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Team Based Learning: Preparing pharmacy students for an integrated curriculum during induction

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Abstract

Background: Pharmacy students have to integrate their science and practice learning and be able to apply it in practical situations. Integrating knowledge and skills from diverse disciplines can be a challenge and supporting students in this was a priority for the school. Team Based Learning (TBL) has been used as an active learning strategy to promote a supportive learning environment where students work in small groups to solve case-based problems.

Aims: The aim was to describe how TBL was introduced to students during their induction and to describe the student response.

Method: The first year of the undergraduate pharmacy programme started with a week-long induction comprising four TBL sessions, designed in part to set out the expectation of integrating pharmaceutical science and pharmacy practice knowledge and introducing the Code of Conduct for pharmacy students. The student experience of TBL was determined using an online survey and the marks students achieved in the assessments.

Results: The students' individual assessment means were 72%, 80% and 49%, whilst the team means were 96%, 97% and 74%. Five themes emerged from the students comments on TBL which were: comfort, how TBL helped learning, assessing too early in the programme, preparation time and having the opportunity to meet others on the programme.

Conclusion: The students responded positively to TBL in the induction. The TBL sessions set the expectation of pre-learning/preparation for all teaching sessions and science-practice integration throughout the programme. TBL also allowed students to engage with a greater number of their peers than would have been possible with more didactic forms of teaching.

Keywords: *Team Based Learning, Integrated curriculum, Induction*

Introduction

Avoiding compartmentalisation of learning in modular programmes has challenged educators for many years. It could be argued that this is particularly important for healthcare professionals so that they are able to integrate their learning and apply it to the whole patient. The professional regulator in Great Britain, the General Pharmaceutical Council (GPhC), has recognised the importance of this and requires pharmacy curricula to be integrated. A key component of this integration involves students applying the science which underpins the programme into practical situations.

Traditionally, each of the disciplines that make up the undergraduate pharmacy programme set their own examination papers. It is not known the extent to which separate modular exams contribute to compartmentalisation, but it has been well documented that assessment drives learning (Wormald *et al.,* 2009).

This school decided to replace individual unit examinations with a single integrated written examination at the end of each semester of the first year. The weighting attributed to examinations has not been altered and remains at a 50% contribution to the final year mark. Individual units still set unit coursework assessments which include practical examinations and OSCEs (Objective Structured Clinical Examinations). The school recognised that this change could present a challenge to the students and therefore we sought a method of preparing and supporting students for the integrated examination. Team Based Learning (TBL) has been used as an active learning strategy to promote a supportive learning environment, where the principles of constructivist learning theory are applied. The application of this theory promotes a learner-centred environment whereby the student is provided with opportunities to identify gaps in their understanding by working in small groups to solve case-based problems (Hrynchak & Batty, 2012). The group work aspect promotes reflection on the learner's own understanding of a topic and provides opportunities to engage in peer discussion; this process leads to the learner developing their own learning framework. In this environment, the teacher is present to facilitate learning.

TBL has been in use for around twenty years, mainly in the US where medical and pharmacy schools have employed it to teach part or all of their curricula. Its use in the UK is restricted to a handful of schools in health care. TBL is used in a number of ways by different

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institutions. Some use it to deliver the entire programme whilst others use it to deliver single units or parts of units (Thompson *et al.,* 2007). Those that used TBL in parts of programmes tended to rely on TBL for application of knowledge and problem solving.

A key aspect of TBL involves organising students into permanent teams of around five to seven members. Students are allocated to diverse teams rather than self-selecting to avoid cliques forming. The allocation to teams is frequently performed with the students present to ensure the process is transparent (Michaelsen, 2002). As the sessions are usually delivered with all the teams in a single room, it does not require the staffing levels that are required with enquiry based learning (EBL) or problem based learning (PBL). This makes it particularly suitable for pharmacy with a lower per capita level of funding in the UK, when compared to medicine or dentistry (Ofstad & Brunner, 2013).

Students are assigned material to read prior to the class. The TBL session starts with readiness assurance process (RAP) which involves an individual readiness assessment test (iRAT) and a team readiness assessment test (tRAT). The marks that students achieve in these assessments count toward their final grade. This acts as an incentive to complete the pre-reading prior to the class, which encourages students to prepare and participate in learning at a much earlier stage in the process. There is also evidence that TBL encourages attendance (Middleton-Green & Ashelford, 2013). Students are able to appeal against any of the test items provided they can support this with evidence. The final stage of the RAP involves providing feedback on any areas of difficulty identified by the iRAT.

Students then complete an application exercise, which is designed to promote learning and develop team working skills. This exercise focuses on the application of concepts rather than memorisation of facts and it is claimed that TBL activities should promote higher level learning and active learning (Haidet & Fecile, 2006). Immediate feedback is provided by staff during the session which promotes further discussions (Hunt *et al.,* 2003). There have been reports that TBL has resulted in greater improvement in knowledge scores and that this improvement was greatest amongst weaker students (Tan *et al*., 2011).

The aim of this paper is to describe how TBL was introduced to students during an induction to the pharmacy programme and to describe how the students responded to TBL.

Method

The first year of the undergraduate pharmacy programme started with a week-long induction comprising four TBL sessions designed in part to set out the expectation of integrating pharmaceutical science and pharmacy practice knowledge and introducing the student Code of Conduct (see Table I). Two of the TBL sessions involved case studies drawing on team discussions involving pharmaceutical chemistry, formulation science, metabolism, dispensing and drug-drug interactions. The discussions were facilitated by both science and pharmacy practice staff, which promoted the importance of integration of knowledge. The third TBL session sought to introduce the students to the British National Formulary (BMA & RPS, 2013) and highlight the different study skills a pharmacy student may utilise in the course of the programme. The aim of the final TBL session was to raise awareness of the Code of Conduct for Pharmacy Students (General Pharmaceutical Council, 2010) and to help students understand how fitness to practise procedures operate using a series of case studies. These case studies, taken from the GPhC website, were based upon real cases where students fitness to practise was in question (Hall *et al.,* 2011). The cases discussed in the session included health and conduct concerns. This session was facilitated by staff members who are registered as pharmacists with the GPhC.

Table I: Description of TBL sessions

Session	TBL 1	TBL 2	TBL 3	TBL 4
Title	Study skills and the BNF	Asthma	Drug stability	Code of Conduct
Description	The application exercise involved an evolving case study of a patient, beginning with using the BNF to identify the indication of a drug, then using the BNF to decide upon the suitability of the drug with an existing condition and, finally, discussing the role of the pharmacist in relation to recommending alternative treatments.	The application exercise involved a case study of the hospitalisation of a patient with an asthma attack. Product Information Leaflets (PIL) were supplied together with links to the Summary of Product Characteristics (SPC) for the relievers and preventers, and questions were asked on the chemistry and formulation on the medicines.	The application exercise included a case study on treating a child with impetigo: Drug stability and allergy issues regarding the dispensing of flucoxacillin were discussed.	The application exercises involved students acting as Fitness to Practise Panel members reviewing anonymised cases where fitness to practise was a concern either through conduct or health[10]. The student teams had to prioritise the issues for the Panel and ultimately make a decision on the future of the student in the case study.

The room capacity dictated that each TBL session had to be delivered twice with half the cohort attending any one session. Students were required to attend all four sessions and were allocated into groups of seven students upon arrival at the session. To ensure groups were diverse and friendship groups were avoided, group allocation differed for each session but the basis for the allocation was clear and transparent to students.

At the start of each session students completed an individual test (iRAT) based upon the pre-reading and then completed exactly the same test as a group (tRAT). Both iRAT and tRAT contained ten multiple choice questions with five options. Students completed the iRAT on a pro-forma which was collected at the end of the test and marked by staff. The iRAT was marked out of ten. The tRAT was completed using scratch cards where students scraped away the answer on a grid to reveal whether their selection was correct or not. It was agreed by TBL leads that a correct answer at the first attempt scored two marks, one mark at the second attempt and half a mark at the third attempt. The first TBL session was set as a practice so the marks were not collected but the marks for the other three TBL sessions were collated.

Evaluation of the student experience of TBL was completed by sending first-year students (n=156) a link to an online survey at the end of the first week. The students were informed that the survey was anonymous. Students were asked to rate the TBL sessions using a series of five-point Likert scale statements. The statements were derived from previous studies on TBL (Young-Su, 2009; Dean *et al.,* 2009). There were also a series of open ended questions for students to expand their answers. The answers to all the open ended questions were subjected to a thematic analysis.

Results

Only nine students did not complete all four TBL sessions and all but one student missed only one TBL session. Sixty-four students completed the online survey (response rate 41%).

The students performed well in the two science-practice integrated TBL sessions with high sets of marks for the iRAT/tRAT (iRAT means of 72% and 80%, tRAT means of 96 and 97%). The marks for the final TBL session on the Student Code of Conduct were much lower (iRAT mean of 49%, tRAT mean of 74%). The scores were not recorded for the first TBL session on study skills.

The student responses to the statements can be seen in Table II. The majority of students were in agreement with the positive statements on TBL. 80% of the students felt that it was useful to hear others opinions during the TBL discussions and 79% felt the application exercises were applicable to real life situations.

Following analysis of the open comments, five themes emerged from the data.

Table II: Student agreement with statements on TBL

The Team Based Learning (TBL) sessions were helpful for understanding the content of the workshops	Response Total	Respons e Percent
strongly agree	9	14%
agree	42	66%
neither agree nor disagree	8	12%
disagree	6	9%
strongly disagree	0	0%
Total Respondents (For this Question)	64	

Small group participation improved my understanding of the educational material that was presented	Response Total	Response Percent
strongly agree	6	9%
agree	34	53%
neither agree nor disagree	16	25%
disagree	5	8%
strongly disagree	1	2%
Total Respondents (For this Question)	64	

It was useful to hear other's opinions via discussion	Response Total	Response Percent
strongly agree	19	30%
agree	32	50%
neither agree nor disagree	8	12%
disagree	2	3%
strongly disagree	1	2%
Total Respondents (For this Question)	64	

The content of the TBL workshop is applicable to real situations	Response Total	Response Percent
strongly agree	17	27%
agree	33	52%
neither agree nor disagree	10	16%
disagree	4	6%
strongly disagree	0	0%
Total Respondents (For this Question)	64	

The first theme centred round why the students enjoyed the TBL session. Some students liked particular TBL sessions because they felt comfortable with the material as it used principles that had been studied in school or college:

> *'The information given for this TBL was the most related to the content of the A Level chemistry course and I felt that I could see where my current knowledge would help on the MPharm course.'*

The second theme was how the TBL session helped the students to learn. The group discussions during the tRAT and application exercises contributed to student learning:

'We were given some drugs to see in TBL2 and situations to discuss in TBL4, and this part was helpful because I gained some useful knowledge on the drugs from my team members, as they knew some things about certain medicines that I didn't. Also it was good to hear my other team members opinions on how to deal with the situations in TBL4, it was helpful to discuss some of the issues.'

The application exercise in the TBL session on the Student Code of Conduct involved students acting as members of the Fitness to Practise panel reviewing case studies and this helped students see things from a different perspective:

'The fact that we had to discuss the situation the way the panel would have had to do put us in their shoes and allowed us to see things from a perspective that we may not have considered as a pharmacy student.'

The third theme was assessment. Students had a number of concerns with the assessments at the start of the TBL session (iRAT and tRAT). Students were concerned about having assessments so early in the programme, about the number of assessments and also that they counted towards the final degree mark:

'(It) was a bad time to do it as week one is where everyone is still settling in etc. I found it hard to juggle settling in with flat mates and socialising with having to do reading everyday and prepare myself for the TBL tests. TBL is a good way to 'self study' and I feel like I did learn things from the reading, however personally conducting the sessions in week 1 was too early.'

'I felt that having to prepare for four TBL sessions one after the other was tiring. Especially since it is so early in the semester and a proportion of the marks go towards our final degree.'

The fourth theme was time. Some students felt they would have liked longer to prepare for the TBL sessions and some students felt the TBL sessions themselves were too long.

'Make them only three TBL's so they have a day before each one to revise within five days of the week. Ours seemed very rushed.'

'In the TBL exercises have more time allocated to discussing factors in team. Also the MCQ after the tRAT, should have less time allocated to it, as in all the TBL session that part was just too slow so became a bit dull.'

The fifth theme was the group working aspect of the TBL session. The majority of students who raised group working were very positive regarding having the opportunity to meet and work with other students on the course:

'The TBL's were great at helping all of us meet each other especially as the groups were randomly chosen.'

'Being put into random groups with people I'd never met or spoken to and being able to build friendships with them and work as a team.'

'I wasn't alone during lunch breaks.'

Some students would have preferred the groups to have been longer lasting to help establish friendships.

'I have always found it awkward to be randomly assigned to groups, particularly different ones each time, it is difficult to make friends when you are constantly being split up.'

Discussion

It is encouraging that a majority of the students who responded to the questionnaire thought that the TBL sessions supported their learning and found the exercises to be applicable to real life. Students appreciated the impact of the discussions with their peers on their own learning and the increase in mean marks between individual and team assessments suggests that the team discussion had a positive impact. It is anticipated that the instant feedback the students receive when they mark the tRAT coupled with the feedback from staff, will support their learning, but it is too early to determine the impact of the feedback. Future research will seek to explore the role that feedback in TBL sessions plays in student learning.

Many students clearly did not like having four assessments in the first week of the semester. The pre-reading was assigned the previous week giving the students at least four days for the estimated eight hour preparation time. The week one induction was partly in response to comments on the two week induction delivered the previous academic year, which was criticised as being too long, with too much free time. The one week induction involving TBL was part of setting the expectations of self-directed study and pre-reading for classes. The TBL planned for the end of the semester will only have three sessions on alternate days. Making the assessments summative rather than formative was not popular, but a key aspect of TBL involves making the students accountable for their learning and it is suggested that this encourages participation. The contribution that these TBL marks make to the first year mark is 2% and the contribution to the final degree classification is 0.12%. It is not known whether the mean marks or the attendance would have been so high if the assessments were only formative.

The sessions were timetabled to last two hours and for some students this was too long, whilst others felt rushed. Managing groups of mixed ability and backgrounds can

be a challenge and as this was the first time that TBL sessions were delivered in this school. It may be down to lack of experience managing TBL discussions that led to these frustrations. Staff did not impose a strict timetable for the different activities within the session, but instead attempted to move from one activity to the next when all the groups had finished. It is not known whether those who felt that too much time had been spent on the discussions were less engaged or whether their team had completed effective discussion more quickly.

The TBL sessions are normally arranged with fixed groups that do not change (Michaelsen, 2002). We made a deliberate decision to change the groups each session to allow students to meet a larger number of peers during induction. Some students would have liked the opportunity to have fixed groups to help form relationships. As the questionnaire was anonymous it is not possible to attribute these views to any particular group of students, such as overseas or out of town students, who may be more in need of making new contacts amongst their peers.

Conclusion

The students have responded positively to TBL in the induction of the first year of the pharmacy programme. The TBL sessions have set the expectation of pre-learning/preparation for all teaching sessions and science-practice integration throughout the programme. TBL also allowed students to engage with a greater number of their peers than would have been possible with a series of induction lectures, which may have facilitated a smoother transition into University life.

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