Portfolio Assessment

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INTRODUCTION

Portfolios have been used in fine arts and architecture for many years to display the work of their owners.[1] In contrast, the introduction of portfolios to the health professions, particularly as an assessment tool, has been recent, but rapid, with portfolios now regularly used at undergraduate,[2,3] post-graduate,[4] and continuing[5] education levels.

A portfolio is a collection of various forms of evidence of achievement of learning outcomes.[2] In practical terms, a student portfolio for assessment purposes is a compendium of reports, papers, and other material, together with the student's reflection on his or her learning and on strengths and weaknesses. The assessment portfolio is prepared by an individual student either at the direction of the faculty or as uniquely devised by the student. It may also contain reports of grades, evaluations, and examinations, and it is usually held together in some appropriate binder or is in computer-based form so that it can be circulated easily to defined faculty for the specific purpose of assessment. If the portfolio comprises only a collection of evidence, it is no more than a logbook documenting learning experiences. The crucial difference between a logbook and a portfolio is that the portfolio evidence is annotated by the learner's reflections regarding his or her learning. The learners, depending on their reflective ability, may reflect on the learning experiences at three different cognitive levels: descriptive, analytical, and evaluative.[6]

The reasons for the current wave of interest in portfolio assessment in health professions education are twofold: its potential to assess performance and its potential to assess outcomes, such as attitudes and professionalism, that are difficult to assess using traditional instruments.

Miller[7] identifies four levels at which students need to be assessed: "knows"—factual recall of knowledge; "knows how"—application of knowledge; "shows how"—a simulated examination situation where competence is assessed; and "does"—assessment of performance in a real-life setting. Portfolios provide an assessment framework that has the potential to assess the candidate at the level of "does."

There are three types of learning outcomes in the health professions[8]: those that relate to the "tasks" of the health professional, or what the health professional does in her or his day-to-day activities; those that relate to the approach or attitude that the health professional takes to those "tasks"; and those that relate to the professionalism of the individual. The strength of portfolios lies in their ability to assess outcomes related to attitudes and professionalism.

ANSWERING THE SIX QUESTIONS ABOUT PORTFOLIO ASSESSMENT

There are six questions to be addressed when considering any assessment system: why, what, how, when, where, and by whom. Each of these questions is addressed in turn in relation to portfolio assessment.

Why Portfolio Assessment?

As indicated above, the potential of portfolios to assess student performance and curriculum outcomes related to attitudes and professionalism is the major driver for the use of portfolio assessment. Various assessment tools such as tutor rating scales, peer ratings, and patient feedback can be included in the portfolio to provide evidence of the student's or trainee's performance. The results of other examinations, however, can also be included within the portfolio framework: written tests, such as multiple-choice question (MCQ) examinations, that assess the candidate's knowledge; other written tests, such as extended matching item (EMI) questions or short-answer questions (SAQs), that assess the candidate's application of knowledge; and the objective structured clinical examination (OSCE), which assesses the candidate's competence in a simulated examination setting. Thus, assessment results at all four levels of Miller's pyramid may be included within the portfolio framework to provide a holistic view of the candidate.

Portfolio assessment can be used for formative assessment,[9] for summative assessment,[2] or both.[10,11] This makes the portfolio a flexible and robust assessment method.[12]

What can be Assessed using Portfolios?

Assessment must be focused on the learning outcomes of the curriculum. The attraction of the portfolio is that it can include evidence of achievement of all the learning outcomes within its structure.

How to Implement Portfolio Assessment?

Portfolio assessment has five stages:

1. Collection of evidence of achievement of learning outcomes
2. Reflection on learning
3. Evaluation of evidence
4. Defense of evidence
5. Assessment decision

1. Collection of evidence of achievement of learning outcomes – The student collects evidence of achievement of the learning

outcomes during his or her day-to-day learning activities, interaction with patients, or other studies.

The evidence can be anything from a tutor rating to evidence of visiting a patient's home, which the student thinks has helped her or him achieve the curriculum learning outcome(s). "The evidence in portfolios," suggest Friedman Ben-David et al., "is limited only by the degree of the designer's creativity."[13] Some categories of information that can be included in the portfolio are

- best essays
- written reports of research projects
- evaluations of performance (e.g., tutor reports, checklists, patient evaluations)
- videotapes of interactions with patients or peers
- records of practical procedures mastered
- annotated anonymized patient records
- curriculum vitae

Much of this material will be submitted by the student for marking and feedback during the portfolio-building process.

Traditionally, most of the evidence collected has been paper-based. Portfolios, however, are increasingly becoming computer-based (i.e., e-portfolio).[14] E-portfolios have addressed, at least partly, concerns regarding the volume and portability of the traditional paper-based portfolio.

Although students may collect any evidence they wish, this tends to make the portfolio unmanageable—a drawer for "everything but the kitchen sink." A broad structure for the portfolio is needed to standardize content for summative assessment purposes. Balance is required between structure, to provide suitable material for summative assessment, and student selection of portfolio content to express the individuality and creativity of the candidate. "It is advisable to add structure to the assessment but to refrain from over-structuring, as this tends to trivialize the measurement."[15]

The student will have to exercise discretion not only regarding the type of material to be included in the portfolio but also in deciding the volume of portfolio material. "Too much information can create an unwieldy collection of documents that only the owner can decipher,"[16] while too little will be an underrepresentation of achievement.

Creating an assessment blueprint, a grid that meshes curriculum outcomes with curriculum content, is one of the best ways to ensure that the portfolio has sampled all the content and represented all the outcomes in appropriate amounts and proportions.[17] The portfolios used to revalidate Tayside general practitioners[5] provide an example of a framework that has achieved the required balance between outcomes and content without compromising either.

Summarizing portfolio content, Stecher[18] states that portfolio content should have diverse products of student learning; be cumulative (i.e., should contain work completed over a period of weeks or months); and be embedded in instruction (i.e., entries are drawn from ongoing work).

2. *Reflection on learning* – Reflection, according to a model developed by Schon[19] as quoted by Challis,[20] is "revisiting an experience after the event, in order to extract the principles and effectively 'bank' these for future use." This is "reflection on action." The reflective process should be directed to promote learning, personal and professional development, and improvement of practice.[21] In the context of portfolio assessment, reflection must answer four questions relating to a learning experience: What did I learn? What do I still need to learn? What resources did I use for further learning? and What further learning was achieved?

3. *Evaluation of evidence* – Once the student submits the portfolio, assessors will evaluate the quality of the evidence it contains. The assessors rate the student's achievement of the learning outcomes on rating scales, anchored with precise and specific descriptors of behavior at each point on the scale. Such rating scale rubrics help benchmark the passing standard in the standard-setting process of portfolio assessment.

Because of the subjective nature of the assessment decisions involved in the use of rating scales, ratings of several examiners must be collated to arrive at a *reliable* evaluation of the portfolio evidence of a particular student.

Evaluation of evidence provides feedback to both assessor and assessee. The assessor, by analyzing the evidence of performance in the portfolio, finds out how successful the teaching/training has been and what changes are needed for improvement. In practice, it is crucial that the evaluation of the evidence be an ongoing process, with feedback provided for students throughout the period of portfolio building. The feedback indicates to the assessee what her or his strengths and weaknesses are and what areas need improvement. For this reason, it is imperative that students know how to interpret the assessors' ratings. Involving students in designing the rating scales, as reported by Williams[22] in a middle-school portfolio assessment in the United States, may be an effective way of sharing the assessment criteria with the students. Profiling students' progress toward the learning outcomes over time will facilitate this feedback process.

4. *Defense of evidence* – At this stage, the examiners interview the candidate to probe how well the portfolio has reflected his or her achievement of the learning outcomes. The examiners use the interview to confirm or refute the decisions they made regarding the candidate's strengths and weaknesses in terms of the learning outcomes when they read and evaluated the portfolio in stage 3.

It is our experience at Dundee Medical School that if the examiners, following their initial evaluation of portfolio evidence, think that a student has clearly passed, subsequent discussion of portfolio evidence between the student and the examiners may not be essential. The stage of defending portfolio evidence might be restricted only to borderline, failing, and honors candidates. However, the students appreciate the opportunity to discuss their portfolio work with the senior faculty, and so this portfolio assessment stage has been retained.

5. *Assessment decision* – Pre-validated rating scales with clearly defined descriptors are used to assess the evidence. The expected standard of performance, as a point on the rating scale, is agreed by the examiners prior to the assessment. Any disagreement regarding the standard of

student performance is resolved by discussion between the examiners after the student interview. In essence, the assessment decision is taken by consensus among the examiners.

When Should the Assessment be Carried Out?
The portfolio demonstrates the student's progress toward achievement of curriculum outcomes over time. Portfolio assessment is thus an ongoing process (i.e., continuous assessment), charting student progress toward the expected standard in each exit learning outcome. For each candidate to benefit from such ongoing assessment, his or her portfolio supervisor must have regular review sessions to discuss the ratings with the student and monitor the student's progress toward the curriculum learning outcomes. Supervising a student who is building a portfolio is a process akin to master's degree or PhD supervision.

Where Should the Assessment be Carried Out?
Portfolio assessment is carried out where the students learn and practice what they will do in their future professional career (i.e., ward, operating theater, clinic, community, etc.). This confers on portfolio assessment a degree of authenticity that few other assessments can claim to have.

By Whom Should Assessment be Carried Out?
It is important that the portfolio contain feedback and/or ratings from a range of stakeholders with whom the students have come into contact during their training, including tutors, peers, other health care workers, and patients. It may also contain the ratings of the assessees themselves (self-assessments). Thus, portfolio assessment is similar to 360-degree assessment.[23]

ISSUES RELATED TO PORTFOLIO ASSESSMENT
Validity
Validity is the extent to which the assessment measures what it purports to measure.[24] In the context of portfolio assessment, validity is the extent to which the portfolio assesses the curriculum learning outcomes.

Validity has different facets: face, content, construct, concurrent, and predictive validity. Portfolio assessment has high face validity because of its ability to assess real-life performance using a variety of quantitative (e.g., ratings) and qualitative (e.g., comments and written reports) assessment tools in several settings (e.g., ward, small group learning, theater, and clinic). If blueprinted properly, portfolio assessment offers a robust framework to include a representative sample of the curriculum content across a range of learning outcomes. Therefore, it has the potential for high content validity. The portfolio can also assess students' reflective ability, which indicates its construct validity (the construct being the student's reflective ability).[25]

Demonstrating that the portfolio has concurrent and predictive validity is problematic. The lack of other tools that assess student performance to a similar extent poses problems in measuring concurrent validity. Since portfolio assessment is relatively new in health sciences education, it is not yet possible to ascertain whether portfolio results can be used to project students' future performance as health care professionals. Difficulties in verifying portfolio material as evidence attributable to the owner of the portfolio may also threaten its validity.[26] In practice, however, we have not found identification of plagiarism to be a major problem— although the question of how to deal with students who plagiarize remains contentious.

Reliability
Reliability is the "degree to which the test scores are dependable or relatively free from random errors of measurement."[27] In other words, reliability is a measure of the reproducibility of the assessment. Reproducibility must be consistent over time and across candidates and examiners.

Inter-rater reliability is not considered a major contributor to the overall reliability of assessment.[28] It has, however, attracted considerable research interest with regard to portfolio assessment. The evidence to date on inter-rater reliability of portfolio assessment remains inconclusive, and this question has been a matter for concern and debate.[26, 29–31]

Portfolio assessment necessarily involves subjective judgments that assess trainees in their natural settings in day-to-day practice. The assessment material that an individual candidate selects for his or her portfolio may be somewhat different from what another candidate includes, reflecting differences in individual clinical practice.

How, then, can portfolio assessment ensure reliability? *Excessive* standardization in pursuit of reliability may only add an element of artificiality to an authentic form of assessment. The solution likely lies in sampling across the entire range of potential sources of bias and subjectivity. This involves assessing a candidate with multiple assessment tools, in a variety of settings, on many occasions, by several raters. It is only through such an approach that almost all errors of subjectivity can be offset to arrive at the "purest" possible test score for a given candidate. As Schuwirth[32] points out, "there is a widely-spread misconception that subjective tests are by definition unreliable. Subjective assessment, however, can be reliable if certain criteria are met." Explaining these criteria, he observes that

> the judgements must be collected in a way that they sample through possible sources of bias. Any formal assessment of professional behaviour should contain observations of the student on multiple occasions and by multiple judges.[32]

Barton and Collins[33] acknowledge that there is tension between validity and reliability and suggest emphasizing validity at the expense of reliability.

Practicability
Crossley et al.[17] view *practicability* as a combination of feasibility, cost effectiveness, and acceptability.

Concerns regarding the feasibility and cost effectiveness of portfolio assessment relate not only to academic staff time but also to the infrastructure required to run a holistic portfolio assessment process. These logistics include adequate secretarial support to log individual student grades; staff–student contact time for the ratings to be valid and for the supervision of portfolio building to be meaningful; examiner time for reading the portfolios; numbers of

examiners to conduct interviews following the submission of portfolios; and briefing of examiners to prepare them for this new form of assessment, which is fundamentally different from the traditional examinations to which they are accustomed. Students, too, require briefing, particularly regarding their ability to reflect on their own performance with a view to improve. The latter is particularly important if students enter tertiary education directly from a didactic secondary-school system. To bridge this gap between secondary and tertiary education, a suitable student induction program that will introduce students to a variety of skills such as reflective practice and self-assessment is necessary. Although the list of feasibility and cost-effectiveness concerns seems daunting, recent adoption of portfolio assessment schemes by many UK medical schools[34] indicates that these concerns are not an insurmountable barrier to the implementation of portfolio assessment.

With regard to acceptability, experience has shown that though the initial student response to portfolio assessment may be somewhat qualified, suitable modification of the assessment process based on student, staff, and examiner feedback will allay students' concerns about portfolio assessment.[35]

ADVANTAGES AND DISADVANTAGES OF PORTFOLIO ASSESSMENT

Box 1 illustrates a list of advantages of portfolio assessment; the disadvantages of portfolio assessment are shown in Box 2.

LESSONS FROM EXPERIENCE

Six years' experience of conducting portfolio assessment as the final-year summative assessment at Dundee Medical School has provided valuable insights into the portfolio assessment process. The salient lessons we have learned are as follows:

1. Portfolios provide an assessment framework at the level of ''performance.''

2. Portfolio assessment can provide a holistic view of the student in terms of the four assessment levels and the 12 curriculum outcomes of the medical school.

3. The portfolios identified problems that the medical school did not have the procedures to deal with (e.g., in relation to fitness to practice). An undergraduate fitness-to-practice committee had to be convened to deal with student issues identified through the use of portfolios.

4. Reflection may be difficult for some individuals, but it can be learned.

5. Staff development and examiner training are crucial for the implementation of portfolio assessment and to achieve acceptable inter-rater reliability.

6. A student induction course will help students engage in reflective practice and self-assessment.

7. The portfolio is not a receptacle for all coursework.

8. A balance is needed between structure and selection.

BOX 1: ADVANTAGES OF PORTFOLIOS AS A METHOD OF LEARNING AND ASSESSMENT

Portfolios:

- assess and promote critical thinking.

- encourage students to become accountable and responsible for their own learning (i.e., self-directed, active, peer-supported, adult learning).

- can be the focus of initiating a discussion between student and tutor.

- facilitate reflection and self-assessment.

- can accommodate diverse learning styles, though they are not suitable for all learning styles.

- can monitor and assess students' progress over time.

- can assess performance, with practical application of theory, in real-time naturalistic settings (i.e., authentic assessment).

- use multiple methods of assessment.

- take into account the judgment of multiple assessors.

- have high face validity, content validity, and construct validity.

- integrate learning and assessment.

- promote creativity and problem solving.

- promote learning about learning (i.e., metacognition).

- can be standardized and used in summative assessment.

- combine subjective and objective, as well as qualitative and quantitative, assessment procedures.

- can be used to assess attitudes and professional and personal development.

- enable identification of the unsatisfactory or struggling performer.

- offer teachers vital information for diagnosing students' strengths and weaknesses to help them improve their performance (i.e., formative assessment).

- reflect students' progression toward learning outcomes (i.e., student profiling).

CONCLUSION

Van der Vleuten[35] suggests that the utility of an assessment tool is a function of its reliability, validity, educational impact, acceptability, feasibility, and cost effectiveness. In portfolio assessment, the face validity is high; the educational impact is positive in terms of directing student learning toward the curriculum outcomes; many medical

schools find portfolio assessment to be feasible; acceptability grows with time and with suitable modifications; and reliability may be acceptable if one is prepared to sample through the sources of bias, make use of pre-validated rating rubrics, and train the assessors. Portfolio assessment has much to offer.

BOX 2: DISADVANTAGES OF PORTFOLIOS AS A METHOD OF LEARNING AND ASSESSMENT

- When portfolios are used for summative assessment, students may be reluctant to reveal weaknesses.

- Portfolios are personal documents, and ethical issues of privacy and confidentiality may arise when they are used for assessment.

- Difficulties may arise in verifying whether the material submitted is the candidate's own work.

- Portfolios take a long time to complete and assess.

- The portfolio process involves a large amount of paperwork.

- Portfolio assessment may produce unacceptably low inter-rater reliability, especially if the assessment rubrics are not properly prepared or are used by untrained assessors.

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