

A Preliminary Investigation into Technology and Processes Facilitating the Assurance of Learning

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This paper reports on the outcomes from a preliminary evaluation of technologies and processes intended to support the Assurance of Learning initiative in the business faculty of an Australian university. The study investigated how existing institutional information systems and operational processes could be used to support direct measures of student learning and the attainment of intended learning goals. The levels at which learning outcomes had been attained were extracted from the University Learning Management System (LMS), based on rubric data for three assessments in two units. Spreadsheets were used to link rubric criteria to the learning goals associated with the assessments as identified in a previous curriculum mapping exercise, and to aggregate the outcomes. Recommendations arising from this preliminary study are made to inform a more comprehensive pilot based on this approach, and manage the quality of student learning experiences in the context of existing processes and reporting structures.

Keywords: rubric, assurance of learning, learning analytics, accreditation, TEQSA, AACSB

Introduction

There is an increasing trend for universities to take a holistic approach to managing the quality of educational programs based on objective data and learning analytics (Elias, 2011; Hrabowski, Suess, & Fritz, 2011; Johnson, Smith, Willis, Levine, & Haywood, 2011). Drivers for doing so include ensuring a quality learning experience for students (Curtin University, 2011), and to comply with the reporting requirements of regulatory agencies (TEQSA, 2012) and accrediting bodies (AACSB, 2012). These generally require that students are provided with consistent and equitable learning opportunities that produce the intended learning outcomes, regardless of a student's location or study mode (AACSB, 2007b; Curtin University, 2011).

Curriculum mapping is the process in which generic graduate attributes or program-level learning objectives are mapped to the learning outcomes and assessment in individual subjects (Oliver, Jones, Ferns, & Tucker, 2007; Sumsion & Goodfellow, 2004). This is usually undertaken at the program level to document where students will develop the intended capabilities and skills in conjunction with a given program of study. The Assurance of Learning closes the loop on this design by using objective data to identify what students have actually learned as a consequence of their participation in the program (AACSB, 2007a). Direct measures of learning can be achieved through standalone testing, or through a course-embedded approach in which regular assessments undertaken in conjunction with formal coursework are used to measure student learning (AACSB, 2007a). Assessment rubrics that are aligned with program-level learning objectives can be used to facilitate the course-embedded approach (Kerby & Romine, 2010). This can be implemented using online tools that are generally available as standard features of a Learning Management System (LMS) (Blackboard, 2012; Cooch, 2012).

Learning analytics available from some LMS providers and third party software suppliers can be used to aggregate and report on course-embedded measurements at the program level. This requires that detailed assessment outcomes for individual students are stored in backend information systems, external web applications, or that these data are retained in the LMS over the duration of the reporting period.

In those cases where LMS data is cleared out in preparation for new teaching periods and assessment data for individual students are not directly available in the University's backend information systems, an alternate approach must be sought to collect and report on program outcomes. This paper reports on the processes and practices for such an approach, and is the principal contribution of this paper.

Context for the pre-pilot study

The business faculty of a large Australian university has established five generic learning goals that can be further expanded into 8 program-level learning objectives. These are discipline knowledge, discipline skills (theoretical principles), critical thinking skills, written communication skills, oral communication skills, collaborative team skills, ethical skills, and socio-cultural skills. Program-level rubrics have been developed that contain descriptors for these objectives at three levels of attainment: below expectations, meets expectations, and exceeds expectations. Generic assessment rubrics have also been developed that expand on the program-level rubrics. These generic assessment rubrics contain criterion descriptors for five attainment levels corresponding to the Fail (F), Pass (P), Credit (CR), Distinction (D), and High Distinction (HD) grade ranges. These are aligned with the program-level rubrics, where the F attainment level corresponds to below expectations, and P and CR map to meets expectations, and D and HD correspond to exceeds expectations.

The intention is to develop unit specific assessment rubrics that are aligned with these generic assessment rubrics for a representative sample of assessments from the Bachelor of Commerce during a subsequent pilot study. This will be used to aggregate and report on outcomes for the program as a whole. This paper reports on a preliminary investigation into the technology and process that will be used in that study, using the Blackboard 9.1 (Service Pack 6) LMS and data extracted from its online rubric tool.

Methodology

Three assessments from two units were selected for participation in this preliminary investigation. These were a spreadsheet modelling assignment from an undergraduate unit called Business Software Tools 200, and a critical essay and a business report from a first year unit called Communication in Business 100.

Business Software Tools 200 is a unit about information systems that support decision-making using spreadsheets and databases. The spreadsheet modelling assignment has criteria associated with the program learning objectives for discipline knowledge, critical thinking and written communication. The discipline knowledge criteria in the assessment rubric involve analysing data and completing two case problems from a textbook. The critical thinking criteria deal with a more advanced and open-ended problem that requires a variety of analysis techniques and considerable interpretation. The written communication criteria cover documentation, referencing and English expression.

The curriculum in Communication in Business 100 has been designed with authentic assessments that examine real business cases. The unit develops communication skills, including critical thinking, persuasive argument development as well as presentation and writing skills. The first assessment is a critical essay in which students examine the social performance of a business and present a critical review in a manner appropriate for academia. The second assessment is a business report. The audience is senior executives of businesses and the writing must be concise and persuasive. These assessments are designed to challenge students to:

- write in ways that are appropriate for different audiences;
- develop arguments that are well supported and use appropriate evidence; and
- demonstrate an understanding of the complex social and ethical issues facing business today.

Unit coordinators for the units to be sampled in this study developed assessment rubrics using the online rubric tool and associated this with their respective assessments in the LMS. The rubrics specified attainment levels for the five grade bands, and had criteria associated with the program-level learning goals. Rubrics were not aligned with the generic assessment rubrics, as the latter were not finalised at the commencement of the semester. A rubric statistics report containing the percentage of students performing at each attainment level was downloaded from the LMS as an MS Excel workbook. Merged cells in the statistics report were unmerged to facilitate copy-and-pasting these into reporting spreadsheets that linked rubric criteria to program-level learning goals, as it was not possible to specify this in the online rubric tool itself.

Two different types of MS Excel workbooks were used in this study. The first workbook type was for recording assessment data. There was one assessment workbook for each assignment in the sample. The workbook contained a tab for data entry. Each criterion and the corresponding percentage of students performing at a given

level was copied-and-pasted from the LMS rubric statistics report. These were associated with a program-level learning goal from a drop-down list. Figure 1 shows an example from the spreadsheet modelling assignment.

Assessment Criteria	F (%)	P (%)	CR (%)	D (%)	HD (%)	Learning Objective
1. Customisation (demonstrating individual	11%	15%	18%	25%	27%	1.1 - Discipline Knowledge
2. Problem steps completed from text (Case	2%	2%	15%	53%	29%	1.2 - Theoretical Principles
3. Problem steps completed from text (Case	4%	2%	45%	27%	22%	2.1 - Critical Thinking Skills
4. Modelling process/method (refer to Read	7%	16%	16%	36%	24%	3.1 - Written Communication
5. Documentation on the model (e.g. docur	9%	27%	25%	27%	11%	3.2 - Oral Communication
6. Extra features that have been implement	16%	7%	20%	40%	16%	4.1 - Collaborative Team Skills
7. Additional Question (demonstrating critic	9%	18%	29%	22%	22%	5.1 - Ethical Skills
8. Lessons Learnt (600 words maximum) o	4%	45%	27%	16%	7%	5.2 - Socio-cultural Skills
9. References (in-text, end-of-text, Curtat	5%	9%	38%	33%	15%	
10. English expression (spelling, word usage	7%	11%	27%	44%	11%	

Figure 1: Data entry tab of the assessment workbook for the spreadsheet modelling assignment

A second tab in assessment workbooks automatically tabulated and displayed results for the assessment in text format and as a stacked bar chart. These were presented based on the fraction of students performing at the below, meets, and exceeds expectation levels for the program-level learning outcomes with which rubric criteria were associated.

The second type of workbook was an administration workbook for aggregating results using links to the assessment workbooks. Data was aggregated in tabs associated with each program-level learning objective. A separate tab was used to display aggregated results for all assessments in the sample.

Results

The assessment rubric in the spreadsheet modelling assignment contained three criteria that were linked to the discipline knowledge criterion, four criteria were linked to critical thinking, and three were linked to written communication. Rubrics for the critical essay and business submission assessments each contained two criteria linked to written communication and one criterion linked to critical thinking. Aggregated results for the three assessments are shown in Figure 2. This shows that the majority of students performed at the meets expectation level, except for discipline knowledge in which the majority performed at the above expectations level.



Figure 2: Aggregated sample in the administration workbook for three assessments and two units

There are no results for program-level learning objectives related to discipline skills (theoretical principles), oral communication skills, collaborative team skills, ethical skills, or socio-cultural skills because these assignments did not include rubric criteria and descriptors related to these. For example, although the goal of the written essays in Communication in Business 100 was to undertake a critical review of the social performance of a business, the rubric assessed written communication and critical thinking in developing a sound argument. Criteria for ethical and socio-cultural skills were not included in the rubric and hence these were not assessed.

Discussion

Positive outcomes of using the online rubric and the aggregation results identified were: structured feedback for individual students, an evaluation report showing the percentage of students performing at each criterion and achievement level, and a demonstrable link between assessment criteria and program learning objectives. Challenges identified during this preliminary investigation were limitations of the structure and interface of the online rubric tool in the LMS, writing effective rubrics with concise yet meaningful descriptors, and issues related to workflow using the online tools. This would suggest the need for substantial staff training, up-front technical assistance, and pedagogical support in writing effective rubric descriptors.

Based on observations from this preliminary investigation, it is proposed that individual Unit Coordinators or LMS Administrators with access to the online rubric tool be given responsibility for producing the individual assessment workbooks. This would be done after results are finalised for each assessment.

It is further proposed that Major Coordinators, Heads of Discipline, or an LMS Administrator collect the individual assessment workbooks at the end of each teaching period and maintain the administration workbook that produces the aggregation report. That is, each major such as accounting, management, marketing, and information systems would have its own administration workbook. Such an approach would assist in annual reporting and course reviews, the latter of which are undertaken on a periodic basis. In part, implementing Assurance of Learning at this granularity is manageable in the sense that number of assessments in such a sample would be relatively small. However, it should be noted that the solution described here does not scale well when the number of assessments in the sample set is large. This is because assessment reports must be open for links in the administration workbook to be active.

Longer term, it is reasonable to consider adding a Blackboard building block in which rubric criteria are linked directly to program-level criteria in the online rubric statistical reporting function, alleviating the need to maintain individual assessment workbooks. It is also conceivable that a future enhancement to the Blackboard rubric tool could align rubric criteria to program-level learning objectives using the Blackboard “goals” feature introduced in Blackboard 9.1 (service pack 8).

The approach outlined in this paper will require assignment rubrics to be aligned with the generic assessment rubrics, and to ensure that the sample set includes coverage of each rubric criterion for the set of generic assessment rubrics. This is because different criteria from generic assessment rubrics for a given program-level learning objective might be covered by multiple assessments from different units.

Conclusion

The LMS online rubric tools provides a means to set an assessment rubric, from which meaningful data can easily be extracted. These data give the fraction of students performing at each attainment level for all criteria. From an Assurance of Learning perspective, what is missing is the ability to link criteria to program-level objectives, a means to designate the set of assessments to be included in the measurement, and to aggregate the results. This study has demonstrated that a set of linked spreadsheets managed by staff in accordance with routine reporting processes and practices can be used for this purpose, and will inform a more comprehensive pilot to be conducted in the near future. It is indicated this will lead to a sustainable approach based on objective data from the LMS to ensure that academic programs are of high quality and that the learning outcomes attained by students are consistent with the intended educational design.

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