

# Facilitating the learning of clinical examination skills through online assessment

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This paper reports on the evaluation outcomes of a teaching and learning initiative involving the use of an integrated system for the online clinical assessment of practical skills. The system, known as *eCAPS*, was developed to promote authenticity and efficacy of practical skills assessment in a second-year medical training program. Drawing on contemporary conceptual understandings of assessment for learning, *eCAPS* consists of a progressive (asynchronous to synchronous) organisation of online video experiences and learner expectations, allowing both formative and summative assessment of selected practical competencies within two program environments (problem-based learning and individual learning). This paper presents data from semi-structured interviews conducted both with the student participants and with the experienced clinicians who provided expert content analyses of the simulated patient video consultations. *eCAPS* appeared to promote student engagement in the learning of clinical skills, and to support enhanced ecological validity in the remote assessment of these skills. The learning and assessment efficacy of *eCAPS* provides promising opportunities for professional learning and competency verification within other professional health education environments.

**Keywords:** authentic; online; practical skills

**Theme:** innovative assessment: opportunities and challenges

## Introduction

This paper reports on the research outcomes of an Australian Learning and Teaching Council-funded project involving the online clinical assessment of practical skills (*eCAPS*) for second-year medical students. *eCAPS* is an integrated online assessment protocol that draws on contemporary conceptual understandings of assessment for learning (Black & Wiliam, 1998;

Boud, 2007; Earl, 2003) and authentic assessment (Herrington, Oliver & Reeves, 2003) to fulfil the purpose of generating truly interactive online courses (Holzer & Kokemueller, 2007) that demonstrably enhance student learning of *practical* skill-sets in musculoskeletal medicine.

The protocol is constituted by three sequential yet interdependent elements:

- 1 web-video lectures/demonstrations of musculoskeletal practical skills sets by experts in the relevant field of focus
- 2 asynchronous, learner-generated video demonstrations of a variety of clinically relevant practical skills using portable USB cameras uploaded to a response and feedback online repository for personal and course-community access
- 3 real-time (synchronous) assessment of practical skills sets within a simulated Objective Structured Clinical Examination scenario via personal computer videoconferencing (e.g. Skype).

*eCAPS* was implemented and evaluated in two phases. Each implementation phase was five weeks in length and was instantiated through a musculoskeletal knee injury module. The Phase 1 cohort consisted of four second-year medicine problem-based learning groups, with approximately 10 students in each group (n=40). Baseline data were collected on the standard of each student's clinical knee examination, and each student participated in a semi-structured interview following their synchronous practical skills assessment. The cohort of second-year medical students in Phase 2 was not limited to membership of a PBL group, to ascertain the nature of individual engagement with the protocol (n=26). Sample baseline data were also collected prior to the commencement of this phase, and focus group interviews were conducted with representative samples of students at the conclusion of the phase.

The findings of the *eCAPS* evaluation indicate that the resources and requirements of the protocol promoted activities and behaviours that resulted in notable gains in students' clinical knee examination quality, even though they received no face-to-face instruction. The online nature of the protocol supported students' independent learning of relevant content, while the expectations of producing an asynchronous knee examination video both promoted, and was supported by, the group-learning dynamics of a PBL environment. Students' clinical skills and understandings improved through the requirement to demonstrate a knee examination (asynchronously and synchronously) as well as through the fulfilment of other roles within their groups, such as acting as a patient, and videoing the clinical examinations of their peers. The feedback provided by experts in the field of knee injuries and treatments on randomly selected asynchronous videos from each PBL group was used and valued by the students in their preparation for the synchronous assessment.

The findings of this evaluation highlight that online and audiovisual technologies can provide useful learning and assessment opportunities for practical skills when they are developed in a manner that promotes the obvious and coherent relationship between subject matter, performance expectations, student demonstrations of practical skills and feedback. This is particularly important in the relationship between the formative and summative assessment expectations associated with practical skills development and assessment. *eCAPS* demonstrated that

technology can provide a context for the promotion of quality feedback for students whether their learning context is remote, face to face, within PBL arrangements or more individual in nature.

eCAPS provided an efficacious means of remotely developing and assessing medical students' knee injury clinical skills and thus offers the potential for learning and assessment in other learning contexts. For example, the eCAPS protocol could provide a useful platform for continuing professional development and competency assessment for the purposes of ongoing professional registration in many health fields such as medicine, physiotherapy, exercise physiology, etc. Such a platform would allow practicing professionals to access demonstrations and support information on innovations in the field, as well as provide the opportunity for registering authorities to "witness" and thus verify a registrants' possession of key or critical competencies.

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