Literature Review on Self-Assessment in the Adult Learning, Continuous Improvement Context of the American Board of Radiology's Maintenance of Certification Program

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Introduction

The vision of the American Board of Radiology is to ensure that its diplomates "...possess the knowledge, skills, and experience requisite to the provision of high-quality care.... The ABR-MOC program includes concepts of quality improvement with an emphasis on active participation in individual educational planning. Included are needs assessments, CME, and practice performance tools. To help with continuous professional development and MOC, the ABR will work cooperatively with the specialty and subspecialty societies to assist each diplomate in creating and implementing individual educational plans and lifelong learning self-assessment programs." (from the ABR's MOC proposal submitted to the American Board of Medical Specialties, 2004)

The purpose of this literature review on self-assessment is to assist the societies, as creators of self-assessment modules (SAMs), as well as the ABR qualifiers of such modules for the ABR-MOC program, to begin with a common understanding of the nature, role, and best practices of self-assessment. To begin, this review focuses on why self-assessment is an important, even indispensable, part of the learning process, especially for adults. Then, we will consider the literature concerning key attributes of self assessment, content and design issues, the crucial role of feedback, making assessment more authentic, and finally expected outcomes of self-assessment. Along the way, some comments will be inserted explicitly applying the implications of the literature for SAMs in the context of the ABR-MOC program.

Why Self-Assessment?

The literature has a number of concise descriptions of self-assessment. Here are two of the best, eloquently stated in their authors' own words:

"A key attribute of an effective learner is the ability to critically analyze one's achievements and progress.... Powerful learner agency [i.e., self-assessment] engages the student in the full cycle of action, reflection, evaluation, and further planning for continued improvement." (Randall, 1999)

"Good [practitioners] have always assessed or evaluated their own performances. They observe the consequences of their actions, listen to feedback, analyse...results with care and use this evidence, and more, to make judgments about their professional competence. This is the essence of the reflective practitioner." (Dixon, 1996, p 19)

The purpose of SAMs is to extend the habit of self-assessment more broadly across all practitioners, both those who have intuitively done it from the beginning of their professional careers, and those who have not previously considered doing it. Part of the challenge is that our societally-reinforced "mechanism of distrust and concealment [with regard to faults] has to be broken." (Gelderman, 2000) Dixon (1996) promotes the concept of a self-assessing culture, with the focus not on criticism but on continuous quality improvement, and states that this most readily occurs where participants are expected to evaluate their own performance on the basis of evidence, and self-assessments are actually used to inform decisions and action plans. Creators of SAMs have a unique opportunity to incorporate both of these aspects.

Within the context of any type of education and learning, assessment has three possible purposes: to evaluate and credential, to determine institutional effectiveness, and/or to promote learning. Self-assessment within a Maintenance of Certification program clearly is for the latter purpose: to promote learning. Battersby (1999), after preparing an entire journal issue on assessment, concludes "the practice and feedback aspect of assessment is what contributes most dramatically to learning... Of course conceptual explanations are necessary, but without the subsequent opportunity to apply these concepts and receive feedback, the possibility of misunderstanding, even by professional learners, is enormous. As a result I have [personally] increasingly shortened the presentation part of my workshops and lengthened the time for application, practice, and feedback." This statement expresses well the unique opportunity offered by SAMs within the Maintenance of Certification process.

A Modular Approach to Self-Assessment

The MOC program includes self-assessment "modules." Why is a modular approach appropriate for self-assessment within MOC?

A SAM is a way-point in the physician's personal educational plan for his or her MOC process. While imparting knowledge is an expected part of a SAM, it is not the central purpose. SAMs are not just CME in a slightly different format. The key component of a SAM is engaging the physician in effective self-assessment which the physician relates back to his or her personal educational plan and uses to make "course corrections" in future MOC activities and, more importantly, in practice. That is why an effective SAM, in contrast to other CME offerings, must incorporate the qualities enumerated in the next section to facilitate the learner's engagement in not only self-assessment but self adjustment.

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Nature of Self-Assessment

Dixon (1996) describes a self-assessment cycle that can readily be related to the creation of SAMs and to the participating physician's relating the results back to his or her personal MOC educational plan:

1. decide what quality means (agreed-upon standards and improvement targets)
2. develop coherent QA systems (monitor actual performance against standards)
3. self assess (make judgments on the basis of the evidence)
4. write self-assessment report (summarize the analysis, evaluation and priorities for action)
5. determine operational aims (plan what the MOC participant wants to achieve in the future)
6. create an action plan (how to implement, with targets for improvement)

According to Randall (1999), there are several key elements needed by learners for effective self-assessment:

1. sufficient time for reflection,
2. support,
3. external assessments from trusted and respected colleagues, and
4. clarity of standards and criteria, as related to the learning materials at hand.

MOC aims to facilitate the first two, i.e., to motivate the physician to devote time to reflect on (evaluate) his or her practice, and to provide a structured framework for activities that will support and lead to such reflection.

SAMs are a key component in this type of learning process, and the societies creating SAMs can contribute greatly to the effectiveness of their members' learning by incorporating the third and fourth elements into the design of their SAMs. External assessments might take the form of the society's own documents related to standards, best practices, benchmarks, and the like; they might be models of responses to the problem presented in the SAM by experts within the society or a systematic approach to collecting appropriate peer input. Similarly, the society with all of its member-based expertise, is in a unique position to offer and continuously improve upon the clarity of standards and criteria.

Self assessment is the first stage in a process, leading to further steps of "self-awareness" and "self-reflection" (Dunlop, 1999). Self reflection has been described as one of the characteristics of a mature professional, an expert in contract to a novice. Another way of viewing the learning cycle, of which SAMs are a part, is practice-feedback-processing. Each cycle is meant to increase the individual's competence in the six competencies which have been defined by the American Board of Medical Specialties as foundational to MOC. Specific inclusion/reference to the six competencies within SAMs is highly encouraged.

Richardson (1994) expounds a view of self-study as "an important form of practical inquiry." And practical inquiry, in turn, "may be foundational to formal research that will be truly useful in improving practice." (pp. 7-8) Applied to the context of MOC's individual educational plans and lifelong learning self-assessment programs, one can see the opportunity for a continuum of (1) acquiring relevant CME, (2) participating in SAMs for self-assessment of the same or similar concepts, (3) leading to selection and implementation of an appropriate and effective practice performance project. In Diagnostic Radiology, the diplomate's selection of SAMs also has an important role to play in defining his or her practice profile, which in turn will assure that the examination to be taken is relevant to his or her practice. Societies can be instrumental in aiding their members to view MOC as a continuum, and integrating their CME, SAM, and practice performance selections along the way.

Content/Instructional Design Issues

Format. The medical literature has several meta-analysis studies, as well as numerous individual studies, on the effectiveness of continuing medical education that are instructive in terms of SAMs design. Davis et al state: "... [V]ariables over which the CME provider has control and appear to have a positive effect [on the practice of physicians and the health of their patients] are the degree of active learning opportunities, learning delivered in a longitudinal or sequenced manner, and the provision of enabling methods [e.g., patient materials] to facilitate implementation in the practice setting." (1999, p. 873) Strictly didactic methods were the least likely to show positive effects in the studies they analyzed.

Assignments. The assignments done present the most important opportunity for learning. If assignments do not require thoughtfulness and engagement...if they do not provide practice in application of understanding... they will not be effective. (Battersby, 1999) The choice of the appropriate assignment can be deeply motivating to participants. (Taylor, 1999) To develop such assignments we need to think about just how would they use this knowledge – the same kind of analysis that is necessary to develop learning outcomes. (Battersby, 1999)

Green (1999) points out that during the process of developing learning outcomes, it is important to think about how the learning can be measured. In the self-assessment context, this is equally important, i.e., ask: What level of learning do I [the SAM author] expect? What would be indications in SAM participants that learning has occurred? Is there a 'performance' that would demonstrate a depth of understanding? Incorporating practice and feedback opportunities into the SAM that elicit these indicators and performances will make it a more effective learning experience.

Instruction in self-assessment skills. Several authors suggest that self-assessment is a set of skills to be taught, rather than a naturally-occurring set of skills that every learner can apply at will. Attitudes and skills of reflective practice, as described by John Dewey (1934), may be of use here. The essential attitudes are *open-mindedness* (readiness to listen and ability to admit that a previously held belief may in fact be wrong), *wholeheartedness* (thorough involvement in the subject, engagement), and *responsibility* (knowing why something is worth believing intellectually and morally).

The phases of the reflective cycle, though there is no one correct sequence of their application, are: *suggestions* (spontaneous ideas when confronted with a puzzling situation), *problem* (recognizing the real cause for concern), *hypothesis* formation (the problem in terms of what can be done), *reasoning* (using past experience to extend one's thinking about the subject), and *testing* of the hypothesized end result (to corroborate or negate). With aid, through direct instruction and/or mentoring, physicians engaged in self-assessment can also "move beyond assertions without evidence, or detailed listings of behaviors without reflection,... [to] careful observations and analysis of one's performance and judgment of its quality or effectiveness." (Student Learning Initiative, quoted in Banta (ed.), 2002, p. 94) The point for SAMs developers is to consider incorporating specific instruction in the skills of self-assessment into SAMs.

Inclusion of colleagues. In addition, more than a few authors view collaboration with one or more trusted colleagues as an essential part of self-assessment, and one which keeps it from being a circular, self-reinforcing exercise without sufficient connection to collective perspectives on the same issues (e.g., accepted standards and best practices). Loughran and Northfield (1998) state: "We argue that if self-study is to lead to genuine reframing of a situation so that learning and understanding through reflection might be enhanced, then the 'self' in self-study cannot be solely individual." (p. 7). SAMs, when presented in face-to-face venues or even on the internet, offer additional possibilities for collegial interaction that can make learning more effective than when it is done in isolation.

Authenticity. What is practiced during learning should be as close as possible to what the learner will be doing once the learning is over. Such an approach to assessment involves what is commonly called "authentic assessment", wherein learners practice real world use of their understanding (Battersby, 1999). Authentic assessments are based on examining genuine examples of the learner's work, tasks that "closely simulate or actually replicate challenges faced [in professional practice]." (Wiggins, 1998, p. 141) In such assessments, physicians can "display their skills in a way that is more direct and thorough than that provided by traditional paper and pencil tests." (Palombo & Banta, 1999, p. 116) A benefit of authentic assessments is that they are, both on their face and at a deeper level, less separate from the learning process than tests. They intrude less, and seem less like a loss of instructional time to testing time. Additionally, in this type of assessment, a more interactive and collegial learning environment is fostered, which is

appropriate to continuing education of highly-educated physicians. As Palombo & Banta note, "the faculty are more like coaches than like judges", and "opportunities and abilities for self-assessment are enhanced." (1999, p. 117)

It seems that SAMs are an ideal situation in which to experiment with increasing incorporation of authentic assessment techniques. SAMs developers interested in these approaches might consult references below, such as Wiggins (1998) for scoring rubrics applicable with authentic assessments, and Palombo & Banta (1999) for types of performance assessments and references to experts in each area.

Importance of Feedback

Learners without some form of feedback are "in the dark" about the effectiveness of their learning efforts. The best feedback consists of rich and detailed descriptions of what the learner did and did not do relative to shared, appropriate and rigorous standards. To be a self-directed adult learner, one's assessment process must provide opportunities to receive and use feedback in order to self-adjust (Wiggins, 1998). Wiggins regards feedback that occurs during the assessment activity as being more valuable than feedback that occurs after the performance. SAMs offer an ideal opportunity for ongoing feedback during the assessment process. The resulting back-and-forth between performing and self-adjusting for the participant is what leads to superior learning.

Understanding *feedback*, as distinct from evaluation, interpretation, praise, or blame, is important. Wiggins again helps explain: The best feedback is highly specific, directly revealing or highly descriptive of what actually resulted, clear to the performer, and available or offered in terms of specific targets and standards. (1998, p. 46) The best feedback is:

- timely, continual during the performance/application/practice
- fact-based description of the learner's results based on the learner's intents/goals
- self-evident to the learner via comprehensible standards and criteria
- leads the learner, himself or herself, to perceive an error as an error, and to analyze errors as to type (e.g., conceptual vs. procedural)

Optimal feedback does not:

- immediately label "correct" or "incorrect", but allows the learner opportunity to come to the appropriate conclusion himself/herself
- praise or blame, ascribe interpretations or evaluations that go beyond the facts of the performance
- jump to immediately offer advice on how to improve

SAMs developers could challenge themselves to think creatively about "How can I 'hold up a mirror' to the participants so that they themselves can see what they need to fix and even how to fix it?" In some contexts, videotaping performance provides that kind of mirror. In others, presenting models of performance (expert and otherwise) for

comparison may provide the mirror. Also, it may be useful to "punctuate" the performance with a time for the participant to answer questions such as: "When did my approach work? Why? When did it not work? Why not?" Good feedback, i.e., that which is immediate, descriptive, self-evident, etc., will evoke a receptivity in the learner to guidance from an expert source. The guidance is separate from the feedback, however, and must come afterwards in order to be maximally effective. (Wiggins, 1998, p. 51)

According to Rowntree (no date), the following are aspects of feedback that will best help the learner to profit from the assessment experience; or in the case of SAMs, allow participation to be a truly self-assessing experience:

- delivered immediately
- selective (focusing on no more than 2-3 of the reasons a response was incorrect, not an exhaustive catalogue)
- specific (giving examples)
- understandable (clear in language, with regard to both terminology and grammar)
- balanced (reinforcing what is right as well as correcting what is wrong)

Assessment Questions

Green (1999) observes that often we, as instructional designers, want learners to achieve higher levels of learning than we evaluate. We must not succumb to the temptation to "make the measurable important" but rather should strive to "make the important measurable." (Words of Robert McNamara, while president of the World Bank).

To correct the discrepancy between the level of learning aimed for and the level reflected in assessments, adjustments in assessment activities should be considered. For example, when using multiple choice questions, one can increase the cognitive level on which the SAM participant will engage in the following ways:

- instead of wording the question to require knowledge recall, word it to require comparison and contrast, or observation of differences and similarities, or prediction of an outcome based on an action/inaction. (Williamson, 2005)

- rather than asking "select the criteria for *x*", ask "which evaluation of *y* flows from the criteria for *x*?"

- identify ideas for questions by thinking "what of importance in this area of knowledge can tend to fool someone who is more toward the 'novice' than the 'expert' end of the professional performance continuum?"

- think of the multiple-choice format in creative terms, for example, require a classification/sorting task presented in a series of "questions", as follows: the stem of each question presents a different situation related to the topic of the SAM, and the physician must sort/classify each situation into one of a set of mutually exclusive and exhaustive categories you provide, which are the answer choices for this whole set of questions.

SAMs developers should provide a sufficient number of assessment questions to assure that a reliable sample of knowledge and behaviors is obtained from participating physicians, to serve as a basis for detailed feedback that they can use in making self-adjustments. Generally, at least five to ten individual responses should be required. If questions are multi-part and/or nuanced in their feedback, five might be appropriate; while if the content is more wide-ranging, even more than ten might be appropriate.

Expected Outcomes of Self-Assessment

Ideally assessment is expected, in one way or another, to facilitate and increase the amount of learning that occurs. Gibbs (1999) illustrates how small changes in assessment strategy can dramatically transform the learning that occurs, or does not occur. The assessment system tends to maximize learning when it:

- requires learners to put in an adequate amount of time
- encourages them to apply themselves to appropriate learning activities (not just problem-solving but also applying and internalizing relevant assessment criteria),
- provides timely feedback
- introduces the element of peer-pressure [could be in the form of accepted/widely-respected standards or incorporation of peers into the self-assessment process]

In this light, the SAMs developer should ask: Does the SAM hold up a colleague-based mirror for the participating physician to look into? Does the SAM include criteria and examples by which the physician can identify what competent performance looks like? Does the SAM help the physician review direct evidence from his or her own experiences? Does the SAM include appropriate standards against which to judge one's experiences and actions? (criteria taken from Randall, 1999)

Reflection on the part of the participating physician may be facilitated by incorporating questions/prompts such as these:

- Why have you selected this particular SAM? How does it help to fulfill your personal MOC educational plan? How does it relate to your personal learning objectives for this MOC cycle?
- What impact has this SAM experience had on your thinking? How do you anticipate it will influence your future practice of radiology?

Notes on the Usefulness of SAMs in the ABR MOC Process

1. In the planning of the ABMS for MOC, SAMs represent a vital part of the lifelong learning attitude and practice that MOC seeks to foster.

2. Configuration of SAMs content selections will be used by the ABR to infer the physician's practice profile which will in turn be used to determine the content of his/her cognitive expertise examination (taken in the last 3 years of the MOC cycle). Questions in SAMs may be used directly or indirectly (reworked) in the cognitive expertise examination.

Implications for societies: The efficacy of SAMs will be greatest when....

- Societies also take every opportunity to encourage and guide physicians in seriously preparing, updating, and fulfilling their personal lifelong learning (educational) plans.
- Societies help physicians to select SAMs that are most congruent with the physician's educational plan and pattern of practice.
- Societies make every effort to assure that assessment questions are prepared as an integral part of SAMs more than an afterthought, that the assessment questions are important and not just easily measured, and that they are presented in such a way as to elicit active self-assessment and self-adjustment from participating physicians.

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