

Effective Assessment in a Block Pedagogy: Understanding the Impact of Summative Assessment Type on Student Achievement

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Abstract

Block mode of delivery, also known as intensive mode, has increasingly been adopted by courses in higher education institutions (HEIs) in recent years. This surge has been attributed to the efforts of HEIs to adapt to the changing student population, which involves a diverse student population, as well as the evolving education landscape, recently impacted by the COVID-19 pandemic. The distinctive nature of a block delivery model, and the impact of demographic, contextual and disciplinary factors on assessment performance makes an evaluation of student achievement in a block pedagogy a critical area of focus. The study presented here explores the impact of different types of summative assessment on student achievement in a block mode of delivery implemented across the different courses in a UK-based HEI. This is achieved using a quasi-experimental design, involving independent sample t-tests. The study firstly compared first and second year students' grades in modules where summative assessment had been adapted for block, with students' grades from the same modules that were traditionally taught in the previous year; and secondly examined the impact of different types of summative assessment in block delivery on students' grades. Results indicate that adapting the type of assessment for block delivery had no statistically significant difference on students' final grades. However, when comparing different types of summative assessments in block delivery, students achieved higher grades in time-constrained and multiple summative assessments, compared to single final essays ($p < 0.001$ and Cohen's $d > 0.5$). The results from this study indicate that the type of summative assessment has an impact on students' academic success and, therefore, this should be at the heart of staff training and curriculum design when adopting block delivery.

Keywords: block mode, summative assessment, assessment methods, block teaching, intensive learning.

Introduction

Moving to teaching modules in blocks has become more prevalent at higher education institutions (HEIs) in recent years. One reason for this has been the change in character and composition of the current student population that includes students from diverse non-traditional backgrounds (for UK data see HESA, 2022), since intensive and block mode types of delivery have been proven to increase engagement and achievement, particularly among non-traditional students (Loton et al., 2022; Samarawickrema et al., 2020; Burton & Nesbit,

2008). This has been accentuated by the COVID-19 pandemic, which necessitated HEIs to redesign their curriculum to provide an adaptable and conducive learning experience.

In this context, considering that student achievement is ultimately measured by means of summative assessment methods, research on the impact of summative assessment types in block pedagogy becomes imperative given that summative assessment research in block mode models is scarce, especially at a large-scale. For that reason, the aim of this study was to examine the impact of instances where academics decided, based on their expertise and experiences, to change the type of summative assessment for block teaching as they transitioned from a traditional delivery, which is known henceforth as adapting summative assessments, and to identify which types of summative assessments are most effective in block teaching. While the limited research on the topic typically focuses on one course or discipline (Kwan et al., 2022; Kofinas et al., 2017), this study examines the impact of summative assessment type on student achievement through a whole institution approach, involving all transitioned first- and second-year students at a UK university, during the academic years 2020/21 and 2021/22. This aim will be achieved by investigating three hypotheses:

H₁: Students who enrol for modules that adapt summative assessments for block teaching achieve higher final grades than students who enrolled for the same modules when traditionally taught.

H₂: Students who enrol in block teaching modules that have multiple summative assessments achieve higher final grades than those who enrol in block teaching modules with a single essay as a summative assessment.

H₃: Students who enrol in block teaching modules that have a time-constrained summative assessment achieve higher final grades than those who enrol in block teaching modules with a single essay as a summative assessment.

The following section explores the literature on the block mode of delivery and the possible implications of the use of the diverse types of summative assessment in a block model. This is followed by the methods, including sample and data collection as well as measurements and data analysis used in this quasi-experimental research; and a results and discussion section, in which the results of the studied three hypotheses are provided and discussed in relation to the previous pertinent literature. The paper concludes by highlighting the key findings, implications of these, and recommendations for future work.

Literature Review

Block mode of delivery

Block mode of delivery, also known as intensive or 'One-Course-At-A-Time' mode, is a teaching and learning model structured around short periods or 'blocks', commonly consisting of 4 to 6 weeks (Harkin & Nerantzi, 2021), in which the content of a single module or unit is delivered and assessed within the specific number of weeks that form the block. This mode allows students to focus on one module at a time, as opposed to the traditional semester or quarter system, generally consisting of 10 or 15 weeks respectively, in which students take several modules at a time and complete their pertinent summative assessments at the end of the term. Although block or intensive mode has been increasingly adopted by courses in higher education institutions (HEIs) worldwide from the 1990s, especially at postgraduate level (Grant, 2001; Burton & Nesbit, 2002), there has recently been a surge of interest in this type

of delivery involving undergraduate courses (Burk, 2020; Chau et al., 2022), as well as entire institutions (Buck & Tyrell, 2022; Harkin & Nerantzi, 2021).

This increase in block mode has been attributed to the efforts of HEIs to adapt to the changing student population and circumstances. Higher education is no longer exclusive to students from privileged backgrounds, but it involves a diverse student population with a raising number of mature students, part-time students, students with a specific learning difficulty, students who do not speak English as a first language, as well as students from low socioeconomic status (for example see UK data from HESA, 2022). In addition, the changing educational landscape, recently impacted by the COVID-19 pandemic, has resulted in an increase in alternate modes of delivery, including block mode (Buck & Tyrell, 2022). In this context, block mode plays a significant role, as numerous studies (Samarawickrema & Cleary, 2021; Harvey et al., 2017) have documented the improvement student engagement and performance, especially in non-traditional learners (Schuetze & Slowey, 2002; Burton & Nesbit, 2008), students with special needs (Samarawickrema et al., 2020), and students from widening participation groups (Loton et al., 2022). In Loton et al.'s (2022) findings, the change to block mode resulted in students achieving higher marks, especially students who were younger, or whose background was one of non-English-speaking, and low academic performance and socioeconomic status.

Whilst research in block teaching and learning has seen an increase in the past few years because of the raise in block delivery previously mentioned, it remains a rather novel approach that needs exploration. Research to date has focused primarily on the comparison between traditional and intensive courses (Kucsera & Zimmaro, 2010; Rawls & Hammons, 2012) or students and academic staff perspectives of intensive courses (Burton et al., 2002; Dixon et al., 2021; Kwan, 2022). However, given that the possible benefits of block mode have been confirmed in previous research, a move towards a deeper analysis that allows one to identify effective practices in block pedagogy seems imperative. Nerantzi & Chatzidamianos (2020) in their endeavour to provide guidance on course design based on a block teaching format implemented in a single HEI, imply the need for guidance in both curriculum and assessment design in block delivery, based on wider contexts and empirical research. Additionally, student performance in assessment has been reportedly affected by students' background (Dang et al., 2022), as well as contextual and disciplinary factors (Iannone & Simpson, 2017). Considering the distinctive characteristics of block mode as well as the diverse demographic profile of the current student population, reconsidering assessment in block delivery becomes a topic of utmost importance.

Summative Assessment in Block Mode

In a higher education system based on a culture of certification, the role of summative assessment becomes particularly important. As opposed to formative assessment, which allows to assess students' learning process, summative assessment is the most extensively used indicator of academic performance and achievement in HEIs worldwide due to its focus on determining the level of knowledge the student has achieved by using a grade against a standard or benchmark (Khaled & El Khatib, 2020; Kamara, 2022). Previous studies comparing students' achievement in traditional and intensive (or block) modes have concluded that students taking part in intensive (or block) mode courses score higher marks in summative assessments than those enrolled in traditional mode courses (Austin & Gustavson, 2006; Anastasi, 2007; McCluskey et al., 2020; Loton et al., 2022). This has been largely ascribed to the focus of block or intensive modes on one module per block as well as an increase in active teaching methods. The removal of competing schedules that allows the student to focus on one assignment at the time has been shown to result in improved time management and planning skills leading to increased motivation (Daniel, 2000; Davies, 2006). Furthermore, the increase

in summative assessment results in block mode has been attributed to an increase in class interaction and discussions, as well as a reduced number of students per group (Mishra & Nargundkar, 2015; McCluskey et al., 2020).

These studies have considered students' characteristics and have shown that while this improvement in achievement that occurs in block mode seems to apply to all students and particularly non-traditional students (Dixon & O'Gorman, 2020), there might be a variation in the effect of block mode on students' achievement depending on discipline. In their recent study, Loton et al., (2022) found that the effect was higher in students in business degrees and lower in arts and education students. However, it is worth noting that these studies base their findings on the comparison of final grades resulting from summative assessments without considering the type of assessment. As it has been previously suggested (Nerantzi and Chatzidiamos, 2020; Buck & Tyrell, 2021), differences between the mode of delivery in traditional and block modes might have an impact on the type of summative assessment most suitable for each mode; and therefore, the appropriateness of traditional types of summative assessment should be considered regarding the characteristics of block mode of delivery.

The most common traditional summative assessment methods include written assignments such as essays or reflective portfolios, and examinations such as multiple choice and essay tests (Dang et al., 2022; Khaled & El Khatib, 2020). The advantages and disadvantages of these have been widely identified in the previous literature on summative assessment in higher education. While Multiple Choice Question (MCQ) tests are considered as more objective, valid and reliable compared to written assignments and other types of tests, these have been extensively criticised for being less effective in measuring higher-order skills, which could result in memorisation and 'surface learning' (Dang et al., 2022; Scouller, 1998). Notwithstanding, written assignments and essay tests have been criticised for measuring students' writing skills rather than knowledge (Race, 2015). Another disadvantage of written assignments compared to examinations involves the time needed to complete the task, with students reportedly facing challenges in regard to lack of time to complete written assignments (see, for example, Sam et al., 2016). Yet written assignments have been regarded as more effective in providing students with feedback as opposed to examinations (see Race, 2015), especially in regards to MCQ and automated scoring tests, as this might be more elaborate.

When evaluating the appropriateness of these types of assessments in a block mode, short progressive tasks might be more suitable than long assignments that require considerable time given the short period of delivery per module in a block model. In their study on an intensive programme, Walsh et al. (2019) found that not only did students face challenges processing the learning and completing written assignments due to the limited time, but also lecturers encountered difficulties providing timely feedback. Multiple shorter or scaffolded tasks, on the other hand, could result in a more manageable workload (Chau et al., 2022; Dixon & O'Gorman, 2020), and would allow students to receive timely feedback, which could improve their learning and, ultimately, their academic achievement (Clark, 2022; Grant, 2001). Time-constraint type of assessments such as exams would also avoid these difficulties managing the workload, as those are commonly administered in a scheduled short period of time. In this type of assessment, however, students might take a surface learning approach as opposed to a more in-depth approach when completing written assignments (Dang et al., 2022) and students might get little or no feedback (Race, 2015). Nevertheless, bearing in mind that one of the advantages of block mode is its suitability to the needs of the current diverse student population, essay writing might put certain groups of students at a disadvantage due to the skills needed to write essays (Race, 2015), such as students with special needs or mature students who have not written an academic assignment in a long period of time. Thus, the revision of traditional modes

of assessment and the introduction of innovative modes that align with the characteristics of block delivery and ensure students' academic development and achievement should be considered by stakeholders when designing assessment in block mode.

Methods

As this study aimed to examine the impact of transitioning from a traditional semester delivery to an intensive block delivery, a quantitative, quasi-experimental design (Campbell & Stanley, 2015) was used to evaluate the impact of the transition and to investigate any differences that exist between the types of summative assessments used in block delivery. Due to the comparison containing different time periods, traditional delivery the academic year before the block delivery, and by nature contained different populations, this research design was the most appropriate to test the hypotheses and gain large-scale statistical insight. Furthermore, secondary data, which contained nominal, ordinal and discrete variables, was cleaned, coded and used to test the hypotheses by applying the relevant statistical methods, which in this case was an Independent Sample *t* Test (Creswell & Creswell, 2017).

Sampling and Data collection

The secondary data collected from the host institution was anonymised and included student enrolments per module for the 2020/21 and 2021/22 academic years. As this study aimed to evaluate the impact of transitioning to block delivery, the module enrolments used in the analysis were only for those modules that had a traditional teaching model in the 2020/21 academic year and transitioned to a block teaching model in the 2021/22 academic year. The variables in the dataset included the academic year, students' final module grade, the module level, the type of assessment used in the module, a variable stating if the module followed a block or traditional teaching model, and a variable stating if the module adapted the summative assessment/s when transitioning to a block teaching model.

Measurement

To evaluate the impact of transitioning to block teaching and to assess which types of summative assessments were more suited to block teaching, the students' final module grade was used as the discrete dependant variable for all hypotheses. This assumed that students achieving higher grades was an indicator of a more suited summative assessment and that students' grades was an indicator of impact for evaluating the transition to block teaching. Modules that adapted summative assessment/s for block teaching were filtered, and the academic year was used as the nominal independent variable for comparing students' final grades when the modules were traditionally taught to when these were block taught, testing H_1 . The type of summative assessment used in block teaching modules was the nominal independent variable used for testing H_2 and H_3 , as it enabled a comparison of students' final grades by the type of summative assessment.

Data analysis

Data were analysed in SPSS using inferential statistics, an Independent Samples *t* Test, accompanied by the relevant effect size measure, Cohen's *d*. If differences were statistically significant ($p < 0.05$), the effect size was interpreted following the prescribed order of magnitude: 0.2 being a small effect, 0.5 being a medium effect, and 0.8 being a large effect (Cohen, 2013). To ensure that the assumptions of these tests were met, data were cleaned and coded. Cleaning the data involved removing all data pertaining to students who were enrolled for the same module in both academic years, as the data sets needed to have independence of observations, and final grade outliers were removed, which involved determining the standard deviation and mean for the dataset ($SD = 16.5$, $mean = 61.9$), and removing all data that were

three standard deviations from the mean. Furthermore, data pertaining to students who withdrew from their studies were removed, and level 6 and level 7 student data were removed, which made up 3% of the sample as they were not the focus of this study. The cleaning process led to the removal of 326 records, which meant that the number of observations used for H₁ was 1 059, H₂ was 878, and H₃ was 1 217.

As for coding data, the types of summative assessments for block modules were processed and sorted into three categories: essay, time-constrained (such as examinations and time-limited practical tasks), or multiple summative assessments (such as presentations, practical tasks, or quizzes). Once this was completed, the distributions between groups in the population were analysed to determine if unequal distributions existed in the dataset. Descriptive statistics were organised by academic year, module level, whether summative assessments were adapted for block teaching, as well as the type of summative assessment used in block teaching modules (see Table 1).

Table 1. Module enrolments descriptive statistics

	n		%	
	2020/21	2021/22	2020/21	2021/22
Enrolments in modules that adapted summative assessment for block teaching				
First year	224	220	21%	21%
Second year	330	285	31%	27%
Enrolments by type of summative assessment in block teaching modules				
Single essay	-	532	-	34%
Time-constrained	-	346	-	22%
Multiple assessments	-	685	-	44%

Module enrolments by study level in modules that adapted their summative assessment for block teaching had a similar distribution between traditionally taught modules and block teaching modules, first year students being 21% in each year, with a total proportion of 42%, and second-year students being 31% and 27% respectively, making a total proportion of 58%. Therefore, second-year students were slightly overrepresented. Lastly, distributions between types of summative assessment in block teaching modules weren't similar, with an overrepresentation of the multiple summative assessment method at 44%, single essay at 34%, and time-constrained summative assessment at 22%. This unequal distribution needed to be considered when interpreting the results from the inferential statistical tests for H₂ and H₃.

Results and Discussion

Provided that the aim of this study was to examine the impact of adapting summative assessments to block teaching and to identify which types of summative assessments were more suited for block teaching, three hypotheses were tested.

H₁: Students who enrol for modules that adapt summative assessments for block teaching achieve higher final grades than students who enrolled for the same modules when traditionally taught.

This study found that students who enrolled for block modules with adapted summative assessments did not have statistically significant higher final grades (60.22 ± 13.66 std.

deviation) than students who enrolled in those same modules when taught traditionally (59.63 ± 12.60 std. deviation), $t(1026) = 0.733, p = 0.464$. Therefore, this study failed to reject the null hypothesis and cannot accept the alternative. Table 2 contains the results from the group statistics and independent samples test.

Table 2. Group statistics and independent samples test for H_1

Group statistics				Independent Samples t Test			
Teaching model	N	Mean	Standard deviation	t	df	Sig (2-tailed) equal variance not assumed	Mean difference
Traditional teaching	554	59.63	12.599	0.733	1026.265	p = 0.464	0.594
Block teaching with adapted summative assessments	505	60.22	13.660				

Adapting summative assessments for block teaching when transitioning from a traditional semester type of design did not have any impact on students' grades in this study, however, potential for increasing student performance by transitioning to block teaching has been found in previous studies (Buck & Tyrrell, 2022; Loton et al., 2022). One reason for no impact being found might be that as the year progressed, student attendance could have gradually declined in block teaching as was found by Dixon and O'Gorman (2020), hence, countering possible benefits from adapting summative assessments to block teaching as deep learning might have been hampered. It is worth noting however that this possibility cannot be corroborated as attendance records were not available for this study. Another reason could relate to the design and implementation of block teaching. Nerantzi and Chatzidamianos (2020) suggested a three-step plan to consider when moving to block teaching, consisting of designing blocks that follow a progressive learning pattern, using threshold concepts to chunk learning with a less-is-more attitude, and using frameworks to aid the construction of scaffolding for module blocks. To support the prescribed steps being followed, staff developments are considered crucial for the preparation and implementation of block teaching. However, research into summative assessments in block teaching is scarce, which could prove to be a challenge when designing development programmes for staff. To gain a deeper understanding on the challenges experienced during the transition and to identify areas for improvement, investigating these areas further would be beneficial. From another perspective, students' grades not being impacted from an initial institution-wide implementation of a new curriculum design could be seen as a positive sign, as there will naturally be room for improvement after such a large change, and as Burton and Nesbit (2002) found, students tend to prefer block once they have experienced it.

H₂: Students who enrol in block teaching modules that have multiple summative assessments achieve higher final grades than those who enrol in block teaching modules with a single essay as a summative assessment.

Students who enrolled for block modules with multiple summative assessments had statistically significant higher grades (65.10 ± 13.88 std. deviation) than those who enrolled for block modules with a single essay as a summative assessment (57.68 ± 13.16 std. deviation), $t(1215) = 9.456, p < 0.001$. This difference had a medium effect size, $d = 0.546$. Therefore, the

null hypothesis was rejected, and the alternative hypothesis accepted. Table 3 contains the results from the group statistics, independent samples test, and independent samples effect size.

Table 3. Group statistics, independent samples test, and independent samples effect size for H_2

Group statistics				Independent Samples t Test				Independent Samples Effect Size
Type of summative assessment	N	Mean	Standard deviation	t	df	Sig (2-tailed) equal variance assumed	Mean difference	Cohen's d
Single essay	532	57.68	13.162	9.456	1215	$p < 0.000$	7.415	0.546
Multiple assessments	685	65.10	13.876					

This result highlights a significant difference between the types of summative assessments and the students' average grades, where the difference between average grades was 7.4 percentage points in favour of multiple assessments. This is a clear indication that the type of summative assessment is an important consideration in block teaching. As mentioned in the literature review, Walsh et al. (2019) found that students might struggle to process the learning material and complete assessments that are less frequent, and as a consequence, recommended breaking up larger, less frequent assessments into smaller, more frequent assessments. Based on the above results, it is evident the recommendation is statistically supported and should be considered when teaching in blocks. Rethinking summative assessments is further emphasised by Dang et al. (2022) who found students prefer multiple-choice assessments even though they have been habituated to examination and essay assessments. Due to the intensiveness and time limitations of block teaching, multiple assessments may offer the flexibility needed to adjust to workload and offer an assessment that is more reflective of the students' learning (Chau et al., 2022). Additionally, multiple assessments have the potential to increase feedback from lectures, and ultimately, improving learning and achievement (Chau et al., 2022; Grant, 2001). As for single essays as a summative assessment in block, there is evidence to suggest it may put certain students at a disadvantage (Race, 2019). It can thus be suggested that innovative approaches to summative assessments in block teaching, such as multiple assessments, are needed, and evidence to support these innovative approaches is crucial to inform practice.

H₃: Students who enrol in block teaching modules that have a time-constrained summative assessment achieve higher final grades than those who enrol in block teaching modules with a single essay as a summative assessment.

Students who enrolled for block modules with time-constrained summative assessments had statistically significant higher grades (68.10 ± 17.57 std. deviation) than those who enrolled for block modules with a single essay as a summative assessment (57.68 ± 13.16 std. deviation), $t(591) = 9.435$, $p < 0.001$. This difference had a medium to large effect size, $d = 0.692$. Therefore, the null hypothesis was rejected, and the alternative hypothesis accepted. Table 4 contains the results from the group statistics, independent samples test, and independent samples effect size.

Table 4. Group statistics, independent samples test, and independent samples effect size for H_3

Group statistics				Independent Samples t Test				Independent Samples Effect Size
Type of summative assessment	N	Mean	Standard deviation	t	df	Sig (2-tailed) equal variance not assumed	Mean difference	Cohen's d
Single essay	532	57.68	13.162	9.435	591.494	$p < 0.000$	10.414	0.692
Time-constrained	346	68.10	17.574					

The above results indicate a significantly higher average student grade for time-constrained summative assessments compared to single essay assessments, the difference being 10 percentage points. While essays and time-constrained assessments are more traditional approaches to summative assessment, these results suggest that time-constrained assessments are better suited for block teaching. This could be a consequence of the time and effort required by the student, as well as the students' retention of the content being greater at the time of assessment, considering less time would have passed before the assessment compared to a traditional delivery. However, time-constrained assessments do have certain limitations, such as assessing students' ability to recall content and not reflecting higher order skills (Dang et al., 2022). Another limitation lies in feedback, time-constrained assessments, such as examinations, do not offer continuous feedback during the learning of a module, which is a crucial element of the learning process (Race, 2015). This feedback limitation is significant as one benefit of block teaching is the opportunity to provide more frequent feedback to students about their learning. That said, the results are clear that time-constrained assessments are better suited for block teaching compared to single essay assessments, and as such, should be given careful consideration when designing assessments for block teaching.

Conclusion and Further Research

The data from this study have indicated that there may be a direct correlation between types of assessment used in block learning and student achievement. Students in modules with a single time-constrained assessment and modules with smaller, multiple assessments that occur throughout the module achieved significantly higher average grades when compared to students in modules assessed by a single essay or report.

This study suggests that enabling students to complete multiple shorter assessments enables a more effective way of scaffolding learning. This mode enables students to receive frequent and regular feedback, to be able to apply and test understanding of feedback in further work. Crucially, this further supports findings in earlier research that block delivery boosts the student's sense of self as an effective learner (Buck & Tyrell, 2022).

In developing assessment frameworks for block pedagogies, the need for course teams to focus on what is being assessed and the best methods for assessing it must be brought together with consideration of the cumulative development of knowledge and confidence through the

academic cycle, and even, potentially the competing demands on a student's time. Innovative assessment can be compassionate assessment and speak to the agenda of reimagining delivery for more contextualised learning which acknowledges diverse needs and spans disciplines. Evidence has shown that individual assessment preferences overshadow the differences among departments or courses.

As this study acknowledges, research into the impact of assessment types in block, on student achievement is limited. This study, is itself, based only on data obtained over two years, during which COVID restrictions were in place for part of the 2020/21 academic year and therefore should be considered when interpreting the results of this study. Furthermore, the longer-term impact of a strategic approach to assessment which promotes achievement and success as an intrinsic part of its design would be beneficial. Further research should explore difference between shorter, frequent assessment types, e.g., multiple choice questions *versus* exam type questions, as well as the wider application of multiple-choice quizzes/tests/examinations (T-MC), closed-book written quizzes/tests/examinations (T-CB), open-book written quizzes/tests/examinations (T-OP), or project reports/essays (W-PE). Larger scale datasets enabling greater comparison between disciplines and course types should also be considered.

There is also scope for qualitative research to enable greater understanding of the lived experience of assessment from the perspective of both staff and student communities. It is easy to see the potential in a UK context of teaching excellence framework, widening access, equity of opportunity, continuation, completion and achievement. It is also reasonable to suppose that such approaches may positively impact on wellbeing, and progression into further higher study or graduate employment because of greater sense of self efficacy and confidence.

Disclosures

No conflicts of interest, financial or otherwise, are declared by the authors.

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