# Developing practitioner learning in professional football: examining the evidence for a problem-based learning approach

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## Headline

High performance environments, such as professional football, have been described as fast-paced, challenging, and constraints-led [1]. When operating in this context, research has suggested that effective practitioners need to demonstrate abilities to be adaptable, open-minded, and display requisite knowledge and skills [2]. Yet traditional professional development (PD) methods in support of practitioner learning have been criticized for lacking relevance to the realities of the situation [3]. Moreover, traditional approaches have traditionally drawn from bio-scientific discourses [4] with practitioners perceived as mere technicians who 'transfer' professional knowledge to their practices in a linear and unproblematic way [5]. Unsurprisingly, formalised education and PD programmes have mirrored this conception of learning as simply acquisition [6] and have been organised around the delivery of discrete units, focusing on specific and narrow aspects of disciplinary knowledge. The outcome of this approach has been that PD in high performance environments, has delivered new knowledge in ways that are de-contextualised from the complex and messy realities of the environment [7]. As a result, development programmes have been accused of failing to offer any real value or relevance for practitioners [8] and this is exacerbated in the case of sport scientists (SS) working in professional football [9, 10]. Therefore, development methods which consider specific environmental demands may be advantageous on the learning journey of professionals, and problem-based learning (PBL) is one such learning method advocated to support practitioner development in the professional football context.

PBL is an educational tool which begins with the presentation of a specific situation or 'problem' and challenges the learner(s) to think critically around potential solutions [11]. This method of learning has been widely adopted in a range of professional fields and academic settings to scaffold development within authentic learning situations [12-14]. The credibility of PBL is that it is grounded in contemporary understanding of how individuals learn. Informed from the classic work of [15] and [16] constructivism underpins much of the work conducted in educational settings and describes how learners 'construct' new knowledge based on what they already know. The features of the model include:

- individuals are active agents in the learning process.
- learning activities need to be meaningful (relevant).
- learning does not occur by transmission.
- learning occurs through interpretation.
- interpretation is filtered by prior knowledge.
- inquiry activities are powerful in facilitating development.
- learning is always a social activity

Drawing from these features, PBL involves learners work in small collaborative groups to address a problem. With the educator as facilitator, learners hypothesise possible solutions, identify gaps in knowledge, and engage in self-directed learning. For example a key skill of effective SS working within professional football is the ability to perform as part of a multi-disciplinary team, and therefore the collaborative discussions are encouraged within PBL [17]. Furthermore, PBL approaches have been described as more effective in comparison to traditional learning approaches at improving communication [18], critical thinking [19], and leadership qualities [20] for professionals working within similar complex-environments.

## Aim of the paper

However, despite the potential benefits of the method, no reviews have been completed on the utilisation of PBL for the sport science practitioner. Therefore, the purpose of this review is to explore the findings of previous PBL studies relating to the discipline of sport science, with a particular focus on professional football.

## Methods

This research sought to investigate the potential for problem-based learning to improve the development of sport scientists within elite football. To achieve the aim the 1st researcher utilised a review of the relevant research in the area from the Google Scholar, PubMed, and ProQuest databases. The identification of relevant research papers was completed during a 2-month period (May and June 2023). This review needed to be completed to provide insight on the questions described below (table 1).

**Table 1. Research Questions**

| |
|---|
| 1. What research has been completed on PBL within sport science between 2013-2023? |
| 2. What is the current state of evidence that supports the use of PBL in formalised professional development, and what are the implications for sport scientist learning in professional football? |

To help filter the results and ensure the review included the highest quality inputs, inclusion and exclusion criteria were used to ensure the research identified relatively appropriate studies during this phase of the research (Table 2). Literature that did not fulfil inclusion criteria were not used in this review.

**Table 2. Inclusion criteria used within the review**

| |
|---|
| Peer-reviewed published research papers |
| Full-text articles |
| Research papers published within the past 10 years (2013-2023). |
| Studies which evaluated PBL |
| Documented their research methodology |
| English language text |

The 1st researcher conducted the initial search using various key terms such as 'Problem Based Learning (PBL) Football Sport Science', 'Problem Based Learning (PBL) Soccer Sport Science'. A total of 4 separate studies (Google Scholar = 0; PubMed = 4; ProQuest = 0) published from 2013-2023 were identified via the two databases. However, all 4 of these studies were excluded as they did not evaluate PBL.

The next step involved broadening the search criteria beyond sports science/sports coaching. The key terms used within the second search of the databases were; 'Problem Based learning (PBL) Sport Science' and 'Problem Based learning (PBL) Sport Coaching'. A total of 11 separate studies (Google Scholar = 6; PubMed = 5; ProQuest = 0) published from 2013-2023 were identified via the two databases. 7 of these studies were excluded as they did not evaluate PBL. One of the studies was excluded as it did not utilise sport science or sport coaching participants. The 3 remaining studies which were deemed relevant enough to be included within the review can be found within table 4.

To provide a more detailed review, and subsequently a more informed starting point for sport science practitioners to work from, the 1st researcher expanded the search criteria to incorporate PBL studies from the similar profession of physiotherapy. This search was conducted using the key terms of 'Problem Based Learning (PBL) Physiotherapy'. A total of 27 studies (Google Scholar = 23; PubMed = 3; ProQuest = 1) published from 2013-2023 were identified via the two databases. However, 22 of these studies were excluded due to not being peer-reviewed journal articles (12), not evaluating PBL (9), not being English language papers (1). The 5 remaining studies which were deemed relevant enough to be included within the review can be found within table 5.

From this review of PBL research which has been published within the sectors of football, sport science, sport coaching, and physiotherapy between 2013 and 2023, only 8 empirical studies were discovered. These studies can be found within tables 4 and 5 and form the basis for addressing study questions.

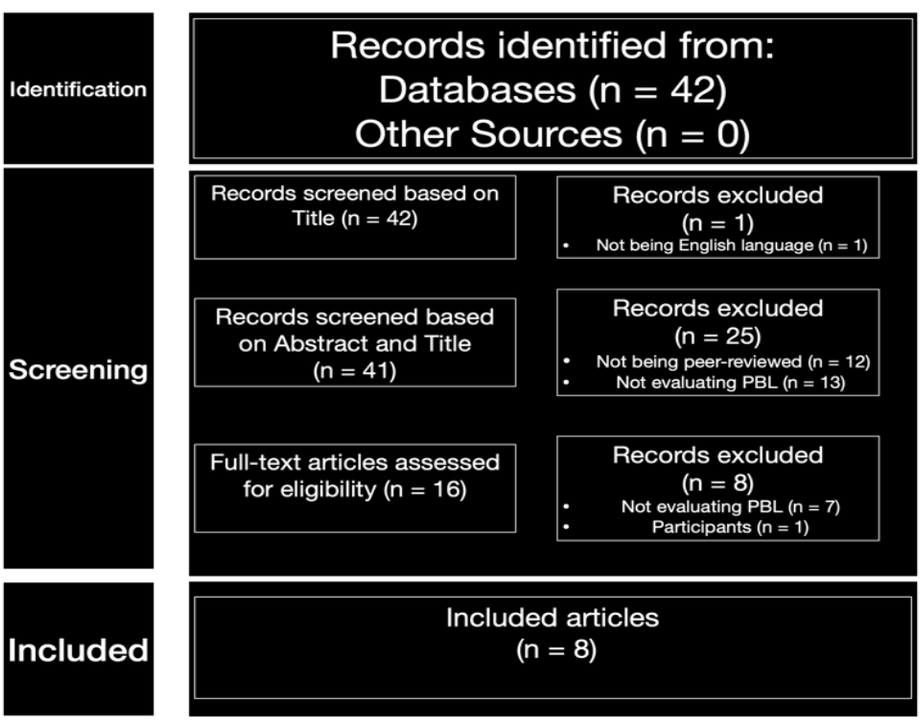


**Fig. 1. PRISMA Flow Diagram of Search Strategy**

## Results

**Table 3. Results to research question**

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|---|
| 1. What research has been completed on PBL within sport science between 2013-2023? |
| Only a small number of studies have been completed on PBL in sport science within the last 10 years. Table 4 below shows 3 studies from our literature search. These studies were all completed using university students as their participants. |
| 2. What is the current state of evidence that supports the use of PBL in formalised professional development, and what are the implications for sport scientist learning in professional football? |
| The studies in tables 4 and 5 all show positive outcomes from the utilisation of PBL. However, none were completed within the professional football environment. |

**Table 4. PBL Research within the fields of Sport Science or Sport Coaching**

| Authors | Research Design | Participants | Results | Conclusion |
|---|---|---|---|---|
| Rossato and O'Driscoll, (2013) | Case Study | 64 Third year sport science undergraduates | 81% found the PBL task helpful to aid learning, 66% felt it could aid learning more than a traditional approach, 73% enjoyed the PBL task. | PBL may be useful to engage students within the topic area of the coach-athlete relationship. PBL could also be used to help develop transferrable skills for those students who want to pursue a career in coaching. |
| Heavside et al., (2017) | Focus group and interview | 4 postgraduate psychology students and 1 lecturer | PBL was instrumental in developing key employability skills: team working, communication and interpersonal sensitivity; thinking critically, creatively and flexibility; translating knowing into practice, and increasing life- long learning awareness. | Findings suggest that PBL is beneficial in developing the skills sought by graduate employers. |
| Konstantaki, (2015) | Qualitative questionnaire | 25 second year sport science undergraduate students. | 93% of students agreed PBL fosters active participation. 95% agreed it enhanced their understanding of the module content. 87% agreed that PBL encourages deep learning experiences. 67% were positive that PBL helped them develop team work, communication, and critical thinking. | Findings showed overwhelming student support of PBL as an alternative method of teaching and learning in sports science. |

**Table 5. PBL Research within the field of Physiotherapy**

| Authors | Research Design | Participants | Results | Conclusion |
|---|---|---|---|---|
| Lennon et al., (2018) | Mixed Method Evaluation | 56 Second year undergraduate physiotherapy students | Students reported greater levels of understanding, satisfaction, relevance, achievement, and teaching when utilising PBL compared with lecture-based delivery. | PBL is effective at promoting early evidence-based practice. Students identified with the interactive, collaborative, and experiential nature of PBL to EBP instruction. |
| Willis et al., (2018) | Quasi-experimental nonrandomized pretest-posttest design | 42 Final year physiotherapy students | Significant improvements ($P<0.05$) observed in self-reported decision-making, self-reflection, and reasoning. | Improved self-reported clinical reasoning skills after completing PBL coursework concurrently with integrated clinical experience. |
| Korpi et al., (2019) | Interpretative phenomenological analysis | 15 medical professionals with 1-12 years work experience. | Students self-reported PBL forced them to reflect (both individually and as a group) more than traditional methods of learning | PBL created challenge and forced critical reflection, both self-reflection and reflection together (peer group) |
| Dissanayaka, (2014) | Questionnaire and focus group | 32 third year undergraduate physiotherapy students | Questionnaire and focus group findings showed the group were positive about their experiences with PBL | PBL facilitated learning concepts in musculoskeletal physiotherapy and helped students to manage patients confidently during their clinical training. |
| Arienti et al., 2021 | Observational pretest and post-test study. | 121 physiotherapy university students | Students shown improvements in all domains tested except for sympathy. | Digital PBL approach was an effective educational tool which developed evidence based practice competencies in physiotherapy students. |

## Discussion

Despite the application of PBL across multiple professional fields [12-14], it has yet to be widely adopted in the field of sport science. Specifically, only three studies have been completed on PBL in sport science within the last 10 years, and each of these were situated with university students. The positive conclusions of the three sport science studies in table 4, unanimously stated benefits in using a PBL approach in developing professional skills which are sought by graduate employers [21-23]. However, presently, the development of these skills (e.g. creativity, problem solving, clinical reasoning, inter alia) are largely forged in the workplace for practitioners, and are seen as the responsibility of the individual to learn 'on the job' [24]. Young S & C coaches within professional football have recently been reminded that learning is a lifelong process, and it is important they stay contemporary in their field whilst maintaining a critical eye [24]. PBL has been reported as being beneficial at developing the critical eye of young sport scientists [22, 23]. Despite practitioners being critical of traditional learning approaches [3], there has been no PBL based studies conducted over the past 10 years in any domain with professionals working in the performance sport environment. It may be reasonable to suggest, therefore, that the positive outcomes documented within other professions [19, 20, 25] indicates the potential of PBL to scaffold the professional development of practitioners in football.

The eight studies which have been documented within the current review universally acknowledged the positive benefits of utilising PBL to facilitate learning amongst sport science and physiotherapy students. Subsequently, PBL within sport science may provide a dynamic development model to facilitate

the interaction between learner and new knowledge. The key message for professional development designers and educators is that learning activities need to be grounded in contemporary understandings of how individuals learn.

## Practical Application

Whilst to the authors knowledge there is not yet a precedent for incorporating PBL into the development plans of sport scientists working in professional football, the current evidence base available does provide a positive insight for the potential of PBL to aid the development of practitioners within the field. Notably, the development of skills such as team work [21-23], interpersonal sensitivity [22], reflection [25], clinical reasoning [26], collaboration [27], and communication [23] that are central to quality practice, but appear to be missing from formalised professional development strategies. These desired outcomes of the PBL approach are in contrast to the current criticism of PD within professional football which is too prescriptive in nature and removed from applied practice [28, 29]. Subsequently whilst more research is required into the effects of PBL on the development of sport scientists working in professional football, evidence from other professions suggests PBL could be a powerful learning tool in support of practitioner learning in performance environments.

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