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PROBLEM-BASED LEARNING IN PHYSIOTHERAPY TEACHING: AN INTEGRATIVE REVISION

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ABSTRACT

Introduction: Problem Based Learning (PBL) is one of the most used active teaching methods in health courses, motivating and bringing the student to the center of their training process. **Objective**: To identify and analyze the use of PBL in teaching physiotherapy. **Method**: Systematic integrative bibliographic review in national and international databases, using Health Science Descriptors and their MeSH Terms: physiotherapy, education, problem-based learning. **Result**: Among 148 articles identified, 22 were selected. The study demonstrated that the PBL provides students with engagement in their own learning process, contributes to their autonomy, despite the difficulties encountered in teamwork. It was also found that it facilitates the experience with interprofessional education (IE) but demands better training from teachers. **Conclusion**: The PBL is very effective when applied in IE programs and in student-centered curricula. It has been found that the necessary training of more humanistic, critical and reflective professionals in the area of health and, specifically in physiotherapy, is permeated by the will and courage to face the challenges of real curricular changes that use innovative and motivating teaching methods. The method presents itself as a relevant and effective way to develop competences, skills and attitudes that are fundamental to the practice of physiotherapists.

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INTRODUCTION

For a long time, common sense was that the ideal educational model would be the one named by Paulo Freire as "*Educação Bancária*" (Banking Education), in which the teacher transfers his/her knowledge and demands students to simply reverberate it. Its name was given since it replicates a banking transfer (PAGLIOSA, DA ROS, 2008). In contrast to this model there is "*Educação Libertadora*" (Liberating Education) that values conscientization, autonomy and humanization between teachers and students. It is based in interactive, relational, dialogical processes (FREIRE, 2011). Among the constituent elements of liberating education, it should be noted the establishment of solid argumentative association between the intended curriculum and historical, social, political and cultural contexts, i.e., pedagogical project and conjuncture influence each other in a dynamic, dialogical process. This type of strategy contemplates the articulation of purposes, contents and actions aiming to allow humanization and autonomy of people involved to build connections between knowledges and possibilities of human emancipation towards social transformation (MENEZES, SANTIAGO, 2014). In this context, it is worth mentioning active teaching methods, which motivate and bring students to the center of the training process. These methodologies also create a pleasant, transformative environment in which teachers are no longer a content transmitter. Instead, they act as facilitators in the process of building and lapidating knowledge. Thus, both curriculum content and learning environment communicate with the actual situation of students and favor their autonomy (FARIAS*et al*., 2015). Among the most used active teaching methods in healthcare undergraduate programmes, including Physiotherapy, there is Problem-Based Learning (PBL) which embodies several nuances of significant learning valuing students' previous knowledge and elaboration of learning objectives. It motivates students to search for answers and, therefore, take part in the solution of problems presented (FARIAS*et al*., 2015). PBL is an active teaching method based on problematization as a teaching strategy to reach and motivate students, who become able to face a problem, analyze it, reason,

relate it their own histories and find a new meaning through their discoveries. Then, students can develop clinical thinking and are guided to build their own training process (MITRE *et al*., 2008). With PBL, the teacher assumes a role completely different from the one performed when a traditional teaching method is applied. This demands not only that the teacher masters the content but also collaborates with the learning process, allowing the development of analytical, synthetical skills by students. The teacher must allow creativity to blossom and encourage students to qualitatively evaluate and make their own decisions, supporting them when difficulties emerge during the process (SOUZA, DOURADO, 2015). Considering the importance of assessing the healthcare needs of the population, the search for a complete, non-fragmented education becomes even more relevant, as advocated in the National Curriculum Guidelines of Physiotherapy Undergraduate Programmes, with the objective to articulate teaching, research and extension/assistance (BRASIL, 2002). Thus, this study aims to identify and evaluate the use of PBL in teaching Physiotherapy through a systematic, integrative literature review.

MATERIALS AND METHODS

The path to achieve the goals proposed was a systematic, integrative literature review performed through a scientific research that gathered relevant studies in a literature database regarding the use of active teaching methods in Physiotherapy. This kind of method aims to define a clear question, establish a research strategy and clarify inclusion and exclusion criteria, as well as submit selected articles to quality check tools (DAVISON, 1966). To perform the systematic, integrative review, a bibliographical research was made on Virtual Health Library (VHL) in the following databases: United States National Library of Medicine's PubMed, Scopus, Lilacs, Physiotherapy Evidence Database (PEDro) and Cochrane Library. The following Health Science Descriptors (HSD) were used: Physiotherapy, Education and Problem-Based Learning. To select the articles, the following inclusion criteria were adopted: articles in Portuguese, English and Spanish; articles published between January 1999 and October 2019; articles that address research performed with Physiotherapy students and teachers and describe PBL in Physiotherapy training aiming to answer the following question: how has PBL been applied in Physiotherapy education and what are the results of using it? As exclusion criteria, content was discarded when it did not answer the research premises.

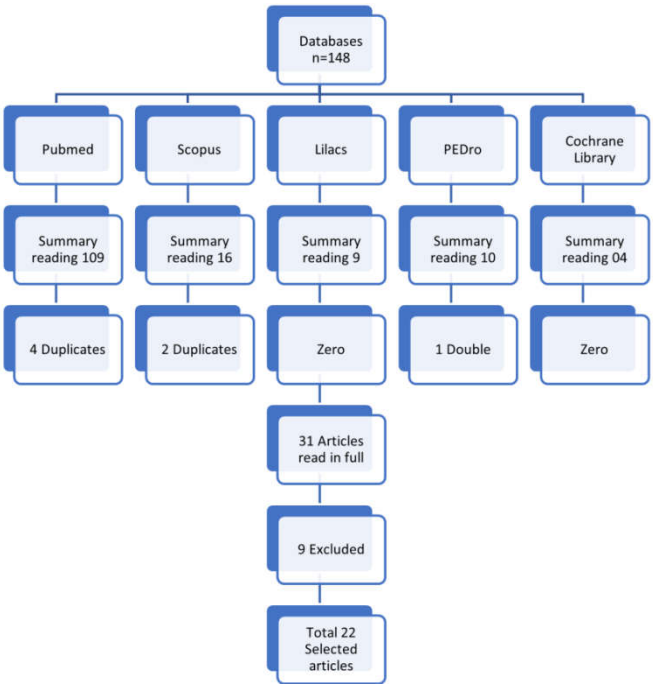

Figure 1. Flowchart of research strategy in databases

The records identified in the databases resulted in 148 articles, being 109 from PubMed, 16 from Scopus, 9 from Lilacs, 10 from PEDro and 4 from Cochrane Library. A total of 7 articles were duplicated in the sources consulted and, after reading abstracts of all articles, 31 were selected to be read in full. After this meticulous reading, 9 articles were excluded, finally leaving 22 articles selected (Figure 1).

RESULTS

The results presented in the 22 articles selected and read in full are summarized in Chart 1. It also lists title, authors' name, journal and year of publication, as well as objectives, sample size and research methods of each one of them.

DISCUSSION

A qualitative study (SILÉN *et al*., 2008) which applied questionnaires to 111 students of Physiotherapy and Medicine programs in the United Kingdom concluded that student-centered learning must be part of the most innovative curricula to engage students in the teaching-learning process, as well as allow a practice-based education. Thus, students in Physiotherapy undergraduate programmes have a learning experience that works as an interface between academic environment and the real world. Still in this context, this same study (SILÉN *et al*., 2008)corroborates what Ministry of Education's Opinion CNE/CES n° 213/2008 (BRASIL, 2008) says, showing that overcoming the concept of education as content transmission, in which teachers hold knowledge and students are no more than information receivers, is crucial to let teachers act as facilitators in the teaching-learning process and students actively participate in their learning, generating the possibility to combine theory and practice in order to better prepare professionals to the challenges of the healthcare field. In its turn, Chesani*et al*. (2017), in a case study with teachers and students of a Portuguese Physiotherapy programme, concluded that merely using a student-centered teaching methodology is not enough to make students understand health-disease process regarding its dialectical complexity, although they demonstrated that PBL actually places students in the center of the learning process, granting them autonomy.

As well as Chesani*et al*. (2017), Roman *et al*. (2017) also try to verify limits and possibilities of PBL. In a qualitative, narrative review focused on the Brazilian reality, they concluded that using PBL presents advantages, such as the possibility to train more humane, critical professionals, and disadvantages, such as not allowing students to fully understand health-disease process. The authors point that this method is an improvement since it can distance itself from the Flexner model and allow the resolution of ordinary problems and the construction of a more integrated knowledge based on the Brazilian reality. When comparing PBL with traditional teaching methods, Roman *et al*. (2017) demonstrated that PBL values meaningful experiences in which there is more than just transmission of information, as it happens in traditional methods. In a qualitative literature review about Problem-Based Learning in Physiotherapy training, Solomon (2005) also evidenced several incoherencies and deficiencies when confronting a traditional curriculum and PBL. Among these incoherencies and deficiencies, Solomon (2005) identified that Canadian traditional curricula cause pressure and anxiety while PBL has a greater sense of will and choice. Furthermore, the study results point that training might fail if basic needs of students are not met. These are freedom, power, love and belonging, fun, survival and reproduction. In this sense, it was observed that PBL meet those needs more appropriately when compared with traditional curricula. Still comparing PBL with traditional teaching methods, an UK study performed by Freeth et al. (2001) using questionnaires, semi structured interviews and observations showed that PBL grants more autonomy to students when making clinical decisions, allowing them to develop self-confidence and to feel better prepared for future professional practice.

Chart 1. Summary of results and variables surveyed

Nº	Author/Country/Year/Journal	Objective	Type of study	Results
1	Dahlgren (2000) Sweden, 2000. Instructional Science	To verify the role of course objectives in relation to students' study strategies in PBL with 58 students from three different PBL programs at *LinköpingsUniversitet*; a bachelor's degree in Physiotherapy, a master's degree in Psychology, and a master's degree in Computer Engineering.	Qualitative	The objectives were used differently in each program – as an integrated tool in the learning process, as an administrative schedule or as a retroactive checklist, respectively. The students' use of the course objectives in the learning process varied according to the course culture and the way the objectives were formulated and conceived.
2	Freeth *et al*. (2001) United Kingdom, 2001 Nurse Education Today	To describe the multi-method evaluation of an interprofessional training ward placement with 36 students of Medicine, Nursing, Occupational Therapy and Physiotherapy.	Qualitative research through questionnaire, semi structured interview and observation.	The students were able to develop both their profession-specific skills in a real-world setting and the quality of their interprofessional teamwork.
3	Kamwendo and Tornquist (2001) United Kingdom, 2001 Nordic College of Caring Sciences	To study perceptions and attitudes to research-related activities of 211 Swedish students of Occupational Therapy and Physiotherapy.	Qualitative research with students of Programs that employed PBL or traditional teaching methods.	The students had a positive attitude towards research, particularly for the activity 'read research literature to update knowledge' and 'apply research findings to improve practice'. PBL students had a more positive attitude towards research and to a greater extent intended to engage in research activities in the future.
4	Solomon and Crowe (2001) Canada, 2001 Medical Teacher	To assess the content of 56 journals of a peer tutoring model from the perspective of the student tutor.	Qualitative study	Due to the stress students face to adapt to PBL, it is important that they gain confidence before assuming the role of peer tutor. Other models in which senior students act as tutors of junior students were better evaluated and are more appropriate to students training for professional practice.
5	Dahlgren (2003) Sweden, 2003. International Journal of Engineering Education	To describe and assess aspects of experiences of 58 students with PBL within three different academic contexts: Computer Engineering, Psychology and Physiotherapy.	Qualitative research through semi structured interviews.	The results show differences between how PBL is realized and understood by students in the three programs. These differences are discussed in relation to the perspectives of knowledge and learning embedded in the programmes as reflected through the students' experiences.
6	Reynolds (2003) United Kingdom, 2003 Journal of Interprofessional Care	To examine 157 first-year Occupational Therapy and Physiotherapy students' evaluations of their initial participation in PBL, during an interprofessional module focusing on communication skills and patient-focused approaches to care.	Qualitative research through questionnaire.	Findings suggested that PBL made a positive, well-received contribution to learning during an interprofessional module.
7	Solomon (2005) Canada, 2005 Physiotherapy Theory and Practice	To review 39 traditional and PBL curricula over the past decade within the context of Physiotherapy practice.	Qualitative literature review.	There are no long-term Physiotherapy-specific studies comparing the outcomes of programs of different curricular designs. PBL may help promote skills important for current practice and remains a viable alternative for those interested in curricular innovation.
8	Goelen*et al*. (2006) Belgium, 2006 Medical Education	To measure the improvement in attitudes towards interprofessional collaboration of 177 undergraduate healthcare students who have a single module of interprofessional problem-based learning using real patients as triggers integrated into their curricula.	Quali-quantitative research (control and intervention groups) performed to assess a dedicated module, consisting of 5 PBL seminars, that was integrated into Medicine, Nursing and Physiotherapy curricula at the participating institutions.	Patients may contribute to PBL promoting a sense of responsibility among students and motivation in interprofessional learning, as well as allowing assessment of learning processes through Interdisciplinary Education Perception Scale.
9	Thavare (2006) New Zealand, 2006 Pacific Public Health	To include different studies in one and make recommendations for schools considering adopting PBL in their curricula	Qualitative, systematic literature review.	The perceptions and attitudes of Physiotherapy students towards PBL are positive despite certain difficulties of working as a team.
10	Pereira (2007) Brazil, 2007 *Revista Comunicação em Ciências da Saúde*	To make college students think about their professional practices as teachers under the principle that we learn when we change the way we think and act; and we teach when we share with others the experiences and knowledge accumulated.	Qualitative literature review.	Teachers and educators must be aware of the need to change and adapt educational practices and consider ethics and moral principles.
11	Silen*et al*. (2008) United Kingdom, 2008 Medical Teacher	To support the efficiency of PBL in the development of a joint use of 3D data in healthcare curricula through the application of 111 questionnaires to enhance knowledge about the possible educational value of 3D visualizations to learning Anatomy and Physiology.	Qualitative research through questionnaire.	3D images/films encourage students to better understand and help them to get information about biological variations and different sizes of organs, space extension and relationship of each other. With PBL, these scenarios based on authentic situations serve as a meaningful context to learning.
12	Solomon and Salfi (2011) Canada, 2011 Education for Health Journal	To evaluate an innovative interprofessional communication skills initiative with 96 students which incorporated PBL, cooperative learning and standardized patients.	Qualitative study	The demand for experiential events which provide students with the skills required to interact effectively in healthcare teams is likely to continue with the growing awareness of the need for interprofessional education.

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13	Cusack and O'Donoghue (2012) United Kingdom, 2012 Quality in Primary Care	To examine perceptions of 92 Health Science students about an interprofessional education module delivered by means of PBL	Quali-quantitative research through questionnaire applied to students from four Health Science disciplines elected to participate in this IPE PBL module.	Overall satisfaction with the module was high, with 63 students reporting that they agreed or strongly agreed that they were satisfied with the module. Analysis of qual itative data revealed the following emerging themes in relation to the module: (1) collaboration (learning together with others from different professions); (2) structure (small group work, discussion, teamwork assessment procedures); and (3) content (problem diversity).
14	Gunn*et al*. (2012) United Kingdom, 2012 Physiotherapy	To provide evidence of how skills gained through PBL are applied in practice by physiotherapists, from the perspective of their placement supervisors.	A qualitative semi-structured interview purposively recruiting a sample of 10 PBL-qualified physiotherapists with experience of placement supervision of students of Physiotherapy.	The supervisors felt that PBL offered positive benefits for both student education and clinical practice. There was evidence of the application of skills and attributes associated with PBL, including positive learning behaviors and a high level of motivation and self-direction. Proactive students were able to apply transferable skills inherent in the PBL approach to clinical practice, including a holistic, problem-solving approach and effective teamworking.
15	Macintyre et al. (2012) Canada, 2012 Physiotherapy Canada Journal	To examine whether 49 Physiotherapy students in a PBL curriculum intend to implement best practices for management of clients with rheumatoid arthritis (RA).	Qualitative, prospective study.	Most students indicated that they would recommend treatments or referrals for physiotherapy/exercise, education, and occupational therapy or joint protection pre- and post-PBL (>83% and >95%, respectively).
16	McAllister et al. (2014) United Kingdom, 2014 Clinical linguistics & phonetics	To investigate factors in PBL tutorial groups which promote or inhibit learning. A study with 18 participants, including tutors, student tutors and students.	Qualitative research through semi structured interviews with focus groups and one-on-one interviews.	An increased control by the program and tutors decreases student's motivation to assume responsibility for learning. Support in tutorial groups needs to adapt to student progression and to be well aligned to tutorial work to have the intended effect. A lifelong learning perspective may help students develop a meta-awareness regarding learning that could make tutorial work more meaningful.
17	Martín Espinosa and Campos (2015) Spain, 2015 *Revista Opción*	To show an experience of teaching innovation integrated between two second-year courses of Nursing in the Faculty of Nursing and Physiotherapy of Toledo with 72 students, which is based on the use of PBL as teaching methodology.	Qualitative, experimental research	It was observed a change in teachers involved. They guided the learning process and students became active during this process in a constructivist perspective, allowing a meaningful learning.
18	Chesani*et al*. (2017) Brazil, 2017 *Revista Trabalho, Educação e Saúde*	To investigate limits and possibilities of PBL in the training of a physiotherapist. Research conducted with 121 participants.	Qualitative research through interviews and questionnaires applied to teachers and students in Physiotherapy, in addition to classroom observations.	Signs that in the training investigated there are more limits than possibilities regarding the achievement of a more critical, reflective, humanistic professional, as well as recognition of the possibility of PBL as pedagogical practice in favor of a more humane and critical training.
19	Roman *et al*. (2017) Brazil, 2017 Clinical & Biomedical Research	To review articles available in scientific journals that exemplify the use of ATLM in the teaching process in undergraduate healthcare courses, with focus on the Brazilian reality.	Qualitative, narrative review.	The results reported in the articles were positive regarding the use of ATLM in the health teaching process during undergraduate studies.
20	Peltokallio and Piirainen (2019) Finland, 2019 Interdisciplinary Journal of Problem-based Learning	To investigate how Physiotherapy students using a PBL approach develop into experts during higher education, and answers the question: “How do Physiotherapy students at bachelor’s level understand the PBL approach while learning to become professionals?"	Interpretative phenomenological analysis (IPA) of longitudinal data with 15 students. Qualitative.	The main results on the new way of learning strengthen earlier conceptions of the importance of reflection in the learning process. The PBL method activates a reflection process by allowing students to participate in something that differs from their previous experiences of teaching and learning methods, which creates confusion and forces them to critically reflect on their actions.
21	Lennon *et al*. (2019) Ireland, 2019 Physiotherapy Research International Journal	To verify whether PBL is effective in promoting early EBP.	Qualitative research through questionnaire applied using the Likert Scale.	Within group change in the EBP Profile Questionnaire following a PBL approach identified significant improvement in domains of EBP terminology (mean change 3.38; $p < 0.001$); practice (mean change 16.5; $p < 0.001$), and confidence (mean change 10.1; $p = 0.008$).
22	Wormley *et al*. (2019) United States, 2019 Physiotherapy Theory and Practice	To understand, interpret and describe perspectives of Physiotherapy students regarding core value development in a modified PBL program.	Qualitative research through questionnaire and semi structured with 27 students.	Eleven emerging themes represented the adjustment to PBL and essence of core value development from the students' perspective. An additional overarching theme "transformation" was also identified as students described a process of "transformation" from student to professional, supported by the curricular elements of the modified PBL process.

PBL, Problem-Based Learning, IPE, Interprofessional Education, MAEA, Active Teaching-Learning Methodologies, EBP, Evidence-Based Practice.

In the same perspective, McAllister *et al*. (2014) investigated factors in PBL tutorial groups which promote or inhibit learning. The study was performed through semi structured interviews with focus groups and one-on-one interviews. It demonstrated that when students are placed at the center of learning they develop skills and responsibilities that would not be developed with students in the role of mere content receiver, making them less motivated to take responsibilities. In a study performed in a Swedish university, Dahlgren (2000) analyzed the use of PBL under students' point of view and concluded that regardless of the method employed the learning experience varies according to academic context and their different educational cultures. However, it proved that PBL grants self-responsibility and autonomy to students. Also aiming to verify students' view on the efficiency of PBL, Kamwendo and Törnquist (2001) performed a qualitative research with students enrolled in programs that use Problem-Based Learning or traditional teaching methods in a Swedish institution. The results showed moderate but significant differences between PBL and traditional education methods, highlighting that students had positive attitudes towards research becoming more prone to engage in research activities in the future. It also demonstrated that PBL may be a more appropriate teaching method to train researchers than a traditional one. Kamwendo and Törnquist (2001) showed that PBL meets the main requirements that an active method needs to be considered effective. It matches what Limberger (2013) says about the importance of these requirements on awakening, curiosity and autonomy, allowing students the opportunity to learn how to learn, i.e., it is an investigative method. Solomon and Crowe (2001) conducted a qualitative research with student tutors in a module that used PBL and concluded that tutored students need to develop self-confidence to assume the role of tutor and that senior students are better as tutors. In the same perspective, Peltokallio and Piirainen (2019) performed a research with 15 volunteer students from two different levels of higher education and data collected for three and a half years. They ratified that the new way of learning reinforces previous conceptions around the importance of reflecting about learning process and that PBL activates this reflective process, allowing students to participate of something that differs from their previous experiences with teaching-learning methodologies. Then, PBL forces students to critically think about their actions. The authors (PELTOKALLIO, PIIRAINEN, 2019)concluded that regardless of how it is used PBL allows Physiotherapy students to adopt a reflective practice since the beginning of their studies. This new way of learning how to learn, indispensable to future practice, involves multiple actors and curricular factors, i.e., it is focused on information search, creative learning, teamwork and the facilitator role of teachers.

In a study performed through questionnaires and semi structured interviews, Wormley et al. (2019)tried to understand, interpret and describe perspectives of Physiotherapy students regarding core value development in a PBL program. The authors concluded that the use of PBL may perfect development of professional values with attributes developed to work as a team, decision-making in clinical practices and human development. Addressing 11 emerging themes that represented the adjustment to PBL and essence of core value development from the students' perspective, the authors described a process of "transformation" from student to professional, supported by curricular elements of the PBL process. Cusack and O'Donoghue (2012) examined perceptions of Health Science students about an interprofessional education (IPE) module delivered by means of PBL while Goelen et al. (2006) tried to measure the improvement in attitudes towards interprofessional collaboration of undergraduate healthcare students who have a single module of interprofessional problem-based learning in Medicine, Nursing and Physiotherapy programmes in Erasmus University College (Brussels, Belgium). Both studies concluded that from students' point of view the experience of this kind of learning is considered positive because it offers teamwork opportunities and allows the resolution of clinical problems during training. In this same context, Reynolds (2003) performed a study with application of questionnaires that verified first-year Occupational Therapy and Physiotherapy students' evaluations of their initial participation in PBL, during an interprofessional module f focusing on communication skills and patient-focused approaches to care. The results suggested that the method made a positive, well-received contribution to learning. Students developed team interaction skills which are fundamental to their professional practice. In a study conducted through literature review focused on perceptions of Physiotherapy students about the use of PBL, Thavare (2006)equally concluded that positive aspects prevail over negative ones and teamwork is always encouraged, favoring an interprofessional relationship with further benefits in clinical practice. On the other hand, the study also verified that students have to overcome difficulties while developing this important pillar of education that is learning to cope with others. In Canada, Macintyre *et al*.(2012) performed a study with 49 Physiotherapy students on clinical practice with PBL approach. They concluded that there was a change in decision-making in the treatment of these patients with protocols of Physiotherapy referral procedures. Using PBL, most of the students demonstrated security within their therapeutic behaviors with guidelines of best practices to manage patients. Aiming to assess pedagogical trends in healthcare (Nursing, Nutrition and Physiotherapy), Pereira (2007) performed a qualitative research concluding that college teachers need to reflect about their professional practice. The study also highlights the need to qualify faculty to better develop PBL under the principle that we learn when we change the way we think and act; and we teach when we share with others experience and knowledge accumulated.

Gunn *et al*. (2012) interviewed 10 experienced supervisors with students of programs that use PBL in an UK university. The study provided evidence of how skills gained through PBL are applied in practice by physiotherapists. All supervisors enrolled in the research felt that PBL offered positive benefits for both student education and clinical practice. There was evidence of the application of skills and attributes associated with PBL, including positive learning behaviors and a high level of motivation and self-direction. Proactive students were able to apply transferable skills inherent in the PBL approach to clinical practice, including a holistic, problem-solving approach and effective teamworking. Regarding the role of teachers in teaching-learning process, Solomon (2005) performed a qualitative literature review about PBL in Physiotherapy training. Despite evidence suggesting there is no simple distinction between expert and non-expert tutors, the study demonstrated that implications for faculty development are clear. It also concluded that qualification to assume to role of tutor is needed. Solomon (2005) indicates that one of the main skills to be developed is the facilitating ability of PBL tutors, although it is not the only one. Through a qualitative research with students who assumed the role of tutor in a PBL module, Solomon and Crowe (2001) concluded that in the first training years, even if the tutor role is played by a teacher-facilitator, it is important that he/she masters the problems proposed and has skills such as leadership and facilitation to deal with the lack of students' previous knowledge and difficulties emerging in the debates.

Investigating factors in PBL tutorial groups which promote or inhibit learning, McAllister *et al*. (2014) used semi structured interviews with focus groups and one-on-one interviews to find out that control by the program and tutors decreases student's motivation to assume responsibility for learning. The study concludes that support in tutorial groups needs to be adapted to student progression and to be well aligned to tutorial work to have the intended effect. Regarding interprofessional education, Cusack and O'Donoghue (2012) performed a study to examine perceptions of Health Science students about an interprofessional education (IPE) module delivered by means of PBL. The quali-quantitative research conducted through questionnaires applied to 92 students from four Health Science disciplines revealed the following themes as important to interprofessional experience: collaboration (learning together with others from different professions); structure (small group work, discussion, teamwork assessment procedures); and content (problem diversity). Using questionnaires, semi structured interviews and observations, a UK study by Freeth et al. (2001) concluded that students were able to remarkably develop specific professional skills in a real-world setting within an interprofessional team, facilitating

interaction of professions and improving quality of work developed as a team. These same conclusions were also achieved in the study performed by Thavare (2006). Still regarding interprofessional education, Goelen*et al*. (2006) conducted a study at a university in Brussels, Belgium, in which they tried to measure the improvement in attitudes towards interprofessional collaboration of undergraduate healthcare students who have a single module of interprofessional PBL in Medicine, Nursing and Physiotherapy programmes. The results revealed that practicing with real patients in PBL promotes a sense of responsibility among students and motivation in interprofessional learning. Within subjects highlighted after reading the articles in full, Solomon (2005) points to the need for specific research about PBL in Physiotherapy since literature assessing PBL and other active teaching-learning methodologies is still below expectations in spite of a recent increase in educational process approaches in Physiotherapy journals. A solid, long-term and comparative research base is needed to support the development of educational practices. In a study performed through qualitative research with application of questionnaires, Lennon *et al*. (2019) concluded that within group change in the Evidence-Based Practice Profile Questionnaire following a PBL approach identified significant improvement in domains of EBP terminology (mean change 3.38; $p < 0.001$); practice (mean change 16.5; $p < 0.001$), and confidence (mean change 10.1; $p = 0.008$). It was also observed that PBL is a viable approach that may collaborate to EBP early teaching, i.e., a process that aims to solve clinical questions, scientific evidence and patient's preferences in Physiotherapy professional training. EBP became a curriculum standard in healthcare programs, but it brought up the difficulties of understanding how to execute it. With a PBL approach in EBP an improvement in understating, learning, teaching and results was observed when compared with EBP without a PBL approach.

Martín-Espinosa and Campos (2015) showed an experience of teaching innovation integrated between two second-year courses of Nursing in the Faculty of Nursing and Physiotherapy of Toledo, which is based on the use of PBL as teaching methodology. The authors concluded that it is possible to establish new ways of combining theory and practice in addition to break the traditional dichotomy between basic and clinical training. It was observed that active methods such as PBL may be important allies to the development of critical sense, reflection ability and active participation of students in their own learning allowing them to become professionals compromised with the needs of the healthcare system. One of the suggestions in the study by Cusack and O'Donoghue (2012) is the possibility to perform a research using real cases while Goelen, et al. (2006) were able to demonstrate that when combined with interprofessional education with real patients PBL effectively contributes to train professionals enrolled in this teaching-learning process. They also highlight that students with PBL experience in Interprofessional Education tend to fare better when taking part in multidisciplinary or multiprofessional teams. Although recognizing the need for specific research on the subject, the study observed that PBL usually facilitates learning in interprofessional teams. It also directly influences the recovery of patients who received care from this kind of team since they are more appropriately treated and become aware of the importance of self-caring (GOELEN *et al*., 2006).

CONCLUSION

The analysis of articles included in this integrative review showed that most of them were qualitative and included a relatively small number of participants without a direct comparison between traditional teaching and active methodologies. However, qualitative studies are characterized for a deep analysis and findings were consistent in terms of results. PBL has been increasingly used as a teaching-learning methodology in Physiotherapy programmes, but it still demands new, specific approaches to determine whether this is the most effective active methodology to train more critical, humane and reflective professionals who meet healthcare demands of society which asks for a holistic view of the human being. Despite the limitations listed, the integrative review demonstrated that PBL adoption contributes to several aspects. Regarding students, they developed autonomy and satisfactorily and with passion learn "to know", "to do" according to the skills acquired and transferable to practice, "to be" citizens with goals to be socially pursued, and, finally, "to live with others" awakening to a constructivist, motivated, more positive and responsible awareness of the importance of lifelong learning. To constantly reflect, question and rethink their professional practice must be goals to be pursued, never neglecting the value of teamwork. Student-centered teaching, in small groups, with qualified discussion of a great diversity of problems extracted from reality and a well-defined process of continuous evaluation allow students to develop skills and attitudes fundamental to their professional life. It is worth mentioning the importance of interprofessional work which is considered the main challenge in students' PBL experience. On the other hand, regarding the role performed by teachers (tutors) in PBL, it was verified the need for meta-awareness around their role and, especially, professional qualification and reflection about their own teaching practice. The teacher must acclimate himself/herself with the method, leave the pedestal, set boundaries and search for possibilities, gain confidence, acting as a learning facilitator, with skills to work with the contents brought by students in the face of authentic situations and experimental models as triggers, mediate discussions so that they can relate theory, previous knowledge, learning objectives and future professional practice. The use of student tutors with educational profile may help overcome barriers among the resistant students until they are adapted. Thus, it was noted that the needed training of more humanistic, critical, reflective healthcare professionals, specifically in Physiotherapy, goes through individual will and courage (of each student and each teacher), as well as institutional managers facing the challenges of curricular change to use innovative, motivating teaching methods. In this sense, PBL presents itself as a relevant, effective way to develop knowledge, skills and attitudes fundamental to interprofessional practice of physiotherapists, capable of surpassing traditional teaching methods, still present in Physiotherapy programmes in the 21st century.

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