The Effect of Continued Team Randomisation on Student's Perception and Performance in a Blended Team-Based Teaching Approach

Document Version:
Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:
Link to publication record in Queen's University Belfast Research Portal

The Effect of Continued Team Randomization on Student's Perception and Performance in a Blended Team-Based Teaching Approach

Maryam Malekigorji

School of Pharmacy, Faculty of Medicine, Health and Life Science, Queen's University Belfast,
Belfast BT9 6AG; UK; m.malekigorji@qub.ac.uk

Abstract: The purpose of this study is to investigate how constant changes in team allocation within a modified flipped team-based learning (FTBL) study can affect student's perception of a course (gathered by an online questionnaire) and academic performance. This teaching strategy is a team-based learning (TBL) approach combined with flipped classroom learning methodology, in which BSc students studying pharmaceutical science/biotechnology courses in a UK satellite campus in China preview online lectures and apply their knowledge in different in-class activities. The students are randomly assigned into teams in each session. The project was run across the full academic year (sixteen sessions). Students' perceptions regarding modified FTBL were statistically analyzed, and their academic performance was compared with previous results obtained by the initial FTBL study. Although students initially showed reluctance to leave their 'comfort zone'—the main limitation of this study—our findings show that learners perceived benefits to the adoption of continued random allocation, which resulted in the removal of limitations from their social clustering and eventual accustomization to this learning approach. Modified FTBL assisted students in enhancing their team-work skills, improving their academic performance, developing their reflective capabilities, improving their rapport building skills, learning and academic performance. Learners also believed that this learning strategy creates critical incidents that can simulate their future work environment, as they might be expected to work in unfamiliar situations. Therefore, the present study indicated strong support for the modified FTBL method, which was seen to work exceptionally well despite some minor problems that students experienced working in a team with different teammates in every session.

Keywords: team-based learning; flipped classroom; team re-allocation

1. Introduction

In 1984, General Physicians Professional Education (GPPE) suggested curriculum changes at all American medical colleges to increase active learning approaches, such as problem-based and student-centered learning approaches, to minimize lecture time, creating integrated and interdisciplinary courses [1]. Later on, the Assessing Change in Medical Education (ACME) emphasized that the medical education system must change to help medical students become lifelong learners [2].

For many years, the development of team-based learning (TBL), originally developed by Dr. Larry Michaelsen in 1997 [3], has been the focus of educators at every level of education. Within two decades, numerous medical schools in the USA and in the UK adopted and integrated the TBL approach into their curriculum due to its potential to improve learning outcomes and simulate the conditions of contemporary work environments [4–7]. Organizational behaviourist and anthropologist have been trying to analyze small group formation, team dynamics and its output in

order to understand the benefit of team-work in productivity and complex multiple task accomplishment, which could not be completed by individuals working alone [8].

TBL allows a single instructor to manage multiple small groups simultaneously in a classroom requiring consistent preparation and attendance. In addition, it is widely accepted that the presence of student-centric styles of teaching and learning can assist with the production of favourable outcomes in which students are asked to provide their perspective of quality in higher education institutions [6]. Furthermore, it has been reported that many staff in different organizations are spending most of their time in unfamiliar situations, rather than those which their previous education prepared them for. This may reduce confidence in higher education to prepare graduates who are able to meet the needs of employers [9,10]. Ciborra and Patriotta also reported that the lack of groupware and team-work in research and discovery (R&D) sections of pharmaceutical companies (relevant job market to the students in this study) limits staff learning and innovation [11]. Consequently, it is proposed that higher education needs, more than ever, to focus on the development of team-work skills to encourage students to leave their comfort zones and gets them in situations that can slightly unnerve them. Due to the positive outcomes mentioned above, many educational institutions follow team-based approaches to enhance students' group experiences during their under- and postgraduate studies. However, this is a rather sensitive area, as working in teams should not be adopted as the most effective learning approach in all activities as it may lead to individuals making riskier decisions [12], internal conflicts [13], reduced adaptability and independence [14] and may cause grade inflation [15]. Hence, educators need to consider these negative factors if adopting TBL within their curriculum to avoid inefficacious effects on students' experiences and their skill attainment. Although the application of TBL or individual attainment of goals within the curriculum is still debatable, team-work literature greatly reflects that effective team-work requires a great degree of both task and outcome interdependence (when team members need to share resources, information, outcomes and rewards) [16].

Although the implementation of a new active learning strategy would be a challenging task for educators, the adoption of an interactive learning approach is even more challenging for the learners, especially for those who have only experienced traditional ways of learning in their past education. While this fact is not unique to international students, studying a degree that differs from the learner's mother tongue, and with different teaching styles and assessments, can often be a major adjustment for international students, who may be experiencing this for the first time. For example, previous studies reported 'language' and 'culture shock' as two major difficulties experienced by Chinese students studying an English degree in their first year of their study, and significantly affected their learning and performance over their course [8]. Psychological and sociocultural adaptations, as two cultural adjustment models, concern learners' physical/psychological well-being and students' senses respectively, showing how well they can 'fit in' to the new learning environment. Although TBL is a well-known educational approach that is increasingly being employed and has facilitated new approaches of teaching and learning, it cannot guarantee that effective and appropriate learning outcomes are achieved for all learners with different cultures and learning styles. Therefore, it is important to shed light upon students' perceptions of course effectiveness when applying TBL to validate that the implementation of new learning techniques is congruent with better educational quality and increases in these learners' gains.

2. Research Aims and Objectives

The aim of this study is to investigate whether continued random group membership assignment in modified flipped team-based learning (FTBL) activities improve student learning experiences and satisfaction for second-year BSc Chinese students studying a UK degree in China Medical University-The Queen's University Belfast joint college (CQC) as a UK satellite campus in China. It was anticipated that this new strategy can more accurately simulate the conditions that BSc pharmaceutical sciences/biotechnology graduates will experience when they enter the work environment and will help them to integrate into the organisational culture more easily [11,17]. This study follows a preliminary study that presented qualitative and quantitative evidence of the

applicability and effectiveness of the FTBL approach within a CQC module delivered in China, in which the students were allocated to pre-arranged (fixed) teams alphabetically [6,18].

In our previous study, FTBL was defined as TBL approach combined with flipped classroom learning methodology and was introduced to BSc students undertaking study within the CQC and compared to a solely flipped classroom or traditional teaching styles, which was found to correlate with improvements in student engagement and academic performance. However, analysis of student feedback revealed that learners were not satisfied by the team arrangements and the associated need to work within the same team for the duration of the entire FTBL course [6,18].

Therefore, the aim of this study is to gain insight into the opinions of students enrolled in the course with regard to modified FTBL, and in particular, how constant changes in team allocation and environment may affect their learning and academic performances in comparison with their previous experiences of teamwork. The instructional principles associated with this method of teaching include requiring learners to examine and solve problems, work together from multiple perspectives, become responsible for their own learning process, and become aware of their role in the instructional process. Professions always express a need for students who can communicate, value teamwork, solve problems, acquire breadth and depth of knowledge, and be life-long learners—which are crucial elements in work conditions and the most important attributes graduates can develop to enhance their employability and on-going career success [19].

To date, there is no published work available which investigates the constant reconstruction of teams within such teaching strategies and little is currently known about the feasibility of conducting this novel FTBL strategy. As such, this study allows information to be gathered in relation to this, whilst also providing a practical application of doing so within FTBL environment.

3. Materials and Methods

This research investigates the effects of continued randomized allocation in group situations on student's perception and academic performance, adopting a general definition of learning [20]. In a previous FTBL study, group familiarity, which occurred over the course as students worked in fixed teams throughout the study, may have led to the ignorance of minority views within the team [21], in-group favoritism and out-group prejudice [22], and the acceptance of minimally suitable solutions [23], which may affect group decision making and effectiveness. The module in which this study was applied, "Industrial Pharmaceutics", is a compulsory 40-credit level-2 module delivered in a BSc (Hons) degree within a satellite UK University campus in China. The module content was structured in a unique way to focus not only on science but also on the team decision-making aspects in order to reflect how team decision-making can deviate from individual decision-making programs.

Deep learning and active engagement require the activation of many elements which are related to human personalities such as body impulse, intellect, emotions, desire, imagination and intuition. After delivering UK courses in China for two years, the author felt that the level of student engagement and teamwork are still not as same as UK home students, and many aspects of the students' personalities were still not being fully activated by the initial FTBL.

According to the literature, teams of five to seven members was reported as the most suitable group number with regards to team dynamics and task distribution [24–26]. Therefore, in this study, students were allocated randomly in groups of five to six members (52 students) for sixteen sessions. Before the introduction of the modified FTBL approach, a one-hour training session was delivered to the students and the rationale of the study was clearly mentioned, with great emphasis on the value of teamwork and communication skills that might be useful for their future career and professional life. Team allocation was constantly changed and randomized by Microsoft Excel software for each session (to maintain the whole process of randomization and allocation) [27]. Students were notified about their new group arrangement five days prior attending the sessions as they were requested to preview the lecture material by watching the recorded lectures available online and complete any given tasks before/during the sessions (assuming that all members are capable of performing the tasks). Each session consisted of different tasks and peer assessments, where each group was

assigned to different activities randomly. Student classroom performance was monitored and scored by the teaching staff. As team arrangements changed continuously, the final score was calculated individually. Modified FTBL, by creating conflict and critical incident [28], therefore, presented an excellent opportunity to expose learners to a situation where they were expected to collaborate (working with different colleagues/teams) and experience the effectiveness of this model, whilst perhaps breaking their social clustering and giving them the chance to realize how bias was impairing their objective decision-making.

There were two major motivating factors for learners in this study. Firstly, there was an opportunity to take part in a different team in each session allowing for greater, more enriched student interactions. Anecdotal evidence showed previously that there were no or very little interactions between some students even outside of the classroom and not many students were actually willing to participate in an effective group project. This might be due to the fact that some students have a preferred list of students to socialize with and sometimes are not brave enough to step out of their friendship areas [29]. This modified FTBL, which gives learners the chance to meet new teammates in every session, may provide them the opportunity to integrate at a wider extent and realizing the importance of acquiring teamwork skills that are crucial in order to be successful in their studies and future careers. Furthermore, the presentation of final individual awards (top three students), by judging students' performance within the teams may have motivated the students to be actively engaged in different activities and to not rely on other team members in order to receive credits and complete the tasks over the course.

To investigate student perception regarding this novel approach in comparison with previous FTBL study, an online questionnaire was prepared using SurveyGizmo—an online survey website. The online questionnaire has been deemed the most suitable approach as it removes barriers related to other methods (e.g., in paper-based questionnaires) which may limit response rates such as the need for students to be on-site in order to respond and thus increasing convenience. The questionnaire was developed with reference to existing TBL literature [30–32], the previous FTBL evaluation questionnaire [6,15] and feedback derived from discussions with researchers who possess expertise in educational research. In order to maximize response rates, the questionnaire was designed to be relatively short, and the questions were largely in a closed-question format [32]. The resultant questionnaire makes use of the Likert-type attitudinal (from 1 = strongly agree to 5 = strongly disagree), in addition to open questions, allowing for categorical data to be captured in the main, but also allowing for additional detail and discussion to be obtained from respondents. The questionnaire (including the cover sheet) has been piloted with a number of current international postgraduate students (n = 9) who are registered on Queen's University Belfast (QUB) postgraduate research programs within the School of Pharmacy, and modified based on the feedback they provided. Some questions had previously been piloted on international undergraduate students enrolled on various courses at QUB and the questionnaire was subsequently approved by the QUB School of Pharmacy Research Ethics Board (School reference: 025PMY2017). The questionnaire consists of four sections, with 28 questions in total, which addressed various aspects of students' opinions of FTBL that makes use of randomly constructed teams:

- Section A (four questions) involves open-response questions which consider the likes and dislikes of FTBL teaching method in general, as well as random team allocation changes, in order to gather qualitative information about perceived issues which may be cultural, etc., in origin.
- Section B (thirteen questions) examines the students' views on modified FTBL and associated skills development by way of five-point Likert scale attitudinal questions and a multiple choice question, gauging their opinions on the usefulness of modified FTBL as an approach, and the ability of this technique to improve their academic performance versus other teamwork activities students may have experienced before.
- Section C (ten questions) investigates students' general perceptions of the organization and communication within the teams by way of five-point Likert scale attitudinal questions.

- Section D (three questions) relates to demographic information but does not include the collection of any identifiable information (Table 1).

Table 1. Demographic information of the participants.

Demographic variable		Percentage
Gender	Male	30
	Female	70
Age	18–20	55
	21–23	35
	24–26	10
Secondary school location	China	100
	Overseas	0

Students were invited to participate in via email, and two reminder emails were also sent during a two-week period in order to maximize the response rate. In order to minimize the Hawthorne effect, participants were well informed on multiple occasions (within the sessions and by email communications) that the online questionnaire study did not include the collection of any identifiable information (i.e. it is anonymous) and participation in the sessions was entirely voluntary and they could choose not to submit their questionnaire at any point. The students were also advised that collected non-identifiable survey data would also be stored within the educators SurveyGizmo account for a minimum period of two years and would be deleted from the account afterwards; the information gathered via this questionnaire would be used for publications arising from this work as well as helping educators to inform teaching provision.

Cronbach's alpha coefficient (α) for section B and C of the questionnaire was computed to examine the internal consistency reliability, yielding values of 0.99 and 0.98 for those sections, respectively. Collected data were processed using IBM SPSS 25 software and statistically analyzed using appropriate statistical tests with $p < 0.05$ set a priori. Students' academic performance, by their module results, was also compared with the previous results obtained by the initial FTBL study carried out in the previous academic year.

4. Results

Students were assigned into teams randomly from the first session as discussed. Resistance was received straight after the introductory session from a few students reflecting that they did not want to work with certain members; this was the main drawback to the implementation of the project within the course initially. However, as mentioned earlier, the aim of this study was to break students from their common routines and social clusters in order to reveal their cultural beliefs and enrich their learning, academic performance and social skills. Learners were reminded that the team structure changed constantly and they needed to work with the same teammates only once. Therefore, persuading learners to engage in the project activities, minor internal conflicts, lack of adaptability and independence were the main limitations in this study, especially at the beginning of the project.

As the course progressed, it was realized that the participation of students in team activities notably increased, while gaining skills to distribute tasks and confidence to lead the group improved exceptionally to reflect the overall team view. Moreover, in comparison with previous student cohort who undertook the initial FTBL approach, higher levels of engagement, mastery of subject-specific knowledge and academic performance (judged by final examination) (Table 2) were found. In addition, a lower failure rate was reported and the number of students who received first- and second-class honors increased considerably in comparison with the initial FTBL study.

Table 2. Summary of failure rate and Class Grades Honours of 2015–1016 (initial FTBL) and 2016–2017 (modified FTBL) entry year cohorts.

Entry Academic Year	N	Fails (%)	Third-class Honours (%)	Second-class Honours (%)	First-class Honours (%)
2015–2016	32	25	13	38	24
2016–2017	62	12	10	47	31

Score range: fail—below 40; Third-class honours—40–49; Second-class honours—50–69; First-class honours—above 70.

The individual perceptions gathered by the online questionnaire also demonstrated a deeper level of understanding of the course, highlighting higher levels of collaboration, peer interactions and teamwork that was superior to the initial FTBL study (Table 3 and Table 4). Respondents reflected on their perceptions regarding modified FTBL in general in section A of the questionnaire (Table 3). In summary, learners mostly highlighted that the modified FTBL approach was a good strategy to improve their spoken English, confidence, teamwork skills, previewing material, cooperation and communication skills. In addition, it was noted that learners believed that modified FTBL increased their concentration, helping them to remember the material better, encouraging them to follow the subjects in the class, giving them the opportunity to express their opinion and share resources. Negative feedback regarding modified FTBL mainly addressed a lack of equal task distribution within groups, feeling anxious answering questions in front of others, bearing extra burden when a teammate was absent, finding it hard to finalize the overall view when there were multiple opinions, feeling uncomfortable while sitting in the front row and finding it difficult to cooperate with inactive team members. Most of those negative comments were expected in the hope that learners would gradually improve their team-work skills, change their learning habits, and appreciate that it might take a lot of effort to apply themselves in extroverted tasks which could assist them to gain worthy skills in learning, academic performance and collaboration while studying or working in a diverse environment.

Table 3. Examples of students' positive and negative comments towards modified flipped team-based learning (FTBL) approach in general.

Student Positive Comments
"It can improve the ability of language expression and increase the teamwork ability"
"It can help me to prepare before class more carefully. Also it helps in oral English"
"It contributes to improve the ability to cooperate with others"
"It is a good method for us to practice our team-work skills"
"It provides the chance for students to communicate with each other"
"Encouraging us to follow the lectures"
"Having the opportunity to say my opinion"
"A good way of study, we can reflect our own ideas about the subject"
"Providing chance for us to intercommunicate to learn more"
"We can discuss things together and everyone take part in the class"
"We can share resources with each other"
"Making us do more preview work before the lecture and students will be more active and concentrate better on the lecture"
"It can help me to highlight the important information of the slides of the courses also help to memorize"
"It is a chance for us to improve our communication and discuss with classmates. In addition, it can urge us to pre-study the lectures before classes"

Student Negative Comments
"Some teammates are less responsible for the tasks"

"Being nervous of answering questions in front of other students"

"Some students tried to escape the class after signing their names"

"Team discussion is so complex that makes hard for the team leader to reflect it properly"

"This form of class is not suitable for Chinese students' learning habit"

"I do not like to sit in the front row of the lecture theatre"

"Difficult to cooperate and communicate with inactive people"

Responses with regards to common questions between the modified FTBL and initial FTBL studies [18] were compared, and it was noted that respondents rated the modified FTBL approach significantly higher ($p < 0.05$) as an effective learning strategy for becoming an efficient member in their future career. Moreover, respondents believed that this learning approach would assist them more with their professional development in comparison with the initial FTBL approach. Responses also show significantly higher ($p < 0.05$) motivation in graded team activities in the modified FTBL method compared to the previous study [18]. In addition, although there were high demands by the students to assign their team members by themselves (not randomly) in both studies, this attitude significantly decreased ($p < 0.05$) in our modified FTBL approach.

Students were also asked to report if they learned and/or improved different skills (Figure 1) through the modified FTBL study and their answers were compared with the result obtained in the initial FTBL approach [18]. Interestingly, the ability to influence others, self-awareness, applying knowledge to practical situations, time-management, leadership, self-study and innovative thinking skills were rated significantly higher ($p < 0.05$) in the modified FTBL study.

Other skills and learning habit development/improvement reflected by learners included: awareness of knowledge, cooperation, group study, leadership, communication skills; the ability to communicate in English and understanding course content; concentration, listening skills, previewing lecture material, searching scientific contents and the ability to discuss new content within the team.
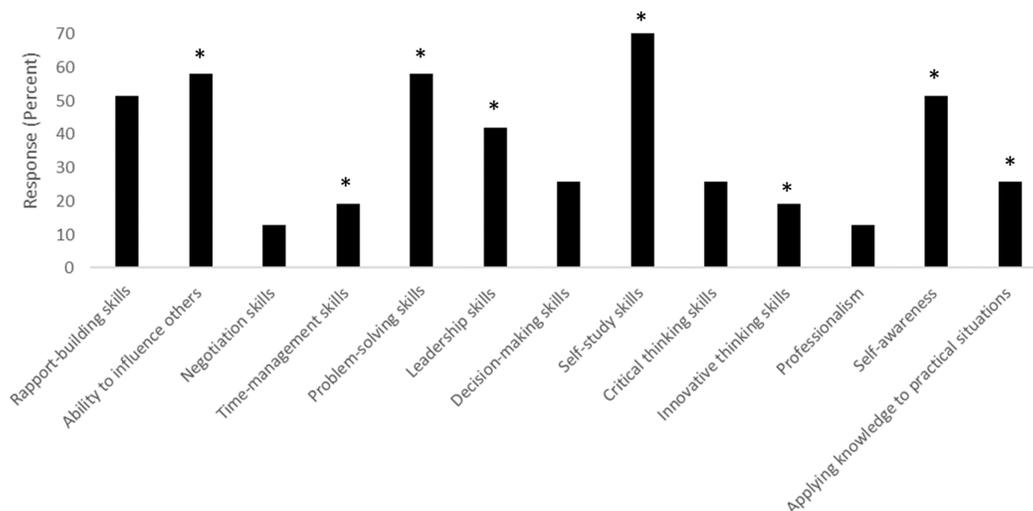

Figure 1. Students' perceptions regarding skill development in the modified FTBL approach.
(* Denotes significant higher response rate in comparison with initial FTBL study ($p < 0.05$)).

Table 4. Examples of students' positive and negative comments towards constant team reallocation.

Student Positive Comments
"Become familiar with classmates and learn how to cooperate with different people"
"Everyone has the opportunity to answer questions"
"It could encourage us to study with different members and to create new views"
"It is a good method for us to practice our team-work skills"

"It provides a feeling of freshness"
"More equitable team structure!"
"Constant random selection was interesting and I like the fact that attendance was monitored"
"It increases the chance for everyone to get involved"
"It was fun to see who will be my teammates in the next session"
"More communication and better learning atmosphere"
"More chances to work with different classmate and get to know them"
"An interesting experience of teamwork to improve the ability of students' learning autonomy"
"It is more interesting and promote us to cooperate with each other"
"It's a brand new form of class which I have never had before, changing teammates every time makes me know more about how important the team discussion would be before each class"

Student Negative Comments

"I hope we can have some team, each of which includes students and teacher"
"I would prefer to work with the same sex"
"learning less from lecturer"
"There is no need to change teams' allocation in every session. Maybe we can change groups every week or every two weeks."

Descriptive statistics regarding student perception in Section B and C of the questionnaire are reflected in Table 5.

Table 5. Descriptive statistics of section B and C of the online questionnaire.

Section B questions	Mean	Std. Deviation
FTBL with continued changes in team allocation made me want to learn from different peers	3.74	1.24
FTBL with continued changes in team allocation allowed me to learn from different peers	3.61	1.14
Being taught in this way allowed me to develop my team-working skills more than other teamwork-based activities that I have experienced	3.71	1.21
Using FTBL with continued changes in team allocation in class has made me more aware of the usefulness of collaboration	3.77	1.06
Being taught in this way has improved my ability to seek out information compared with working in the same team for the duration of the semester	3.94	1.03
Being taught in this way will allow me to perform better within my degree	3.61	1.09
I believe that FTBL with continued changes in team allocation will help me to be more active within the team in comparison with working within a fixed team *	3.55	1.06
I believe that blended TBL with continued changes in team allocation will help me to remember what I have been taught more than working within a fixed team	3.65	1.08
I believe that FTBL with continued changes in team allocation will help me to perform effectively in my future career	3.65	1.05
I believe that FTBL with continued changes in team allocation will help me to become an effective team member in my future job	4.10 **	0.87
Section C questions	**Mean**	**Std. Deviation**
I am happy to share class notes and appropriate study materials with my peers during blended team-based exercises	3.81	1.11
I believe that the feedback I provided to my peers during FTBL learning will assist with their professional development	3.74 **	0.97

I believe that the feedback I provided to my peers during FTBL learning will assist with their academic development (i.e. their ability to know, understand, and use knowledge)	3.71	0.94
I would prefer to choose the members of my team myself, rather than this being chosen randomly	2.61***	1.20
In comparison with working within a fixed team, continued changes in team allocation have encouraged me more to study with my peers outside of the classroom *	3.45	1.09
In comparison with working within a fixed team, continued changes in team allocation have increased my interest in the course material *	3.68	1.14
In comparison with working within a fixed team, continued changes in team allocation have given me more opportunity to get to know my classmates better and collaborate with them more effectively *	3.87	0.99
The grading of team-based activities motivated me to more actively engage in the class	3.97 **	1.05
There should be more FTBL approach within my degree course	3.16	1.16
The presentation of an award for performance in team-based activities motivated me to more actively engage in the class	3.71	1.04

* Denotes new question implemented in the research questionnaire compared to initial FTBL study; ** Denotes the result was significantly higher than the previous FTBL study; *** Denotes the result was significantly lower than the previous FTBL study; $p < 0.05$

4. Discussion

Modified TBL has recently been the focus of educators, where interactive and digital teaching learning strategies are embedded in traditional TBL approaches. For example, Hartley and McGuire reported the use of modified TBL in a three-step cycle—namely, preparation, in-class readiness assurance testing, and application-focused exercise—in a medical course, which was well received by the learners and supported them while preparing for assessment [33].

Our previous studies and anecdotal evidence suggested that many CQC students have a preferred list of students to socialize with and sometimes are not brave enough to leave their friendship areas. In this study, constant randomization of the group structure broke learners' social clustering and improved their academic performance (Table 2). For many learners, the chance to meet different classmates outside class may be very limited due to work, family and other commitments, and most informal meetings outside classes are mainly related to friendship groups, in which peer learning experience does not normally occur. Moreover, informal peer learning may have become less common as students are given more course study options with broader subject choices, enabling them to design their own progression of subjects. As a result, learners may not acknowledge classes or cohorts, or parts of a particular group of peers while studying their course [34].

Moreover, modified FTBL gives each student the chance to not only work with different partners each time but also to sit in a different part of the classroom. This may encourage passive students to change their leaning habits and enhance their participation and engagement within the class, which positively results in higher academic performance. Similar studies to this research project integrated the flipped classroom with the TBL approach to investigate student learning experiences and collaborative learning outcomes in a Korean University. The authors proposed that this blended teaching strategy enhanced the learning time invested by students, and improved self-learning and collaboration skills [35].

Several studies also show that TBL can simulate the working environment, improving employability skills as students generally have minor perceptions of teamwork when entering the university [9-11,36]. Therefore, TBL has been implemented in many different university courses such as accounting [37], healthcare [38], engineering [39], etc., in order to support learners in acquiring

knowledge and skills useful for employment, become more mature, and, ultimately, feel more confident to enter the global marketplace.

This study, in line with the results obtained in other studies mentioned, shows modified FTBL helped learners to become more focused in their learning and helped them understand team dynamics and task distribution. However, this was at the expense of a more holistic learning experience, which they may require in their future career and academic life. For example, giving the opportunity to learners to leave their comfort zones with the modified FTBL strategy showed improvement in their performance and assisted them to develop new skills, demonstrating greater levels of mutual performance monitoring and back-up behavior, which is in line with Laird study, and provides further evidence that effective learning is both experience and cognitive-based [23].

The results in this study are also in agreement with Blowers' research that random team arrangement offers enhanced and positive learning outcomes for undergraduate students, increasing task work and teamwork capabilities amongst learners [40]. It is proposed that modified FTBL benefits both high-performing and low-performing members within the team. By constant reallocating team members, some highly active participants who usually feel pleased to work within their social group, acting as group leader, had the chance to work with other highly active peers that resulted in the distribution of tasks more evenly, and specifically required them to be involved in activities they felt were less frustrating and more rewarding. In contrast, low-performing members reflected that working within a modified FTBL module encouraged them to accept different roles in some sessions as other members had similar or less capability performing the required tasks, which enhanced their confidence and assisted them to gain positive outcomes (Table 4). There were minor comments showing a few students' reluctances to attend the sessions in order to avoid anxiety while answering questions in front of their peers (Table 3). The author suggests that the negative feelings while working in a team might be related to the students' learning habits, which may also be influenced by language and culture shock for international students when they study a course in a different language than their mother tongue [8]. Hence one of the rationales for designing an FTBL strategy was to improve learners' confidence and presentation skills in order to overcome their fears and negative feelings while accomplishing tasks in teams. Students were constantly reminded within the study that enhanced learning occurs not only by studying hard individually but also via communication, collaboration, leadership and presentation skills. Students were reminded that team-work requires a great degree of both task and outcome interdependence [16] as they needed to share the material, preview the content and complete the tasks in teams. Social interaction in teams can also enhance friendship and improve networking skills and can provide opportunities to learn about other cultural groups [8]. With this regard, Lau and colleagues assessed team member effectiveness and teamwork skill development among Chinese freshmen in Hong Kong through a cooperative learning activity with questionnaire surveys and qualitative interviews. They report that Chinese students have different understandings of teamwork. However, the completion of a TBL project helped them to acquire the relevant competencies [41]. The authors stated that there should be more TBL applications for Asian and Chinese students in order to help them to adapt to different educational strategies.

Difficulties in dealing with some less motivated team members were reported by the students in both initial and modified FTBL studies but were significantly lower in the latter study. As discussed, learners should develop the skills to find ways to encourage their teammates to contribute to different tasks and learn how to assign various roles and responsibilities within the team fairly and efficiently. Michaelsen and Sweet also reported that learners would eventually appreciate the value of working in a team, and TBL enables instructors to provide learners with compelling empirical evidence of the value of teams for tackling difficult intellectual challenges—such as when better students were overloaded by less motivated or less able members, which was commonplace [24]. A further issue during the study was that Chinese students had been taught within their boundaries of comfort that resulted in a degree of dissatisfaction at the beginning of the program, which was also reflected in modified FTBL online questionnaire result. Other studies also highlighted that Chinese students usually preferred to work within homogenous groups

[42], which was seen in this study as well. For example, one student remarked, "I would prefer to work with the same sex". As discussed, one of the objectives of FTBL study was to simulate students' future work environment by constantly re-shuffling the team arrangements, just as they would not be able to work in a desirable and comfortable work environment in the future as companies and businesses are spending less time in periods of routine stability [43]. Therefore, learners should be encouraged to break from their commonplace routines before entering into their professional life.

Moreover, responses reflected that certain students would prefer not to sit in the front row of the lecture theatre (Table 3). Normally, students who are willing to engage directly with the lecture and feel involved with the teaching activities are seen seated in central locations at the front of the lecture theatre, and those with lower engagement and/or motivation usually sit at the corners and back of the lecture theatre [44]. The modified FTBL module aimed to provide the opportunity to all learners to sit in different locations of the lecture theater to experience learning and differences in the degree of interaction, which may encourage the less engaged learners to be involved more within the class activities. Previous studies suggested that learners who sat in a central/front location of the classroom achieved the highest grades in examinations both if they independently chose to sit centrally and if they were randomly allocated a central seat [44,45]. Therefore, implying the ecology of the classroom has a greater impact on attainment than the students' personality.

5. Conclusions

FTBL with sustained and random team reallocation was discussed in this paper to investigate students' perceptions regarding constant team randomization with the hope of improving students' learning and experiences in developing the crucial skills they need in both within their education and their future careers, and in order to raise the awareness of the implementation of team-work learning approaches at a greater extent.

Students' academic performances, as judged by final examination, have been improved by constant randomization of teams in comparison with the results obtained in initial FTBL study (fixed groups) (Table 2); this is believed to be related to the changes in student's social clustering. Despite students' initial misgivings, they rated modified FTBL as a method of learning superior to what they have experienced within their education, and learners demanded more modified FTBL practices within their future degree course (Table 5). Therefore, providing more team-work opportunities within courses has been planned.

Further investigations will mainly focus on greater utilization of the FTBL strategy within the curriculum, such as the implementation of FTBL in practical aspects of modules, and an FTBL approach in which team allocation is chosen by the students in order to identify the barriers we may face during the application of this method. It is also worth identifying what parts of each module within the curriculum require individual assessment, and what parts are better to be assessed in teams (developing and promoting teamwork skills efficiently), as some tasks may not need to be completed in teams and may have counterproductive effects on both individual learners, the team and even on organization [46]. Moreover, the instructor must carefully consider any possible negative effects of FTBL on the course such as riskier decision making, internal conflicts, reduced adaptability and independence, which may cause grade inflation [12–15]. It is recommended that any new learning strategy should be implemented from the beginning of the course and continued throughout the learners' studies, helping the learners to adapt to the new educational strategies and allowing for enough time to deal with challenges and identify limitations.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Muller, S. Physicians for the twenty-first century: Report of the project panel on general professional education of the physician and college preparation for medicine. *J. Med. Educ.* **1983**, *59*, 201–208.

2. Vasan, N.S.; DeFouw, D.O.; Holland, B.K. Modified Use of Team-Based Learning for Effective Delivery of Medical Gross Anatomy and Embryology. *Anat. Sci. Ed.* **2008**, *1*, 3–9.

3. Michaelsen, L.H.; Fink, R.H.; Knight, A. Designing effective group activities: Lessons for classroom teaching and faculty development. In *To Improve the Academy: Resources for Faculty, Instructional and Organizational Development*; DeZure, D., Ed.; New Forum Press: Stillwater, OK, 1999; pp. 373–379.

4. Searle, N.S.; Haidet, P.; Adam Kelly, P.; Schneider, V.F.; Seidel, C.L.; Richards, B.F. Team learning in medical education: Initial experiences at ten institutions. *Acad. Med.* **2003**, *78*, 555–558.

5. Issenberg, S.B.; Pringle, S.; Harden, R.M.; Khogali, S.; Gordon, M.S. Adoption and integration of simulation-based learning technologies into the curriculum of a UK Undergraduate Education Programme. *Med. Ed.* **2003**, *37*, 42–49.

6. Malekigorji, M.; Rooney, D.; Corbett, D.; Hanna, L.A.; Hall, M. Assessment of Chinese students' progression and perceptions in blended team-based learning approach at an international college in China. In Proceedings of the World Congress on Education, Dublin, Ireland, 26 January 2017.

7. Gatfield, T. Examining Student Satisfaction with Group Projects and Peer Assessment. *Assess. Eval. High. Educ.* **1999**, *24*, 365–377.

8. Spencer-Oatey, H.; Xiong, Z. Chinese Students' Psychological and Sociocultural Adjustments to Britain: An Empirical Study. *Lang. Cult. Curric.* **2006**, *19*, 37–53.

9. Elias, P.; Purcell, K. Is mass higher education working? Evidence from the labour market experiences of recent graduates. *Natl. Inst. Econ. Rev.* **2004**, *90*, 60–74.

10. McClelland, G.P. The influence of randomly allocated group membership when developing student task work and team work capabilities. *J. Furth. High. Educ.* **2012**, *36*, 351–369.

11. Ciborra, C.U.; Patriotta, G. Groupware and teamwork in R&D: Limits to learning and innovation. *R D Manag.* **2002**, *28*, 43–52.

12. Lamm, H.; Myers, D.G.; Ochsmann, R. On predicting group-induced shift toward risk or caution: A second look at some experiments. *Psychol. Beitrage* **1976**, *18*, 288–296.

13. Jehn, K.A.; Mannix, E.A. The dynamic nature of conflict: A longitudinal study of intra-group conflict and group performance. *Acad. Manag. J.* **2001**, *44*, 238–251.

14. Janis, I.L. *Groupthink: Psychological Studies of Policy Decisions and Fiascos*; Houghton-Mifflin: Boston, MA, USA, 1982.

15. Chapman, K.J.; Meuter, M.; Toy, D.; Wright, L. Can't we pick our own groups? The influence of group selection method on group dynamics and outcomes. *J. Manag. Educ.* **2006**, *30*, 557–569.

16. Procter, S.; Currie, G. Target based team-working: Groups, work and interdependence in the UK Civil Service. *Hum. Relat.* **2004**, *57*, 1547–1572.

17. Reicherts, A.; Wanous, J.P.; Austin, J.T. Understanding and managing cynicism about organizational change. *Acad. Manag. Exec.* **1997**, *11*, 452–467.

18. Malekigorji, M.; Corbett, D.; Hanna, L.A.; Hall, M. An Investigation of Chinese Students Academic Performance, and Their Views on The Learning Experience, Associated with Flipped Team-Based Learning. *Liter. Inf. Comput. Educ. J.* **2018**, *9*, 2788–2799.

19. Johnson, D.W.; Johnson, R.T. Social skills for successful group work. *Educ. Leader.* **1989**, *47*, 29–33.

20. Laird, D. *Approaches to Training and Development*; AddisonWesley: Reading, MA, USA, 1985.

21. Ng, K.Y.; Dyne, L.V. Individualism-collectivisim as a boundary condition for effectiveness of minority influence in decision making. *Org. Behav. Human Decis. Process* **2001**, *84*, 198–225.

22. Hilton, J.L.; Hippel, W.V. Stereotypes. *Ann. Rev. Psychol.* **1996**, *47*, 237–271.

23. Hoffman, L.R.; Maier, N.R.F. Quality and acceptance of problem solutions by members of homogenous and heterogeneous groups. *J. Abnormal Soc. Psychol.* **1961**, *62*, 401–407.

24. Michaelsen, L.K.; Sweet, M. The Essential Elements of Team-Based Learning. *New Direct. Teach. Learn.* **2008**, *2008*, 7–27.

25. Chickering, A.W.; Gamson, Z.F. Seven Principles for Good Practice in Undergraduate Education. *Am. Assoc. Higher Educ.* **1987**, *80*, 3–7.

26. Wenger, E.C.; Snyder, W.M. Communities of practice: The organizational frontier. *Harv. Bus. Rev.* **2000**, *1*, 139–145.

27. Saghaei, M. Random allocation software for parallel group randomized trials. *BMC Med. Res. Methodol.* **2004**, *4*, 26.

28. Chell, E. Critical incident technique. *Int. J. Hosp. Manag.* **2004**, *17*, 23–32.

29. Gao, X. To Be or Not to Be "Part of Them": Micropolitical Challenges in Mainland Chinese Students' Learning of English in a Multilingual University. *TESOL Q.* **2012**, *44*, 274–294.

30. Kima, H.R.; Song, Y.; Lindquistc, R.; Kang, H.Y. Effects of team-based learning on problem solving, knowledge and clinical performance of Korean nursing students. *Nurse Educ. Today* **2016**, *38*, 115–118.

31. Fujikura, T.; Takeshita, T.; Homma, H.; Adachi, K; Miyake, K; Kudo, M; Takizawa, T; Nagayama, H; Hirakawa, K. Team-based Learning Using an Audience Response System: A Possible New Strategy for Interactive Medical Education. *J. Nippon Med. Sch.* **2015**, *80*, 63–69.

32. Edwards, P.J.; Roberts, I.; Clarke, M.J.; Diguiseppi, C; Wentz, R; Kwan, I; Cooper, R; Felix, L.M.; Pratap, S. Methods to increase response to postal and electronic questionnaires. *Cochr. Datab. Syst. Rev.* **2009**, *3*, doi.10.1002/14651858.MR000008.pub4.

33. Hartley, R.S.; McGuire, P.G. Modified team-based learning as a weekly formative review. *FASEB J.* **2019**, *33*, 660.6.

34. Boud, D.; Cohen, R.; Sampson, J. Peer learning and assessment. In *Peer Learninq in Higher Education*; Kogan Page: London, UK, **2001**; pp. 67–81.

35. Lee, J.; Bonk, C.J. Integrating Flipped learning with Team-based learning in a Pre-service Teacher Education Course: Experiences and Outcomes. *Int. J. E-Learn.* **2019**, *18*, 5–29.

36. Serrat, O. *Knowledge, Solutions: Tools, Methods, and Approaches to Drive Organizational Performance*; Springer: Singapore, **2017**, doi.10.1007/978-981-10-0983-9.

37. Christensen, J.; Harrison, J.L.; Hollindale, J.; Wood, L. Implementing team-based learning (TBL) in accounting courses. *Account. Educ.* **2019**, *28*, 195–219.

38. Fibuch, E.; Van, W; Charles, W. Succession Planning in Health Care Organizations. *Phys. Exec.* **2012**, *38*, 44–47.

39. Knight, D.W.; Carlson, L.E.; Sullivan, J.F. Staying in Engineering: Impact of a Hands-On, Team-Based, First-Year Projects Course on Student Retention. *Am. Soc. Eng. Educ. Ann. Conf. Exp.* **2003**, *8*, 1–11.

40. Blowers, P. Using student skill self assessment to get balanced groups for group projects. *Coll. Teach.* **2003**, *50*, 106–110.

41. Lau, P.; Kwong, T.; Chong, K.; Wong, E. Developing students' teamwork skills in a cooperative learning project. *Int. J. Lesson Learn. Stud.* **2013**, *3*, 80–99.

42. Tajfel, H. Social psychology of intergroup relations. *Ann. Rev. Psychol.* **1982**, *33*, 1–39.

43. Stephenson, J.; Weil, S. *Quality in Learning: A Capability Approach in Higher Education*; Kogan Page: London, UK, 1992.

44. Smith, P.D.; Hoare, A.; Lacey, M.M. Who goes where? The importance of peer groups on attainment and the student use of the lecture theatre teaching space. *FEBS Open Bio.* **2018**, *8*, 1365–1567.

45. Stires, L. Classroom seating location, student grades, and attitudes. *Environ. Behav.* **1980**, *12*, 241–254.

46. Sprigg, C.A.; Jackson, P.R.; Parker, S.K. Production team-working: The importance of interdependence for employee strain and satisfaction. *Human Relat.* **2000**, *53*, 1519–1543.