Uncovering unit level performance for first year units

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Abstract

The transition and integration of university students, and especially the retention of first year students into academic classes (units), is important in higher education. Integration success is currently measured through students expressing their satisfaction in teaching outcome surveys but there are no learning result surveys. This study proposes unit grade average (UGA) as a measurement of the learning result. UGA is not a survey metric, but is calculated from grades. While GPA is a combined score for one student across units and is a model for UGA, UGA is a combined score for one unit across students. Having unit UGA facilitates the calculation of faculty UGA and university UGA. Additionally, the learning results of a unit's participants can be contrasted through domestic UGA and international UGA. Forewarned with UGA, lecturers, course advisors and other educationalists might be empowered to ensure the ongoing improvement and retention of first year students.

Keywords

First year retention, performance indicator.

Introduction

Student retention and progression rates are a matter of concern for most institutions in the higher education sector (see for example, 2005; Simpson, 2006; Tinto & Pusser, 2006), especially in the first year experience at university (for example, in the Australian context, see K. L . Krause, Hartley, James, & McInnis, 2005). Currently, there are two broad approaches to providing extra *academic (rather than language)* support to help students succeed during their first semester at university: (1) targeting all students who wish to participate in extra learning opportunities; or (2) targeting only those students deemed to be at risk (Miller, Gregg, & Kelly, 2000). While there are considerable resource implications associated with such broad-based schemes, they are reported to be effective (O'Byrne, S. Britton, A. George, S. Franklin, & A. Frey, 2009). However, the problem with the approaches above is that students either have to self-select or be selected for such extra academic support. This assumes that students who are not selected are all coping with their first year of study. This paper questions this assumption and argues that the assumption might be erroneous and a way of investigating whether all students are performing according to lecturing expectations or not is necessary.

The focus of this paper is that impacts on student performance might have been caused by the institution. While institutional impacts might be unintended, Bradley, Noonan, Nugent, & Scales (2008, p. 115) note that "it is imperative that the Australian community has confidence in the standards of its universities". The best way to secure confidence is for universities to understand impacts their processes might be causing.

It is therefore the intention of this paper to propose a new unit performance indicator, Unit Grade Average (UGA) which measures the average unit performance of a unit for all students within that unit. Accumulated historical UGA on a unit is capable of informing key stakeholders such as university administration, faculty managers, academic service units and lecturers to plan learning support to all first year (FY) students in a particular unit. The uses of UGA are illustrated using FY business units at a regional Australian university.

Literature review

This study uses the Conceptual Model of College Impact on Learning Outcomes (Terenzini, Springer, Pascarella, & Nora, 1995) in Figure one as a guide to institutional context. Key areas such as 'coursework and curricular patterns' and 'classroom experiences' are concerned with unit level interactions but are not accessible to this research. Areas like Attitudinal Factors and Student Precollege traits often seek to explain failures and non retention through student deficiencies. However, Lawrence (2002) argues against the over simplification of a student deficit approach explaining non retention. Supporting Lawrence's (2002) call for a wider search for answers on retention is Thomas (2002, p. 426) who found "a wide range of interacting personal and social attributes, as well as institutional practices, which impact on both retention rates and performance". This paper takes the position that student performance can be understood through a unit's learning results which is usually expressed as a grade representing the learning outcomes achieved by a student in a unit. This is broadly contained in the Learning Outcomes in Figure one.

Figure one: Impact on learning outcomes model
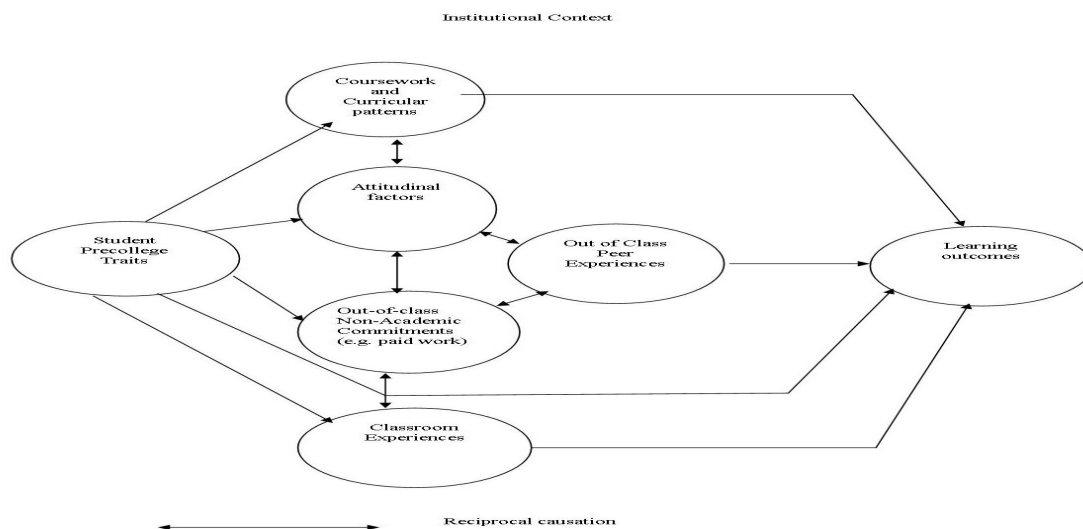
Learning outcomes are featured in unit outlines and describe what each student would learn after successfully completing the unit. Grades are used to show the degree to which a student has been successful in acquiring the intended outcomes. This paper will take the grade results of each student, and combine them into a grade for the unit, called unit grade average, UGA. The derived UGA value will be taken to represent the *average learning result for a unit* for all students.

Knowing a unit's UGA will help pinpoint where, and perhaps reveal why, failure is occurring in units, and UGA might contribute vital information to understanding unit performance. UGA is timely because failure to integrate FY students is "costly for both individuals and universities" (McInnis, 2001, p. 106) and "easily underestimated since they are often only

revealed as discontinuation or failure in later years" (Pargetter, McInnis, James, Evans, Peel, & Dobson, 1998, see Chapter one). Costs might be substantially lessened and certainty of success increased for FY students once the where and why of failure is demonstrated and understood through UGA. Historical UGA is capable of identifying units most in need of transition assistance, permitting more rapid implementation of transition strategies such as those found in the Kift ALTC senior fellowship papers (see for example, K. L Krause, 2008). It would follow that sustaining students in FY will help sustain them through all academic years.

Universities in Australia use various forms of satisfaction survey (Ramsden, 1991) and other measures to gauge teaching performance. The university where this research took place employed a wide range of commonly used indicators to measure success, such as the Australasian Survey of Student Engagement (AUSSE) and the Unit Satisfaction Survey (USS). This study used USS as it is closely tied to units. In 2008, USS surveys were based on the course experience questionnaire (Ramsden, 1991), were done at end of unit, used a seven point Likert scale, were self-reported and were comprised of six questions. The 2008 USS précis made available to this research contained analysis for only one question which was "Overall I was satisfied with this unit". A critical point of the USS scale might be argued to exist at 4, based on it being the halfway (or passing) point on the 7 point scale employed to measure teaching in units.

There are dangers with USS. The first danger occurs if teaching satisfaction (USS) were to be accepted as representative of the measurement of the two sided teaching-learning process. The second danger occurs in relying on survey perceptions because survey responses can be unrepresentatively low, with only 16% response rate from FY business units in semester one of 2008. In a preliminary study on USS which had a 20% participation rate, Vassiliou (personal communication) found unacceptably wide confidence intervals and concluded that USS was a "poor estimator [of satisfaction which] should be used cautiously". The third problem is that USS are self-reported voluntary response questionnaires and this questionnaire design is known for unreliable estimate bias (Moore, 2007). A fourth problem was that when the 2008 USS responses were graphed they showed strong skewing to the upper end of the seven point scale and this is believed to be unrepresentative of a true population (Moore, 2007). A solution would be to supplement teaching indicators (like USS) by measuring *learning* using the UGA indicator. Two views should be preferable to a single view. This study proposes unit learning result (UGA) as the second view, which is a consolidated, quantitative metric of unit achievement. This might give a balanced approach to understanding unit performance. It might be noted that USS was under review at the time of our study and was later to emerge with enhancements.

UGA can also extend understanding of unit performance by obtaining and correlating UGA to literacy requirements needed in assessment, such as examinations. Literacy requirements (such as reading rate and writing rate) can be estimated from past examination papers. Reading and writing skills in English are underlying skills that are often assumed in examinations. If potential reading and writing literacy impacts are not fully understood, and not included in examination development processes within an institution, there is the potential for UGA to suffer. This is a point which is especially important to investigate in view of a 81 per cent increase in international student numbers in Higher Education in Australia since 2002 (Davis, 2010). For instance, a poor correlation between UGA of a unit and examination marks might indicate that the unit cohort had trouble with the literacy requirement of the exam especially within the international student cohort.

Bell (2001) found that ESL reading speeds differ according to whether the reading is extensive or intensive. Extensive has a connotation of graded readers (Schmidt, 2007) warned that college level reading for comprehension. Of the two types, intensive reading is likely to be similar to reading under examination conditions. The method used to measure reading and writing rates was often unreliable as reading and writing rates were often calculated on short time limits (within one minute) with no test for comprehension (Cronan 1987; Rasinski 2004). Measuring reading rate over a 30 minute timeframe, and using non native English speakers from the Yemen Arab Republic, Bell (2001) reported a reading rate of 12 words per minute (wpm) in a multiple choice examination where comprehension was important. However, the degree of accuracy of comprehension in that study was not clear.

On the writing skill in timed examinations, Bishop & Esgate (2001) found that grade nine students in the US in a forty minute English SAT (Scholastic Aptitude Test) examination could write just below thirteen words per minute (12.77 wpm) but could only sustain that rate for 32 minutes and achieved an average output of 419 words. If a working assumption is accepted that native speaker literacy speeds exceed non native speaker speeds in a ratio of approximately two to one, the following rates can be used as a guide to measuring literacy rates for domestic and international students: reading rate is 25 wpm and 12 wpm respectively; writing rate is 13 wpm and 8 wpm respectively.

Methodology

Grade data were collected for semester one and two units in 2008 from university records and analysed in SPSS. Grades were P (indicating a pass), CR (credit), DI (distinction) and HD (high distinction). Unit failure was denoted by all of the following: NS (failure to sit final exam), NN (failure based on non-participation), NC (failure to complete assessment), NX (failure to reach a pass grade), and NW (failure to notify withdrawal). Type of student was recorded as overseas fee paying (International) and Australian (Domestic).

Table one: Calculating Learning Result (UGA)

Fail	Pass	Credit	Distinction	High Distinction	Total	UGA
5	2	3	3	2	15 students	
-5	2	6	9	8	20 points	1.33

Table one is a fictitious unit with fifteen students with learning outcomes (row one) of five fails; with two passes; with three credits; with three distinctions; and two high distinctions. UGA calculations in row two involve assigning -1 to fails, 1 to passes, 2 to credits, 3 to distinctions, and 4 to high distinctions. UGA is the sum of all outcomes (20) divided by the total number of students (15), which is a UGA of 1.33.

The significance of UGA was that it showed a unit's achievement clearly and compactly. Additionally, UGA itself had a built in critical point. A critical threshold of 1.00 UGA represents the minimal value at which a passing result for a unit is achieved. A UGA below 1.00 means that a unit did not achieve a pass. Continuing with results, a UGA of 2.00 or more represented a credit learning result for the unit; UGA of 3.00 or more, a distinction learning result; and UGA of 4.00, a high distinction learning result. In Table one, the UGA of 1.33 represents a pass result for the unit. Each unit's UGA was calculated similarly.

USS and UGA views on performance

Table two: USS against UGA for FY business units.

Unit	USS (out of 7)	UGA (out of 4)	Fail%
BU1	6.44	0.92	16%
BU3	5.57	1.15	22%
BU9	5.47	0.91	29%
BU10	4.31	0.87	25%

Table two details four FY units that were offered by the business faculty in 2008, showing teaching outcome (USS), learning result (UGA), and percentage of failure. The significance of Table two is that it provides conflicting pictures of unit performance.

USS values in column 2 suggest that students are mostly happy in these units, as all USS values exceeded the critical threshold of 4. In fact, some of the units are excelling, such as BU1 which is approaching complete satisfaction of 7. UGA values, however, paint a different picture. Three quarters of UGA values were critically low (below the 1.00 threshold) and represented poor learning results for units. Currently, we are not aware of reports of failure rates at the unit level in universities. However, Thomas (2002, p. 424) has reported withdrawal rates in the U.K. as peaking at 18%. In the absence of figures, we will use withdrawal figures to give an approximate picture of failures. Therefore, in Table two, failure rates up to eighteen per cent are deemed as high, and above that level as very high. The number of students who failed in the units was high to very high, and this supports the situation reflected by UGA.

Since USS does not address critical threshold, reliance on it might reduce the likelihood of unit intervention. On the other hand, UGA could be helpful in detecting achievement of critical thresholds. When a group of students perform in the same FY units with a less than expected number of passes, it might be worthwhile to investigate the possible causes from (both student and) institution perspectives. UGA is such a tool to do this.

Domestic and international student performance

Table three: Domestic and International UGA & Failure for FY business units.

Unit	Dom.UGA	Int.UGA	Over.UGA	Dom. Fail%	Int.Fail%	UnitFail%	USS
BU3	1.30	0.40	1.15	15% N=300	40% N=136	22% N=436	5.57
BU8	1.22	0.24	1.07	18% N=282	45% N=146	28% N=428	5.89
BU9	1.08	0.47	0.91	22% N=76	46% N=30	29% N=106	5.47
BU10	1.12	0.08	0.87	17% N=229	47% N=155	25% N=384	4.31

|				17%	31%	22%	5.78
BU20	1.31	0.76	1.21	N=309	N=142	N=451	

#Fail% is the percentage of student failures within a unit; # N is number of completing students.within that cohort; #DOM means domestic, INT means international, Over means overall.

Table three provides unit UGA, domestic UGA and international UGA, failure rates expressed as percentages and USS for five business faculty units. Domestic UGA is the UGA achieved by the domestic students only (column two); whereas international UGA is the UGA achieved by international students (column three). It also provides overall unit UGA (column four).

The significance of Table three is that it showed a marked disparity between domestic and international learning results. International learning results were below domestic results, in all cases. For example, international UGA in BU10 was about one twelfth of domestic UGA in BU10. All domestic UGA readings reached the critical learning threshold of 1.00, whereas none of the international UGA readings attained this threshold. For example, international UGA in BU10 was one twelfth of the critical threshold at 0.08.

So far, international UGA has clearly pinpointed areas of concern, some grave, and these can be seen in Figure two below. While a critical international UGA does not mean that every international student failed in the unit, it does mean that international student failures were likely to be high. The majority of international failures in these units is 40% or more; conceivably too high to mean that an equivalence of results between domestic and international students is close at hand.

Figure two: Domestic, International and Overall UGA for FY business units.
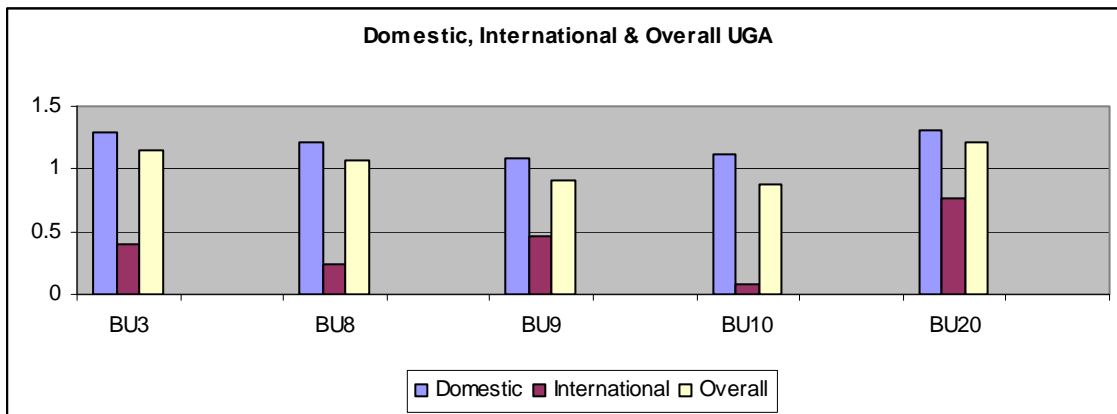
While UGA in Table two gave a reasonably clear picture of unit learning results, it did "overstate" international learning in light of the findings presented in Table three. In fact, the overstatement was caused by an assumption about unit members being homogenous, and this was seen as untrue for domestic and international learning in BU8 where the unit UGA was satisfactory (1.08), but international UGA was low (0.24). However, UGA did enable drilling into the student constituents to expose the international learning results.

The failure rates in Table three supported the finding that equivalence of outcome is not being achieved, with international failures ranging between 13% and 53%, whereas domestic failures ranged from 12% through 22%. In summary, UGA can be used to detect differences of performance of different cohorts within a unit; something which USS was not able to

reveal about units. Although outside the research scope, the findings might have shed some light on the easy marking debate on international students (Devos, 2003).

UAI articulation pathway and UGA performance

Table four: UGA & Grades by UAI grouping.

Id	UAI equivalent	UGA	Fail	P	CR	DI	Fail%	Total units
1	49	-0.44	7	1	1		78%	9
2	51	0.25	3	5			38%	8
3	51	-0.50	3	1			75%	4
4	56	0.33	5	1	2	1	56%	9
5	61	0.00	5	1	2		63%	8
6	63	0.13	4	3	1		50%	8
7	63	0.67	3	4	1	1	33%	9
8	63	0.63	2	5	1		25%	8

Table four shows the 2008 results for eight students who entered FY on an articulation pathway. The significance of Table four is that propensity to succeed diminishes as UAI-equivalent diminishes. For example, none of the students was able to achieve a passing learning result (1.00 UGA). In fact, two students had a negative UGA, which meant that unit fails well exceeded passing grades.

Therefore, it might be concluded that some articulation pathways are problematic, and need attention. UGA is useful in pinpointing the learning outcomes of different pathways. Once those pathways have been identified, and prior to interventions, advice could be given to course advisors, university administrators and lecturers. Amongst others, Krause (2008) notes with concern that it is not typical for lecturers of FY classes to be provided with demographic data on students, and recommends a rethink. The data in Table four underscore that concern.

Equivalence in unit achievement is an expectation of articulation pathways aiming towards accepting students who are at a similar level to domestic students. This aim might be applied to the multiplicity of international pathways as well. UGA can be used to determine the degree to which this is being achieved and has provided a clear way for future action.

Reading literacy requirements

Table five: Reading literacy requirements in final examinations

Unit	UNIT UGA	Weighting	Qs	Exam Time	Words	W.p.m.
BU2	1.45	30%	Essay	120	1,705	14.21
BU3	1.15	50%	Problems	180	1,040	11.56
BU8	1.07	50%	MC	120	1,821	30.35
BU9	0.91	50%	MC	120	2,418	40.30
BU21	1.59	40%	MC	120	1,408	46.94

Table five shows the reading literacy rates (Bell, 2001; Bishop & Esgate, 2001) required for several business examinations. The significance of Table five is that it shows that some units required reading literacy in excess of known sustainable rates. This was true for both domestic and international students.

For example, regarding reading literacy, BU2 was a two hour test, requiring the pre-reading of a 1,705 word article prior to writing brief essays. If the first hour of the test was assumed as reading the article, a reading rate of 14.21 wpm was required. This rate was within the domestic student rate (25 wpm) but slightly above the international student rate (12 wpm). Therefore, international students might have struggled with time, or sustaining quality of comprehension.

While BU3 was within reading limits for domestic and international students, units using multiple choice were not. For example, BU8 required the reading (and ticking) of 40 multiple choice statements, for a total of 1,821 words to be read. This required a reading rate of 30.35 wpm (1821 / 60), which was above those rates for domestic and international students (25 and 12 wpm respectively). A reading time of 30 minutes was assumed for BU21 based on suggestions in the paper, and it has the arduous requirement of 46.94 wpm, which is about double the known sustainable rate for domestic and a threefold increase for international students. In summary, students might benefit from institutional policy that assists in understanding demands made by reading literacy. Demands might be related to impacts on UGA achievement.

Writing literacy requirements

Table six: Writing literacy requirements in final examinations

Unit	UNIT UGA	Exam Type	Questions	Words	W.p.m.
BU2	1.45	Essay	3	1,000	25.00
BU3	1.15	Problems	22	1,000	25.00
BU8	1.07	Essay	2	1,000	25.00
BU9	0.91	Essay	2	1,000	25.00
BU21	1.59	Essay	2	1,500	25.00

Key: Writing thresholds are 13 & 8 wpm for domestic & international students respectively

Table six shows the writing literacy rates required in several business faculty examinations. The significance of Table six is that it shows that the assessment in all units required writing literacy rates in excess of known sustainable rates. Sustainable writing rates are 13 wpm for domestic students and 8 wpm for international.

For example, BU3 was a two hour test, where half the time was assumed for reading, and the remaining time was assumed for writing. Three essays were required. The examination did not specify a required word length, but 500 words were assumed as the requirement for an essay, which was equivalent to 1,000 words per hour. This meant that a writing rate of 25 wpm was required for BU3, and this rate was assumed for all writing. This rate exceeded both

domestic student rate (13 wpm) and international student rate (8 wpm). Therefore, all students might have struggled with time, or with sustaining quality of expression.

Limitations

It must be remembered that findings were calculated with data from FY business students drawn from a pool of just one hundred and five units, and conclusions based on limited data must be treated with caution.

Conclusion on FY

This paper set out to determine whether institutional policies and practices might impact FY students, and to demonstrate the value of UGA in uncovering factors impacting on FY performance. Using UGA, this paper uncovered FY units which had critically low learning results among their students; FY units where international UGA indicated critically low learning results; FY articulation pathways based on UAI which were likely to be contributing to critically low learning results; FY unit examinations which had high literacy expectations in reading and writing that might be contributing to low learning results.

Based on these findings, this paper suggested that universities could be proactive in updating institutional policies and practices to address any FY critical learning threshold performance uncovered by UGA. This could be done by including FY grade distribution in policies; by questioning assumptions about FY equivalence of learning between domestic and international students; and by using UGA to research the reading and writing literacy demands made of FY students in examinations.

This paper suggested that university education providers could use UGA to inform policy on FY learning success; and recommends UGA findings be disseminated to lecturers to assist them in unit improvement; to unit convenors to help them in giving relevant and useful advice to student clients who might benefit from greater transparency; to university planners who can use UGA findings in the larger picture of education renewal (Bradley et al., 2008) sought by the changing FY landscape.

It is imperative to note that the existence of UGA will not *per se* improve the FY teaching-learning process. UGA is a tool that can empower academic staff on learning but action is in the hands of an institution.

Nor have the UGA possibilities been exhausted. Bryant & Zhang (2010) used UGA to exemplify the role that assessment plays in the learning process. Further research will replicate that research for FY only; will compare UGA to a range of survey mechanisms such as AUSSE with a view to yielding further insights into the FY teaching-learning process; enquire whether a rise in FY unit withdrawal rates can be associated with falling satisfaction rates; and investigate UGA for each and every assessment item used by a FY unit, rather than one single UGA figure calculated as a summary of all learning outcomes throughout a unit.

Acknowledgements

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