

THEORETICAL REPORT

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TEACHING CLINICAL REASONING TO PHYSIOTHERAPISTS IN SAUDI ARABIA: A THEORETICAL REPORT

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ABSTRACT

Background: Clinical reasoning (CR) is an essential skill that should be taught to all healthcare professionals. In physiotherapy, it is a cognitive process whereby physiotherapists collect and assess patient data to make a diagnosis and develop an effective treatment plan. Several teaching and learning theories have been developed and used in healthcare education. The purpose of teaching is to facilitate the learning process and the successful development of practitioners in the community. Learning is defined as a knowledge process that is developed through experience which is used to manage daily life situations. The aim of this report is to explore teaching and learning theories and strategies to teach clinical reasoning to physiotherapy students in Saudi Arabia.

Discussion: Although it is challenging to completely change the teaching methods in Saudi universities due to the education system rules already in place, some modules in physiotherapy are different, as they are practical and based mainly in a clinical hospital setting. As such, certain teaching and learning theories could be employed to facilitate student teaching. Indeed, a mixed method based on several theories taking into consideration the context, culture, students' learning styles and the type of knowledge would be most appropriate.

Conclusion: There is a debate about the best theory for teaching physiotherapy students. In the context of clinical reasoning, a behaviorism approach is not suitable, in contrast, constructivism is more appropriate, and thus, Saudi physiotherapy educators should consider constructivism strategies for teaching clinical reasoning.

Keywords: Clinical Reasoning, Physiotherapy, Teaching and Learning Theories, Behaviourism, Constructivism, Saudi Arabia.

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INTRODUCTION

Clinical reasoning (CR) is considered a cognitive process whereby physiotherapists collect and assess patient data, then adequately allocate the diagnosis and develop a proper plan of treatment [1]. The CR process requires critical thinking [2] as well as intuition and knowledge [3] to evaluate complicated information which assists in the selection of a suitable method for effectively solving a problem and making an appropriate decision [4]. Therefore, this process is not a list of symptoms, but rather a comprehensive analysis based on knowledge, as well as cognitive and metacognition skills which continuously improve with experience and time. According to Higgs and Jones (2000) [5], excellent CR is a combination of cognition, metacognition, knowledge, client input, and consideration of the clinical problem and environmental influences. Indeed, the authors referred to these components as the core dimensions of CR, therefore, to apply good CR, a learner should understand these components and their interactions. This may explain why it is difficult for clinicians to implement an effective CR. Moreover, CR has multiple models and classifications [6], making it difficult to teach.

Many studies have shown the importance of CR in physiotherapy practice as well as the need to include it in the physiotherapy curriculum [7,8]. Despite this, however, there remain certain issues when it comes to using CR. Numerous studies have discussed the adverse effect of using CR in medicine [9] and physiotherapy [10] as well as its cognitive errors, such as judging by similarity and confirmation bias. Moreover, some researchers argue that no treatment has been proven to be effective in preventing cognitive errors [9]. However, this is not entirely true, awareness of cognitive errors, knowledge of good reasoning processes and using metacognition questions could represent strategies to decrease such errors [11]. Furthermore, physiotherapists who use CR skills are more likely to make better clinical decisions and provide safe interventions. According to Lapkin et al. (2010) [12], the main reason for adverse patient outcomes is a failure to diagnose accurately. Therefore, assisting students in developing CR skills and understanding the process of CR is a priority.

Physiotherapy programmes have not been established for as long in SA compared to other countries with certain cultural and social differences [13]. As a result, the current curriculum is not well-organised due to limited experience in teaching physiotherapy in SA. However, the new vision of the educational curriculum in SA considers the needs of the students and the community; it also promotes thinking as well as the use of different information sources [14]. However, physiotherapists in SA are not taught how to learn independently, to solve problems properly, and to critically think when assessing and treating their patients in practice, mainly as a result of the didactic teaching approaches extensively used in most universities in SA. Although this, very few of them have sought experience in considering patients' needs. Also, only a handful of these students has attempted to develop biopsychosocial model

awareness and develop CR skills through their postgraduate study experiences in other countries or through international courses. Thus, teaching physiotherapy students in SA to develop their CR skills and encouraging their use in practice will improve the health services that are provided by them.

Improving the physiotherapy curriculum has been excessively discussed, and many methods have been used to develop a more appropriate programme, for example, reflective practice [15], continuing professional development [16] and internationalization of the curriculum [17]. In contrast, there are still limitations when it comes to the Saudi physiotherapy curriculum. Moreover, many studies have included CR in the curriculum [18,19]. The main rationale for the importance of incorporating a CR module in Saudi physiotherapy programmes is to help physiotherapy students to develop CR skills while practicing manual skills by seeing real patients for training. Another reason for this is to enhance their understanding of the biopsychosocial model and pain mechanisms while simultaneously promoting their attention to consider multiple hypotheses of patient conditions and subsequently, provide a better assessment and intervention. Also, CR is also beneficial to improve their oral presentation skills [20], enhance their clinical decision making [18], diagnose properly and avoid assumptions [21]. Therefore, all of these benefits clearly address the importance of CR and thus, it should also be taught in Saudi universities and hospitals.

TEACHING AND LEARNING THEORIES

The purpose of teaching is to facilitate the learning process and the successful development of practitioners in the community [22]. Learning is defined as a knowledge process that is developed through experience which is used to manage daily life situations [23]. Several teaching and learning theories have been developed and used in healthcare education. For many years, healthcare education has focussed on the use of didactic approaches, whether this is to teach students practical theories or problem-solving strategies [3]. Recently, there has been a strong shift in teaching to constructivist approaches. Moreover, there are many other theories that have been used in teaching physiotherapy and learning. Kolb's theory is the most frequently used learning theory in healthcare professions [23]. The concept of Kolb's Cycle (Kolb's experiential theory) is that each person passes through all four stages, starting with concrete experience, followed by reflection, abstract conceptualisation and finally, active experimentation [24]. However, the concept of Kolb's cycle does not essentially match reality, as some stages could be skipped. It is also an exaggeration to claim that learning styles can be broken down into only four stages. Moreover, there is a limited explanation regarding the process of reflection.

In light of this, learning styles were developed by Honey and Mumford [25] based on Kolb's theory. However, Honey and Mumford's theory (experiential learning styles) has more similarities than differences when compared to Kolb's theory, although the former explains each stage in more

detail, considering the bigger picture of learning; with different word descriptions provided for each stage. Even so, the learning styles of students will optimize their learning experiences [23,26,27]. According to Milanese, Gordon, and Pellatt (2013) [26], physiotherapy students share common learning styles, and the most dominant style of physiotherapy students is the converter [23,28]. However, a recent study conducted in SA concluded that there is no relationship between learning styles and student marks or outcomes in the university [29]. With that said, this study cannot be generalized because participants were only from one university and all participants were medical students, which may differ from the physiotherapy environment. Despite this, as many studies have shown that physiotherapy students are converters, meaning that they are pragmatists according to Honey and Mumford's theory, group discussions, problem-solving and case studies should be considered for teaching physiotherapists about CR.

Behaviourism theory, including the likes of didactic strategy, has been largely used in SA to teach theoretical information, concepts, and even practical and clinical practice [29]. Didactic sessions are considered to be lecture-based with students not usually participating in group discussion and problem-solving activities [16]. It has been acknowledged that didactic strategy is an inexpensive method for teaching new theories and factual information, especially to large audiences [30]. Indeed, this could explain why behaviorism theory is widely used. Despite the fact that the traditional method of teaching is useful in some conditions, students' learning may be limited. This is due to the philosophical explanation put forth by Skinner, based on the stimulus and response which focusses on observable learning [31]. As a result, students are passive learners and rely on certain traditional methods, such as rote learning to acquire this type of knowledge. In the last ten years, some university educators have relied on constructivism approaches to teach students and healthcare professionals [3]. Therefore, traditional methods, whereby the tutor is the knowledge given, and the student is only the knowledge receiver, are facing many challenges. Most of these challenges pertain to constructivism strategies when students participate in their learning by, for example, making a decision or evaluating and solving a problem.

Bruner [32] defined constructivism theory as an active process of learning whereby the student develops new thoughts based on knowledge already obtained and identifies the limitation of that knowledge. The constructivism theory of learning has been explained by Piaget (cognitive constructivism) as a product of mind; in contrast, Vygotsky (social constructivism) explained it as a social process [33]. According to Piaget's theory, the role of tutors is limited compared with Vygotsky's theory. Moreover, it will be argued that it is difficult to completely limit the tutors' role in learning transmission to students. For example, most active group exercises need instructions and information to help students understand the exercise and promote cognitive skills. Students are encouraged to fig-

ure out the meaning of knowledge on their own. In other words, the main role of the tutor is to be a facilitator and motivate students to participate in the lecture. However, this approach could be difficult for students who are not familiar with this approach or do not have enough knowledge. Moreover, the educators need certain skills, such as good communication, and good knowledge of the domain subject. Nevertheless, these limitations can be addressed during class, for example, the tutors can be slightly flexible for students, consider and use other theories, such as lecture-based approach for some points that need to be explained in a specific way so as to compensate and balance the student learning. As such, Saudi educators are recommended to use presentation slides in line with additional activities such as group discussion. In other words, the lecturer might alternate between slides, cycling between them until the end of the teaching material or the lecture.

Bloom's Taxonomy theory was developed in 1956 and is considered one of the most common approaches for educators. This theory consists of three main categories: cognitive, psychomotor and affective [34]. However, this theory has some excessive assumptions, one of which pertains to the hierarchical order of each domain. Knowles [35] developed the andragogy theory, which essentially means adult education. Moreover, andragogy came after constructivism theory and is thought to be based on the latter, which explains the similarities between Knowles and constructivism theories; indeed, both promote self-study and problem-centred learning [36]. Knowles' theory is in stark contrast to the assumptions of pedagogy, thus meaning that students are fully dependent on the tutors who assume that these students have little or no experience of educational activity. However, Knowles' assumptions are not perfect, especially as this theory is classed as an adult education, and thus is not suitable for children. However, the question must be asked, is this true?

There is no consensus on the best theory for physiotherapy teaching and learning. However, in the physiotherapy context, a mixed method based on several theories taking into consideration the context, culture, students' learning styles and the type of knowledge would be most appropriate. A study conducted in SA by Almaghraby and Alshami (2013) [37] investigated the learning styles of physiotherapy students and indicated that most students could accommodate multiple teaching methods. Facilitating students' CR skills needs to allow students to be aware of their reasoning process and establish learning experiences that enhance all components of the CR process. As such, physiotherapy students should be taught to think critically (data analysis and synthesis) as well as to reflect on their thinking (awareness and monitoring of thinking processes). Therefore, critical thinking and metacognition questions are recommended. According to Kassirer [7], CR should not be delayed until students obtain the required knowledge. As such, students need to learn how to develop long learning skills and increase their understanding; something which probably cannot be achieved through behaviorism.

STRATEGIES FOR TEACHING CLINICAL REASONING

Several strategies have been discussed and used to develop CR skills, such as concept mapping [38], blogging and metacognition questions [39], making thinking visible [40], problem-based learning [41], reflective practice [42], case studies [7], think aloud [3], jigsaw puzzles [43], and illness script [44]. Some of these strategies are interconnected, according to Delany and Golding [40], think aloud and concept mapping strategies are similar to making thinking visible, while Eshach and Bitterman (2003) [45] indicated that there is a strong relationship between problem-based learning and case studies. Therefore, using some of these strategies may promote the benefits of other strategies and one of them could be supported by several theories of learning and teaching. This report will discuss the three main common strategies to teach CR in physiotherapy.

Concept mapping is a method that can assist learners in demonstrating knowledge by identifying the relationships between several aspects within a given concept domain. Indeed, this strategy is based on the constructivism theory of learning [46]. Furthermore, this method has been used to teach students how they can think critically and use CR. According to Keiller and Hanekom [1], mapping methods are useful for students when it comes to determining, justifying and analyzing relationships between different components. Therefore, teaching concept maps to students during the lecture will enhance their learning and improve their skills in CR. For example, this could be applied by giving the students a case study and asking them to identify the possible causes of patient complaints based on a biopsychosocial model and draw their ideas using a concept map.

Exposure to case studies is one of the strategies that has been used to learn and teach CR [7]. There are different types of case studies that have been discussed in the literature such as paper cases, videotape cases and real cases [47]. A massive systematic review by Thistlethwaite et al. (2012) [48] included 104 articles about teaching or learning through case studies in healthcare education. The authors concluded that most students and tutors enjoy learning through case studies, and their problem-solving skills and knowledge increase. Thus, thinking skills are promoted when students think and analyze data based on cases that match the reality of practice. Moreover, real cases are usually better regarding reflecting the false leads and test findings in practice. Nevertheless, it may not be possible to accurately gauge how students can critically solve patients' problems, but hopefully over time they do. As such, it is suggested that the students are provided with a case study and asked to work in groups to establish reasonable diagnosis hypotheses and develop suitable treatment plans; during the case study, students may be given the appropriate tools usually based on the lecture objectives.

Think aloud is a strategy whereby learners verbalize their thinking during task activities [49], allowing reasoning errors to be detected and corrected directly, either by other

students or by the lecturer [3]. Furthermore, this strategy encourages students to be confident in demonstrating their understanding and experiences to others, thus also improving oral communication skills. This strategy can be applied in small groups' discussions with the lecturer passing through the groups to listen to their deliberations. The groups will then decide whether each student will briefly verbalize his/her experience, or one representative of each group will voice the group's opinions. Indeed, this will depend on the time frame and the situation, which may change according to students' responses.

CLINICAL REASONING ASSESSMENT

There is no doubt that learning assessment is vital in any form of education [50]. An assessment can be classified as either formative or summative [51]. Summative assessment has been used to examine student understanding in a specific time and measure the overall standard of their work [52]. It is also used to check the progress of students based on specific criteria, and these methods need to be reliable [52]. Moreover, it can be used to monitor and measure the effectiveness of learning programmes. According to Taras [53], criteria and standards should be applied to perform a judgment, and this can be implemented through summative assessment. Consequently, most universities prefer summative assessment.

Formative assessment is used to provide data required to adjust teaching and learning while it is happening; indeed, as the student is involved in this process, both tutors and students will determine the student's understanding at a certain point. Formative assessment can be conducted through listening to student discussions, reviewing their work and giving them feedback as well as observing their interaction and communications [51]. Also, it is essentially a positive intent and aims to improve student learning, taking into consideration the progress of each student. Formative assessment can lead to a high score of summative assessment [54]. However, the information is usually conflicting, as students are not fixed learners, and thus they can perform well in one aspect and bad in another. However, this could be an advantage if the aim of the assessment is to help students learn and identify their problems, taking action to address any issues. Also, it is important to note that lecturers will likely find it difficult to ignore the students' knowledge collected by formative assessment when they want to make a summative assessment.

In the SA context, formative assessment is rarely used and difficult to implement. However, with this said, some modules do consider it, especially those modules related to the practical environment. Regarding CR assessment, many tools have been used to assess CR skills, including the diagnostic thinking inventory [55] and the IDEA assessment tool [56]. Moreover, some strategies used to teach and develop CR can also be employed to assess students, such as think aloud [3] and concept mapping [46]. The marking criteria should be clearly described to the students and should also be understood by all lecturers who teach the same module [57]. Therefore, Handbook and marking cri-

teria of any physiotherapy module should be provided and explained to students.

CONCLUSION

In summary, this report has discussed the rationale for including a CR module in Saudi physiotherapy programmes. Certain physiotherapy modules are practical, based mainly in a clinical hospital setting and therefore, other teaching and learning theories could be applied to facilitate student teaching. Regarding the best theory for teaching physiotherapy students, this is a matter of debate. However, in the context of clinical reasoning, a behaviorism approach is not suitable, rather, constructivism theory would be more appropriate. Consequently, Saudi physiotherapy educators should consider constructivism strategies for teaching CR and importantly, the environmental, cultural, and social differences in Saudi Arabia compared to other countries. Also, future studies are recommended, in particular, those that investigate students' outcomes after being taught CR.

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