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Innovations in teaching: a learning format designed to enhance critical appraisal skills

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Aim: *To create a learning experience which enhances clinical competence by encouraging critical appraisal and accurate self-assessment.*
Method: *Strategies for enhancing participants' appraisal skills included:*

- *preparation of a "case study" to demonstrate clinical decision making in primary practice*
- *self-evaluation of that case study according to a pre-determined framework.*
- *critiquing of case studies prepared by peers.*

All participants were provided with a set of guidelines for case selection, case preparation and case evaluation. Each participant prepared one case study and critiqued two others. Student anonymity was ensured by means of cases and critiques being identified through examination numbers rather than names.
Results: *From the student perspective the case preparation aspect of this learning experience was well accepted. The student response to peer-evaluation was more guarded while only one third of respondents considered that the self-assessment component of the exercise may potentially contribute to their development as independent learners. From the lecturer's perspective the total exercise was worthwhile despite certain logistic difficulties. Recommendations for modifying the learning experience have been included.*
Conclusions: *By encouraging reflective clinical decision making and engaging participants in self- and peer performance appraisal, this format creates a learning framework which provides an opportunity for students to enhance their ability to undertake critical appraisal in a context relevant to their future professional practice.*
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KEY WORDS: critical appraisal, education, clinical decision making.

But : *Mettre sur pied une formation enrichissante qui met en valeur les compétences médicales tout en favorisant l'évaluation critique et l'auto-évaluation précise.*
Méthode : *les stratégies suivantes favorisent les aptitudes critiques des participants :*

- *l'élaboration d'une étude de cas qui permet de faire ressortir les prises de décisions médicales auxquelles seront confrontés les participants dès le début de l'exercice de la chiropratie;*
- *l'autocritique de cette étude de cas selon le cadre établi au préalable;*
- *la critique des études de cas menées par les pairs.*

Des directives générales ont été fournies à tous les participants quant au choix, à la préparation et à l'évaluation de l'étude. Chacun des participants a été appelé à préparer une étude de cas et à en critiquer deux autres. L'anonymat a pu être préservé en identifiant les études et les critiques par des numéros d'examens au lieu des noms des participants.
Résultats : *Les participants ont été satisfaits de la préparation de cette formation enrichissante. Les étudiants ont toutefois démontré plus de réserve quant à la section consacrée à l'évaluation des pairs. Par ailleurs, seulement un tiers des sujets considèrent que la section de la formation traitant d'auto-évaluation pourrait éventuellement contribuer à acquérir de l'autonomie. Quant aux professeurs, cette expérience s'est avérée enrichissante en dépit de quelques difficultés d'ordre logistique. Des recommandations visant à modifier la formation ont été incluses.*
Conclusions : *En encourageant une prise de décision médicale réfléchie et en impliquant les participants dans l'auto-évaluation et la critique de la performance de leurs pairs, cette formation met en valeur le cadre académique qui donne aux étudiants la possibilité d'améliorer leurs aptitudes à assumer la critique dans un milieu propre à l'exercice de leur future profession.*
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MOTS-CLÉS : évaluation critique, éducation, prise de décision médicale.

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Introduction

The ability to undertake accurate appraisal in diverse situations is a skill fundamental to successful clinical practice, continuing self-education and professional competence. While patient appraisal is emphasised in undergraduate education, active peer- and self-appraisal is largely overlooked. Even though it is recognised that "self-evaluation is probably the most important determinant of professional competence"... "the development of accurate and reliable self-evaluation skills is rarely addressed".[1] When this issue was addressed by staff involved with the University of New Mexico's Primary Care Curriculum, it was found that 'development of realistic self-assessment is a difficult task".[2] Nonetheless student involvement in self-assessment has been found to sharpen skills required for successful continuing self-education and independent learning.[3] Peer-assessment, which may be more discriminating than faculty evaluation in certain areas,[4] also deserves consideration as a technique for enhancing critical appraisal skills. Appraisal of learning needs is regarded as: "An essential component of clinical competence (which) is the ability to identify the limits of one's knowledge and skills and to organize resources to learn more".[5] Realistic self-appraisal would appear to be a pre-requisite to continuing professional competence and competence is increasingly recognised as the benchmark for vocational education.[6–7]

This paper describes a learning experience which was constructed to expose the learner to various dimensions of critical appraisal pertinent to their development as health professionals. More specifically, it sought to provide the student with an opportunity to refine the skills underlying appropriate clinical decision making, peer- and self-assessment.

The learning task

As part of their assessment for Diagnosis 8, a subject focusing on the clinical presentation of visceral disorders, final year students were required to:

- submit a case study on one of their clinic patients.
- critique two case studies submitted by other students.

The aim of the exercise was to provide a learning opportunity in which students could:

- increase their knowledge of how visceral conditions may mimic musculoskeletal presentations of back, head, pelvic, abdominal or chest pain.
- improve their ability to critically appraise clinical data.
- enhance awareness of their own performance and that of their peers.

For the case preparation, students were allocated into one of three groups according to the category of patient presentation. The categories were backache, headache or chest/abdominal/pelvic pain. Students within each group were invited to select from their clinic patients, the case which offered them the best opportunity to demonstrate their competence in clinical decision making. Student guidelines for selecting appropriate cases are outlined in Figure I. Students were cautioned that the aim of the learning exercise was to ascertain their ability to undertake differential diagnosis from the perspective of a primary contact practitioner and that professional specific (chiropractic/osteopathic) management was not being evaluated. Before preparing their case study, students were made aware of the guidelines which were to be provided for case critiques (Figure II). Each student was required to submit three copies of their case study, each copy to be submitted with a cover sheet (see Figure III). Upon submission of their case study, students were asked to score their own case study according to the marking guidelines provided.

The lecturer then proceeded to allocate to each student two cases for peer-assessment. The case critiquing phase of this exercise required that:

- the case presentation be marked using the marking scale as a guide. A mark out of 24 was to be given. Mark distribution is demonstrated on the cover sheet.
- the student assessor submit a discussion of other possible diagnoses, investigation strategies, management options which may pertain to the case study they had assessed. This analysis was to be evaluated by the examiner.

A maximum mark of eight was allocated for each case critiqued. In allocating case critiques the following principles were paramount namely:

- students should be exposed to a broad clinical decision making experience. Consequently it was decided that:
  - students submitting a case in one category should not receive a case to critique from that category
  - no student should assess more than one case from any single category

Figure I
Guidelines for Case Selection

This is an exercise in excluding visceral causes of pain presenting in chiropractic/osteopathy clinics. In order to meet the case study requirements it is necessary to select a patient who provides an opportunity for you to demonstrate

- the ability to differentially diagnose conditions whose clinical presentation may arise from visceral dysfunction
- safe clinical decision making
- an understanding of how drug therapy may influence the presentation and management of the patient and/or
- the use of nutritional intervention
- personalised patient care including consideration of predisposing/aetiological factors, likely complications and compliance given the particular patient's lifeworld.

Figure II Guidelines for Case Critiques

Case critiques require that:

Marking scale framework/Evaluation criteria:

I. The presenting complaint: (5)
- *why the patient has presented now*
- *the nature of the patient's overt complaint*
- *the presence of predisposing/aetiological factors*
- *the presence of any covert complaint*

II. The exclusion of serious disease: (5)
- *the identification of referral criteria*

III. Diagnostic decision making (5)
- *the working diagnosis*
- *the definitive diagnosis*

IV. Management decision making with respect to the presenting complaint (treatment plus prevention of complications) and to the prevention of recurrences (8):
- *Nutritional considerations*
- *Drug therapy – possibilities and side effects*
- *References*

V. Protocol for monitoring progress (1)

Figure III Case Study Cover Sheet

CASE STUDY

CASE NUMBER: (1–56) .....

CASE TOPIC AREA: (Please circle)
BACK PAIN
HEADACHE
CHEST PAIN/ABDOMINAL PAIN/PELVIC PAIN

STUDENT NUMBER (Case presenter): .....

CRITIQUE OF CASE

Marking scale/Evaluation criteria: (maximum possible marks in brackets)
SCORE

The presenting complaint: ..... (5)

The exclusion of serious disease: ..... (5)

Diagnostic decision making ..... (5)

Management decision making ..... (8)

Protocol for monitoring progress ..... (1)

TOTAL MARKS: ..... (24)

CRITIQUER EXAMINATION NUMBER: .....

CRITIQUER PLEASE ATTACH SUGGESTED ALTERNATIVE APPROACHES (8 marks)

APPENDIX
QUESTIONS USED FOR STUDENT EVALUATION OF THE LEARNING EXERCISE

Please use the following key to respond to the listed questions. Use the answer card provided.
a – strongly agree b – agree c – disagree d – strongly disagree e – did not attend/do

The major case study **assignment** provided a learning experience which:

1. encouraged practical implementation of theoretical information
2. failed to increase my understanding of clinical decision making
3. was useful to my future practice
4. increased my knowledge in the area of general diagnosis
5. will modify my future approach to case management
6. increased my self-confidence in differential diagnosis
7. did not justify the time spent (had a poor cost:benefit ratio)

The case study **critiques** provided a learning experience which:

8. encouraged practical implementation of theoretical information
9. failed to increase my understanding of clinical decision making
10. was useful to my future practice
11. increased my knowledge in the area of clinical decision making
12. will modify my future approach to case management
13. increased my self-confidence in differential diagnosis
14. did not justify the time spent (had a poor cost:benefit ratio)

Please **RANK** the following options using a – most improved, b, c, d, e, blank – least influenced: Use each option only **once** for questions 15 to 20

My understanding of differential diagnosis was ..... by:

15. the protocol development tasks
16. the case preparation for group presentation (Friday)
17. reading the lecture notes
18. doing the case study assignment
19. doing a critique of case studies (assignment)
20. the classroom group case diagnosis sessions

Please **RANK** the following options using a – most improved, b, c, d, e, blank – least/not improved: Use each option only **once** for questions 21 to 26

My understanding of general patient management was enhanced by:

21. the protocol development tasks
22. the case preparation for group presentation (Friday)
23. reading the lecture notes
24. preparing the case study
25. doing a critique of case studies
26. the classroom group case diagnosis sessions

APPENDIX (Continued)
QUESTIONS USED FOR STUDENT EVALUATION OF THE LEARNING EXERCISE

27. The subject would be improved by less (blank if disagree with all the options):
    a. protocol development tasks
    b. /fewer or no classroom group case diagnosis sessions
    c. lecture notes
    d. /not requiring preparation of a major case study
    e. /fewer or no case studies critiques

28. The subject would be improved by more (blank if you disagree with all the options):
    a. protocol development tasks
    b. classroom group case diagnosis sessions
    c. lecture notes
    d. major case studies prepared by students
    e. case studies critiques of major cases prepared by students
29. Assessment in this subject should allocate more marks to:
    a. the examination at the end of the semester
    b. the major case study
    c. the case critiques
    d. none of the above ie is correctly proportioned

Please use the following key to respond to the listed questions. Use the answer card provided.
a – strongly agree b – agree c – disagree d – strongly disagree e – did not attend/do

My self-assessment of my case study:
30. forced me to review how I make clinical decisions
31. made me aware of gaps in my knowledge
32. helped me decide how I should structure my learning
33. helped me identify what I needed to study
34. helped me become a better independent learner
35. did not justify the time spent (had a poor cost:benefit ratio)

The peer-assessment/student critiques of my case study:
36. closely reflected my self-assessment
37. broadened my appreciation of clinical options for this case
38. added little to my appreciation of my case

The experience of preparing one case and critiquing two cases:
39. provided a comprehensive overview of clinical decision making when confronted by a patient complaining of pain
40. was excessively repetitious

The marking schedule for the case study:
41. was a useful guideline in developing the case study presentation
42. complicated assessment of the case study
43. is too detailed
44. needs to be modified

- student anonymity should be ensured. In practice this requires that a system of examination numbers rather than names is used to ensure that the case presenter and critiquer are unaware of the other's identity.

By the end of the exercise, each student had:

- prepared a case study according to defined criteria
- had their case study critiqued by two other of their peers. Feedback from this to include:
  - the completed cover/mark sheet prepared by each peer-assessor
  - a discussion on alternate approaches to the diagnosis or management of the case as proposed by each peer-assessor. The copies returned to the student had the examination number of the student critiquer deleted.
- critiqued two case studies prepared by other students.

The students had a maximum of seven weeks in which to prepare their case studies and a maximum of two weeks during which to critique two case studies. Upon completion of the exercise, students were asked to complete a questionnaire which evaluated their perception of the learning experience (Appendix).

Considerations in developing the learning experience

It appears that, with reference to medical education, "... two of the major problems are factual overload and inappropriate evaluation, including inadequate self- and peer-evaluation".[1] The evaluation system is particularly criticised as overemphasising recall of facts and promoting too much rote learning and too little vocationally meaningful learning. As some 70% of the chiropractic curriculum in American Colleges may be identical to medicine,[8] it is not unreasonable to surmise that chiropractic education may be confronted by similar difficulties.

The teaching/learning format described addresses these two major concerns. By selecting a clinic patient as the subject for this assignment, a learning exercise relevant to the students' professional lifeworld is ensured. Patient management problems focus the content of the learning on realistic clinical situations and capture the process-based learning approach of problem solving. Instead of rote learning, the student is required to actively manage a body of knowledge in order to make various decisions. Instead of being called upon to recall facts, the student is required to employ a decision making process. It is well recognized that: "learning through problem solving is much more effective for creating in the student's mind a body of knowledge useable in the future than is traditional memory-based learning".[9] This exercise is consistent with the tenets of efficient knowledge acquisition and retrieval which involves: the activation of prior knowledge, practice relevant encoding followed by knowledge elaboration.[10] This learning experience overcomes factual overload by focusing on the processes of clinical decision making. Clinical reasoning, a process of hypothesis generation and testing based upon a sound knowledge base, requires active thinking and reflective self-awareness (metacognition).[11] Metacognition is an essential component of self- and peer-evaluation. By involving the student in self- and peer-appraisal of completed assignments, it was hoped that this learning experience would encourage critical thinking and sharply focus the student's attention on their current performance and possible learning needs.

Consistent with the preference of adult learners, this teaching/learning format offers opportunities for self-pacing, problem solving and frequent feedback.[12] Also compatible with the constructs of adult learning is the involvement of peers to facilitate deep learning, reflection and self-direction.[13] Given that students in problem-based learning curricula do appear to acquire behaviours that reflects self-directed learning,[14] it is envisaged that this assignment, with its various levels of critical analysis and feedback, would create an environment in which self-appraisal skills and self-direction in learning would be encouraged.

Proficiency in identifying learning needs, converting these to learning goals, selecting learning strategies and monitoring personal progress,[15] ie self-direction in learning is an absolute requirement for primary practice professionals.

The students' evaluation of the learning exercise

Forty-two (42) of a total class of 64 students completed a subject evaluation. Owing to the requirement of respondent anonymity, it was not possible to follow up the 34% of students who did not participate in this evaluation. The results of student evaluation of this learning experience are reported in Table I. A Likert scale was used to determine how the students' ranked this aspect of their learning experience. The teaching/learning of this subject included the following: protocol development tasks, case preparation for group presentation, reading lecture notes, doing a case study assignment, critiquing case study assignments and participating in the classroom group case diagnosis sessions. Of all these learning experiences students ranked preparation of the case as second only to the lecture notes with respect to enhancing their understanding of both differential diagnosis and patient management. Peer critiquing of case studies was, in contrast considered the least useful of all the listed activities. Fourteen percent (14%) of respondents felt the subject would be improved by fewer or no case study critiques; no respondent considered that more case study critiques would be beneficial. While the case study was itself considered a largely beneficial exercise, the response to peer- and more particularly self-appraisal was, at best, ambivalent. Although respondent reservations about case critiquing may reflect on the learning experience *per se*, their reticence may be equally well explained as a commentary on a change from the traditional teacher "fountainhead of knowledge" approach to that of peer evaluation. Certainly at least two students commented that they would prefer teacher evaluation and concern was expressed regarding the influence of peer marking on the final examination grade.

Although most (43%) of respondents felt that the allocation of marks for the subject were appropriately proportioned, some 29% felt that more marks should be allocated to the case study. One student favoured more marks being allocated to case study critiques.

Table I Student Evaluation of the Learning Experience (n = 42)

*Self-appraisal of Learning Outcome	Agree (%)	Disagree (%)
The case study **assignment**:		
1. encouraged practical use of theoretical information	86	10
2. didn't increase understanding of clinical decision making	12	83
3. was useful to my future practice	90	10
4. increased my knowledge in the area of general diagnosis	89	10
5. will modify my future approach to case management	71	29
6. increased my self-confidence in differential diagnosis	74	26
7. did not justify the time spent (had a poor cost:benefit ratio)	29	71
The case study **critiques**:		
8. encouraged practical use of theoretical information	57	36
9. didn't increase understanding of clinical decision making	29	66
10. was useful to my future practice	50	44
11. increased my knowledge in the area of general diagnosis	66	29
12. will modify my future approach to case management	40	54
13. increased my self-confidence in differential diagnosis	40	55
14. did not justify the time spent (had a poor cost:benefit ratio)	46	50
My **self-assessment** of my case study:		
15. forced me to review how I make clinical decisions	40	59
16. made me aware of gaps in my knowledge	53	48
17. helped me decide how I should structure my learning	29	69
18. helped me identify what I needed to study	24	72
19. helped me become a better independent learner	31	67
20. did not justify the time spent (had a poor cost:benefit ratio)	50	48
The **peer-assessment**/student critiques of my case study:		
21. closely reflected my self-assessment	42	26
22. broadened my appreciation of clinical options for this case	48	26
23. added little to my appreciation of my case	28	45
The **experience** of preparing one case and critiquing two cases:		
24. provided a comprehensive overview of clinical decision making when confronted by a patient complaining of pain	74	24
25. was excessively repetitious	31	69
The **marking schedule** for the case study was:		
26. useful guideline in developing the case study presentation	93	7
27. complicated assessment of the case study	14	83
28. is too detailed	5	91
29. needs to be modified	40	57

*certain questions were omitted by some respondents

The teacher's reflections

Certain difficulties were identified during implementation of the learning format. Particular problems which emerged related to the matching of case studies and critiques using long examination numbers as the identification code. A system of case study numbering is proposed. Colour coding of various phases of the exercise is also suggested.

The strategy of three assessors (two students and the teacher) for each case study proved appropriate. While in most instances the three assessors fell within a 10% range, there were three occasions on which the two student assessors differed by 39%, 33% and 25%. As the results are of substantive significance to the individual student, it is therefore essential that the teacher be involved in assessment of each case. In 18% of cases the mean grade derived from the student assessors scores failed to concur within a 10% range with that of the teacher. There were also instances in which, despite consistency between the student assessors' grades, the teacher judged that the final grade should be lowered by more than 10%. Such discrepancies resulted from the student assessors overlooking the requirement that the case study was also to provide a content/factual learning experience in which all possible, and improbable, visceral causes of pain were to be actively excluded. In view of two students having failed to recognise this requirement modifications to instructions have been made and are shown in Figure IV. Associated with these modifications is a proposal to alter the marking schedule and

Figure IV
Recommended Modifications to the Instructions

Hints: The aim is to develop a protocol for differentially diagnosing a patient who presents in one of the listed categories. At all times apply the general considerations to your patient. The case presentation should use the patient's information as a basis to discuss differential diagnosis of visceral conditions that may present with pain in the designated anatomical area. The objective is not to diagnose a particular patient, it is to develop a diagnostic protocol. The dimensions of management should be explored relevant to your presenting patient's probable diagnosis. In all instances the objectives are to comprehensively cover relevant factual data while developing your skills of critical appraisal.

Marking scale/Evaluation criteria:

I. The presenting complaint: (2)
- *why the patient has presented now*
- *the nature of the overt complaint*
- *the presence of predisposing/aetiological factors*

*II. Broadbased diagnostic decision making: (15)
- *the exclusion of serious disease & the identification of referral criteria*
- *probability diagnosis, possible considerations, conditions which may "masquerade"*
- *the working diagnosis*
- *the definitive diagnosis*

III. Management decision making with respect to the **presenting complaint** (treatment plus prevention of complications) and to the prevention of recurrences: (8)
- *Nutritional considerations (include doses)*
- *Drug therapy – possibilities and side effects*
- *Patient education*
- *Protocol for monitoring progress*

IV. Diagnostic protocol/algorithm/flowchart indicating the diagnostic decision points/watersheds for a patient with pain in the anatomical region allocated (5)

References – to be included in text and used to justify clinical decisions

allocate marks to the development of a diagnostic algorithm.

In 89% of cases the students' self-assessment fell within 10% of that of the teacher's grade. Six of the seven students whose self-assessment deviated from the 10% range assessed their work more favourably than did the teacher. One third of the students whose assessment fell within the 10% range graded their work more favourably than did the teacher. The experience of scoring and being scored coupled with the written comments on the case critiques is perceived to provide useful insight into how participating students appraise themselves and their peers with respect to the cognitive management of clinical data.

Concluding remarks

Despite certain logistic difficulties, it is suggested that this teaching/learning format provides a valuable aid in encouraging students to develop critical appraisal skills. While few students were enthusiastic about undertaking peer- and self-assessment, there was some recognition of the potential benefit of this aspect of the exercise.

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