

Outcomes of Implementing Team-Based Learning (TBL): The Experiences of UK Educators

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Abstract

Team-Based Learning (TBL) is a collaborative learning model that refocuses classroom time to solving relevant problems instead of dispensing information. This is accomplished by a pre-class readiness assurance process that promotes accountability to self-directed learning and teamwork. While research related to the student experience with TBL is present in the literature, there is a relative lack of research published on the experiences of academic staff with TBL. Using a qualitative approach and a semi-structured interview format, this study explored the experiences of 26 academic staff in the UK who implemented TBL using a semi-structured interview format. Thematic analysis of interview text yielded five themes related to curriculum design, student outcomes, and the professional development of academic staff.

Introduction

Team-Based Learning (TBL) is a student-centred active learning pedagogy designed around the constructivist learning theory (Hrynychak & Batty, 2012). In TBL, students work in permanent, diverse, teacher-formed teams of 5-7 students. Team-based learning takes a flipped approach to learning where students are directed to prepare before classes by the readiness assurance process (RAP), which includes a summative individual readiness-assurance test (iRAT) immediately followed by an identical team readiness-assurance test (tRAT) to foster discussion, debate, and peer learning. Students and academic staff receive immediate feedback on team performance, allowing a focused class discussion on any troublesome course concepts. The final and longest part of a TBL unit is allocated to application exercises where teams engage simultaneously with authentic, real-world problems; make collaborative team decisions; and justify their decisions to other teams during discussion and debate facilitated by an academic teacher (Michaelsen, Knight, & Fink, 2002; Strayer, 2011; Sweet & Michaelsen, 2012).

There is research evidence for active and collaborative learning (van der Vleuten & Driessen, 2014); however, the evidence for TBL is still emerging and so far the outcomes are inconclusive (Fatmi, Hartling, Hillier, Campbell, & Oswald, 2013). TBL has been used by individual educators in the US for many years; however, until relatively recently its use outside the US was sparse with articles about its first known use in the UK published in 2013 [Tweddell, 2013; Middleton-Green and Ashelford, 2013; McMullen, 2014].

As the UK higher education system differs from the US with many students commencing tertiary education at a younger age, mostly straight from school or college it is important to identify the experiences of UK educators and whether these experiences are similar to or differ from those in the US higher education system. It would also be prudent to identify if TBL is perceived by educators as achieving improved student outcomes or not. As the use of TBL continues to expand in the UK across diverse disciplines then these experiences and perceptions of benefits in the outcomes should be explored so that others can learn from them.

Research suggests that enhancing students' active engagement in educationally purposeful learning activities enhances learning and achievement (Coates, 2005; Graham *et al.*, 2007) and that disengaged students who skip classes, or feel they did not benefit from them, perform less well (Hidayat, Vansal, Kim, Sullivan, & Salbu, 2012). A number of TBL studies have reported improved student engagement in several areas including preparatory work, attendance, in-classroom activities, and subsequent class discussion (Allen *et al.*, 2013; Andersen, Strumpel, Fensom, & Andrews, 2011; Persky, 2012; Pogge, 2013; Searle *et al.*, 2003; Thompson & Schneider, 2007), while others have reported improved transferable skills such as verbal communication and team working skills (Grady, 2011; Ofstad & Brunner, 2013; Thompson & Schneider, 2007), and problem solving and critical thinking skills (Ofstad & Brunner, 2013; Thompson & Schneider, 2007). However, these are all studies from the US where TBL is well established so it would be appropriate to explore any differences or similarities in experiences of student outcomes in the UK.

Why should UK and other European educators need to change their teaching practices? Van der Vleuten and Driessen, 2014 argue that educational practice and educational evidence are misaligned; the former relying too heavily on information delivery with educators not supporting or designing sufficient activities into their curricula for the much more important stage of processing information. Focusing on content coverage without the ability to work with and apply it to problem-solving simply promotes what Marton and Saljo, 1976 characterise as surface learning or, in other words, knowledge that is soon forgotten. To learn we must actively process knowledge and relate it to what we already know and have experienced; we then actively work to organise and structure the content, an approach to learning Marton and Saljo, 1976, characterise as 'deep'. We would suggest that TBL could be used as a strategy to better engage students to complete pre-class preparation and actively engage them in in-class collaborative problem-solving, decision-making, discussion and debate, and as a result take a deeper approach to their learning. Indeed some researchers have reported improvements in examination results as a result of using TBL (Persky, 2012; Redwanski, 2012; Zingone *et al.*, 2010), although others have reported no significant differences (Johnson *et al.*, 2014). A systematic review of studies comparing student performance data concludes that TBL appears to improve knowledge retention, although the authors believe more research is needed (Fatmi *et al.*, 2013). Again, much of the performance data originates from the US and while the comparison in attainment data is outside the scope of this paper, we can start to explore the educators' perceptions on student outcomes.

TBL may be used in isolated modules or integrated more widely across a programme of study with TBL at scale bringing different challenges. Consistency of approach and large-scale staff support and development were identified as challenges when TBL is used more widely across a programme (M. H. Nelson & Tweddell, 2017; Remington et al., 2015). However, programme-wide TBL implementation can promote team camaraderie and sharing of best practice, an enhanced understanding of the programme and the contributions that others make to it, and a more integrated curriculum (M. Nelson et al., 2013; Remington et al., 2015; Tweddell et al., 2016). Collegial support has also been deemed important when using TBL in large classes in nursing programmes (Andersen et al., 2011; Morris, 2016).

This study uses phenomenological approaches to draw meaning from an in-depth analysis of the experiences of higher education UK educators who have used TBL for at least a semester. This report follows on from a previous publication that considered the educators' initial experience of implementing TBL (M. H. Nelson & Tweddell, 2017), this time giving particular consideration to themes relating to curricular design, staff professional development, and student outcomes as experienced by the educators when utilizing TBL as a means to enhance student engagement.

Methods

Approval from the Ethics Committee at the University of Bradford and the Institutional Review Board at Regis University was obtained prior to identification of study participants. Due to one author serving as a leader in the introduction of TBL into the UK, all academic staff in the UK known to be using TBL in at least one module were identified and invited to participate in this study. The academic staff were identified through input from members of the Team-Based Learning Collaborative and from the experience of the author who introduced TBL into higher education institutions located in the UK. Of those invited, twenty-six academic staff from five universities agreed to participate in this study. The backgrounds and expertise of the participants varied widely and included agriculture, business, engineering, environmental science, healthcare (medicine, midwifery, nursing, pharmacy), and psychology. Participants were provided with a study information guide that explained the purpose of the study and gave informed consent prior to participation. Participants were subsequently interviewed in person for approximately 30 minutes using the semi-structured interview format and guide provided in table 1. Each interview was digitally recorded and then transcribed by the primary researcher. Transcripts were evaluated for accuracy by the secondary researcher by comparing the transcripts to the original recording.

Table 1. Interview Guide

<ol style="list-style-type: none"> 1. From your experiences so far, what are the positive aspects of TBL? 2. From your experiences so far, what are the challenging aspects of TBL? 3. Could you describe how your individual TBL practice has evolved as a result of reflecting on your experiences? 4. What impact has TBL had on your own professional development? 5. Do you have any additional comments to make?

Interview transcripts were inductively analysed line-by-line. The primary researcher coded the transcripts using computer-assisted qualitative data management software (NVivo, QSR International). The coding methods primarily used were open (initial) and simultaneous coding for the first coding cycle followed by axial coding for the second coding cycle (Saldana, 2016). The results of two coding cycles yielded several categories and subcategories of coded text. The primary researcher then identified themes from these categories and subcategories. The themes identified by the primary researcher were validated by the secondary researcher.

Results

The researchers identified five themes related to curriculum, professional development, and student outcomes. Table 2 summarizes the categories that the interview text codes were stratified into and the themes that were identified and validated by the researchers.

Table 2. Code Categorization and Themes

Category	Theme
Experiences related to TBL and curriculum design	<ul style="list-style-type: none"> ● TBL is a good fit for curricular integration
Experiences related to student outcomes	<ul style="list-style-type: none"> ● TBL develops transferable skills ● TBL promotes deep learning
Experiences related to academic staff development	<ul style="list-style-type: none"> ● TBL fosters development of academic staff as educators ● TBL promotes development of communities of practice

Theme 1: TBL is a good fit for curricular integration

Many of the participants taught in a curriculum that is intentionally integrated in an interdisciplinary way and several commented positively about TBL lending itself well to curricular integration.

TBL I quite strongly believe has facilitated, by its very nature, integration between disciplines. And I think that is an interesting area for research. Because of the facilitation skills required in a large room, because we have large groups of 100-ish in a room, then we need at least two people in there. So, what we did then, was to use [colleagues from] different disciplines. (Participant 10)

Obviously, the reason for us using TBL is that it looked like a good way of integrating science and practice, and we have to do that whether we use TBL or however we did it, as far as accreditation. But it just seems a natural way of bringing science and practice together. (Participant 3)

A possible explanation for the synergy between TBL and curricular integration is that TBL application exercises are intentionally designed to provide students with experience solving real-world problems designed to engage students. If students can see the authentic relevance of a topic, task or problem to their future career they are more likely to engage with it. Curricular integration often involves working closely with other academic staff with different areas of expertise. This blending of expertise may make it easier to craft application exercises that address real-world problems. One participant explained why they experienced creating application exercises to be easier in an integrated curriculum environment:

Well sometimes I need a bit of help from colleagues to get that integration in place. You might start out with an idea, and then working with colleagues to grow that into something that is going to work is important. (Participant 2)

Theme 2: TBL develops transferable skills

The experiences of our participants indicate that TBL helps students develop the transferable skills of problem solving and critical thinking. For example, our participants noted that TBL students ask more questions about the material and use the answers to their questions, along with other data, to make an informed decision when solving a problem. In addition, several participants noted that even though TBL promotes students to ask more questions about the course material, students also try to obtain answers to their questions through self-directed learning before approaching an academic.

They are able to use information that they are gathering much more effectively, they are able to ask questions as well as answer questions, they are thinking about rationales and so on. So, I think we are starting

to breed a different type of student, which is quite exciting when you've dealt for a lot of years with passive consumers. (Participant 2)

The students are more able to question things and make their own decisions, rather than just reel off facts. (Participant 5)

Our participants also experienced enhanced team-working skills. TBL requires students to engage much more with their team members which leads to the development of effective team behaviours as evidenced by team leadership, improved interpersonal communication skills, and openness to the opinions of others. Several participants noted that the peer evaluation process helped students to develop and improve upon team behaviours as a result of reflecting upon feedback provided by their team members.

And they [students in a TBL class] have all commented on how they have developed as a team worker, academically they have all commented that they have developed their own skills, and they've realised that themselves that they've developed either to be a team leader or they've developed to quiet down a bit to let someone else have an opinion, and they've developed that process. (Participant 15)

Theme 3: TBL promotes deep learning

Participants from academic programmes that implemented TBL across multiple years of a curriculum noted that TBL students were able to master material earlier in the programme and were able to perform higher-level learning tasks earlier in the programme as compared with students who went through the programme under traditional learning formats.

I have been able to ask them questions in exams that the previous year I know they could not have answered. So, there is more depth, more understanding. (Participant 13)

Our participants also experienced that students were better prepared earlier in the learning process for end-of-year exams. TBL requires students to engage with and learn material prior to the beginning of a TBL unit, which in essence provides the first round of reviewing (revising) for summative exams. With lecture-based learning, students often delayed the first instance of attempting to learn material until they began studying for final exams. With TBL, participants observed that students felt as if TBL made it easier to prepare for final exams due to the requirement to study the material during the RAP.

I think for the students, they are forced... through the iRAT process to learn it. So, they are actually revising in revision time for the first time ever, whereas historically people like myself learnt it for the first time just before an exam. It just flew over my head during the semester and then I taught it myself. (Participant 10)

I think the fact that the failure rate in the first year, and of course we've now just started the second year, was lower than it had been and the

feedback from students has been... although they didn't necessarily enjoy the process of having to learn the material...actually they could appreciate when they came through finals it wasn't the first time that they had seen it or thought about it. (Participant 16)

Theme 4: TBL fosters development of academic staff as educators and scholars

Most participants found that TBL helped them become better educators. For example, the experience of most participants was that TBL increased their reflection upon how they were educating students. Some participants attributed the “backward design” of TBL, which encourages the approach of beginning the design of a unit by first considering the desired student outcomes, as a key reason for their increased reflection upon teaching practices. This approach to unit design encourages academic staff to reflect upon their learning outcomes and to ensure the learning materials and activities are aligned with the outcomes.

Well, it [TBL] makes you reflect a lot harder about what you are doing I think, and exactly what it is that you want to come out of this. (Participant 2)

I think it has helped me understand more about how students learn. (Participant 3)

I am much more measured now, “why am I asking them to read this?”, “what do I want them to do?”. So, I am much better at that, rather than just adding stuff. (Participant 18)

Participants also stated that TBL enhanced their ability to facilitate discussion among students in a classroom session. In addition, several stated that this skill also transferred beneficially into other areas, such as guiding discussions among academic staff in a meeting.

It has made me a more confident facilitator, I would say. I have improved my skills at getting students to articulate the reasoning behind their answers or their views. (Participant 9)

For me, I think the biggest improvement has been my questioning techniques with students. I feel much more comfortable now in silence and allow them time to answer questions. That's been improving over time. Initially, I felt really awkward. I really wanted to help them out, but now I find I am much better at that and my questioning technique has improved in as much as I am able to go beyond to keep getting them thinking, to go deeper, and that has been a change. And I find I am using that now in other student groups, too, so that has been a real benefit. (Participant 18)

Several participants found TBL to be a refreshing change from traditional pedagogies and a recharge for their career as educators.

It [TBL] is much more fun for me. I love it. No two sessions are the same. I always come away with food for thought, my sessions always evolve and shift for the next time. (Participant 4)

I think it [TBL] brings some of the fun back into the classroom which has been good to see, because you can see the teams and their dynamic as the students work on the questions together. So, having a different way of teaching has been really helpful for me. (Participant 26)

Becoming a TBL practitioner helped some participants to engage with educational literature in general, and TBL literature in particular. For some it was the natural inclination to probe the literature to determine if TBL did indeed work and what evidence there is to support TBL.

TBL is part of my research. So, for me personally, it is a constant in my life, to be keeping up with what is going on in the department, what is going on in the research, what has been published, so for me it is a huge personal development and personal interest of mine. (Participant 15)

Additionally, several participants stated that TBL aided their efforts to earn teaching qualifications within the UK higher education system. For example, experience with TBL helped provide evidence to attain a fellowship of the UK Higher Education Academy.

Theme 5: TBL promotes development of communities of practice

TBL fostered a culture of collaboration among our participants and their academic staff colleagues. Participants in a programme-wide TBL environment engaged more with each other and developed more awareness and understanding of their colleagues' expertise by virtue of TBL-related discussions. Academic staff with stand-alone TBL courses developed collaborative relationships with other staff from diverse disciplines across campus in a meaningful manner that would not have occurred in the absence of TBL.

So, we've had lots more discussion around how we actually teach than I guess we'd probably would have done otherwise, because if it were just a lecture ... we wouldn't have had lots of staff development sessions on how to give lectures. (Participant 5)

The first biggest and most important thing is it [TBL] has improved our team teaching and teamwork in general across disciplines in the school. Most of our teaching previously was quite uni-disciplinary and you worked quite closely with other people in your discipline but you didn't work as closely with people outside your discipline, whereas now most of the application exercise sessions that we run are taught by two people from different disciplines, so it has definitely improved teamwork, improved the team spirit within the school. (Participant 9)

I've been going out getting everyone else involved in the university as well, so there is a group of us that have been running workshops for others on TBL itself, but also on writing MCQs [multiple-choice questions] and what we've learned from MCQs within TBL. (Participant 23)

A few participants mentioned that they have been able to lead change around campus regarding innovative teaching. As they became known around campus for their TBL expertise, these participants found themselves in situations that allowed them to encourage others to change their courses into the TBL format.

I have helped three other colleagues to design MCQs, I have had sessions with them, I calmed them down, I have helped people with MCQs, I have shared my MCQs, I've done this, I've done that. So, I have acted as an agent of change, and it is gradually being more introduced. (Participant 25)

Many participants noted that peer-review of TBL materials was helpful for improving their practice of TBL, such as crafting effective MCQs for the readiness assurance process and creating appropriate pre-class study materials. Several participants noted they wished more peer review was available to them in a more intentional manner. In general, participants experienced that TBL made the process of peer review of teaching materials less confrontational and more collaborative.

There are three or four other members of staff who have looked through all my material and made suggestions, and that is a big help. (Participant 13)

I feel I could develop my approach certainly to developing materials better and actually reviewing other people's materials, observing other people teaching I think is something I need to do, to develop my practice within TBL further. (Participant 3)

Discussion

Developed from the findings of this study, Table 3 provides several recommendations for academic staff to consider when implementing TBL. As a whole, the experiences of our study participants with student engagement, curricular, professional development, and student learning outcomes related to TBL were positive.

Within the category of curricular design, our study identified a theme that the experience of academic staff indicates TBL is a good instructional strategy to use in an integrated curriculum. The utility of TBL for delivering an integrated curriculum in a programme-wide manner has been demonstrated in a setting in which academic staff were assigned to multidisciplinary teaching teams and asked to develop integrated course materials for disease state units within a pharmacy curriculum, including instances of application exercises integrated across disciplines (Nelson et al., 2013). Results from this study were overall positive for the perceptions of academic staff and students with regard to

TBL, teamwork, critical thinking, engagement with the material, and confidence to learn independently. When implementing TBL in therapeutics workshop sessions, TBL allowed for ease of integration of material across disciplines and fostered student-to-student reinforcement of knowledge and concepts learned earlier in the curriculum (Beatty, Kelley, Metzger, Bellebaum, & McAuley, 2009). In many areas of higher education increasing the integration of curricular content is encouraged, and in some areas it is required by accrediting bodies. Accordingly, the finding that our participants found TBL to be a catalyst for curricular integration is a helpful discovery to share with our community of higher education academic staff.

Within the category of student outcomes, our results indicate a theme of academic staff experiencing the development of transferable skills related to professionalism, teamwork, and communication. This finding is not surprising, as similar results have been reported in the literature. A qualitative study demonstrated that TBL accelerated the development of professional attributes in nursing students, such as critical thinking and motivation to participate in cooperative learning (Currey, Eustace, Oldland, Glanville, & Story, 2015). Hazel et al., 2013 showed that TBL enhanced professional skills in veterinary and animal science students, including communication, critical thinking, and teamwork. Academic staff facilitating a TBL course for midwifery students noted that students learned how to work with peers who had different communication styles (Moore-Davis, Schorn, Collins, Phillippi, & Holley, 2015).

Also within the category of student outcomes, our analysis yielded a theme of academic staff perceiving that deep learning occurred among learners. The education literature suggests that active engagement of students with course material is important for deep learning while traditional, teacher-centered pedagogies foster surface learning (Bevan, Chan, & Tanner, 2014). Enhancing student engagement by providing students with meaningful and relevant problems to solve that requires prior knowledge encourages the deep learning process (Novak, 1988). Surface learning often utilises rote memorisation of facts, while deep learning involves students using factual knowledge in a manner that allows them to construct their own meaning of this knowledge. Team-based learning promotes deep learning by virtue of first holding students accountable to learning facts and concepts on their own and then applying this knowledge within a team setting to solve meaningful, real-world problems. In addition, TBL contains elements of elaborated learning, such as peer teaching and justifying and explaining the rationale for a collaborative decision, which further promotes deep learning (van der Vleuten & Driessen, 2014). Others have reached similar conclusions. For example, Bleske et al., 2014 found that second-year pharmacy students who learned in a TBL setting were able to perform at a similar level as third-year pharmacy students when solving application of knowledge problems and Beatty et al., 2009 concluded that high-level learning occurred in student teams within their TBL workshop sessions. These findings should be of value to any academic institution seeking to provide their graduates with a competitive edge in the workforce.

Given previous literature indicating academic staff experience increased workload when implementing TBL (Tweddell, Clark and Nelson, 2016; Kebodeaux, Peters, Stranges,

Woodyard, and Vouri, 2017) it was encouraging to learn that academic staff also perceived benefits of TBL implementation related to their growth and development as an educator. This finding is illustrated by the theme of TBL fostering the development of academic staff as educators. In other words, while academic staff experience an increased “cost” of implementing TBL, they also experienced more long-term benefits related to their development as a professional, educator, and scholar. This is a key finding that we believe should be leveraged to 1) incentivise use of TBL and 2) provide academic staff with efficiencies in both scholarship and teaching. For example, academics may be encouraged to use TBL if they view it as an opportunity to help them prepare for their next career step. In addition, the perceived additional time cost for TBL may be offset down the road by academic staff also being able to generate and disseminate peer-reviewed TBL research as a result of their effort to implement TBL. To maximize this benefit, academic staff should be encouraged to carefully consider how they wish to research TBL implementation prior to actually implementing TBL. This additional time investment can lead to a well-designed scholarship project as compared with the approach of implementing TBL first and then trying to develop a scholarship project after the fact. Another benefit to academic staff is the scalability of TBL. In our experience this has reduced the need for multiple repetitive workshops because TBL may be scaled up to large group classes.

In addition to benefits related to individual academic staff development, it was also encouraging to discern the theme of TBL serving as a catalyst for the development of communities of practice among academic staff. Due to the substantial differences between traditional (lecture-based) learning and TBL, academic staff who pioneer the implementation of TBL are at risk for being in isolation with regard to peer support. Fortunately, TBL is somewhat like a universal language in that it may be used to deliver curricula in virtually any discipline. Accordingly, academics who pioneer TBL within their unit should investigate if others in their academic institution are using TBL because the strategies and logistics of TBL are applicable across many disciplines. In other words, a TBL practitioner is still likely to learn substantially from a mentor who uses TBL in an entirely different discipline. There are a few references in the literature to similar findings. Johnson et al., 2014 refer to the creation of teaching circles that academic staff involved in TBL attended on a regular basis during the implementation of TBL in a multi-year pharmacotherapeutics course. Nelson et al., 2013 found the use of TBL “brown bag” sessions to be helpful for academic staff to share TBL experiences and solve TBL challenges when implementing TBL throughout a pharmacy curriculum. These findings should be helpful not only to academic staff but also to their supervisors and mentors who search for additional means to develop their staff and promote collegiality across campus.

There are several possible limitations of this study to disclose. At the time of this study, it was not possible to identify and interview every academic staff member in the UK who implemented TBL. Due to the relative newness of TBL and the lack of knowledge among TBL experts of academic staff using TBL in the UK gave the authors confidence that respondents were recruited from a pool that included all or nearly all TBL practitioners in UK higher education institutions. Accordingly the authors believe that

data saturation was achieved due to the number and diversity of staff who were interviewed. In addition, both of the investigators are TBL practitioners and may not have fully detached themselves (bracketed) from their own experiences of TBL in every instance, which may have unintentionally influenced the opinions of some participants.

It is hoped that these findings will encourage other academics to explore the implementation of TBL and other collaborative learning models as a means to enhance student engagement and learning as well as their own professional development as an educator. The data presented here offers several possibilities for additional research in the area of TBL and student and academic staff outcomes. For example, what are the longitudinal outcomes associated with TBL promoting the development of transferable skills in students with regard to job placement success? Does the perceived promotion of deep learning by TBL result in longer retention of information and problem-solving skills as compared with traditional learning methods? In terms of academic staff development, does utilization of TBL into one's academic career result in longitudinal career opportunities that would not have been otherwise possible or likely? With regard to TBL fostering development of academic communities of practice, will implementation of TBL on a widespread basis within an institution result in greater academic staff satisfaction? As the use of TBL continues to grow in the UK, as well as worldwide, we conclude this report with a call for additional TBL practitioners to use this data as a means to conduct studies that will potentially answers these and other questions raised by these findings.

Table 3. Recommendations

- Utilize TBL to facilitate further integration of curricula; when implementing TBL across an academic program, consider also exploring how the curriculum could be integrated such that curriculum design and delivery changes are simultaneous.
- Leverage the ability of TBL to draw academic staff together across multiple disciplines as a means to develop communities of practice, both within an institution and across institutions, to enhance staff development and engender a spirit of academic cooperation.
- Consider implementing TBL into curricula in which a deficit in deep learning has been identified.
- Incorporate the idea of TBL into strategic planning discussions in which a goal of enhancing the transferable skills of graduates is desired; this may be particularly helpful for programmes in need of an enhanced marketing message to address student recruitment deficits.
- Consider building an invited TBL workshop into existing academic staff development programmes given the potential of TBL to enhance staff development.

Acknowledgements

The investigators thank the 26 academic staff who consented to be interviewed for their generosity of time.

Funding

This work was supported by a grant from the Regis University Research and Scholarship Council.

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