Evaluation of a flipped classroom model base on students' perceptions: An undergraduate engineering module case study

Cooke, Gill[a] Smith-Ortiz, Adriana[a] Mazurkiewicz, Piotr[a]

WMG, University of Warwick, UK[a]

Corresponding Author's Email: adriana.smith-ortiz@warwick.ac.uk

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ABSTRACT

Flipped classroom approach has become popular due to the potential for creating deep learning experiences using active learning and the use of technology that facilitates the implementation of the approach (Abeysekera and Dawson, 2014). The aim of this research is to assess whether the Flipped Classroom model designed and implemented by the authors is perceived as effective by engineering students on the mandatory second year management module.

The supplemental blended learning model (Twigg, 2003) was used to create a delivery model consisting of lectures, out-of-class activities and ending with flipped classroom seminars. The fortnightly lectures and online learning material underpinned the in-class activity-led seminars which in turn aligned to the assessment. Given the requirements for students to manage their engagement with learning outside of the classroom, self-regulated learning has been considered within the study.

The authors collected the data using two online pre-validated questionnaires (Shih, Liang and Tsai, 2019) via Qualtrics and applied descriptive statistical analysis tools and the Pearson correlation analysis, using SPSS software. Results indicated that students perceived the activity led learning part of the flipped classroom (seminars) as a positive experience and are satisfied with how the experience enhanced their learning. Survey analysis revealed students reported a lack of critical engagement with the online material, inconsistently allocating time to learning nor systematically preparing for the face-to-face activity led learning seminars. There was general agreement the flipped classroom approach required more self-regulated learning skills.

INTRODUCTION

The Problem

Technical Operations Management is a mandatory module for the 300+ second years on the suite of School of Engineering (SoE) programmes. It runs in the Autumn Term alongside three other mathematical and engineering science-based modules. Since its' inception in 2017 both low attendance and poor student satisfaction have prevailed, when compared to the other three modules. Pre-covid19 it was taught entirely in traditional lectures and during the pandemic it became fully online consisting of asynchronous (pre-recorded) lectures. Therefore, the module team decided to redesign the approach to teaching and learning, grounding the revisions in pedagogic research whilst aligning to the School of Engineering teaching model.

SoE Model: Learn-Apply-Reflect (LAR)

The SoE model requires each module to structure the learning around three phases:

1. Learn: the primary mechanism for covering knowledge content such as lectures, or additional reading and asynchronous passive content.
2. Apply: is to enable students to actively apply their learning, for example, through online quizzes, problem sheets, tasks/questions.
3. Reflect: the opportunity for students to take responsibility for self-assessing whether they are confident with their learning or need further support, for example through drop-in sessions, discussion forums, lecturer office hours etc.

These stages were used as the basis for the redesign and integrated with pedagogic theories on Flipped Classroom.

The Intervention: LAR and Flipped Classroom Model

The primary underpinning of the redesign was based on flipped classroom approach adapted to reflect the supplemental approach (Twigg, 2003). "In the supplemental model, the traditional face-to-face course structure and class meeting times are retained and out-of-class activities are introduced to enhance student learning"(Liyanapathirana and Mirza, 2019). A blended approach was included in the redesign to facilitate the out-of-class activities.

However, the reliance on the use of out of class activities represented the largest change in this redesign particularly in comparison to other modules concurrently studied by the students due to the reliance on students being self-regulatory in their engagement with the online learning environment. (Evans, 2021) has noted that "whether students choose to adopt self-regulatory learning focused approaches is of central importance" and this will impact the success of the adopted model.

The stages of the LAR model, as applied to the redesign are:

Learn – Before the Seminar

The learning cycle starts with a face-to face lecture that occurs every two weeks and where new topics are introduced that provide the foundations for the content, structure and scaffolding for further knowledge. The students are then directed to the asynchronous material shared in the learning platform, Moodle. The material is consistently structured week by week involving a combination of pre-recorded lecture, short videos, and research papers or e-book chapters. This material builds on the lecture by adding depth of content to build knowledge. Self-regulated learning skills are needed to engage with these learning resources.

Apply – Before and During the Seminar

On Moodle the Apply section consists of activities/tasks/questions (aligned to Learn self-regulated learning tasks) for students to use to deepen their understanding through the application of their knowledge prior to the seminar. Again, students are expected to use this material for self-regulated online learning.

A week after the lecture, a timetabled face-to-face seminar forms the basis of the Flipped Classroom and consists of activities designed to focus on developing higher cognitive skills, building on the asynchronous self-regulated learning. During the seminars the FC and Collaborative learning (CL) approach are combined by setting group work activities that allow the students to apply their knowledge acquired prior to the seminar. The students are given an activity or problem to solve, more challenging than those provided online and are encouraged to express their opinions, work, and discuss with their colleagues to identify a solution, which is shared with peers in the seminar. In addition, these activities are deliberately designed to support the summative assessments.

Reflect – Before and After the Seminar

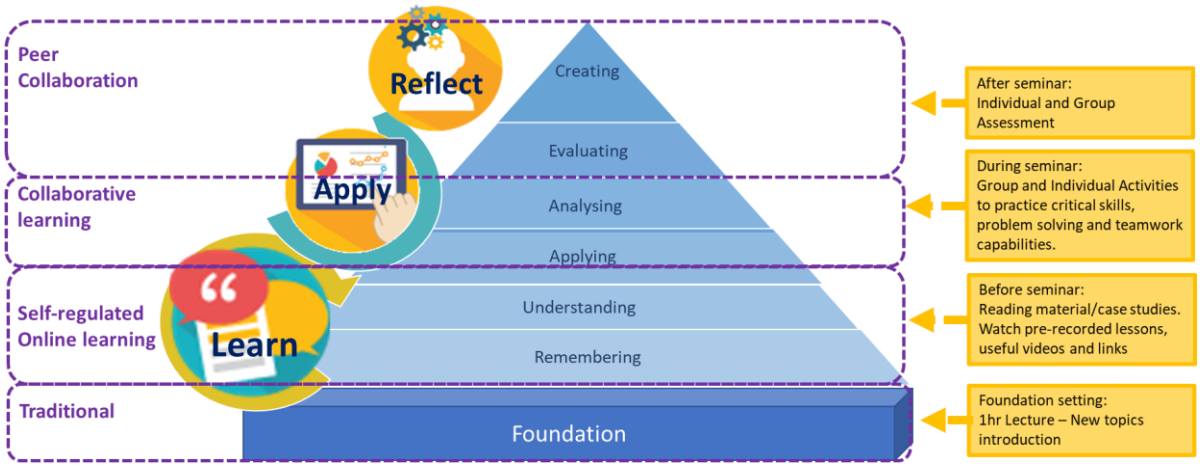
The higher cognitive skills, evaluation and creation are part of the "Reflect" stage of the LAR model. Although the three stages of the LAR model occur constantly in micro cycles of the learning process for every topic. In the week of the lecture, Reflect requires the students to self-assess their learning and address any shortcomings through their own self-directed study. Whilst during or at the end of the seminar, Reflect is the opportunity for students to engage the academics in further questions to clarify their understanding.

At a macro level, Reflect happens after acquiring and applying knowledge to assess, evaluate and create solutions to answer the Assessments tasks.

Bloom's taxonomy and the LAR Model

Bloom's taxonomy is a useful framework that differentiates the cognitive skills levels that are developed through the learning process (Anderson, Krathwohl and Bloom, 2001). As the Bloom's pyramid levels move up, the cognitive skills become more complex. Hence, developing higher order thinking skills such us "Analysing", "Evaluating" and "Creating" are essential in higher education (Pappas, Pierrakos and Nagel, 2013). In this research, the authors redesigned the structure and content of the module employing the revised Bloom's taxonomy (2).

Figure 1. *Bloom's taxonomy and the LAR Model. Adapted from (Anderson, Krathwohl and Bloom, 2001) Revised Bloom's taxonomy*



The combination of Flipped Classroom and Collaborative learning approaches alongside the implementation of the LAR model allows the authors to offer better quality interventions

and to support the students in the development of problem-solving, critical thinking, teamwork and communication skills that are essential in the preparation of engineering students.

Whilst the aim of the teaching and learning redesign is to improve student satisfaction, the aim of this study is to evaluate the effectiveness of the redesign as perceived by the students.

LITERATURE REVIEW

Flipped Classroom (FC)

Flipped Classroom's (FC) is a positive pedagogical approach, that has already been well evidenced in educational research studies (Mason, Shuman and Cook, 2013; Shih, Liang and Tsai, 2019). FC is usually presented as an active learning (Lage, Platt and Treglia, 2000) pedagogy that 'flips the traditional learning process' where academic teaching is done in the classroom and students activity is focused around writing or doing homework activities after the classes(Jenkins et al., 2017; Shih, Liang and Tsai, 2019). Nowadays, FC is structured around two main learning elements: Online learning activities (OLA) and Face-to-face learning, both comprising theoretical and practical elements.

However, in academic practice, it is difficult to clearly separate the learning process and the in-class activities as they often overlap and therefore the phrase 'blended learning' is frequently used. Blended learning, like FC, proposes to stimulate student-centred learning outside and inside of the classroom (Jowsey et al., 2020; Youhasan et al., 2022a), but without purposely separating them, often using both approaches simultaneously.

There are examples in the literature that do not clearly distinguish between FC and blended learning (Youhasan et al., 2022b) or inverted classroom (Mason, Shuman and Cook, 2013), because FC is seen as form of blended learning since it combines features of online instruction and offline learning and often uses them as interchangeably.

FC and blended approaches permit better utilising the actual face-to-face engagement time for higher level tasks (hands on practice, experiments problem solving or collaborative projects) (Flumerfelt and Green, 2013; Shih, Liang and Tsai, 2019) more effectively since 'traditional' in-class teaching is delivered asynchronously in online study environment. Many

studies found that when the FC approach was used, students were more actively engaged in the learning process with improved awareness about their own learning process (Gilboy, Heinerichs and Pazzaglia, 2015; Joy et al., 2023).

Successful FC delivery requires regular academic assistance to regulate student engagement with the learning resources (Sletten, 2017; Jovanovic et al., 2019). From the student's perspective SRL skills may play a significant role in the effectiveness of the FC implementation. Without necessary training or skills development, they fail to manage and execute study time for pre-class lecture videos and consequently are unprepared for the collaborative or face to face delivery component. This creates difficulties in activity participation, learning process efficiency and unnecessary frustration and disengagement (Mason, Shuman and Cook, 2013; McLaughlin et al., 2013).

Self-Regulated Learning

Self-Regulated Learning (SRL) is learners' systematic management of the learning process (Cho, Kim and Choi, 2017; Shih, Liang and Tsai, 2019). The concept assumes that learners proactively set their own study goals which enhances their motivation, reflection and use of cognitive strategies to comprehend complex tasks (Abar and Loken, 2010; Järvelä et al., 2015; Shih, Liang and Tsai, 2019).

Many empirical studies show self-regulation is positively correlated with satisfaction and improves achieving learning outcomes (Artino, 2008; Sun et al., 2008; Wang, Shannon and Ross, 2013; Broadbent and Poon, 2015; Wu et al., 2023). However, many variables influence satisfaction including, but not limited to the style of the activities used, course structure design, role of the educator, SRL skills and technology fluency.

Quality of course design that includes richness of activities and interactions in online delivery is evidenced by research to improve self-regulation (Lock et al., 2017), which is even more evident when instructor's scaffolding for the interactions was applied (Cho and Kim, 2013).

In the FC environment, where the active self-regulation in the open course structure is encouraged, students' commitment and skills of time management and actually applied strategies towards reaching learning objectives are essential to meet course learning outcomes (Connor, Newman and Deyoe, 2014).

However, studies have identified issues with students' ability to manage their time to regularly engage with online material (Panzarasa et al., 2016; You, 2016; Jovanovic et al., 2019) particularly in accordance with pre-planned delivery expectations (Gašević, Dawson and Siemens, 2015; Jovanovic et al., 2019).

Collaborative Learning

Engineering education requires the development of core skills such us problem solving, teamwork, communication, creativity, and innovative thinking. The Collaborative Learning (CL) approach gives students an active role in their learning process. By setting up group activities, where students can do analysis and discuss with colleagues to find solutions, the CL encourage development of relevant skills, such us: communication standards, arguments stating, engineering standards and confronting alternative reasoning or critique, importance of timekeeping, peer feedback and other metacognitive skills (Wieman, 2019). Research (Madland and Richards, 2016) also found learner-learner interaction helped learners engage in deeper approaches to learn and utilize the cognitive skills indicative of critical thinking. CL can also develop students' social interactions and inclusivity as it allows peers to freely shared their thoughts and opinions about a particular problem.

Therefore, combining FC and CL active approaches is highly beneficial to support students in the cognitive learning process and develop other skills.

Intentional Behaviours

Intentional Behaviour towards FC refers to the extent in which the students would like to continue their learning process using the FC approach. Sletten (2017) found that the perception and attitude of the students towards the FC was positively related to their actual use of the several types of SRL strategies. This suggests that students' attitude towards FC should align with their intention to use the resources regardless of actual or intended achievements or grades. (Winne and Jamieson-Noel, 2003).

Since an active participation in face-to-face classes and activities is where the top level knowledge and skills are applied and demonstrated (as per the beforementioned model in the Figure 1.), it is critical to design the FC delivery to support regular, on time and productive engagement with the pre-class activities (Jovanovic et al., 2019). Consequently, achieving the success in FC delivery is a significant challenge for students with time management and other SRL difficulties (Mason, Shuman and Cook, 2013; Lai and Hwang, 2016; Panzarasa et al., 2016; Sletten, 2017) . Therefore, positive guidance and

encouragement towards their intentional behaviour to engage in the online learning is essential.

AIM AND OBJECTIVES / RESEARCH QUESTION(S)

There are two overarching study aims, firstly to understand whether the LAR Flipped Classroom model is perceived positively by students, and secondly to explore how the students self-regulated their online learning experience.

Specifically, the study investigates the following research questions:

1. What is the students' perception of the interaction in the physical class (seminars) when the Flipped Classroom-LAR model is use?
2. To what extent do students' Self-Regulation in their approach to Online Learning (OSRL) impact the student's perception of usefulness of the Online Learning Activities (UOLA), their positive experience of Flipped Classroom (PEFC) and their Intentional Behaviours (IB)?
3. Do the students perceive Flipped Classroom as a positive experience (PEFC) and what are their Intentional Behaviours (IB)?

METHODOLOGICAL APPROACH

Participants

The participants, second year undergraduate engineering students, are enrolled on a mandatory module delivered across 10 weeks (Oct-Dec) in the 2022-2023 Autumn term.

Ethical approval for the research was obtained prior to distributing the questionnaires to the participants. The approved online platform Qualtrics was used to create and distribute the questionnaires plus store the data securely.

During the face-to-face lesson on week 9, the purpose and details of the study was explained to the students, and they were also informed about voluntary character of their participation, and that no identifiable data was going to be collected as part of the study.

The link to both questionnaires in Qualtrics, was shared with participants using QR codes and adding the link to the module Moodle page. The link was open for a week until the end of the teaching period in Autum term. Out of 301 students officially enrolled in the module, 112 students responded to the questionnaires. The answers were cleaned by removing answers that were less than 50% completed, resulting in a final sample of 101 responses (33% effective response rate) that could be statistically analysed.

Surveys

The authors were influenced by the validated quantitative survey evaluations of Shih, Liang and Tsai (2019) since the questionnaire had been developed to ask the students about their behaviours towards online self-learning and their perception of the effectiveness of the blended approach, and hence reflected the overarching aim of this study so were deemed appropriate to use. Therefore, permission was sought and received from the corresponding author to use their two questionnaires to collect information.

The questionnaires were modified to ensure the English and terminology reflected that used with the students; otherwise, the surveys were used in their entirety.

In the first, questionnaire OSLQ-Online Self-regulated learning Questionnaire a total of 26 items were measured, across six dimensions. The questionnaire focusses on gathering information about the student's engagement with the online material shared prior to the classes. The six dimensions and a sample item for each category are listed (2).

Table 1. Categories in the OSLQ

Dimensions	Number of items	Sample item from the Dimension
Goal setting -GS	5	I set goals to help me manage studying time for my online courses.
Environmental structuring - ES	5	I choose a location where I study to avoid too much distraction.
Task strategies	3	I prepare my questions before attending to seminars.
Time management – TM	4	I allocate extra time for my online courses because I know it is time demanding.
Help seeking -HS	5	I share my problems with my classmates and then try to solve the problems together.
Self-evaluation -SE	4	I ask myself a lot of questions about the module material when studying for an online course.

2In the second questionnaire, PFCQ-Perception of Flipped Classroom Questionnaire, 17 items were measured over four dimensions. The items in the second questionnaire assessed the student's perceptions in relation to the class interactions, online resources, and their perception of the overall experience with the combined approach. The four dimensions and a sample item for each dimension are (4):

Table 3. Categories in the PFCQ

Dimensions	Number of items	Sample item
Interaction in physical class - IPC	6	In comparison to other courses, I learn more from my team members with use of FCM.
Usefulness of online learning activity - UOLA	3	Conducting the online course improved my effectiveness in the module.
Positive experience of flipped classroom - PEFC	4	Compared to people of my age, I feel I learn better in blended learning model.
Intentional Behaviours - IB	4	I am satisfied that FCM meets my needs in terms of learning.

4Using a five-point Liker scale, the survey measured to what extent the participants agree or disagree with the statements presented to assess each item in both surveys.

Data treatment

The data in this study were analysed statistically using the SPSS software. The mean (μ) value of the response for each item and percentages were obtained and interpreted accordingly using the mean responses interpretation of the 5-point Likert type of questions (Mendoza et al., 2021). 5The Kolmogorov-Smirnov test indicated the data was not normally distributed and therefore the non-parametric descriptives were applied to the statistical analysis of the data.

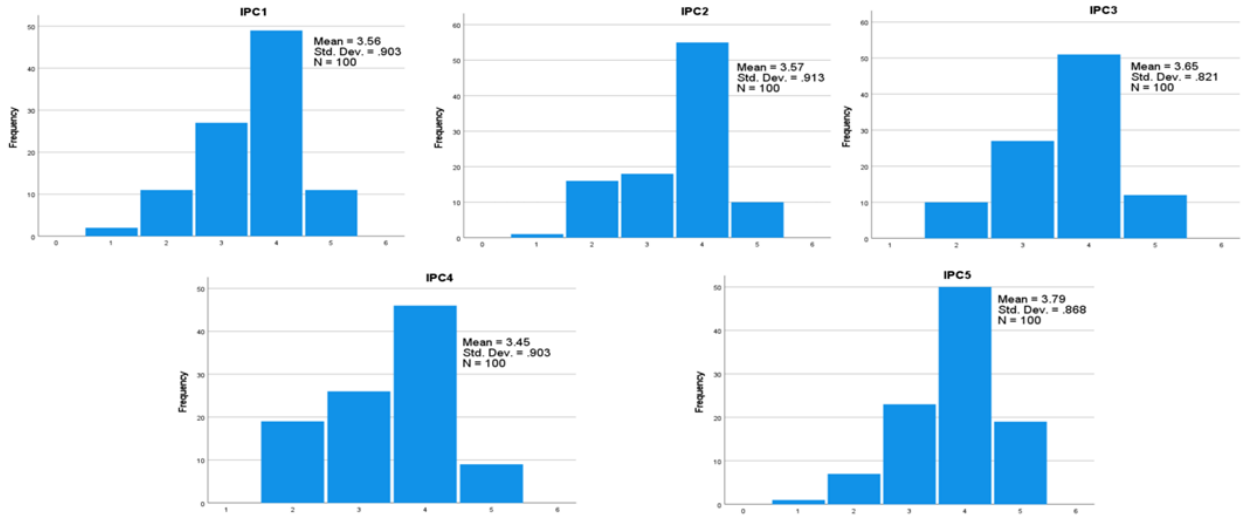
KEY FINDINGS

Student's perception of the Interaction in physical class part of the Flipped Classroom model- LAR

The first section of PFCQ assesses the students' perception of the Interaction in the Physical Class (IPC) when using Flipped Classroom and Collaborative learning. These results indicate there is a consistent positive perception of the benefits obtained from the participation and

group work executed during the seminars. Most of the students agree that there is an effective exchange of information and knowledge (A1, μ=3.56) and that they can get support from cooperative learning and group work with other participants in the physical class when FCM is used (A2, μ=3.57) (4).

Figure 3. Histogram and Mean values for PFCQ



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Students perceived that in face-to-face activities it is easy to get counselling and support (A3, μ=3.65) and that the lecturers tend to facilitate more peer discussions when FCM is applied (A5, μ=3.79). Furthermore, the students agree that in comparison to other courses, they learn more from the team member with the use of FCM (A4, μ=3.45).

Impact of OSLQ on PFCQ dimensions

The six dimensions of the OSLQ assess the student's self-regulation in Online Learning activities of the FC model. The overall results of the dimensions A-Goal Setting (μ=3.7, 77) and B-Environment structuring (9) suggests students intended to set goals to work with online materials and agree that the study environment in which they self-study is effective.

Table 6. Mean values of OSLQ, dimension A-Goal Setting (GS)

		GS1	GS2	GS3	GS4	GS5	**GS**
N	Valid	101	101	101	101	101	101
	Missing	0	0	0	0	0	0
Mean		3.76	3.70	3.67	3.77	3.64	**3.71**
Std. Deviation		.971	.965	.981	.979	1.045	.

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Table 8. Mean values of OSLQ, dimension B-Environment Structuring (ES)

		ES1	ES2	ES3	ES4	ES5	**ES**
N	Valid	101	101	101	101	101	101
	Missing	0	0	0	0	0	0
Mean		4.00	4.06	3.93	3.66	4.36	**4.00**
Std. Deviation		.883	.732	.886	.898	.672	.53

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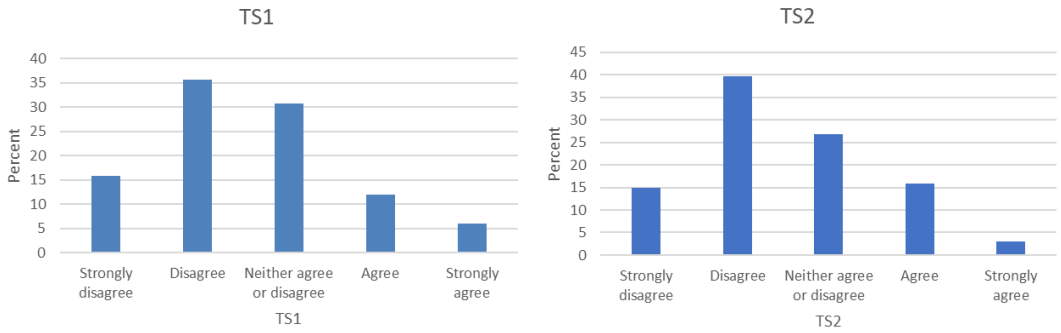
In contrast, the results obtained in the dimension C-Task Strategies (TS) that assess how the students prepare themselves before attending to the seminars, indicate a lack of early engagement with the asynchronous material shared prior the seminar (μ=2.91).

Specifically, the lack of critical engagement with the online material was observed in the answers to statements TS1 – I prepare my questions before attending to seminars (μ=2.56) and TS2- I work through the problems in my online course on top of the set ones to master the course content (μ=2.52).

Figure 5. Histogram of the TS1 and TS2 results



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The authors collected evidence from Moodle logs to further investigate student's engagement with the synchronous material prior the seminar activities. The average percentage of students who reviewed the asynchronous material before the seminars was calculated per week. The weekly average varies between 20%-36% of the total of the students enrolled in the module. This analysis corroborates the survey results and confirms a significant lack of engagement with the asynchronous material.

To explore the relationship between the OSLQ and the PFCQ dimensions, the authors calculated the Spearman correlation coefficient. The correlation results (11) indicate that there is a positive relationship between the six dimensions of the OSLQ (GS -Goal Setting,

ES-Environment Structuring, TS-Task Strategies, Time Management, Help seeking and SE) with all the dimensions of the PFCQ. Therefore, all the dimensions that influence the Online self-learning experience have a significant impact on how students perceived both the online learning activity and the usefulness of physical interactions, and in turn how satisfied they feel with the FC experience.

Table 10. Spearman correlation coefficient values of the relationship between OSLQ and PFCQ

OSLQ/PFCQ	IPC	UOLA	PEFC	IB
GS	.279**	.449**	.396**	.219*
ES	.262**	.246*	.309**	0.185
TS	.482**	.530**	.498**	.475**
TM	.336**	.480**	.479**	.334**
HS	.305**	.206*	.225*	0.180
SE	.422**	.365**	.432**	.437**

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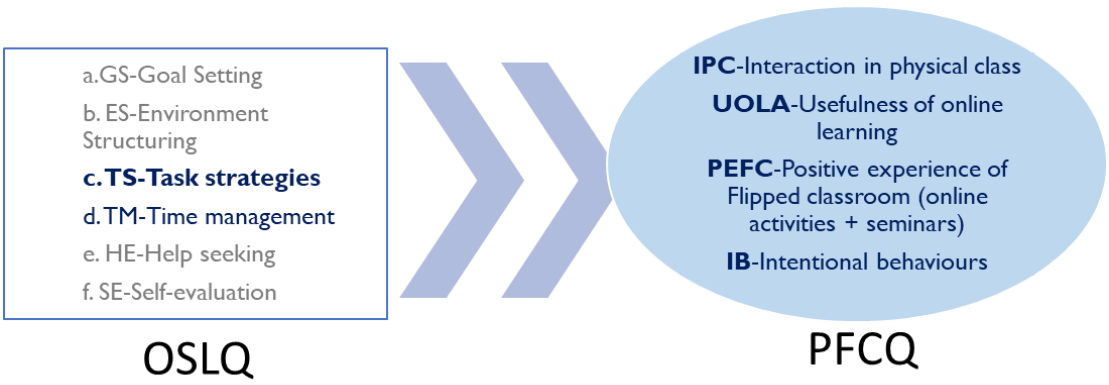
In particular, the Task Strategies-TS dimension of the Online Self Learning Questionnaire, that assesses the level of critical engagement of the students with the material prior the interaction in workshops, has the strongest impact on all the dimensions of the Perception of FC Questionnaire (IPC, rs=0.48, UOLA, rs= 0.53, PEFC, rs= 0.498 and IB. rs=0.47).

Figure 7. Relationship between OSLQ and PFCQ dimensions



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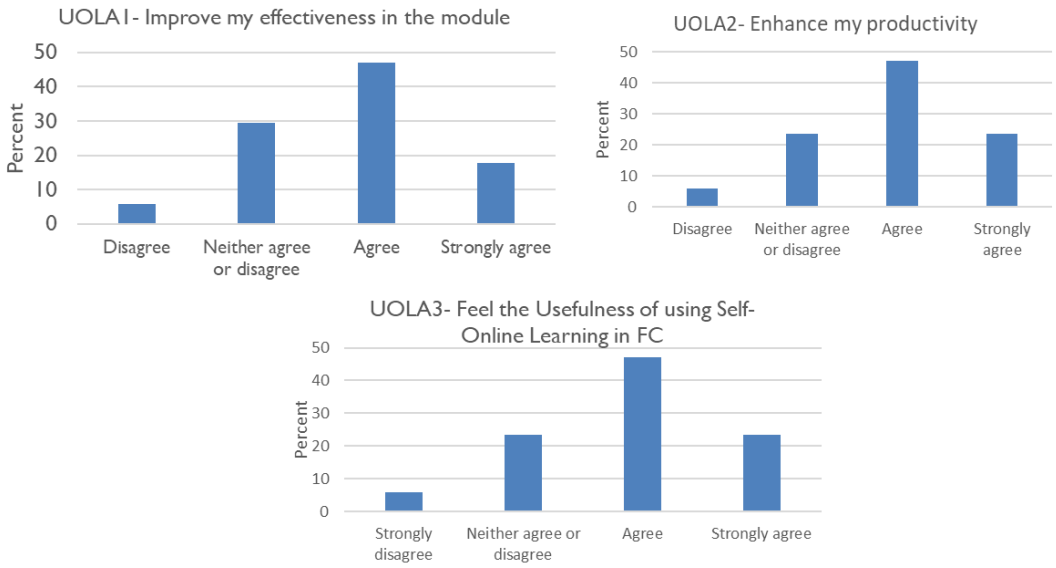
Students' perception of the FC Experience and Intentional Behaviours (IB)

Taking into consideration the evidence from the analysis of the first questionnaire and the data collected from Moodle logs about the lack of engagement and the strongest impact that it could have on the student's perception, the authors opted for segregating the results, to

focus analysis on the responses of the students who identified they engaged with the online material prior to the seminar, and then to measure these students' perceptions of UOLA, PEFC and IB.

The segregated results of the second questionnaire shows that most of the students who engaged with the asynchronous material prior to attending the seminar, agree that the use of the online activities improve their effectiveness in the module (μ=3.76) and enhance their productivity (μ=3.88). These results (10) together contributed to an overall satisfactory feeling of usefulness of the self-online learning when using FC aligning to the question UOLA 3, (μ=3.82) results.

Figure 9. Perceive usefulness of the Online Learning Activities (UOLA) results10



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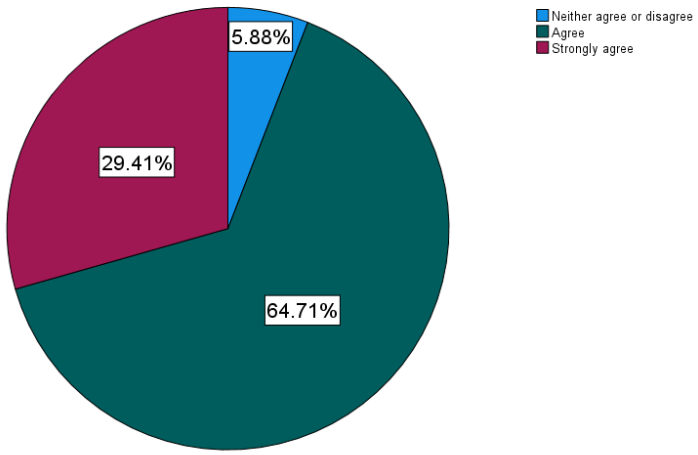
The PEFC results indicated that most of the students feel that they have learned better and benefited from the flexibility when using blended learning model. The ability to use asynchronous material at a convenient time seems to influence the student preference to engage with the blended learning activities (13).

Table 12. Results of PEFC dimension

Positive experience of Flipped Classroom - PEFC	(μ)	Interpretation
PEFC1-I feel in favour of participating in blend learning activities	4.12	Agree
PEFC2-I feel I learn better in blended learning model.	3.76	Agree
PEFC3-I feel that my learning time is more flexible with the use of the blended learning model.	3.82	Agree

13Interestingly, 94.12% of the students reach agreement that learning in a blended environment requires more self-regulated learning skills.

Figure 11. PEFC 3 Results- I feel that my learning time is more flexible with the use of the blended learning model



12The results shown in the previous sections and Intentional Behaviours-IB answers (15) confirm the overall satisfaction of the students with the blended approach used. Notably the comparison of responses which indicate students' attitude to engaging with the online materials, IB4 "I would like to learn using the Moodle LAR activities as much as possible" results before (μ=3.09) and after the segregation (μ=3.76) show a distinct difference.

Table 14. PEFC 3 Results

Intentional Behaviours - IB	(μ)	Interpretation
IB1-Overall, I feel satisfied with flipped pedagogy.	3.76	Agree
IB2-I am satisfied that FCM meets my needs in terms of learning.	3.82	Agree
IB3-I would like to continue using the FCM in my learning.	3.76	Agree

DISCUSSION

The FC- LAR model approach was found by students to provide a positive perception of the interactions in the seminars. Research (Mohammad Zadeh et al., 2023) reports students often develop their knowledge and comprehension through direct interactions with teachers and that students also perceive synchronous delivery as more meaningful experience. Students also found that collaborative learning and peer support was positive; as reported in literature (Cheng, Wu and Su, 2021; Okolie et al., 2022).

However, it was found that students were not engaging with the online learning prior to the seminars and the reasons are not attributable to students' intent to engage, the self-study environment or the flexibility associated with the convenience of online materials.

One possible reason for the lack of the engagement is that the online learning activity requires more self-regulated learning skills, as reported by the students. Research (Panzarasa et al., 2016; You, 2016; Jovanovic et al., 2019) recognised insufficient time management skills to result in students' struggling and finding it challenging to regularly follow appropriate study patterns, especially online, where their typically irregular, very high intensity study was followed by long stagnation periods (that do not correspond with the delivery strategy) and in turn impact engagement.

Studies (Lai and Hwang, 2016; Sletten, 2017; Jovanovic et al., 2019) found that clarity and settings of the instructions in the FC online learning environment for students has higher requirements than conventional teaching design. As indicated in the literature review, successful FC delivery requires regular academic assistance to regulate student engagement with the online resources. Therefore, to support students who are struggling then it is necessary to provide more guidance and support for the SoE students to aid their transition from traditional learning methods to the blended approach.

Whilst the results demonstrated those that engaged found the online learning useful, improved their effectiveness and enhanced productivity. But the difference in attitude to engagement with online materials and possible associated lack of satisfaction in the cohort suggests additional support could be in the form of redesign of the online learning environment layout, improving resources and apply knowledge scaffolding and information driven corrections (Mor, Ferguson and Wasson, 2015). Satisfaction with online resources are the subjectivity of opinion (Kuo et al., 2014; Alqurashi, 2019; Turhangil Erenler, 2020; Zhang and Lin, 2020; Wu et al., 2023). Recent studies identify a necessity for the 'evidence-informed models, which can be used as a basis for the development of robust, blended online learning environments' (Mohammad Zadeh et al., 2023).

The survey was administered in week 9 (of 10) and levels of satisfaction can also vary within the duration of the course as well as patterns of engagement with FC online activities (Jovanovic et al., 2019). There are studies evidencing that often learning experience and studying satisfaction can significantly drop when students lose interest despite being motivated at the beginning of online learning (Turhangil Erenler, 2020; Wu et al., 2023).

The research findings are useful for colleagues in SoE implementing the FC LAR model, as it shows students are satisfied with the approach, but they need to consider how SRL can be supported in online learning.

CONCLUSIONS & RECOMMENDATIONS

This paper describes the design of a FC model and its' integration with the SoE LAR model, and how the design is underpinned by pedagogic theory. A survey was used to evaluate the model. The students had a positive perception of interactions in the seminar classes, with the lecturers and their peers. The students' approach to self-regulation and to online learning established that students need more support, but those that engaged found it effective. It was also found that the extent they found the online learning useful impacted their perception of FC-LAR. The study also established that students intend to engage in the online learning. Finally, students reported they perceive FC as a positive experience.

Whilst this research found students expressed overall satisfaction with the FC-LAR model, action is needed to address the shortcomings identified by this research. Students need support with self-regulated learning and their engagement in online learning. The nature of the guidance and the design of the online learning environment warrants further research. Further research looking at the engagement of students and associated satisfaction during the module is another area worth further research.

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