for each student we take the average in respect to s to get the achievement of the $CLO(j)$, hence assuming that p is the number of students:

$$CLO(j,a) = \frac{\sum_{s=1}^{p} CLO(j,s,a)}{p} \quad j = 1 \cdots m\,, a = 1 \cdots f$$

In our example $p = 8$.

CLO STUDENTS ACHIEVMENTS AVERAGES						
	CLO 1	CLO 2	CLO 3	CLO 4	CLO 5	AVERAGE
Student1	60%	30%	30%	60%	0%	36%
Student2	85%	60%	60%	95%	50%	70%
Student3	60%	75%	75%	95%	60%	73%
Student4	90%	65%	65%	60%	60%	68%
Student5	60%	100%	100%	90%	70%	84%
Student6	95%	65%	65%	70%	85%	76%
Student 7	85%	80%	80%	100%	0%	69%
Student 8	100%	100%	100%	100%	70%	94%
AVERAGE	79.4%	71.9%	71.9%	83.8%	49.4%	71.3%

Next is to do the same for all the assessments that we have then we simply average all the assessment

$$CLO(j) = \frac{\sum_{a=1}^{f} CLO(j,a)}{f} \quad j = 1 \cdots m$$

OVERALL CLO ACHIEVMENTS OF ALL STUDENTS

	61%	74%	74%	55%	51%	63%
Student Name	CLO 1	CLO 2	CLO 3	CLO 4	CLO 5	AVERGAE
Student 1	54%	53%	53%	43%	34%	47%
Student 2	62%	68%	68%	61%	51%	62%
Student 3	57%	80%	80%	61%	57%	67%
Student 4	71%	80%	80%	43%	61%	67%
Student 5	53%	88%	88%	57%	56%	68%
Student 6	64%	68%	68%	48%	61%	62%
Student 7	57%	70%	70%	63%	29%	58%
Student 8	70%	90%	90%	65%	60%	75%

ADVANTAGES AND DISADVANTAGES OF THE TOOL

One advantage of the Alta COL Assessment tool is that it uses Microsoft Excel 2007 format meaning it is widely available for the majority of institutions. The tool can be integrated into open-source learning platforms, such as Moodle, that are easily customizable. As the tool is easily customizable data can be entered from any course that supports learning outcomes.

Another advantage is that we can calculate the average achievement for a certain student for the whole course in hand. What is more we can calculate the average achievement for a certain student for the on hand assessment.

CONCLUSION

The OECD (2000) has argued that a teacher's knowledge base is very rich in personal, hands-on know-how but much less so in terms of a shared, codified knowledge. We would argue that the emergence of e-learning in recent years will move teaching beyond being a rich and deep profession and into a wider more connected community. The benefits of this process are clear but at the same time e-learning will challenge us to find optimal ways to teach globally. E-tutoring will merge traditionally separate areas of teaching across cultures and within classrooms of one culture which in turn are increasingly multicultural.

Continual national and international accreditation is increasingly a feature on the academic calendar. It is a real commitment of any institution in terms of time and resources as well as the associated costs of membership site visits etc. It is important, therefore, to get as much from the process as possible in both tangible and intangible results. Can a tool such as the Alta CLO Analysis tool aid us in benefiting from the potential of the self study process to support knowledge creation and consolidation? Neither the self study team nor the response to their recommendations but instead the internalization or 'buy-in' of the staff and faculty of the institution to a process of documenting the search for better practice.

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