“You can concentrate better on the topics and invest more time in it”: A case study evaluating the impact of immersive scheduling on students

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Abstract

This case study explores the influence of immersive scheduling or block teaching introduced in the first semester to two cohorts of the first-year undergraduate Business Administration (BBA) programme at the Flensburg University of Applied Sciences in North Germany. Instead of the traditional scheduling of long-thin modules in parallel, the delivery of the BBA programme first semester was changed to short-fat modules in sequence. The two blocked modules were offered as a ‘layer’ alongside other traditionally scheduled modules. This study aims to evaluate the influence of layered-blocked scheduling on academic achievement, learning, understanding, engagement, motivation and satisfaction and clarify the different immersive scheduling arrangements in the literature.

The results of a mixed-method approach show that compared with previous cohorts, immersive scheduling enhanced students' achievement for the blocked modules. An anonymous questionnaire completed at the end of the block teaching indicates strong self-reported benefits in terms of learning, understanding, engagement, motivation and satisfaction. This is reflected in the qualitative responses, which additionally indicate students' support for immersive scheduling in the future. The paper concludes by discussing the findings and suggesting areas for further discussion and research.

Keywords: Immersive Scheduling; Block Teaching; Academic Achievement; Student Experience; Business Education

Background

Within the European context, modular education became established for under- and postgraduate education as part of the Bologna Agreement in 1999 (Loughlin *et al*., 2021). Within this modular learning framework, a typical undergraduate programme constitutes 180 ECTS (European Credit Transfer System) or 360 CATS (Credit Accumulation and Transfer Scheme) in the United Kingdom (UK), spread over three or more years. Each year is divided into two or more semesters. The curriculum is organised into independent credit-bearing long-thin modules that are scheduled in parallel over a semester (Tight, 2012). Modular education has various institutional and student benefits, according to French (2015). For instance, it allows the former economies of scale and flexible adaptation of its course portfolio in response to social and economic demands, while offering flexibility and mobility for the latter, as credits can be accumulated and transferred, depending on individual needs and circumstances.

However, the 'traditional' learning framework (Burton and Nesbit, 2008) might come with considerable disadvantages for students' learning. Within the framework, students' attention is divided across multiple long-thin modules, and the range of topics will change frequently during the day and week. As the curriculum is broken down into small units, students might experience little connection between the modules, topics, learning activities and assignments (French, 2015). This divided attention and disconnect between topics might lead to conflicting priorities and demands, affecting students' academic achievement, engagement and motivation (Martens and Metzger, 2017). Initiatives to enhance students' learning and depth of engagement, without making changes to the traditional scheduling, include, for instance, redesigning or merging long-thin modules into long-fat ones (van der Sluis and May, 2015).

Immersive scheduling or block teaching seeks to overcome the disadvantages of traditional scheduling through a structural change in delivery. Lacking a clear definition, immersive scheduling is associated with compressed, condensed or intensive forms of scheduling. With considerable variation (see below) the purpose of blocked scheduling is to teach a single semester-long module, over a short, concentrated time, while keeping the contact- and self-directed learning time equivalent. The switch from long-thin to short-fat modules, also called blocks, enables students to immerse themselves in, or concentrate on, one topic intensively (Burton and Nesbit, 2008; Nerantzi and Chatzidamianos, 2020). Literature reviews have shown that, in comparison to semester-length modules, immersive scheduling results in either the same or better learning outcomes (Burton and Nesbit, 2008; Daniel, 2000; Davies, 2006). Furthermore, case studies have reported enhanced motivation, commitment and satisfaction levels with blocked modules. Students feel that they have greater concentration and immersion in the subject and they report improved relationships between peers and tutors. However, the case studies have stressed the organisational complexities of implementing immersive scheduling (*cf*. Beudels *et al*., 2022; Dixon and O'Gorman, 2020; Karaksha *et al*., 2013; Kucsera and Zimmaro, 2010; Lutes and Davies, 2018, Metzger and Haag, 2016; Metzger and Vollmer, 2017; Richmond *et al*., 2015; Scott, 2003; Swain, 2016). Institutions in the United States, Australia and the UK, which implemented blocked scheduling throughout their undergraduate provision, reported promising results, in particular for diverse student populations (McCluskey *et al*., 2019; Samarawickrema and Cleary 2021; Turner *et al*., 2021). Despite the growing number of evaluations, the research to date is considered limited (Burton and Nesbit, 2008; Dixon and O'Gorman, 2020) and immersive scheduling exists in various arrangements, something not addressed in the literature.

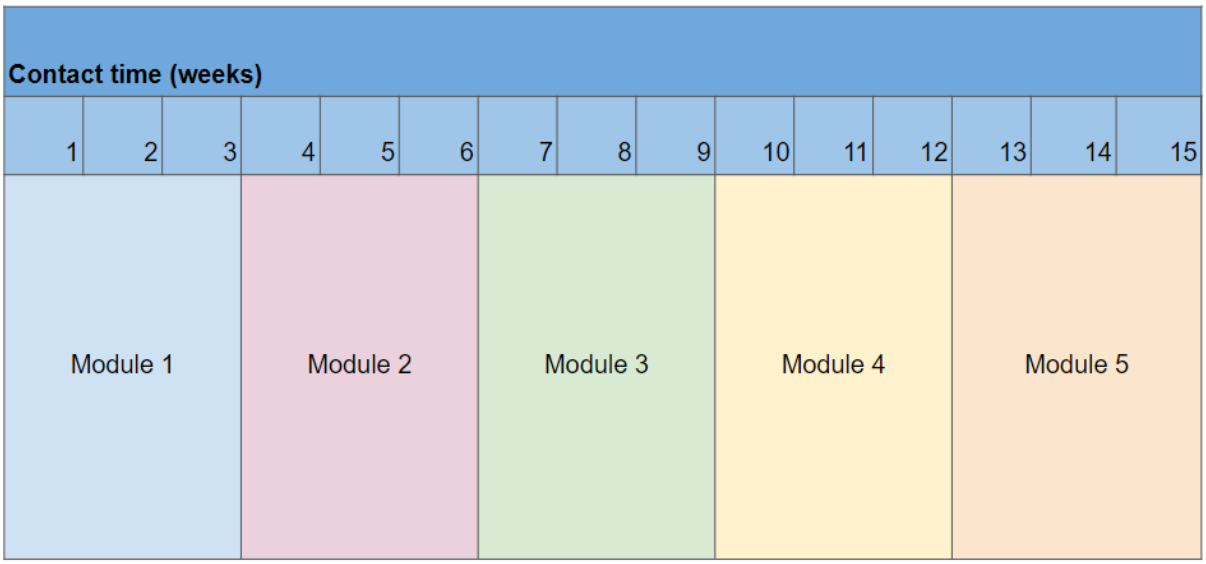
This case study contributes to the limited research by evaluating the introduction of immersive scheduling in a first-year undergraduate (Bachelor) Business Administration (BBA) programme at Flensburg University of Applied Sciences in Germany while clarifying the different arrangements of immersive scheduling. In this study, layered-block teaching was introduced within the first semester of two cohorts of the BBA programme to understand whether a change in the learning framework might enhance students' academic achievement, learning, understanding, engagement, motivation and satisfaction.

Implementation of immersive scheduling

Immersive scheduling has been implemented in various ways. Experiments with compressed teaching formats have, for instance, focused on a single module, outside regular term times (Burton and Nesbit, 2008; Davies, 2006). Within a traditional undergraduate learning framework, students are taught several long-thin modules in parallel over multiple weeks, which are completed in an assessment period at the end of a semester (Tight, 2012). As an example, see figure 3.

An implementation of immersive scheduling might be called fully blocked immersive scheduling, and positive results for students' academic achievement have been reported by, for instance, Victoria University, Melbourne, Australia. The fully blocked semester required a redesign of all of its long-thin to short-fat modules, scheduled in sequence over a semester. Each module is completed at the end of a block, reducing (figure 1) the need for an assessment period (McCluskey *et al*., 2019; Samarawickrema and Cleary, 2021).

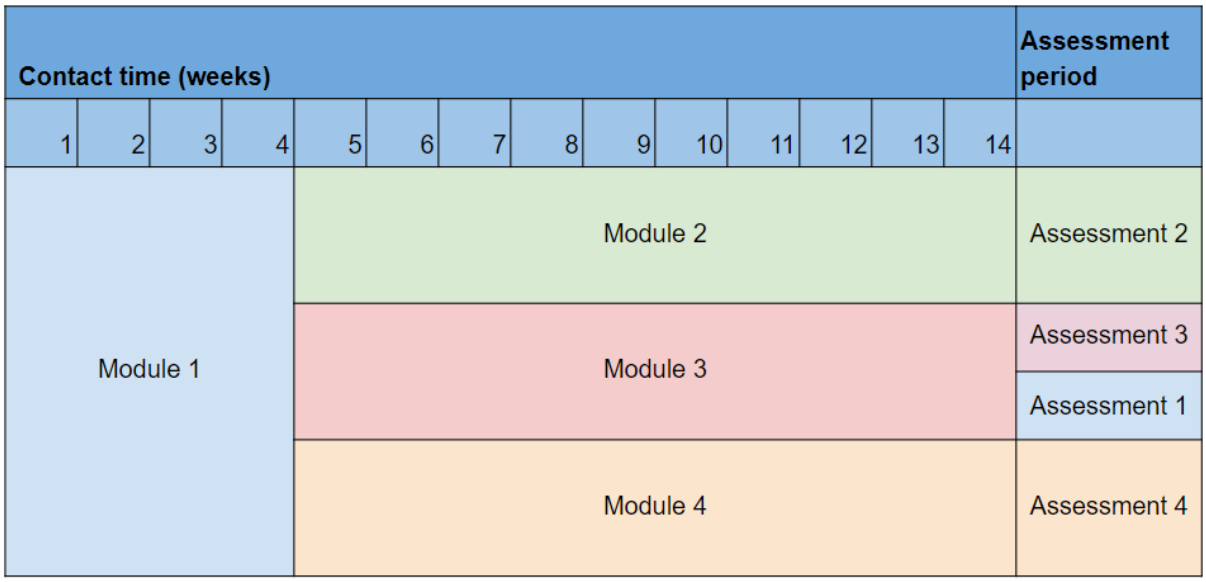
Figure 1: Fully blocked semester



Another implementation might be called front-blocked immersive scheduling, and positive results for students' academic achievement have been reported by, for instance, the University of Plymouth, UK. Front blocking (figure 2) starts with a short-fat block, followed by long-fat blocks or traditionally long-

thin scheduled modules in parallel, each of which is completed with an assignment in an assessment period (Turner *et al*., 2021).

Figure 2: Front-blocked semester



This case study explores another arrangement, which might be called layered-blocked immersive scheduling. Similar to what is described in the case studies by Metzger and Haag (2016) and Metzger and Vollmer (2017), an opportunity for block teaching arose as one of the authors led two modules. Before the introduction of immersive scheduling, the first semester of the BBA programme constituted six modules, five ECTS each, taught over fourteen weeks, followed by an assessment period of two weeks (figure 3). Each module was completed by an invigilated assessment, except for the skills and competency-focused modules, Digital Economy and English and Study Skills, which were completed through coursework, presentations, viva voce and an assignment.

Figure 3: Traditional scheduled BBA semester

Modules nr	Contact time (weeks)														Assessment period
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1	Mathematics														Assessment
2	Economics														Assessment
3	Introduction to Business Administration (IBA)														Assessment
4	Accounting 1: Introduction to Accounting and Bookkeeping (Acc1)														Assessment
5	Digital Economy														-
6	English and Study Skills														-

Two previously long-thin modules: a) Introduction to Business Administration (IBA) and b) Accounting 1: Introduction to Accounting and Bookkeeping (Acc1) were scheduled as short-fat blocks in sequence, while the remaining long-thin modules were delivered traditionally (figure 4). Similar to fully-blocked scheduling, the modules Acc1 and IBA were completed directly at the end of the block teaching, and a mid-semester assessment was contentiously negotiated for IBA with the Examinations Office for week 8.

Figure 4: Layered-blocked first BBA semester

Modules nr	Contact time														Assessment period
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1	Mathematics														Assessment
2	Economics														Assessment
3/4	Introduction to Business Administration (IBA)							Accounting 1: Introduction to Accounting and Bookkeeping (Acc1)							Assessment
5	Digital Economy														-
6	English and Study Skills														-

The BBA programme has two intakes per academic year. The first BBA semester starts in either the winter semester (WiSe) (~ September-February) or the summer semester (SuSe) (~ March-August). The layered blocked semester was introduced during the summer semester of the academic year 2018-19 (SuSe18-19) and the winter semester of 2019-20 (WiSe19-20).

To make immersive scheduling more effective, the literature suggests that block teaching benefits from a student-centred teaching approach and prompts to keep students on track (*cf*. Davies, 2006; Lee and Horsfall, 2010; Nerantzi and Chatzidamianos, 2020). Moreover, immersive scheduling, such as front-blocked scheduling, could be conducive to inductive learning and teaching approaches (Prince and Felder, 2006), such as inquiry- or problem-based learning. Nevertheless, it was decided to keep the delivery the same to ensure a valid comparison of the academic achievement of the IBA and Acc1 modules with previous cohorts. Except for some necessary changes to accommodate the blocked scheduling, the format of the lectures, tutorials, case studies, activities and final assessments remained the same for the different cohorts described in this study.

Data collection and analysis methods

To evaluate the influence of layered immersive scheduling, a mixed-method approach to research, combining quantitative and qualitative methods, was taken (Bryman, 2015; Creswell, 2018). To evaluate the influence of blocked scheduling on students' academic achievement, the marks of the final assessment were compared with traditionally taught cohorts, using the nonparametric Mann-Whitney U test in SPSS 28, as the assumption of normality for an independent T-test could not be met (Boslaugh and Watters, 2008; Field, 2018). The difference in means was established by comparing the combined marks of two previous traditionally taught cohorts (SuSe17-18) and (WiSe18-19) as the control group, with the combined marks of the layered blocked taught cohorts (SuSe18-19) and (WiSe 19-20) as the intervention group, for the IBA and Acc1 modules. To ensure the independence of the sample, only students who had completed the modules and assessments for the first time were selected – thereby excluding, for instance, resit students – from both the control and intervention groups (Field, 2018). In terms of interpreting the findings, the German HE Grading System (1-5) is equivalent to the ECTS (A-E) system, with 1.0 meaning very good, 4.0 being a pass and 5 being insufficient/fail (KMK, 2019).

To understand the influence of immersive scheduling on students' learning, understanding, engagement, motivation and satisfaction, a voluntarily anonymous pen-and-paper questionnaire was designed and delivered at the last session of each taught block (Gillham, 2008). The questionnaire, containing seven closed-ended questions, explored the following three topics:

- Learning and understanding. Students' perception of the block teaching for their learning and understanding of the content.
- Motivation and engagement. Students' perception of their motivation and commitment to study subjects offered with block teaching.
- Satisfaction. Students' satisfaction with the block teaching.

To supplement the quantitative findings and ensure the inclusion of the student perspective, each topic was closed with an open-ended question, inviting students to comment and/or elaborate on their

choices (Gillham, 2008). The questionnaire was completed by 149 respondents. Combined, the respondents left 269 responses to the open-ended questions. Considering the repetition found within the responses, it was decided to analyse all of the comments combined using thematic analysis, taking the questionnaire topics above as the main themes (Clarke and Braun, 2013). The findings from the questionnaire are presented using descriptive statistics, supplemented with themes shared among the participants. The research approach was reviewed by the university ethics committee and has received a favourable opinion.

Results

A summary of the comparison of the means and the Mann-Whitney U Test is presented in table 1. For module IBA, the results indicate that the mean marks of the intervention group (M = 3.0, Mdn = 2.7) improved compared with the control group (M = 3.4, Mdn = 3.3). The Mann-Whitney U test indicated that this difference was statistically significant for IBA, U ($n_{Control}$ = 165, $n_{Intervention}$ = 188) = 12140,5, z = -3,027, p < .05). The mean marks for module Acc1 indicate a slight improvement between the intervention (M = 3.0, Mdn= 2.7) and the control (M = 3.0 Mdn = 3.0) group. However, the Mann-Whitney U test indicates that this difference was not statistically significant for Acc1, U ($n_{Control}$ = 133, $n_{Intervention}$ = 142) = 9302.0, z = -0.216, p > .05).

Although the difference in the improved means for IBA compared to Acc1 was more pronounced and significant, the results indicate that immersive scheduling produces either the same or better learning outcomes, which is in line with the literature (Burton and Nesbit, 2008; Samarawickrema and Cleary, 2021; Turner *et al.*, 2021).

Table 1: Summary of the Control and Intervention marks

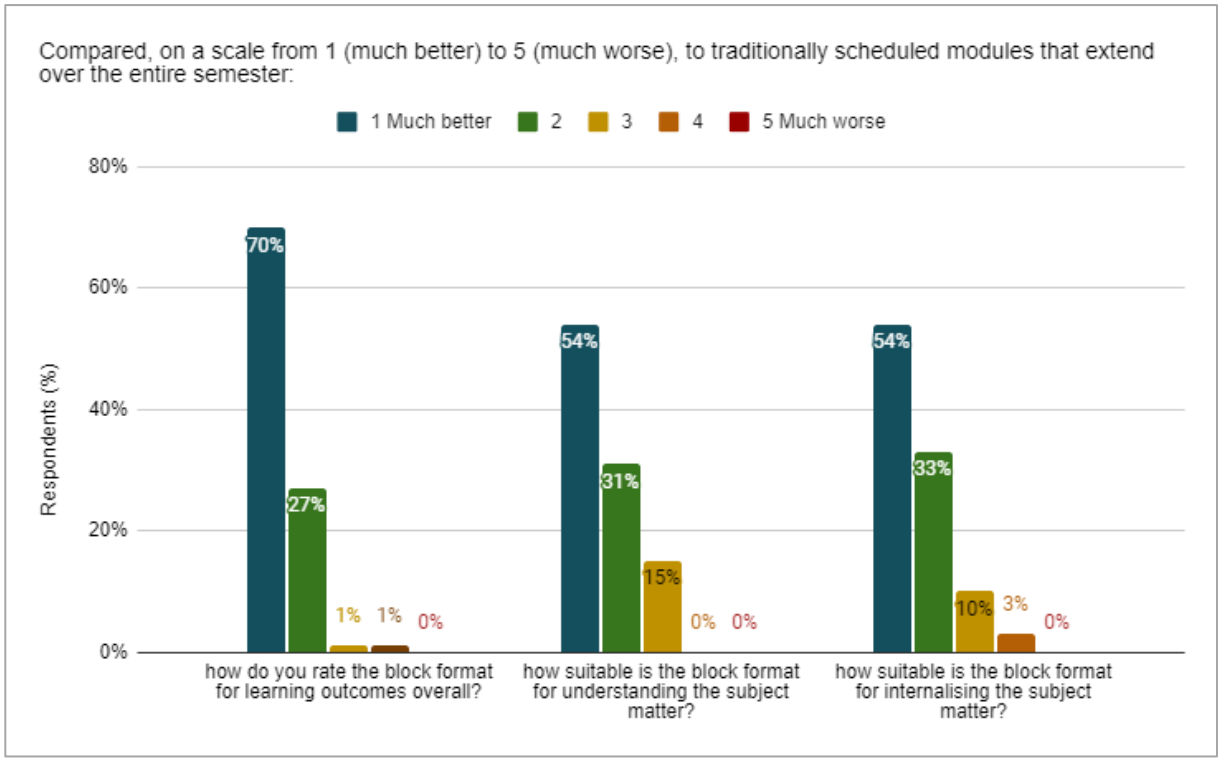
		IBA	**Acc1**
Control	n	165	133
	mean	3.358	3.047
	median	3.300	3.000
Intervention	n	181	142
	mean	2.977	2.997
	median	2.700	2.700
Mann-Whitney U	Mann-Whitney U	12140.500	9302.000
	Z	-3.027	-.216
	p-value (2-tailed)	.002	.829

The value of immersive scheduling was also reflected in the questionnaire results, which indicated self-reported benefits in terms of students' learning, understanding, engagement, motivation and satisfaction.

Students reported strong benefits in terms of learning and understanding, in line with the literature (Metzger and Haag, 2016; Metzger and Vollmer, 2017) (figure 5). Almost all (97%, 'much better' and 'better' combined) of the respondents rated the block format in comparison to the traditionally scheduled modules as beneficial for achieving the learning outcomes. Most respondents (85%, 'much better' and 'better' combined) rated the block format as suitable for understanding the subject matter, and 87% ('much better' and 'better' combined) rated it as suitable to internalise the subject matter. Within the comments, respondents recognised the benefits of the reduction in the overall number of modules within a semester and the concentrated contact time for the blocked subjects. This made it "easier to concentrate", they "experienced fewer distractions", it helped them to "stay on topic", and the "regular reminders, refreshers and repetition" within the week made it easier to "remember" and "internalise" the content (Metzger, 2018; Scott, 2003).

"In my opinion, you can concentrate better on the subject matter since you do not have too many subjects at the same time."

Figure 5: Learning and understanding

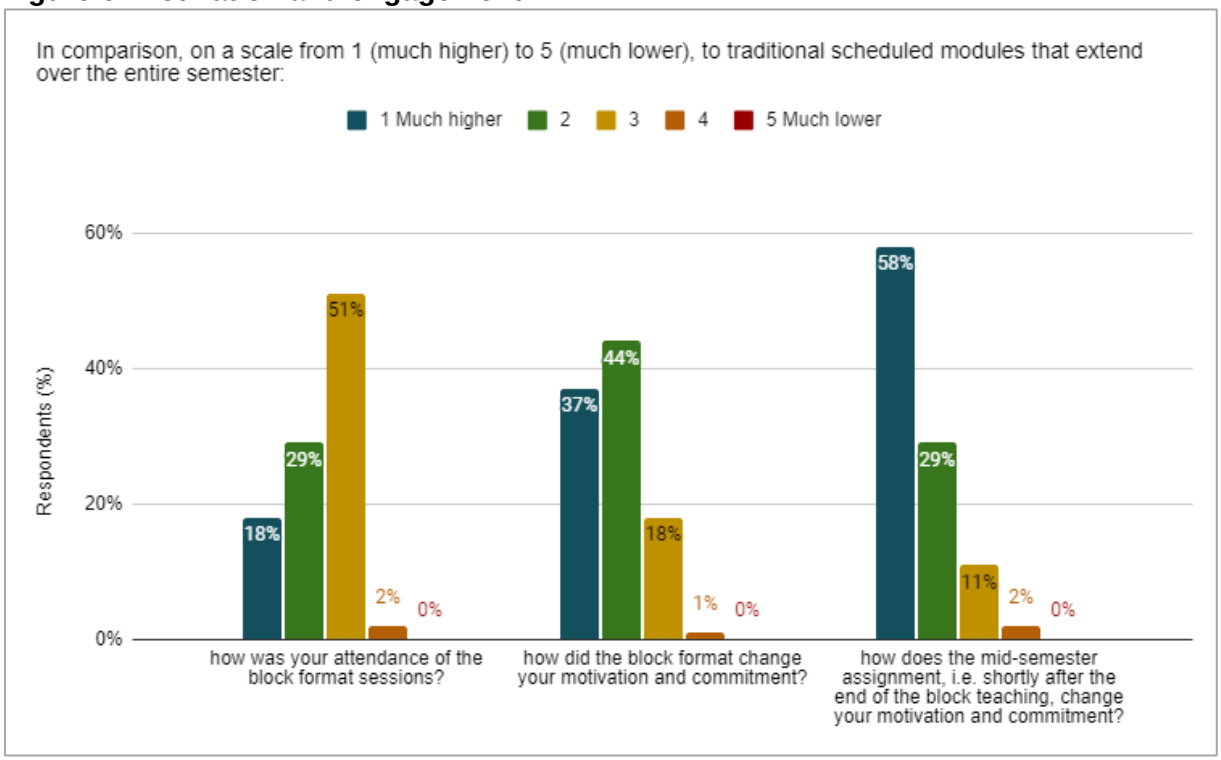


Students reported high levels of motivation and engagement for the blocked modules, in line with the literature (*cf*. Kucsera and Zimmaro, 2010; Scott, 2003; Richmond *et al*., 2015) (figure 6). In comparison to the traditionally scheduled modules, a slight majority (51%) of the respondents reported little change in terms of their attendance, while almost half (47%, 'much higher' and 'higher' combined) indicated that their attendance had increased for the blocked modules. A considerable increase was

reported in terms of motivation; 81% ('much better' and 'better' combined) of the respondents felt more motivated and committed to the blocked modules. In particular, the mid-semester assignment to complete the blocked IBA module positively influenced respondents' motivation (87%, 'much higher' and 'higher' combined). This was reflected in the comments. According to the respondents, the blocked structure allowed them to "engage and concentrate" on the case studies, examples and activities, "without distractions", increasing their internal motivation. Other respondents felt externally motivated as the condensed contact hours required "the need to stay on the topic", to avoid "being left behind" if they did not engage (Metzger, 2018). Respondents recognised the benefit of immersive scheduling in terms of feedback. Not having "to wait a week to raise questions", queries and/or issues was seen as beneficial for "staying on track" and remaining motivated (*cf*. Metzger and Vollmer, 2017; Samarawickrema and Cleary, 2021). Many respondents related their increase in engagement to the mid-semester assignment, which was an external motivator that helped "relieve", or "reduced" the pressure during the assessment period.

> *"I actually start reviewing more often right after the sessions as the important exam date is much closer. That adds some pressure".*

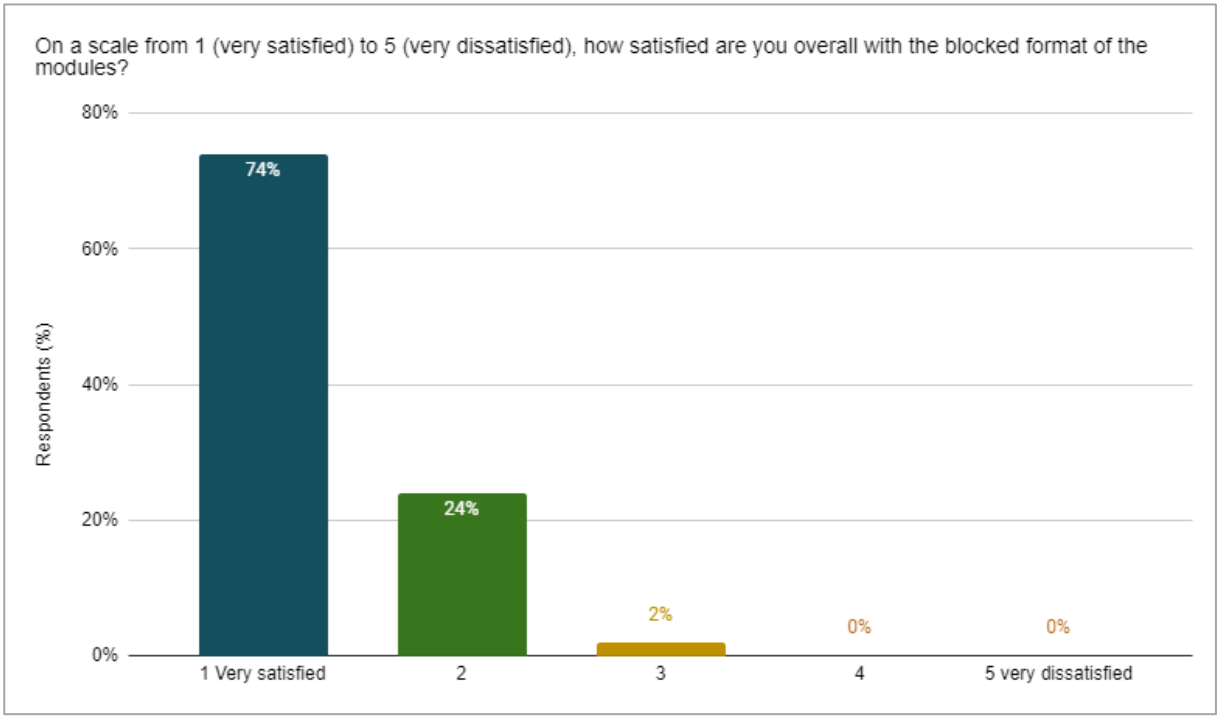
Figure 6: Motivation and engagement



In line with the literature (Karaksha *et al*., 2013; Kucsera and Zimmaro, 2010; Richmond *et al*., 2015) 98% ('very satisfied' and 'satisfied' combined) of the respondents indicated strong satisfaction with the block format (figure 7). In the comments, satisfaction was associated with the learning benefits, an increase in motivation and commitment, and the quality of the lectures, tutorials and learning materials. Many respondents commented that they could see the benefits of more subjects being offered in a block format per semester, although some did balance this against the potential "increase in workload", "competing demands" between modules, and the characteristics or academic demands of a subject (Burton and Nesbit, 2008; Lutes and Davies, 2018).

"Please keep using this block format, it's so much better".

Figure 7: Satisfaction



Limitations and looking forward

The results of this case study suggest that immersive scheduling has the potential for addressing some of the limitations of the traditional modular learning framework (Davies, 2006; French, 2015; Martens and Metzger, 2017). In alignment with other studies exploring layered-blocked scheduling (Metzger and Haag, 2016; Metzger and Vollmer, 2017), the findings suggest that students could benefit in terms of their academic achievement, learning, understanding, engagement, motivation and satisfaction, and from the opportunity to concentrate and immerse themselves intensively in the blocked modules, as discussed above. Moreover, this paper has contributed to the discussion on immersive scheduling, identifying that there are different arrangements in the literature, including fully, front and layered block scheduling, the particularities of which need to be further explored and considered for future evaluations.

The results need to be interpreted, taking into account the familiar limitations of a case study in terms of sample size, the duration of the intervention, and the generalisability and transferability of the results to another setting (Yin, 2018). To ensure the validity of a comparison between the traditional and immersed scheduled cohorts, it was decided to keep the delivery the same, except for some necessary changes. However, immersive scheduling is conducive to student-centred and/or inductive approaches to learning and teaching (Davies, 2006; Lee and Horsfall, 2010) and the interpretation of the results with future studies might need to reflect this. Moreover, as other course teams have experienced, the level of organisational and institutional support from, for instance, timetabling, the

Examinations and Quality Office should be considered while implementing immersive scheduling (Metzger and Haag, 2016; Swain, 2016). This experiment was discontinued owing to the coronavirus pandemic (COVID-19). Although Nerantzi and Chatzidamianos (2020) suggest that immersive scheduling could mitigate some of the limitations of emergency remote teaching (Hodges *et al*., 2020), the constrained institutional resources did not enable exceptions, such as mid-semester assignments, resulting in the discontinuation of this study. Other course teams considering implementing immersive scheduling might want to take into account the wider institutional challenges that might affect their evaluations.

As discussed above, most of the respondents experienced block teaching as beneficial for their learning. Nevertheless, concerns were raised concerning competing demands that might hamper students from engaging. Some respondents raised the issue of an illness that led them to “miss out considerably”, owing to block scheduling, a concern that remained unresolved in this study and the literature (Turner *et al*., 2021). Further implementations of immersive scheduling might wish to find the means to enable students with valid reasons to catch up. Other respondents raised the issue of the potential cannibalism of their time, which might be particular for front- and layered-blocked scheduling (*cf*. Lee and Horsfall, 2010). Although they valued the concentration on a single subject, this could potentially come at the expense of other scheduled modules in parallel. Further studies on front- and layered-blocked scheduling might wish to explore how students' time and attention could be guided over their various commitments. Aligned with Richmond *et al*. (2015) some respondents raised questions concerning learning and retention. They confirmed the benefits of immersive scheduling for acquiring new content and skills but raised questions about the long-term retention of their knowledge and competencies. Expressing strong support for further block teaching, some respondents asked whether immersive scheduling is suitable for all modules, in particular for academic or cognitively demanding subjects, which instead might benefit from prolonged opportunities for reflection and feedback to develop an understanding (*cf*. Burton and Nesbit, 2008; Lutes and Davies, 2018). Many evaluations, including the results of this case study, have investigated the effect of immersive scheduling on academic performance (Davies, 2006). However, further work is needed to advance our understanding of immersive scheduling on the acquisition and long-term retention of students' knowledge and competencies (Ausubel, 2012).

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