

Supporting Early Academic Intervention Using Learning Analytics Through a Power BI-Based Dashboard

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ABSTRACT

Early identification of students requiring academic support necessitates that lecturers review continuous assessment results while intervention remains possible. However, maintaining quiz, test, and assignment marks in separate records can obscure recurring weaknesses. This paper introduces a proposed Power BI dashboard that consolidates these results, displays both class and individual student performance, and highlights repeated low scores for lecturer review. The proposed workflow connects identified assessment concerns to appropriate responses, such as consultations, targeted feedback, or focused revision sessions, and documents subsequent progress. Risk flags are designed to prompt professional judgement rather than serve as automatic indicators of student outcomes. A future comparison of cohorts before and after implementation will assess whether dashboard-supported monitoring correlates with earlier intervention and improved academic performance. This approach provides a practical framework for leveraging existing assessment records to inform academic support, contingent upon data quality, privacy considerations, and careful interpretation.

Keywords: Learning Analytics, Power BI, Student Performance, Continuous Assessment, Early Academic Intervention.

INTRODUCTION

Continuous assessment helps lecturers monitor students' academic progress before the final examination. Results from quizzes, tests and assignments can show students' weaknesses at an early stage. This allows lecturers to provide support while students still have time to improve. However, assessment records must be organised clearly so that lecturers can understand them quickly. In many courses, students' marks are stored in separate spreadsheets or prepared manually. This makes it difficult for lecturers to identify students who repeatedly obtain low marks and compare their performance across different assessments. This monitoring process may delay the identification of at-risk students and reduce the opportunity for early intervention (Ferguson, 2012; Schwendimann et al., 2017). As a result, lecturers may only notice students' difficulties at a later stage. They may also provide the same intervention to the whole class instead of giving support based on each student's problem. Learning analytics can help by changing assessment records into clear and useful information for teaching decisions (Ifenthaler & Yau, 2020).

Although learning analytics dashboards can present student performance, their application to lecturer-led intervention in diploma-level accounting courses warrants further examination. This paper proposes a Power BI-based dashboard using quiz, test and assignment results to highlight repeated low performance and support an intervention workflow. It describes the proposed dashboard, the lecturer's role in verifying risk flags, and a future evaluation of student outcomes. LMS activity, attendance and student information system records are outside the scope of the current proposal.

LITERATURE REVIEW

Learning Analytics in Higher Education

Learning analytics refers to the systematic collection, measurement, analysis and reporting of learner data to understand and optimise learning and the environments in which it occurs (Ferguson, 2012; Macon et al., 2017). In higher education, the approach supports the transition from retrospective reporting towards timely, evidence-informed action (Ferguson, 2012; Ifenthaler & Yau, 2020). Continuous assessment is especially useful because quizzes, tests and assignments reveal students' progress before the final examination. When lecturers can recognise recurring weaknesses early, they have an opportunity to respond while students can still revise concepts, seek clarification and improve their study strategies (Ifenthaler & Yau, 2020). Despite the availability of assessment data, lecturers may monitor performance through separate spreadsheets or manually prepared reports. This can obscure patterns across components and delay intervention (Ferguson, 2012; Schwendimann et al., 2017). The proposed dashboard brings existing assessment records into a clearer view of students and topics that may require support (Bodily & Verbert, 2017; Schwendimann et al., 2017). Whether that view leads to earlier or more effective intervention must be evaluated.

Dashboards and Power BI

Dashboards turn different indicators into visual summaries that help with monitoring, comparison, and making instructional decisions (Bodily & Verbert, 2017; Schwendimann et al., 2017). Good learning dashboards show relevant indicators, allow for useful comparisons, explain how risk levels are set, and avoid cluttering the screen with unnecessary visuals (Matcha et al., 2020; Schwendimann et al., 2017). Microsoft Power BI works well for this because it can bring in assessment records from spreadsheets, process the data, calculate measures, and offer interactive visuals and filters. This makes it a practical choice for lecturers and faculties who already use Microsoft tools. In an accounting course the dashboard has the ability to display the class averages, the distribution of assessments, the pass rates and how each individual student is getting on. Such information enables lecturers to determine whether there is a problem impacting the whole class—for instance, whether there is a topic which many students are having difficulty with or whether a particular student is experiencing continuing difficulties with a number of assignments. However, it is necessary to interpret these results with care since learning analytics do not always indicate the reasons for a student's performance (Matcha et al., 2020; Slade & Prinsloo, 2013). For example, a low score could be the result of having failed to submit the work, being absent, misunderstanding a topic or facing other learning difficulties. The alerts shown on the dashboard should cause the lecturer to look into the situation, not serve as automatic labels or as final decisions (Slade & Prinsloo, 2013).

Early Academic Intervention

Early academic intervention is a proactive response provided while students still have opportunities to improve their performance. Learning analytics can support this process by identifying students who may require assistance and enabling lecturers to provide appropriately timed support (Arnold & Pistilli, 2012; Ifenthaler & Yau, 2020). Suitable strategies include revision sessions for topics associated with low class averages, individual consultations for persistent student-level risk and personalised feedback addressing specific knowledge or skill gaps. The intervention should correspond with the evidence presented by the dashboard and should be documented so that its timing, type and relationship with subsequent performance can be evaluated (Arnold & Pistilli, 2012; Ifenthaler & Yau, 2020). This creates an audit trail connecting an analytical signal with a lecturer's professional review, intervention decision and subsequent monitoring.

Research Gap and Objectives

Existing research provides guidance on learning analytics and dashboard design, but evidence of how an accessible business intelligence dashboard can support lecturer-led intervention in this accounting education setting remains to be established. This proposal has three objectives:

1. To develop a Power BI dashboard for monitoring continuous assessment performance.
2. To propose transparent criteria and a lecturer-led process for identifying students who may need early academic intervention.
3. To evaluate student performance before and after dashboard implementation in a future cohort comparison.

Product Description and Methodology

Dashboard Architecture and Indicators

The proposed Power BI dashboard will bring students' quiz, test and assignment marks into a centralised monitoring view. The planned assessment records include an anonymised student identifier, assessment component, score, maximum mark and semester. Power Query can standardise field names, validate data types, check missing values and convert valid scores into comparable percentages. Missing or inconsistent records should be checked against their source before they inform a risk flag. Proposed measures include average performance, pass rate, assessment achievement and patterns of repeated low scores. The specific thresholds for risk categories require documentation and validation before use. The proposed dashboard has four connected monitoring components, as outlined in Table 1. A class-performance view will summarise averages and pass rates; an assessment-analysis view will compare quiz, test and assignment results; and a student-performance view will show results across tasks. A risk-monitoring view will highlight repeated low scores using documented criteria. Each flag should show the results and rule that produced it so that lecturers can verify the record. The categories are prompts for review and should not be treated as diagnoses of a student's ability or circumstances.

Table 1 Dashboard Components, Performance Indicators and Decision Support Functions

Dashboard component	Primary Indicators	Decision Supported
Class performance	Average score; pass rate; distribution	Identify class-wide patterns
Assessment analysis	Quiz, test and assignment averages	Locate difficult topics or components
Student performance	Scores and progress across tasks	Review individual learning needs
Risk monitoring	Repeated scores below threshold	Prioritize early intervention

Proposed filters for student identifier, assessment component, risk level and semester will allow lecturers to inspect different levels of detail. An intervention record is also proposed for documenting revision sessions, consultations and feedback. These features are intended to connect monitoring with intervention planning; their usability and effect have not yet been evaluated.

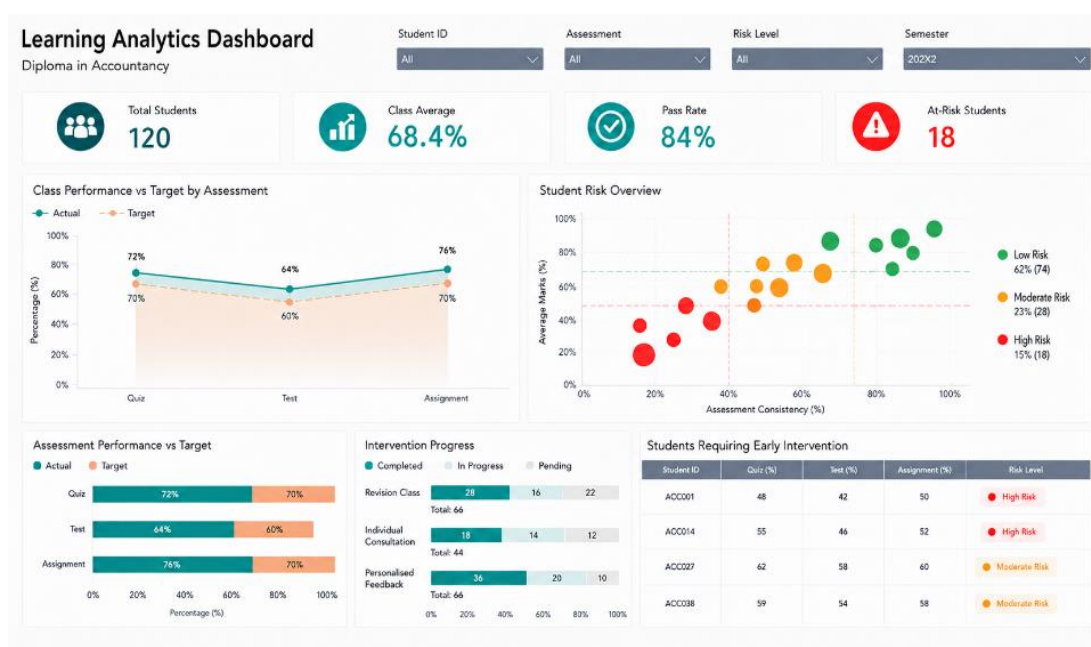


Figure 1 Interface of Power BI-Based Learning Analytics Dashboard

Research Design and Setting

A quantitative, quasi-experimental evaluation is planned for two cohorts of students in a Diploma in Accountancy course at a public university in East Malaysia. The pre-implementation cohort will provide a comparison for a later cohort whose lecturers use the proposed dashboard to review assessment results and plan support. Continuous assessment and final examination outcomes, together with the timing and type of interventions, may be compared where comparable records are available. Cohort sizes, semesters, assessment comparability and analytical procedures must be specified before the evaluation. As students will not be randomly assigned, any observed difference should be interpreted cautiously and cannot by itself establish that the dashboard caused a change in performance.

Intervention Procedure

With the proposed method, the assessment data will be updated following each quiz, test, or assignment. The lecturer will look at the results and check for any missing or inconsistent entries before deciding whether or not a risk flag requires action. In the case of a student obtaining low scores on a number of tasks, this could result in a one-on-one meeting and more intensive monitoring. If a student has difficulties in a particular area, they will receive targeted feedback or be given additional exercises. Where several students have the same weakness, the lecturer might arrange a focused revision session. The lecturer will record the reason for each decision, the kind of intervention carried out, the date, who took part, and the academic problem that was addressed. The risk flag is intended to assist, not to replace, professional judgement.

Once support has been provided, the subsequent assessment results will be reviewed in order to monitor progress. The process links together monitoring, checking, intervention, and follow-up. It has not yet been determined whether this method results in earlier support or better outcomes, and this point will be looked at in the planned evaluation.

Expected Application and Commercialisation Potential

The dashboard that has been proposed is intended to make it easier for lecturers to review patterns in continuous assessment and to decide which students to contact and what kind of support to offer. By bringing together the results of quizzes, tests, and assignments in a single location, lecturers may be able to determine whether a student's poor performance is continuous or merely due to one assessment. On this basis, a lecturer could arrange a consultation, provide specific feedback, or organise a focused revision session. The worth of carrying out these actions relies on having accurate records, clear thresholds, and appropriate follow-up with students. These factors will need to be tested in actual situations.

If the dashboard proves to be effective, it could be put into use in other courses by altering the assessment components, the thresholds, and the risk categories. A package for implementation would include a dashboard template, clear classification rules, an intervention log, user guides, and training. Before it is used on a wider scale or commercialised, the dashboard should be checked for usability, accuracy, security, and appropriateness in different courses. Access to student records should correspond with staff responsibilities and there should be anonymised identifiers, secure storage, procedures for corrections, and a defined retention period, all in accordance with institutional rules. If LMS or attendance data are added at a later stage, the data access and privacy arrangements would have to be reviewed once again.

Novelty & Recommendations

The contribution suggested is a workflow which links continuous assessment displays with the lecturer's review, together with a documented decision regarding intervention and the following monitoring. Since it makes use of an accessible business intelligence tool, it may enable institutions to investigate early academic support based on the data that they already gather. The originality and effectiveness of this method should instead be evaluated in light of existing implementations and the evidence from the planned evaluation, not simply on the basis of the dashboard design.

To put this into effect, the assessment records should be checked and updated quickly. Lecturers should be able to see the risk thresholds as well as the reasons for each flag and should examine them for any possible misclassification. If a low score indicates circumstances which the dashboard does not account for, the lecturer should then check the record and talk over the student's needs before deciding on the support to provide. Recording the timing, type, level of participation and the results of any follow-up regarding each intervention will increase the transparency of the process and supply evidence for future evaluation.

This proposal makes use of continuous assessment records alone and includes no verified outcome data. In future studies it will be necessary to specify and test risk thresholds, gather feedback from both lecturers and students, and compare the outcomes between cohorts while taking into account the differences among them. Examination of LMS activity and attendance can be carried out in a later stage provided that the relevant data and permissions are available. After the classification rules, the interpretation procedure and the privacy safeguards have been assessed, automated alerts and longer-term tracking should be considered.

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