Effectively Assessing the Mastery of Learning Outcomes in ODL Courses

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Abstract

The constant emphasis on maintaining a high level of quality in the self directed Open Distance Learning (ODL) experience at Wawasan Open University (WOU) demands the accurate assessment of learner centric Outcome Based Education (OBE). The summative and formative assessment components of each course module are, in theory, designed to effectively measure the mastery of a set of course learning outcomes (CLOs) by an adult learner in the ODL environment. However, in reality, there is no real scrutiny of the assessments to ascertain whether a learner has achieved the expected mastery of a CLO other than the assumption that assessment marks are an indication of the mastery of a particular set of CLOs measured in a specific assessment component.

With the aim of identifying whether assessment marks are indeed reflective of the mastery of a set of CLOs, a project was initiated at WOU in collaboration with Pearson eCollege to implement the eCollege Learning Outcome Manager (LOM), a web based platform, which facilitates the effective measurement of mastery of CLOs in a course module. TCC123/05 Visual Programming, a lower level technical course module equivalent to a first year course module in a conventional university, was identified as a suitable test case with an enrolment of seventy one learners distributed in four geographic locations across Malaysia. The evaluation of the mastery of CLOs by learners was conducted for this course on the LOM as a postmortem exercise which superimposed the mastery of CLOs on the assessment marks.

This paper discusses the methodology and findings of this project with respect to identifying a potential correlation between the mastery of CLOs and the assessment marks.

Keywords: *Learning Outcomes, Outcome Based Education, OBE, Open Distance Learning, ODL, Learning Outcome Measurement, Assessment, Pearson, eCollege, Learning Outcome Manager, LOM*

1.0 Introduction

Being an Open Distance Learning (ODL) institution, Wawasan Open University (WOU) adopts a blended method for course module delivery to its adult learners which includes self directed course materials supplemented by brief face to face tutorial sessions and online student support. Due to the lifelong learning aspect of the business where the focus on learning outcomes is considered crucial (Hussey & Smith, 2003), WOU invests heavily in the development and continuous improvement of the self directed course material which undergo a comprehensive instructional design process that makes them suitable for learner centric Outcome Based Education (OBE) (Mc Neir, 1993). Each course module is specifically designed to promote mastery of a particular set of course learning outcomes (CLOs) by a learner. The CLOs are further subdivided into unit learning outcomes (ULOs) which allow learners to self assess their mastery using formative assessment components. Despite the fact that the formative assessment component providing valuable insights into the learners' mastery of CLOs (Black & Wiliam, 1998) the lack of class room based activities in ODL makes the summative assessment component key in assessing the mastery of CLOs. However, the summative assessment component, which comprises of tutor marked assignments (TMAs) acting as continuous assessments and the final proctored exam, is not scrutinised in detail to assess the mastery of the CLOs by the learners. It is generally assumed that the assessment marks are reflective of the learners' mastery of the CLOs. i.e the higher the marks the better the mastery of the CLOs. Even though there have been studies conducted such as identifying the correlation between the mastery of CLOs and the GPA (Gijbels et al., 2005) to prove this assumption, no study has been conducted to identify the validity of this assumption in the context of WOU.

2.0 Methodology

A project was initiated at WOU in collaboration with Pearson eColleege to identify the correlation between assessment marks and mastery of CLOs in an adult ODL environment using the eCollege Learning Outcome Manager (LOM) platform which is a comprehensive web based software application. An independent academy was created for WOU on the LOM which allowed the detailed tracking of progress for each course module assessed using the platform. *TCC123/05 Visual Programming*, a five credit hour lower level technical course module equivalent to a first year course module of a conventional university, specialising in Visual Basic.Net (VB.Net) was used as the test case for the project taking into account the total of seventy one learners enrolled in the course module from learning centers located in the regions of Penang, Ipoh, Kuala Lumpur and Johor Bharu distributed across Malaysia. The assessment for this particular course comprised of (i) three TMAs which are a combination of theory and laboratory exercises contributing 50% to the final score; and (ii) a proctored examination contributing the remaining 50% to the final score. The learners were required to obtain a minimum mark of 40% for both components to pass the course module.

As the LOM allows for the tracking of mastery of CLOs in real-time, the study was conducted as a postmortem exercises to avoid any implications the real-time tracking and feedback would have on the marking of assessments. i.e. the LOM was setup to superimpose the mastery of CLOs on top of the assessment marks which were awarded as an independent exercise conducted prior to the study. Four classes were created representing each of the learning centers and LOM accounts were created for each student enrolled in a particular class. In a real-world scenario, the students would be able to track their progress through the LOM but this feature was disabled for the purposes of this pilot study as it was done as postmortem. Only the Student ID was used to identify the student in the system to protect anonymity and to ensure unbiased evaluation.

To effectively measure the mastery of the CLOs (i) each CLO was granulated into smaller ULOs; (ii) a rubric comprising of a three point Likert scale was identified which measured whether the learner *needs improvement*, *meets the requirement* or *exceeds the requirement* with respect to mastery of ULOs; and (iii) learning statements were identified which measured the mastery of a ULO against the rubric. This assessment rubric was then setup on the LOM and each ULO was mapped against the TMAs and exam assessment components which measured the mastery of individual ULOs. An assumption was made from the outset that the average of the mastery of each ULO will determine the overall mastery of the corresponding CLO. i.e. an average mastery of 2/3 would be deemed as *meeting the requirement* with respect to the mastery of the CLO.

After the initial setup of the system, the population of data was done by the academic in charge of the course module. The answer scripts of the exam as well as the TMAs were re-evaluated to determine the mastery of the ULOs by the learners and were marked against the assessment rubric on the LOM. The assessment marks as well as the letter grades were also recorded in the LOM for further analysis. Once the re-evaluation was complete, detailed reports were generated using the LOM in MS Excel format to be further analysed. The Pearson product-moment correlation coefficient (r) was used to determine the correlation between the assessment marks and the mastery of CLOs. The statistical analysis was conducted using the MS Excel software application.

3.0 Results

The mastery of the CLOs was mapped against the assessment marks for the exam and the three TMAs as shown in Figure 1.1. The Pearson product-moment correlation coefficient (r) between mastery of CLOs and assessment marks was calculated for each assessment as shown in Table 1.1.

Assessment	Number of Learners	(r)
Exam	48	0.903748
TMA1	66	0.768821343
TMA2	61	0.843116626
TMA3	54	0.816461787

Table 1.1 Pearson product-moment correlation coefficient (r) between mastery of CLOs and assessment marks

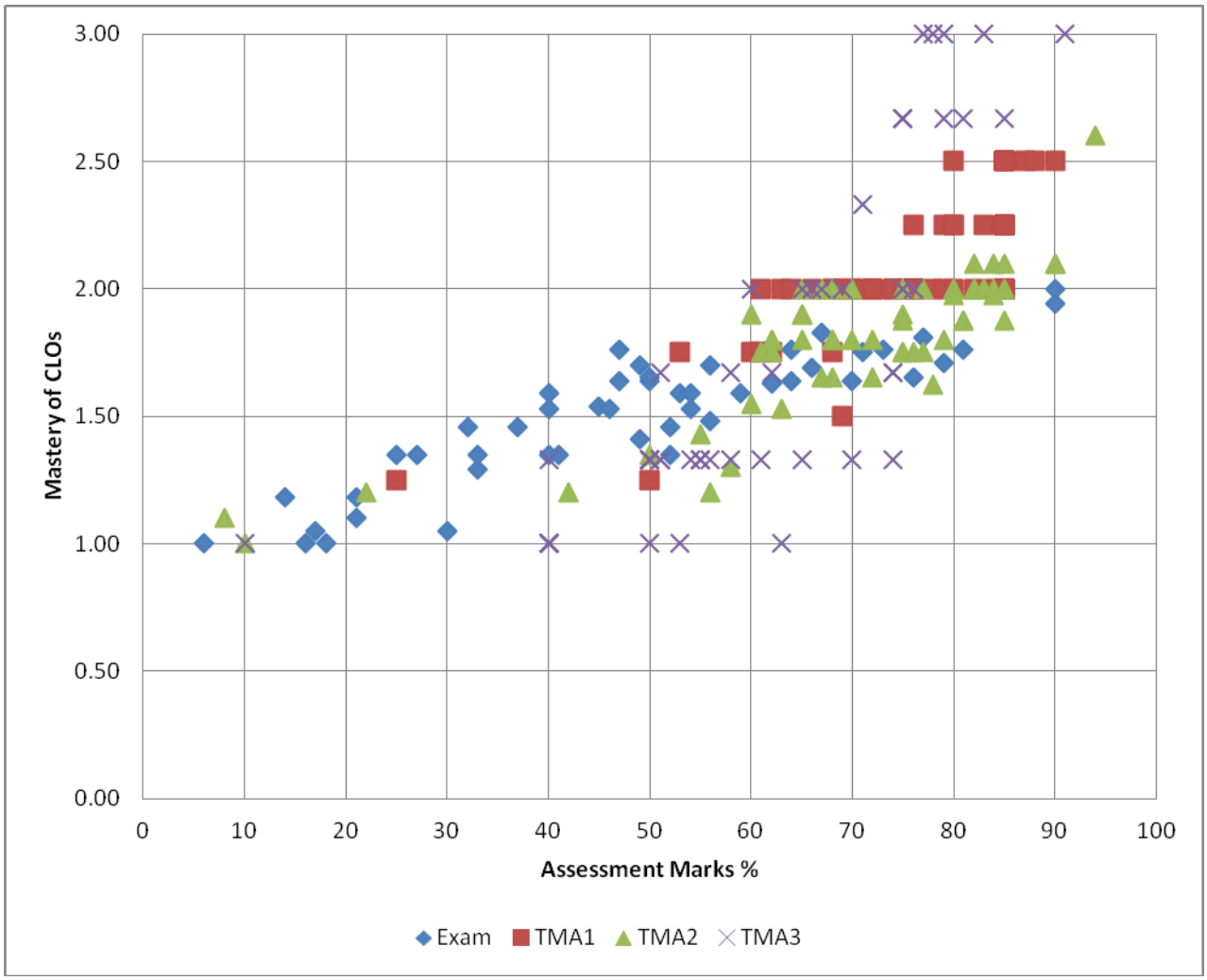


Figure 1.1 Mastery of CLOs Vs. Assessment Marks

4.0 Discussion

To statistically determine whether there was a correlation between the mastery of the CLOs and the assessment marks, the exam marks and the marks for the three TMAs were analysed using the Pearson product-moment correlation coefficient (r). According to the results of this statistical test, as shown in Table 1.1, there is a strong positive correlation between the mastery of the CLOs and the assessment marks. This provides some indication that the marks of an assessment can be used to ascertain mastery of the CLOs. However, the correlation does not indicate which range of marks would be representative of *meeting the requirement* with respect to the mastery of the CLOs. To identify the possible correspondence between the assessment marks and the CLO assessment rubric, the assessment marks for both the exam as well as the TMA component were plotted against the mastery of the CLOs in a scatter plot as shown in Figure 1.1. By analysing the scatter plot, it was identified that the marks ranging from 60% to 90% approximately indicate that the learner has met the requirement with respect to mastery of the CLOs. It was further approximated from Figure 1.1 that marks less than 40% indicate the need for

improvement in terms of mastering the CLOs. This bears a resemblance to the passing mark of an assessment at WOU which is set at 40%. Assessment marks beyond 80% were approximately representative of the learner exceeding the requirement as far as the mastery of CLOs is concerned.

Despite the fact that the aforementioned statistical analysis is indicative of a correlation between the assessment marks and the mastery of the CLOs, the correspondence between the CLO assessment rubric and the assessment marks is only an approximation. This is mainly due to the breadth of the three point Likert scale which was used in the CLO assessment rubric. Therefore, it can be concluded that a more granular CLO assessment rubric is needed for effectively identifying a potential correspondence between the assessment marks and the mastery of CLOs.
During the course of the pilot study, it was realised that the implementation of the LOM needs to be done holistically from inception to conclusion of a course module which include the design, development, delivery, assessment, feedback and revision stages. The strengths as well as the weaknesses of the present assessment mechanisms at WOU were also made apparent during the course of the study especially with respect to assessing the CLOs. Another point to note was that not every CLO needed to be assessed in each assessment. Also the marking schemes would need to take into consideration the CLO assessment rubric when allocating marks.

Overall, the LOM was found to be a more comprehensive as well as a more effective method of assessing the mastery of the CLOs which allows academics as well as learners the ability to track the progress of the mastery of smaller ULOs in addition to the larger CLOs. This in turn provides the key stakeholders the ability to tailor learning activities as well as assessments to ensure the mastery of most of the CLOs by the learners. The LOM provides a usable yardstick for the accurate assessment of OBE in ODL environments which acts as a valuable enabler especially in accreditation exercises.

5.0 Conclusion

A project was initiated at WOU in collaboration with Pearson eCollege to identify a possible correlation between assessment marks and the mastery of CLOs in a self directed adult ODL environment. A lower level technical course module was used as the test case for this project which superimposed the mastery of the CLOs on top of the assessment marks using the eCollege Learning Outcome Manager (LOM) web based software application. Using the Pearson product-moment correlation coefficient (r), it was statistically identified that there was a strong positive correlation between the two. A scatter plot of the mastery of CLOs against the assessment marks provided an approximation of the range of assessment marks which is indicative of the mastery of CLOs. However it was made apparent during course of the study that the assessment marks cannot be used as an effective measure of the CLOs due to the breadth of the range. Thus the LOM was found to be a more effective as well as comprehensive method of assessing the mastery of the smaller ULOs in addition to the CLOs in a self directed adult ODL environment which enables the key stakeholders to keep track of the progress. It was also found to be an

effective yardstick for the accurate assessment of OBE in ODL which acts as a valuable enabler in accreditation exercises.

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