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Problem-based learning in osteopathic education

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Abstract Problem-based learning (PBL) is commonly used in medical schools across the globe. PBL is defined as a problem or case study presented to a small group of students. The problem is usually a description of a phenomena or situation that a professional practitioner might encounter. Through PBL, students learn how to learn as well as building many other skills such as team working, doing research and to communicate their ideas. The article describes the process of PBL, discuss its scientific validity and expose how it could be applied to osteopathic education. The article is also an asset to teachers who might be interested in the integration of PBL in their classes.

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Introduction

One of the goals when teaching a profession is the assurance that students will learn the necessary skills and acquire the knowledge to become a competent practitioner. Some issues that bear consideration concern the basic ability of students to learn a profession and their attention to continued learning throughout their career. Other issues include the learning process itself and possible enhancement of learning

methodologies, and whether or not master classes can be successfully combined with other learning methods.

Although the lecture format remains the predominant teaching methodology in osteopathic schools across Europe and Canada, learning methods and teaching practices need to evolve in response to the changing demands of higher education. Medical education has modified the learning process of their students from traditionally based master classes to problem-based learning (PBL).¹ PBL began at McMaster University in the mid-1960s and soon became part of modern medical education.^{2,3} PBL is commonly used in the education of many health professionals such as nurses, physical therapists, occupational

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therapists, social workers and optometrists.⁴ Two meta-analyses support the assertion that PBL is superior to traditional lecture-based teaching for medical students.^{5,6} PBL may offer to the students a working method and clinical reasoning skills that is unique compared to other teaching methods. Osteopathic physicians trained in the United States are considered medical students and therefore, PBL is already part of their education.⁷ There is currently no literature on the use of PBL among osteopathic manipulative therapists. It is possible that osteopathic manipulative practitioners could also benefit from the inclusion of PBL in their academic curriculum. Several Universities base their whole preclinical syllabus on PBL as a basis for student learning; expecting to cover a diversity of subjects from basic sciences to ethics and patient management. The aim of this article is to outline the use of PBL and discuss how the method could be applied in osteopathic education.

Definition of problem-based learning

PBL begins with a problem or case study presented to a small group of students. It usually comprises a description of a phenomenon or situation that a professional practitioner might encounter. In medical or osteopathic education, the problem is often related to a patient's complaint. To solve the case the student must clarify the problem, understand the significant features and discuss the problem with colleagues. The solution will come from a combination of the student's prior knowledge, which must be sufficient to understand the basis of the problem and to orient personal research; from the other students in the group by sharing expertise and knowledge; and from research skills. Therefore, the scenario should incorporate basic knowledge that the student has already acquired. For this reason, PBL should not be considered when the student has minimal knowledge of their discipline. One of the goals of PBL is to encourage clinical reasoning and problem-solving skills. It is recommended that faculty members come together to build a series of problems that are modelled on real situations that will be useful to the students.

PBL is a process that takes into account the integration of the knowledge, skills and attitudes of the students. A tenet of PBL is that learning should become intrinsic to the student in contrast to the goal-oriented education used in traditional master classes.

The teacher's role in PBL is to facilitate the students in their task of knowledge generation and problem solving specific to the case, rather than teaching correct answers.⁸ The students assume

each of four different roles during the course: scribe, steward, secretary and group leader⁹. The steward is in charge of logistics, such as communication between students and faculty members, and sourcing all the materials required for PBL. During the discussion the secretary writes the different ideas posed by the group on a marker board. The scribe then captures on paper, or computer, what is written on the blackboard. The group leader's role is to chair the discussion and ensure the participation of all the students.

PBL can be divided into three learning sections. For the first section, which is done in a small group, the students read, define and analyse the problem, build a hypothesis and define the personal work. The second section is done by each student individually and requires that they compile information on the problem from electronic databases, the library, and experts in the field. The student must understand the information and prepare to present his research and reflections to his colleagues. The third section, which generally occurs a week after the first section, is a group meeting where each student presents their findings. The group discussion leads to a path for resolving the case. The students summarize their new knowledge then perform both a self-evaluation and a peer evaluation. [Table 1](#) summarizes the three sections of PBL.

Research supports the notion that PBL has positive outcomes on both the learning process and the outcomes of the students.¹⁰ The main benefits of PBL include enhanced problem-solving skills and clinical reasoning, enhanced learning retention, acquisition, argumentation and self-directed learning skills. PBL helps students close the gap between theory classes and practical classes by focussing on real-life problems and increasing the student's intrinsic motivation toward their learning process. PBL also helps students learn to work as a team to facilitate time and conflict management.

Some disadvantages of PBL as mentioned by Moust et al. include a decrease in self-study time, poor preparation for tutorial groups, lack of effort put into the brainstorming part of PBL, and repeated studying of the same sources to decrease the time required to perform a literature search. Further, some students ignore the original problem entirely and cannot transfer their knowledge to practice.^{11,12} In order to promote the advantages, and to avoid the disadvantages, of PBL, the teaching unit must address the management of students and teachers. Teachers should take time to explain to the student how PBL works and how it will help them in their future profession. The students must understand that PBL is meant to assist in the learning of new knowledge while integrating

Table 1 The three steps of PBL. There should be enough time for the students to perform individual searches between group meetings.

The three sections of PBL		
Sections	Steps	Action
1	1 Reading the problem	In group with the tutor
	2 Define the problem	
	3 Analyse the problem	
	4 Propose hypothesis	
	5 Dictate the guidelines for personal work	
2	1 Database research	The student works individually
	2 Library research	
	3 Discussion with advanced osteopath or professionals	
	4 Reading personal notes from previous classes	
3	1 Group discussion	In group with the tutor
	2 Resolving the case	
	3 Optional: hands-on treatment	
	4 Summary of the work process	
	5 Self-evaluation and peer evaluation	

prior knowledge or information from other classes in their program. For this reason, the student must always reference the learning outcomes that are relevant to a particular session so they can keep each member of the group on task.¹³

Special PBL training should be given to the teacher to enable them to motivate their students and perform their role as tutor. The role of tutor is different from a professor in that the tutor works with the team instead of simply providing the answers. PBL groups should include no more than 8-10 students to encourage productivity. Students are encouraged to meet more than once a week in subgroups. Each part of the process of PBL can be evaluated to ensure strong participation amongst the students with a portfolio.¹⁴ A peer-based assessment method can be used as an adjunct with the tutor's assessment to increase learning motivation and be sure that everybody does their part of the work.¹⁵ As there are different types of learners (visual, auditory and kinaesthetic) and approaches to learning (deep, strategic and superficial) a program should include many learning approaches in order to reach every student and develop different kinds of learning skills. Deep learning approaches are associated with PBL.^{16,17} This is why PBL should

be mixed with lecture classes, case studies, fellowship work and other learning modalities.

Example of PBL for osteopathic medical education

An example case presented to a group of osteopathic students and their tutor is that of a 31-year-old man with non-specific back pain (NSBP). It is the responsibility of the students to define the problem by asking questions such as whether or not the patient consulted a medical doctor and when the event occurred. The students review what they should already know such as: the patient's medical history, biomechanics, anatomy, and physiopathology. Once all of the questions are asked and the problem is clarified, the students analyse the cause of the NSBP including the possibility of an environmental cause. The students build a hypothesis towards solving the case and identify what they need to learn. Then, the individual work begins. For example, the students may want to know what is the best practice for dealing with NSBP in allopathic and osteopathic medicine. They might access an electronic database such as PubMed, Medline or Web of Science to find scientific evidence. The students could also go to the library to consult journals, books and web sites or pose questions to an experienced practitioner.

A week later, the students gather together to discuss their findings. They will examine the signs and symptoms of their problem and consider how they could be alleviated. Depending on the case, the tutor will help the students question themselves on their choice or elaborate on certain aspects of their theory. Finally, students learn how to deal with specific issues and to generate the data they will need to make an informed decision on how to manage NSBP. This is a simple case, but it covers many aspects of learning. The student is directly involved in his own learning process, by sourcing and summarizing the information independently and discussing findings with colleagues. The teacher may also want to add a hands-on section wherein the students perform osteopathic tests and treatment.¹⁸ This option bridges the gap between theory and practice.¹⁹ It is proposed that the use of PBL for osteopathic students will enhance the intrinsic interests of the student for the subject, help transfer basic science to clinical solving problems and upgrade self-learning skills.²⁰ The ultimate goal of PBL is for the student to understand how to manage a clinical case upon graduation and maintain an interest in continued education.

Conclusion

The World Health Organization has set benchmarks with regard to osteopathic education. It is important for osteopathic schools to meet these benchmarks in order to produce effective and safe osteopaths.²¹ It is hoped that knowledge of these requirements, in countries where there is no legislation for osteopathic education, will discourage self-proclaimed osteopathic specialists from imparting misinformation to their students.^{22,23} Students of PBL will build a solid practice based on correctly sourced, informed opinions of treatment options. As a result, the student is already learning the methods they will encounter as they advance in their studies and careers. The inclusion of different learning methods in a student's curriculum such as traditional classes, lab exercises, problem-solving methods, apprenticeships with advanced osteopaths, research oriented education and hands-on training could be highly motivating. Further studies are required to measure the impact of PBL in osteopathic education and measure the learning transfer from the classroom to the professional qualifications required to build a successful osteopathic practice.

Author contribution statement

François Lalonde is the only author of this manuscript. Database research was done by François Lalonde.

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