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LEARNING THROUGH CASE STUDIES IN HEALTH SCIENCES: PROPOSAL FOR ADAPTATION OF THE FRISCO GUIDELINES

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Resumo
Na área de ciências da saúde (em particular na Enfermagem e em Medicina Veterinária), é frequente recorrer-se a estudos de caso para melhorar a aprendizagem no raciocínio e julgamento clínico direcionados para a tomada de decisão. Com o objetivo principal de manter a abordagem metodológica do desenvolvimento do pensamento crítico do grupo webPACT da UTAD, que inclui a utilização da grelha FRISCO na análise de um documento que serve para escrever um texto (pelo autor-aluno) a ser submetido a revisão por um par (aluno-revisor), sentimos a necessidade de tutorar de forma mais direcionada os alunos em relação à aplicação das diretrizes FRISCO aquando da análise de descrições de casos clínicos. Neste trabalho apresentamos a nossa proposta para essas adaptações que julgamos essenciais.
Palavras-chave: Pensamento crítico, Estudo de casos, Aprendizagem ativa, Grelha FRISCO, Ciências da saúde.

Abstract
In the area of health sciences (in particular the Nursing and the Veterinary Medicine Courses), the use of case studies is a common approach to enhance learning in clinical reasoning and judgment for rational decision-making. The authors aim to maintain the methodological approach to nurture critical thinking used by the webPACT group at UTAD, which includes the use of the FRISCO guidelines to analyse a text that will serve to write a document (by the author-student) to be peer-reviewed (by the reviewer student). The authors felt the need to coach differently the students on regard to the application of the FRISCO guidelines to clinical case descriptions. This paper presents the authors´ proposal for these adaptations.
Keywords: Critical thinking, Case studies, Active learning, FRISCO guidelines, Health sciences.

INTRODUCTION

Educators have endorsed the development of critical thinking (CrT) skills for years (Walker, 2003). Increasingly, stakeholders worldwide demand from newly graduates the skills to adequately solve problems and think critically, independently of the scientific area (Quitadamo & Kurtz, 2007). One operational

definition of critical thinking states "*Critical thinking is the intellectually disciplined process of actively and skilfully conceptualizing, applying, analysing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action*" (Elder & Paul, 2008). Applied to health related professions, critical thinking may be considered as a purposeful, outcome-directed thinking, which is driven by patients' needs and guided by professional standards (Bradshaw &Lowenstein, 2011).

The Bologna paradigm transposed to students the responsibility for their own learning achievements, expecting them to develop an active self-learning process while fostering lifelong learning. Still, in general, students who come to the University have limited CrT capacity, low self-assessment skills and a defective training for individual learning (Karandinou, 2012). Moreover, traditional examinations forms target knowledge-based readiness and often test students' ability to memorize information rather than their aptitude to interpret data and to skilfully utilize their knowledge in solving problems (Koritnik, Ragatz, Ficklin & Deal, 1996). CrT skills are not static; their development may be influenced by the learning environment as well as by the instructor's approach to teaching (practices or methods) (Abraham, Upadhya, Torke & Ramnarayan, 2004). Therefore, the regular use of CrT strategies during graduation and the adequate guidance for their application would stimulate CrT skills and newly professionals would be better prepared to succeed in their professional environment (Thompson, 2010).

Recent changes and demands in the health care environment have stressed the need for critical thinking (Simpson & Courtney, 2002) in health-related professions. Therefore, educators are looking for teaching strategies fostering CrT in students by engaging them in active learning processes. Active learning methods include case studies, discussions or debates, experiments, field trips, role-play, and Socratic questioning (Sandstrom, 2006).

Guided reflection helps students to bring closure to the clinical experience, to conduct self-evaluation and to gain from the experience. Several frameworks have been developed with the objective of guiding, in a systematic way, the reflection (the Bloom´s taxonomy, The FRISCO guidelines by Ennis, and the Paul-Elder´s elements of thought). The FRISCO approach is a part of the methodological approach currently used to the development of critical thinking skills by the UTAD critical thinking group (webPACT group) (Dominguez et al., 2014). However, as more members from the Nursing (Nur) and Veterinary Medicine (MIMV) joined in, and even though the use of the FRISCO framework seemed to be powerful to develop a systematic guided reflection covering a large range of CrT skills, it seemed important to adapt it so as to serve the purposes of these specific educators in the analysis of clinical case-descriptions. The

aforementioned learning methodology is transversal to different scientific areas and has been already applied in MIMV, in technological subjects, but its application into clinical subjects has been rather limited. To prepare the replication of the methodology to learning and developing clinical competencies, the adaptation of the FRISCO guidelines was foreseen as necessary to smooth any difficulty in its application to the analysis of clinical situations. Hence, the main purpose for this study is to describe the adaptations of the FRISCO guidelines proposed by the Nursing and Veterinary Medicine educators to the analysis of clinical case-descriptions, thus contributing to reinforce the framework and show how it can be used in a specific scientific area, making way to other areas in the future. The proposed adaptions will be implemented in the second semester of the current year, in both the MIMV and Nur graduations. Therefore, it is not yet possible to assess the usefulness of this adaptation.

1 - BACKGROUND

1.1 - Educating for Clinical Skills

Health care professionals must use CrT skills to solve increasingly complex problems (Walker, 2003): not only they must evaluate, analyse, and interpret the information (the case or situation), but they also make inferences (relation between symptoms and the organ and the disease) and analyse the made assumptions regarding that information (ex: comparing the evolution in clinical reports, personal experience or journal descriptions) with the purpose to solve the problem and to make the appropriate clinical decisions (Popil, 2011) and to rise positive health outcomes (Lunney, 2009). Decision-making is the core of clinical practice. Clinical errors or delay in diagnosis often arise from failure of critical reasoning process, misinterpretation of signs or deficient prioritization of a clinical situation (Gambrill, 2005).

Commonly, the clinical practice enhances a wide range of individual skills regarding the way to structure problems, the outcomes to expected, the risks to take, the criteria used to select practice methods, and how to evaluate progress (Gambrill, 2005). However, most students are devoid of practice and therefore they do not possess the thinking skills to analyse and synthesize information. In fact, knowledge transfer to new contexts is not automatic and needs to be explored under multiple applications (Bradshaw &Lowenstein, 2011). Educators may use several instructional methods or strategies to boost CrT development in their students, fostering the development of analytical, problem solving, mind-mapping, argumentation and communication skills (Staicic & Turk, 2010).

Nowadays, teaching clinical skills in universities offering medical or nursing graduations rely in teaching approaches that often combine theoretical background with real-life case studies, team projects, and discussions with practitioners or small internships that allow the students to gain increased clinical

reasoning, inter-disciplinary communication and cooperation skills (EUNetPaS, 2010). The two main goals are to facilitate the transition into the professional environment and to increase patient care and safety.

2.1.1 - Critical thinking and case-based learning

Critical thinking, case-based learning, and scientific reasoning are closely related; all use reasoning to solve a problem (the goal) valuing the clarity, relevance and accuracy while testing theories and searching for (new) solutions (Gambrill, 2005). Case-based learning encourages self-thinking to develop critical appraisal skills under the concept of "learning by doing" and serves as primer for professional clinical skills.

In health-related graduations, real patient cases are often used to present and analyse the best course of action for a specific situation– a case-based learning educational strategy (Brunt, 2005; LaMartina & Ward-Smith, 2014). Problem solving and decision making use the same skills CrT uses: the accurate weighing of the quality of evidence and arguments, identification of assumptions, and recognition of contradictions (Gambrill, 2005). In the case of health related professions, judgments may present increased difficulty due to uncertainty, requiring distinctions between causes and secondary effects, problems and the results of attempted solutions, personal and environmental contributions to presenting complaints, and the links between clinical assumptions and findings.

Recognising the necessity to enhance problem solving and decision making traits during graduation leads most universities or professional Unions/Associations to claim that students ought to master CrT and professional skills over theoretical minutiae or factual recall (Borglin & Fagerström, 2012; Zheng, Lawhorn, Lumley & Freeman, 2008).

In MIMV and in Nur graduations, problem based learning strategies are used in the final years to sustain the acquisition of clinical and decision-makingskills, and often includes medical cases issued from the professional practice. The routine application of such strategies intends to allow students to create a core background supporting their ability to solve similar problems in their professional environments (La Martina & Ward-Smith, 2014).

2.1.2 - Framework resources fostering critical thinking

There are several available strategies supporting a structured CrT in freshman students in clinical subjects, used as facilitators of the reasoning process. A common used framework in problem based learning includes: the use of small groups, an emphasis on the student self-learning, a written problem (case description) engaging the students in a problem-solving process while learning and discussing the contents related to the problem.

Different models are available to help engage and motivate students, as well as to model professional thinking and action (Irby, 1994). Their effect increases when regularly used and when supplemented with feedback. Among them, the Bloom´s revised taxonomy of Learning Domains, Paul-Elder´s Elements of Thought, or Ennis´s FRISCO guidelines may be used for upward clinical skills.

Bloom´s taxonomy identifies six progressive cognitive abilities essential to a good critical thinker (Duron, Limbach & Waugh, 2006), disposed according to a levelled pyramid: Knowledge→ Comprehension→ Application→ Analysis→ Synthesis→Evaluation. The revised taxonomy transformed the names into verbs according to the desired actions to engage at each level. Initially developed to formulate learning objectives, this taxonomy may also assist during construction of CrT (Krathwohl, 2002; Larkin & Burton, 2008; Mikol, 2005): it allows to list a chain of events or to establish a timeline of events (Knowledge/Remember); to explain or interpreter situations (Comprehension/Understand), to examine or classify information or design strategies (Application/Apply), or to categorise events and compare solutions (Analysis/Analyze), as well as to predict outcomes or propose a strategy (Synthesis) and to judge, select and decide on a solution (Evaluation/Create).

Paul-Elder´s proposed the existence of eight elemental structures in Thought (Elder & Paul, 2006) usually represented in a circular checklist for thinking: Purpose (Goal or Function), Question at issue (Problem or Issue), Information (Facts, observations or Reasons), Inferences (Interpretation, Solutions or Conclusions), Concepts (Definitions, Theories or principles), Assumptions (Presuppositions or Axioms), Implications (Effects or Consequences), and Point of view (Perspective, Opinion or Orientation). These elements can be used to decompose any critical analysis into the CrT components. Following the circle teaches individuals how to analyse a broad range of materials from articles, reports, novels or films.

FRISCO guidelines were developed by Ennis (1996) as standard criteria to support the CrT process. The letters are an anagram for Focus, Reasons, Inference, Situation, Clarity and Overview. These guidelines will be detailed later in this manuscript. FRISCO guidelines have been previously adapted to problem solving in mathematics; Diaz (2011), using the six basic FRISCO elements, developed a framework named APRENC-Mates, to be used in math problem solving situations. The author speculates on the benefits of a structured reasoning to improve the students' outcomes/success.

2.2 - Case-Based Learning Strategies
In case-based activities, the trainee is encouraged to:

- Transform the information from a case report into a series of clinical questions that can be answer by the literature or their former learning/practice;
- Search for the best available evidence;
- Clinically assess evidences for their validity and importance;
- Achieve a diagnosis (and understand the process of diagnosing and the output of clinical diagnosis decision support systems);
- Estimate a prognosis;
-Decide on the best treatment;
- Consider the patient welfare;
- Prevent and control the disease, therefore to schedule re-evaluations and putative changes in therapeutics.

Although multiple variations of the process exist, in Nur and in MIMV graduations at UTAD, students are typically presented with a short clinical history, issued from a published case description or from a situation carefully designed to facilitate discussion related to specific learning objectives. In MIMV, these are targeted by the teacher/facilitator raising 3 or 4 questions to be responded by the group. These may include the construction of an algorithm, a list of differential diagnosis, the hierarquization of the symptoms, the discussion of therapeutic approaches or the request for additional exams. Organised in small groups, students read and brainstorm about the problem, hypothesize potential causes of the problem, and discuss the diagnosis and treatments. In Nur, cases are collected from their practical training periods inHealth facilities, and are discussed between the college tutor and a group of students, but the goals and topics to detail are similar. In Nur, during the clinical training small groups of students work under the clinical supervision of a senior nurse for a 8 weeks period, focused on self-learning by doing and seeing how it's done. At the end of this period students have to present a written (final) report on a clinical case they followed, in a problem-solving approach, with the purpose to perform a retrospective reflection on the efficacy of decision-making processes. This document will be discussed with the tutor.

Questioning may cover multiple layers of complexity, and may require evaluation of the literature and integration of knowledge of neighbouring clinical areas (such as surgical pathology, diagnosis methods or clinical chemistry and primary health care).

Until now, no reflective framework is used to support the development of these activities. The facilitator provides general guidelines and feedback, in-class (MIMV) or at the evaluation of the final report (Nur). However, as it has been stressed before (Brunt, 2005; Popil, 2011), major obstacles have been found including the time-consuming nature of this sort of activity and, in MIMV, a minor engagement of students used to more traditional methods.

Now we plan to further structure the clinical reasoning skills in these students, by the use of the webPACT framework, developed at the UTAD by a group of Educators. These educators developed a set of activities to nurture CrT skills in their students by applying a peer review analysis performed in a web platform. The methodological framework of this activity has been described recently (Dominguez et al., 2014). Briefly, it is composed of two to three cycles that include: the writing of a document based on the analysis of a technical or scientific paper (role of student-author) followed by the peer review of the produced document by a peer (student-reviewer) and a counter-argumentation by the author. Although the group is aware of the existence of various frameworks (see above), which allow students to engage with their own thinking process and to optimize it, the group has been using the FRISCO guidelines. It allows the systematization of the analysis and the organization of thinking, reasoning and decision-making (Vieira & Tenreiro-Vieira, 2003). Students must apply the Ennis´ FRISCO guidelines for the paper analysis, and the feedback is given according to the Nelson and Schunn model (Dominguez et al., 2014).

3 - THE ADAPTATION OF FRISCO GUIDELINES TO THE ANALYSIS OF CLINICAL DESCRIPTIONS

Descriptions of clinical cases usually follow a particular format and the text is usually restrictive in content to an almost telegraphic description of events and complementary analysis. Classically, they consist in a more or less thorough story/description of a clinical situation based on real events, or are a construction of events that could reasonably take place. The information contained in a case study often includes a list of symptoms (as they are perceived by the patient or its owner), relevant historical background and the results of complementary exams. In general it illustrates a situation requiring a decision: to diagnose and propose a treatment, as well as to foresee its possible outcome (prognosis).

This characteristic form of the text raises difficulties for students (authors or reviewers) respecting the application of the FRISCO guidelines. Therefore it is necessary to coach the students on the basilar guidelines that rule the document analysis (Dominguez et al., 2014). The in-class presentation of these guidelines and the on-line tutoring of the activity (comprising the writing and the peer-review tasks) could obviate the time-consuming barrier pointed out to the learning process through case studies in clinical subjects in health graduations.

Since in its general form students found difficult to fill in the answers for each letter of the FRISCO acronym, it was necessary to make theses understandable in a more direct way for clinical situations.

Taken these specificities into account, a group of four Teachers from Nur and MIMV clinical subjects, already acquainted with the FRISCO guidelines (having used them in non-clinical situations and having seen them used in other areas -

Dominguez et al., 2014), came to deepen the meaning of each of the acronyms. In an independent way, each teacher developed a proposal of adaptation. Then the teachers met to compare and discuss their proposal until a final one was designed with the agreement of all the teachers involved (figure 1).

Figure 1. Schematic comparison of the original and adapted FRISCO guidelines.
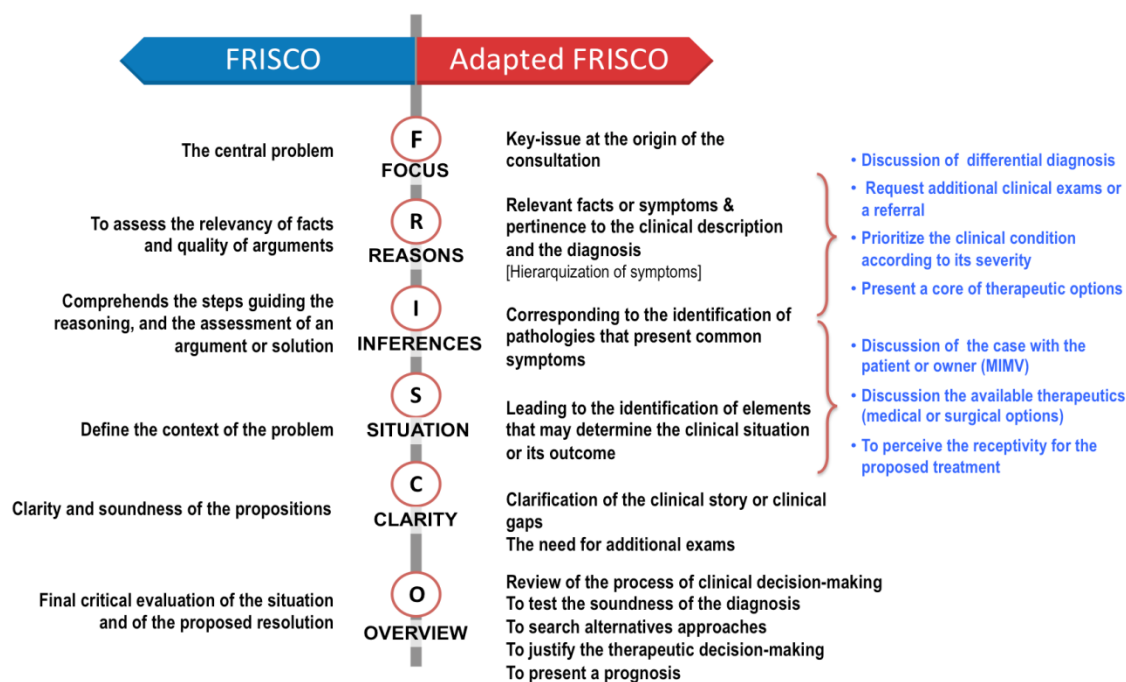
In FRISCO guidelines (Ennis, 1996), F(ocus) would answer to the question on the central problem; when applied to the analysis of clinical cases, it would stand for the key-issue at the origin of the consultation/appointment, for example accentuated weight loss or acute abdominal pain. Under R(easons), the student would assess the relevant facts/symptoms and their pertinence to the clinical description and the diagnosis; it should also allow the student to grade the relative importance of the symptoms described, from the most relevant to the more obscure or superfluous. Relevant symptoms would point out to a list of putative diseases. This is usually assessed in I(nferences) which comprehends the steps that guide the reasoning, and the soundness assessment of an argument or solution; in the analysis of the clinical situation it would correspond to the identification of pathologies that present a particular, common symptom. Taking together, R and I would allow the student to discuss differential diagnosis, decide on the need for additional clinical exams or a referral, to prioritize the clinical condition according to its severity (Manchester scoring) and present a core of therapeutic options. Assessment of S(ituation) allows to define the context of the problem, the identification of partners or traits involved, which during the analysis of clinical files/cases may correspond to the identification of environmental,

social, affective/familiar, etiological and therapeutic elements that may have determined the clinical situation or may influence its outcome. Together with I, it should help the student to review the case with the patient and discuss the available therapeutics (medical or surgical options) and to perceive his receptivity for the treatment to be proposed. Classically, C(larity) is associated with a clear, sound proposition, and this kind of questions retain its relevance in the analysis of clinical cases: often, the patients attributes distorted importance for particular symptoms, either because they exaggerate or neglect them; or the clinical story presents gaps impairing to obtain a definite diagnosis, or some aspects of the anamnesis or medical exam needs clarification, or additional exams need to be performed. The O(verview) corresponds to the final critical evaluation of the situation and of the proposed resolution. When assessing the clinical cases at this point, students should be coached to review the entire process of clinical decision-making, to test the soundness of the diagnosis they reached comparing to the anamnesis and clinical symptoms, to search alternatives approaches, to justify the therapeutic decision-making and to present a prognosis. Overview will also foster meta-cognitive skills when the student revises his process of clinical reasoning and criticises himself with respect to its own reflection, by asking: I thought this? Did I think about that? And if...?

4 - CONCLUSIONS

The webPACT group at UTAD uses a methodology to enhance the CrT skills, which includes the use of the FRISCO guidelines for the orientation of the reasoning steps covering the analysis of a document. Although other frameworks are available for structuring the thinking and analysis processes, which are often referred to by the literature on case-based learning, we wanted to try to maintain the original webPACT methodology, although that does not prevent that in the future, we may compare its success with that of other frameworks. Following similar attempts in different areas, the current proposal for FRISCO adaptation needs now to be tested in practice. The activities where the students will apply the proposed adaptation of FRISCO Guidelines are now ongoing. Thus, up to now, practical results have not been produced. However, we are confident that the adapted FRISCO guidelines will ease the comprehension of the steps to be followed during questioning and reasoning, making students think, ask questions, and use their knowledge in order to answer those questions raised by the teacher for each clinical case. We believe that these new tacking instructions for FRISCO guidelines, and their use by the students in a peer review format, will foster the students´ clinical reasoning and facilitate the design of diagnostic algorithms or therapeutic concept maps, while widening the transversal application of the methodology used by the webPACT at the UTAD to different learning contexts in the clinical area.

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