

AMEE Medical Education Guide No. 11 (revised): Portfolio-based learning and assessment in medical education

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SUMMARY *Portfolios are not new, but their use in initial and continuing professional development in medicine is still in its infancy. In this context, this guide has the following aims: to give the background and an educational rationale for portfolio-based learning and assessment in medical education; to examine how and where portfolios have been used for professional development both within and beyond medicine; to highlight issues which will need to be addressed by those wishing to implement portfolio-based learning, and suggest ways of dealing with them. It does not attempt to address the particular constraints or resource issues that face practitioners in any educational initiative, as these are far too many and too complex for a publication of this type. However, it does provide evidence of a range of ways in which opportunities have been created and developed by colleagues in establishing frameworks within which individual learning can be planned, documented and assessed. Whilst not a panacea for all learning contexts, portfolios have much to offer both learners and teachers as we move forward into the new world of revalidation, clinical governance, and increased accountability.*

Rationale and development of portfolios

What is a portfolio?

"A professional development portfolio is a collection of material, made by a professional, that records, and reflects on, key events and processes in that professional's career" (Hall, 1992, p. 81). It is usually paper based, but it may also include anything that provides appropriate evidence of learning and achievement, such as video or audio recordings, artefacts or photographs. This evidence is gathered together, and possibly presented to another person for review, with a particular purpose in mind. Because the range of purposes is very large, there is an equally large range of structures and complexity of portfolio in use across professions, and even within medical education. Thus some will be little more than a log book recording specific activities, while others offer an in-depth and long-term perspective on professional development over an extended period.

Whatever the guiding purpose behind the portfolio, it should be clear to both the learner and the person making judgements about the portfolio. Some portfolios may be developed in order to demonstrate the process of progression, while others will be assessed against specific targets of

achievement. Some will be essentially private documents, for personal review only, while others will need to be open to public scrutiny. It may therefore be appropriate for some learners to create a long-term, personal development portfolio, which shows breadth of learning. From this, items can be selected to demonstrate learning that meets the standards of achievement required by other authorities.

Portfolios will normally be integrally related to a personal or professional learning plan. This constitutes the framework within which portfolio development takes place, and provides a statement of the outcomes that the portfolio seeks to demonstrate.

In all cases, the portfolio remains the practical and intellectual property of the person who develops it. In order to maximize the learning potential of portfolio development, the learner therefore has to take responsibility for its creation, maintenance and appropriateness for purpose.

There are many benefits that arise from the use of portfolio-based learning that may not be encompassed in other forms of educational activity:

- it recognizes and encourages the autonomous and reflective learning that is an integral part of professional education and development;
- it is based in the real experience of the learner, and so enables the consolidation of the connection between theory and practice;
- it allows a range of learning styles to be used according to the preferences of the learner;
- it enables assessment within a framework of transparent and declared criteria and learning objectives;
- it can accommodate evidence of learning from a range of different contexts;
- it provides a process for both formative and summative assessment, based on either personally derived or externally governed learning objectives;
- it provides a model for lifelong learning and continuing professional development.

The remainder of this guide will explore these points, giving examples of how and where portfolio-based learning has been used in both medicine and other professions, and locating the practice within a model of adult learning and cognitive development.

Where did portfolios come from?

Keeping a portfolio of one's work is nothing new: architects, artists and writers have been doing it for years. Such portfolios are generally maintained in order to demonstrate

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achievement to someone else who is in a position to make a judgement on its contents. The portfolio itself may be generic, consisting of a very large collection of items, or it may be specific, drawing particular elements of the generic portfolio to suit the purpose for which they are to be used. It may be developed and evaluated within strictly defined and pre-specified criteria, or may be developed largely according to the purposes and progression of the individual learner. It may also be either personal or professional, private or public, externally evaluated or assessed, or for individual reflection only (Challis, 1993).

Increasingly, many of these aspects are being brought together so that portfolios are used as a means of planning and structuring both personal and professional development. The compiler provides evidence not only of achievement, but also of how and why that achievement has been made: in other words, an integral part of the professional portfolio is the element of reflection. Through this process, retrospective reflection and analysis of past learning are synthesized into learning that will influence future changes in practice, and the identification of individual needs, resulting in a learning plan. The portfolio thereby has the potential to provide the perfect vehicle for the synthesis of adult learning and reflective practice.

Portfolio-based learning has been introduced successfully into a range of educational and professional learning contexts. This may have been prompted largely in the UK by the move towards competence-based assessment and the introduction of National Vocational Qualifications (NVQs), where the emphasis is on evidence of achievement, rather than the educational processes undertaken by the learner (Simosko, 1991; Redman, 1994). Within this framework, the portfolio is designed to demonstrate how the learner has met the outcomes that form the basis of the qualification. However, the use of portfolios as a tool for development in initial and continuing professional development, taking into account process as well as outcome, is growing. The nursing profession, for example, has a professional portfolio folder, developed by the English National Board (ENB) in 1991. The purpose of this portfolio is to help nurses to plan and implement their continuing professional development (CPD) through keeping records of educational activity and thus to encourage the development of critical and reflective practice. Teachers in training, in both schools and institutions of higher education, are encouraged to maintain portfolios that demonstrate the development of their teaching skills (Graham, 1989). Within medical education, too, the value of portfolio development is becoming recognized.

Portfolio-based learning recognizes:

- the value and significance of past learning and experience for the individual;
- the ability of adults to learn and act autonomously;
- the centrality of reflection in the learning process;
- the need for meaningful links to be made between experiences, learning opportunities and role requirements (RCGP, 1993).

Although different professions have differing specific requirements for the recording and evidencing of learning, there are a series of key aspects that are generally recorded in the portfolio:

- the experience—what has happened, what has been done, seen, written, made etc.;
- the learning—the discovery that what has been recalled has significance for doing or changing things in the future;
- the evidence—a demonstration of how the learning is being applied in an appropriate context;
- learning needs—an identification of where it would be appropriate to go next;
- learning opportunities—an educational action plan identifying ways in which learning needs might be met (Redman, 1994).

The building of the portfolio itself requires engagement in a process of reflection and critical self-awareness. Its creation therefore constitutes an educational process, and this aspect needs to be recognized over and above the outcomes of learning that are identified and evidenced in the physical material contained in the portfolio. If this aspect of portfolio-based learning is to be exploited, this additional learning through the portfolio-building process generally leads to the learner needing support during portfolio development.

What is the educational rationale for using portfolios?

As soon as they enter medical school, students find themselves in an environment in which they are set upon a quite specific career path. Unlike those choosing a more generic degree such as English or Philosophy, medical students become immediately engaged in a process of acculturation into the medical profession (Newble & Entwistle, 1986). However, they are no longer children, and have passed the stage of formal operations which Piaget (1929) believed was attained during adolescence and which he felt represented the culmination of cognitive development. From their first days as undergraduates, we are teaching and working with young adults, and this should be taken into account in the ways in which we facilitate learning amongst our students.

Psychologists exploring the subject of adult learning in the 1970s began to uncover aspects of adult cognitive development that have since had a bearing on the teaching and facilitation of learning in adults. Riegel (1973) suggests that learning is influenced by adults' ability to use dialectical logic, based on a principle of contradiction, and the ability to identify problems or pose questions. He also proposes that a significant feature of adult thinking is the ability to reunite the abstract and the concrete, and thus explore complex problems. If this is indeed the case, then a model of education that is based on a didactic, teacher-led approach, as has been traditionally used in medical education, may deny adult learners the opportunity to use or develop their full potential. It presents a 'handed-down' interpretation of reality for acceptance, rather than allowing the learners the opportunity to define, explore, or even create their own reality.

Riegel's view may be seen to be in line with the proposal made by Knowles (1970), where he presents a model that shows the distinctiveness of adult learning in four key areas:

- As a person matures, there is a shift away from a self-concept of a dependent personality towards one that is self-directed.
- Accumulated experience becomes a resource for learning.

- Readiness to learn becomes increasingly orientated towards the developmental tasks of social roles.
- Time perspectives change from one of postponed application of knowledge to immediacy of application—thus learning moves from being subject-centred to problem-centred.

The implications of accepting these characteristics of adult learning are significant in considering how professionals in training might most effectively engage in their own learning development.

Knowles (1970) expands some of these implications in terms of appropriate models for the facilitation of learning. These include such aspects as the learning climate, diagnosis of needs, the planning process, conduct of the learning experience, and evaluation of learning. Central to each of these is the fact that adults enter into any undertaking with a background of experience and learning from that experience. Therefore, teaching (or facilitating) techniques that build on experiential learning may be perceived by the learners as an extension of everyday life, and will be based on the assumption that learning from experience is as valid as other forms of learning. The trend to introduce problem-based learning into the undergraduate medical curriculum is founded on these assumptions.

However, there also exists a model of initial and continuing professional development which is based on a pattern of attendance at lectures or workshops, and a requirement to engage in such activities for a specified number of hours, rather than on an identifiable increase in learning. Under these circumstances, the learner continues to be seen as dependent, participating in someone else's agenda of desirable learning; individual histories and experiences are not embedded in the learning process; application of the anticipated new learning is not necessarily related to the everyday roles of the participants, and is necessarily deferred.

Knowles's work resonates with the notions of deep and surface learning originally developed by Marton & Saljo (1984) and subsequently developed by Gibbs (1992). Gibbs contends that the quality of the outcome of learning is crucially affected by the way in which individuals approach their learning. Surface approaches are characterized by the rote learning of facts and their regurgitation (frequently under formal examination conditions). Deep approaches involve individuals attempting to understand underlying principles, ideas and concepts and to interpret these in personally meaningful ways. Gibbs emphasizes that the two approaches are not mutually exclusive. What determines whether a learner adopts a surface or deep approach is primarily a mix of prior educational experience and the nature or structure of the particular task in hand.

Gibbs describes the key characteristics of a model of facilitating learning which leads to a 'deep', as distinct from a 'surface' approach to learning. These characteristics are those:

- which recognize that a learner's motivation is intrinsic, and they experience a need to know something;
- where learners are actively involved in their own learning, rather than passive;
- where there are opportunities for exploratory talk and interaction with others;
- where knowledge is approached as a series of integrated

wholes, and related to other knowledge, rather than presented in small separate pieces.

The traditional model of continuing medical education, based on attendance at sessions planned and run by those with a particular 'message' to transmit, represents a model of delivery that is likely to lead to surface learning. Whilst in certain circumstances surface learning is appropriate, and even desirable, it does not lead to the type of engagement with the subject or process of learning that will facilitate personal and professional development. For this to take place, deep learning is necessary.

Kolb (1984) explored the principle of experiential learning by describing it as a cycle that explicitly incorporates and builds on the experiences from which learning is derived. His cycle, which may be entered at any point, includes the stages of engaging in a definable experience, reflecting on that experience in order to draw from it generalizations that may be applied elsewhere, and testing of these generalizations, or theories, through the medium of a new experience. (Thus it may be more appropriate to think of the process not as a cycle, but as a helix, which more accurately represents a sense of progression rather than repetition.)

To engage effectively in all stages of this learning process, learners need four different kinds of abilities: the ability to engage in a concrete experience; to engage in reflective observation; to conceptualize or draw abstract generalizations; to apply concepts to new situations. Each learner brings to each part of the process preferred learning styles, often developed during previous pedagogic experiences. An emphasis on this preferred style, may, without appropriate stimulus, inhibit development that will enable learners to engage in the whole experiential cycle.

Closely allied to Knowles's work, and also overlapping into Kolb's experiential learning theories, are the educational principles of andragogy. Mezirow (1981, p. 136) has described andragogy as an "organised and sustained effort to assist adults to learn in a way that enhances their capability to function as self-directed learners". He suggests that this may be achieved through a progressive decrease in dependency on the educator, using a range of learning resources and engaging in individual goal setting, problem posing and problem solving. Integral to this process is the ability to value, reflect on and learn from experience.

Reflection, as well as being a crucial stage in Kolb's learning cycle, is seen by many others to be a key concept in professional development, and has been particularly highlighted by Schon (1983, 1987) and Boud *et al.* (1985, 1993). Schon highlights the difference between 'reflection in action' and 'reflection on action'. The former, when applied by an experienced practitioner, may be almost at the level of intuition. Thus the response to an apparently new situation, requiring immediate action, may result from many years of experience in different situations which, nonetheless, bear enough similarity to the current situation for an appropriate response to be made. He likens this to a jazz player who, when being given a tune, will add new and individual interpretations to the basic theme to produce a familiar yet original work. Schon believes that the ability to interpret and develop concepts within a sphere of professional expertise enables the individual to learn and grow.

He also proposes a model of reflection on action, which involves revisiting an experience after the event, in order to

extract principles and effectively ‘bank’ these for future use in reflection in action. It is this form of reflection that Boud *et al.* have explored further. The authors identify the key components of reflection. These relate to initial experience(s), the processes of reflection, and the outcomes of these processes. The initial experience includes aspects of behaviour, ideas and feelings. These then feed into the reflective processes, which involve returning to the experience, attending to feelings in relation to the retrospective perception of the experience (utilizing positive feelings and setting aside those which might obstruct learning), and re-evaluating the experience. The outcomes of these processes will then result in new perspectives on experience, a change in behaviour, readiness for application and commitment to action.

A significant issue in encouraging learners to engage in such processes of reflection is the role played by others in supporting reflection. “We believe that if teachers and others assisting learners are to have an effective role in promoting learning, that role is essentially to support the learner in the process and to assist the learner in extracting the maximum benefit from what occurs” (Boud *et al.*, 1985, p. 36).

Portfolio-based learning encapsulates these principles of adult learning, but at the same time offers an effective means not only of facilitating and recording learning and valuing the individual’s unique experiences, but also of reviewing and assessing that learning.

What is the link between portfolios and professional development?

As the traditional ethos of a ‘job for life’ becomes less of a reality for many professionals, greater emphasis is being placed on the role of CPD. This is increasingly aimed not only at keeping abreast of new developments within the profession, but also at providing a means of improving continuing employability in the discipline or field, if not necessarily within a particular organization. The response to this trend by professional bodies and professional associations has been to place increasing emphasis on the needs of their members, and to incorporate into their CPD schemes some framework within which such developments should take place. Thus there has been a shift away from a focus on initial professional qualifications, *ad hoc* CPD activities, predictable career paths mapped out by tradition, and voluntary CPD. These are being replaced by defining CPD and promoting the benefits of structured CPD, developing a strategy for implementing this, linking career planning and personal development to CPD and making it compulsory.

Continuing professional development has been defined as:

The maintenance and enhancement of the knowledge, expertise and competence of professionals throughout their careers, according to a plan formulated with regard to the needs of the professional, the employer and society. (Madden & Mitchell, 1993, p. 12)

This involves three key functions:

- updating of knowledge and skills in existing and new areas of practice;

- preparation for a changing role in the organization, new responsibilities and promotion;
- increasing competence in a wider context with benefits to both professional and personal roles.

In the past, many professional bodies have relied on the individual’s sense of moral obligation and individual motivation to keep abreast of change and new developments, by reading and by attending relevant seminars and conferences. (This is exemplified by the Law Society’s insistence on CPD for those members of three years’ standing or less, but leaving continuation of engagement in CPD for more experienced practitioners up to the choice and professional integrity of the individual.) There has traditionally been no coherent or strategic plan for the management of such development, and as such the role of professional bodies in CPD has tended to be reactive rather than proactive (Watkins *et al.*, 1996). Where attempts have been made to impose structure, this has been greeted with less than enthusiasm by the members of the organization, largely, according to Madden & Mitchell (1993, p. 10) because of the “myth that education is something that happens to the young before they embark upon their working lives”.

Watkins *et al.* (1996) have shown that, even where CPD requirements are imposed by professional bodies, engagement is often measured by the number of hours spent in such activities, not by the learning or change of practice that takes place as a result. The Chartered Institute of Building requires 35 hours of CPD a year; the Royal Institution of Chartered Surveyors imposes a compulsory 48 hours per year, with 20 hours for chartered members; the Institute of Personnel and Development requires evidence of CPD that equates to the recommended 35 hours of involvement. Some professional bodies (such as the British Psychological Society) will only renew licence to practise on the presentation of evidence of engagement in CPD activities. In medicine, general practitioners have to date been expected to engage in 30 hours of postgraduate education per year in order to gain their financial educational allowance, and individual Royal Colleges have their own hours requirement for their members.

However, there is an increasing recognition that measurement of learning activity through an ‘input’ model is not necessarily an indication of personal or professional development, and other means of recording and assessing CPD activity are being developed. The Institution of Electrical Engineers is moving away from a scheme that is voluntary and based solely on the number of CPD hours, to a model in which members are encouraged to maintain a record of activity, 50% of which must relate to non-discipline-related activity that will increase the individual’s employability and management skills. The nursing profession and professions allied to medicine are now using portfolios to chart their members’ professional development. The introduction of NVQs into administrative and management-development programmes makes the use of portfolios an essential process. The Investors in People ‘badge’ equally requires a portfolio of evidence or organizational development to be presented, and the proposed Personal Practice Development Plan (DoH, 1998a) is also based on the principle of a team-based portfolio to demonstrate planning and development.

Concerns of employability and personal and professional development are increasingly being brought together

to create a climate of CPD that relates to an educational-development, outcomes-defined model, rather than a process based on time-serving and inputs.

Within the field of medical education pressure to change the way in which CPD is undertaken and evaluated is being driven from many directions: the rate of change of bio-technology; organizational change; the structure of education within the training grades; issues of appraisal and revalidation; clinical governance; clinical guidelines. The list is long and growing. Portfolios may offer an opportunity for these many dimensions to be drawn together to plan and evaluate educational activity that meets the needs of the 'millennium doctor'.

What does a portfolio look like?

The very personal nature of portfolios makes it difficult to give a clear picture of what constitutes a 'typical' portfolio. A generic portfolio developed for the purposes of recording a wide range of activity, which will not be reviewed by anyone else, may be relatively unstructured. However, if the portfolio is to be reviewed or assessed, then there are some general guidelines that will make it easier for both learner and reviewer to ensure that the portfolio meets its purpose.

In the context of medical education, most portfolios are likely to be developed in order to provide an opportunity for a learner to demonstrate learning and achievement to another person. In order to facilitate this, the following basic structure may prove helpful:

- a title page, giving the learner's name, post and year of training and supervising clinician;
- a contents page, listing what is in the portfolio, with page references;
- a list of the learning objectives whose achievement the evidence in the portfolio claims to demonstrate;
- a short reflective overview, summarizing the learning that has taken place since the last portfolio review, and indicating which items of evidence relate to which learning objective
- the evidence itself, probably grouped together into the areas contained in the learning objectives.

The choice of evidence that is included will rest with the learner, but its source and purpose should be clear. Some evidence will be 'direct', that is, created by the learner. This may include letters, articles, presentations, critical incident reviews, audit reports or reviews of literature, or artefacts that have been developed by the learner for a specific teaching or clinical purpose. Other items of evidence may be 'indirect', that is, items that are about the learner. Typically these may include testimonials, references, or letters about the learner, videotapes, or transcripts.

The stimulus for including each item should be its relationship to the learning objectives for the period under review. The source is daily practice, or research and development activity necessary to improve practice. It is a fundamental principle of portfolio-based learning that the portfolio belongs to the learner, and the learner must take the responsibility for its development, maintenance and presentation for review.

How is portfolio development supported?

Most learners approaching portfolio development for the first time will require some support—not only in the actual construction of the portfolio, but also in the unfamiliar process of engaging in and recording reflections upon their work (Hall, 1992). Support is particularly important for those whose portfolios will be externally reviewed or assessed. The nature of the support will vary according to the needs of the learner and the purpose of the portfolio. For undergraduates or pre-registration house officers (PRHOs), it may be appropriate for the support to be given by a tutor or senior clinician—possibly the educational supervisor—and, given the stage of development of these learners, the nature of the support is likely to involve an element of directing or guiding. In circumstances where the portfolio will be subject to assessment for progression or some other form of external recognition, it is best if the person supporting the learner and the person carrying out the assessment are not the same person.

During the senior house officer or specialist registrar years, a portfolio may be developed as preparation for applying for the next post, or as part of the Record of In-service Training Assessment (RITA) process. As these doctors are now working as junior professionals in their own right, the most appropriate type of support might be through some form of mentoring. It is difficult to define mentoring as it has different manifestations for different people. However, the following definitions are offered as outlining the principles involved: "an intense relationship calling for a high degree of involvement between a novice in a discipline and a person who is knowledgeable in that area" (May *et al.*, 1982, p. 294). Or it may be "the guiding of a novice in professional development and the journeying together towards professional excellence" (Hetherington & Barcelo, 1985, p. 5).

Mentor support may be offered in many ways within a common working environment (SEDA/UCoSDA, 1996) and may take any or all of the following forms:

- 'timetabled' mentoring where agreed time slots are agreed for meetings, which can help ensure both parties are committed to the process and make sure outcomes are identified and discussed;
- 'corridor' meetings where more informal support is offered under circumstances where mentor and mentee meet anyway;
- 'mutual' mentoring where self-help pairs or small groups meet to support each other or work as study groups;
- telephone mentoring, which is particularly appropriate where the mentor and mentee work at some distance from each other.

The Royal College of General Practitioners (1993, p. 8) supports a model of group-based mentoring where "two or possibly three individual practitioners provide one another with peer support, facilitation and encouragement" or "groups of portfolio based learners could form and resolve to deal with specific areas of mutual need".

Increasingly there are opportunities for the support for portfolio development to be given through the use of information technology.

However mentoring support is put into practice, it should be based on the principle that the support is non-judgemental. Its purpose is to enable the learner to

develop a portfolio that meets his/her needs and explore means to achieve this. The mentor may offer opinions and add issues based on personal experience, but should not take responsibility for the eventual actions of the learner in developing the portfolio. Mentoring is a totally separate activity from either appraising or assessing the learner.

How are portfolios assessed?

Assessment is an essential component of any educational or development process, and has a range of purposes. These may be learner focused, or designed to meet the needs of teachers and/or the institutions offering or accrediting the programmes of learning. Broadly, assessment may have any or all of the following aims:

- to provide feedback to learners so that they can learn from mistakes and build on achievements;
- to motivate learners and focus their sense of achievement;
- to enable learners to correct errors and remedy deficiencies;
- to consolidate learning;
- to help learners to apply abstract principles to practical contexts;
- to guide selection, option or career choice;
- to classify or grade learner achievement;
- to estimate potential to progress to other levels or courses;
- to give teachers feedback on how effective they are at promoting learning;
- to provide statistics for internal and external agencies (Brown & Knight, 1994).

As well as multiple purposes, there are very many different methods of assessment: from formal, unseen, written examinations, through to OSCEs and observation of performance in 'real-life' settings. Selecting an assessment method and matching it to the purpose for which assessment is being carried out will ensure that the things that are important get assessed—not merely the things that it is relatively easy to assess. It is clear that portfolios are not the appropriate method of assessment if the purpose is to see whether the learner can recall information and apply it in a specific, time-limited context. Equally, they should not be the first port of call if it is important to be able to rank learners or grade their learning. However, in other contexts, the portfolio may offer the breadth of information about the learner's progress and achievement to be considered an appropriate means of assessment.

The highly individual nature of each portfolio means that their assessment can present as many challenges as the building of the portfolio itself. The process does not fit neatly with the traditional concept of assessment within medical education as a quasi-science, supposedly founded on objectivity. In order to create and therefore to assess portfolios, we have to accept the subjectivity—almost artistic appreciation—of the work that is presented.

The process of reflecting on experiences and identifying and recording evidence of learning involves a process of self-assessment. It is a necessary component of autonomous learning (Boud & Lublin, 1983) and also forms the basis for identifying further learning needs and setting goals for the coming period.

External assessment, however, requires someone other

than the learner to place a value on the presented portfolio. This assessment may be formative—used as feedback to help the learner to develop—or summative—to indicate that a specified end point for current learning has been reached. Many portfolios—for example those created to gain an NVQ—are designed around the fixed outcomes of the occupational standards that are to be met. However, many professional portfolios have much less detailed criteria. The ENB Higher Award, for instance, is based on 10 key characteristics (Harden *et al.*, 1999).

Any evidence of learning or of an appropriate learning plan that meets these characteristics may be included within the English National Board (ENB) portfolio (Brown, 1992).

It follows from this that, even when operating within a set of broad prescribed criteria, a portfolio is still a highly individual and essentially unique creation. Assessment for the purposes of external validation—academic credit, admission into a profession, licence to practice etc.—will therefore need to be carried out with this in mind. Generic principles or themes such as those used by the ENB may be appropriate to guide learners in constructing their portfolios, but this may limit the type of reflection engendered by the process itself. Aspects of great personal worth may be omitted or reduced in order to meet the criteria against which assessment will be carried out, yet it may be in these areas that the learner has the greatest development need or achievement. There is also a danger that the learner will produce a document that meets the perceived requirements of the assessor, but does not meet the needs of the learner. On the other hand, allowing the learner total freedom in deciding what learning to document and pursue leaves open the question of the validity and reliability of the assessment—would two assessors review the portfolio in such a way that similar conclusions as to its merits would be drawn?

Experience in using portfolios indicates that the assessment function is best carried out within a set of principles that enable the assessor to decide whether the evidence presented is valid (shows what it claims to show), and sufficient (detailed enough for an assessor to be able to infer that appropriate learning has indeed taken place) (Simosko, 1991). The negotiation and definition of how these principles are put into practice will take place in the individual's context of learning, and whether the assessment is to be assessed formatively or summatively. If it can be further established that the learning is current, and that the evidence presented has indeed been generated by the learner, and is thus authentic, then inter-rater reliability is increased (Simosko, 1991). The choice of actual material collected and presented for assessment may then be devolved to the learner, who enters into a 'learning agreement' with the assessor. Here the intentions of the retrospective or prospective learning are clearly stated, thus giving benchmarks against which the product, and the reflection on the process of constructing the portfolio, may be measured. Portfolios are therefore, almost by definition, assessed within a criterion, rather than norm-referenced system, as comparison between learners becomes irrelevant (Challis, 1993).

In summary, the following guidelines will help in developing an assessment framework for portfolios:

- Assessment is carried out within a criterion-referenced rather than a norm-referenced system—'grading' portfolios, while not impossible, assumes a rigidity of

format that is counter-productive to the learner-centred philosophy underpinning the use of portfolios.

- The criteria for assessment—that is, the benchmarks or standards against which the evidence of learning will be measured—should be explicit, and known to (or, if appropriate negotiated between) the learner and assessor.
- Criteria should link to specific learning outcomes or objectives, which should be written in such a way that the evidence of their attainment can be assessed; for example, ‘demonstrate an understanding of . . .’ is not readily assessable, as ‘understanding’ is an indefinite term. Objectives which use words such as ‘explain’, ‘evaluate’, ‘analyse’, ‘illustrate’ enable both learner and assessor to approach the evidence of learning from a common standpoint
- The evidence of learning should be accompanied by a verbal or written reflective explanation of why each piece of evidence has been included, and the part it has played in the progression of the learner’s thought and practice.
- Evidence must be ascertainable as either by or about the learner (authentic), be appropriate to demonstrate the learning claimed (valid) and of sufficient recency for the assessor to infer that the learning is still current.

What are the major issues in portfolio-based learning and assessment?

Despite the many advantages of portfolio-based learning, there are particular issues that may prove problematic. These should be borne in mind, and are best addressed at the outset of designing and implementing any portfolio-based learning scheme. These may be summarized as follows:

Portfolio-based learning is not a soft option. Most learners find the process of developing an appropriate portfolio arduous, particularly in the early stages. The amount of thought and reflection that go into both the learning evidenced within the portfolio, and the construction and presentation of the finished article, is very great, and requires a consistency and commitment that it is unusual to find in other educational processes.

Portfolios are highly personal. Individual learning preferences and pressures of work will dictate the amount of effort and consistency with which learners approach the task. Both mentors and reviewers should therefore seek to support the approach taken by the learner, and recognize the learning that is taking place during the construction development process. They should therefore avoid trying to impose a standardized format or dictate what will count as ‘appropriate’ evidence of learning.

Portfolios are about learning. The portfolio’s purpose is to demonstrate learning, not to chronicle a series of experiences. Learning from experience will only happen once reflection and application of resulting modifications in practice have taken place. It is evidence of how the learning has been, or will be applied that will form the basis of the review or assessment.

Quantity of evidence is no substitute for quality. There is no need for a portfolio to be a huge document. A few examples of reflective learning in practice may demonstrate a wide range of learning outcomes. This is far more valuable than

a portfolio that documents numerous repetitions of a task, but does not demonstrate resulting learning and change in practice.

Portfolios are not a quick fix. Portfolio development should become an embedded part of everyday practice. Running around just before a meeting with a supervisor, trying to ‘find’ or manufacture appropriate evidence, is a waste of valuable time and does not constitute appropriate professional practice. The art, from the learner’s point of view, is in taking advantage of both planned and opportunistic learning in order to record its impact on current and future practice.

Assessment should be based on clear learning objectives. Learning objectives should be attainable and capable of assessment. Very broad or nebulous objectives are not helpful to either the learner or the assessor. It is best to avoid the use of ‘understand’ in setting objectives as it is unclear what evidence of achievement of ‘understanding’ would look like. For example, instead of setting as a target ‘to understand the role of the practice nurse’ it would be better to aim to ‘describe the principle functions carried out by a practice nurse and how these contribute to the work of the practice team’. Although this may be interpreted by both learner and assessor as ‘understanding’, it results in an action and evidence which can be reviewed and discussed.

Glossy presentation should not be taken as an indication of the quality of learning. Every reviewer will be impressed by a well-structured and neatly presented portfolio. However, it is the quality of the learning that is being reviewed; marks are not necessarily awarded for artistic impression, unless, of course, one of the learning objectives relates to the learner’s organizational and presentation skills.

Assessment of portfolios is as much an art as a science. However closely the criteria for assessment are drawn up, and however carefully learning objectives are described, there will always be a degree of subjectivity involved in assessing portfolios. This is not a disadvantage, as the principle aim of portfolio development and assessment is not to grade or select on the basis of the evidence presented, but to judge whether appropriate learning has taken place and has been demonstrated, in accordance with the development needs of the learner.

Examples in practice

Using portfolios in medical education

Recent innovations in medical education, such as the Record of In-service Training Assessments (RITAs) for Specialist Registrars (DoH, 1998b) or the learning requirements for pre-registration house officers set out in *The New Doctor* (GMC, 1997) lend themselves ideally to assessment by portfolio. The process of matching curriculum requirements and appropriate assessment methodologies is also stressed in the GMC (1999) document *The Early Years* in respect of senior house officer training. *Tomorrow’s Doctors* (GMC, 1993) also highlighted dimensions of undergraduate teaching which, through an emphasis on learner-centred

education and personal as well as professional development, has encouraged a move to a problem-based curriculum and assessment by portfolio as well as traditional examination (Boud & Feletti, 1997).

Change in the process of training and continuing professional development for general practitioners has also been considered by their Royal College. The year 1993 saw the publication of Occasional Paper 63, from the Royal College of General Practitioners: *Portfolio-based learning in General Practice*. This paper proposes that there is a need for a range of models to be developed to provide a structural framework for appropriate education which meets the needs of general practitioners, and which reinforces or enhances their perceptions of their need for further learning. The model explored in the paper is that of portfolio-based learning, which draws on a range of educational theories relating to the previous knowledge and experience of learners, and their preferred learning styles. More recently, the Chief Medical Officer reviewed continuing professional development for general practitioners (DoH, 1998a) and has proposed quite radical changes in education and development. The main recommendation is that education should be practice based and multidisciplinary; patients needs should be given higher priority; links between education and service delivery should be more evident. Practice Professional Development Plans (PPDPs)—a form of practice-based portfolio—are proposed as a means of making this happen.

The principle of an evidence-based approach to learning appears to be gaining ground throughout medical education and training.

The examples which follow show how the principles of portfolio-based learning and assessment have been used in a range of contexts to support the initial and continuing development of doctors throughout the various stages of their education. These examples are by no means comprehensive, but they do give an indication of the possibilities that are already being explored and developed by medical educators. The examples given are drawn solely from the United Kingdom. This is deliberate, partly because extending into the international arena would have made this document unacceptably large and complex, but also because in this way it can be demonstrated that within a single national framework for medical education, the adoption and adaptation of the portfolio as a means of recording and promoting learning is moving forward apace, and taking maximum advantage of this highly flexible educational tool. Some of these case studies have been largely written by colleagues involved in the work described, while others have been gleaned from the literature. There is thus no common format to their presentation, but instead the 'flavour' intended by the authors has been preserved.

Year 5 Undergraduate Module in General Practice and Community Health Care

The University of Sheffield has for some years used a criterion-referenced, profile-based method of assessment (Usherwood & Hannay, 1992). There exists a formal examination process for General Practice and Public Health Medicine, which takes place each year before the equivalent examinations in Medicine and Surgery. However, it is expected that the majority of students will gain exemption from the examination by presenting a portfolio or record of

achievement that demonstrates that appropriate learning has taken place across a range of areas. Assessment is based on evidence from the following sources: GP practice tutor assessment of performance and competence in practice; small-group tutor assessment of performance in group work; end-of-module OSCE examination of communication skills; clinical audit project; essay/project from public health teaching.

The assessment of clinical competence relies on the student engaging in prescribed activities, and having these signed up by their practice tutor. Activities include taking patient histories, undertaking examinations, writing hospital referral letters, offering a range of possible causes/diagnoses, formulating suitable management plans, giving clear and concise explanations to patients, writing prescriptions. Each of these activities has with it criteria for basic competence—for example:

Take patient histories establishing the reason for consultation and eliciting relevant information from patients, with due regard to physical, social and psychological factors as appropriate.

Students are also expected to undertake additional tasks during their placement, such as attending a session with a community pharmacist, accompanying a GP or deputizing service on emergency calls during an evening shift, and visiting a patient with a serious illness.

Broader professional skills such as punctuality and the ability to work with the practice team are also attested to by the practice tutor.

The student is also assessed against criteria for participation in the small-group learning process, communication skills, and carrying out a clinical audit project. (For details of the development of these criteria see Usherwood *et al.*, 1995.) Additional criteria are included for a distinction to be awarded in some areas.

The portfolio also contains a self-assessment section, containing a clinical learning self-assessment profile, an end-of-module self-assessment, a feedback sheet for tutors at end-point assessment and a log of learning events, linked to the practice assessment tasks.

Because the in-module performance allows exemption from the end-of-year examination, there is no moderation between the elements of the portfolio—that is, failure in one component cannot be redeemed by performance in another.

Portfolios for pre-registration house officers (PRHOs)

Following the publication of *The New Doctor* (GMC, 1997) the Chief Medical Officer established a steering group to explore ways of ensuring that the syllabus set out in the document could be delivered and assessed prior to the issue of the Certificate of Experience. The group decided on a portfolio approach to gathering evidence of satisfactory service, which would be supported by clinical and educational supervisors. In England individual deaneries have adapted the material produced by the steering group according to their own local needs, but in Scotland a more unified approach has been adopted.

The learning portfolio is based on the development of a personal development plan, which the PRHO agrees with his/her educational supervisor. This plan is framed by the

GMC objectives, job descriptions and service contracts for individual posts, an initial self-assessment exercise, and the career aspirations of the individual. PRHOs are asked to identify specific learning objectives, key tasks relating to each objective, the criteria by which their achievement of each objective will be judged, and how the PRHO intends to achieve the objective, including any specific teaching inputs required.

During the course of each placement, the PRHO gathers evidence of achievement which relates to the development plan and the GMC objectives, and collates this into a portfolio. A series of tools or instruments was developed by the CMO’s steering group to facilitate portfolio development. These include the following.

Criterion-based assessment schedule. These grids give criteria for performance from ‘good’ to ‘does not reach standard’ for the major areas of the GMC’s syllabus, which the PRHO has assessed and ‘signed off’ by an appropriate member of the supervising team—medical staff, nursing staff, pharmacists. Assessment of each item is designated ‘essential’ or ‘desirable’. An example of the grid for history taking (essential, and to be assessed by medical staff) is given in Figure 1.

Case presentations. Each presentation is expected to include history taking, gathering and interpreting key clinical signs, use of investigations, and decisions made, or which would be made, with regard to treatment. Colleagues record their

comments on the presentation on a structured feedback form.

Extended case reviews. PRHOs are asked to outline a case, indicating key points from history, key clinical findings, investigations, problem list/differential diagnosis, treatments selected, patient outcomes, research evidence used, involvement of patient in decision making, social context of patient, effects of these on PRHO’s actions, issues of health promotion and prevention of illness, complaints or legal implications, roles of other health care workers, PRHO opinion of quality of care, what might be done differently in similar circumstances.

Recording of untoward incidents (‘critical incidents’). A review of a thought-provoking event, to be addressed under the broad headings of: context; what happened; what were your concerns; identify the positives; identify the negatives; what are you going to do as a result of this incident.

PRHO RITA for Certification. Following a similar philosophy to that adopted for Specialist Registrars, this form allows information to be taken from previous reviews and recorded in order to gain an overall view of the PRHO’s fitness for a Certificate of Experience. The overall assessment requests comments on performance based on evidence drawn from the use of the above and other documentation presented by the PRHO.

None of the above is a statutory requirement in order for

Good	Concise history taking based on careful listening, following up leads appropriately
Satisfactory	Generally safe and acceptable but needs to listen more and follow up leads
Borderline	Rote history taking, not listening well or following up leads adequately
Does not reach standard	Inadequate history taking, not following up leads

How assessed:

- 1. Personal observation by clinical supervisor
- 2. Observation by others
- 3. Discussion with trainee
- 4. Combination of these
- 5. Self assessment

Good/Satisfactory/Borderline/Does not reach standard (please circle as appropriate)

Signed Job title

Figure 1. Example of history-taking grid.

the Certificate of Experience to be issued. However, the format for the portfolio developed by the steering group offers the possibility for individual Postgraduate Deans to create a locally relevant version which will allow for the progress of PRHOs to be monitored and supported appropriately, whilst at the same time ensuring that the GMC requirements are met. This will give a firm basis for accountability in making a judgement about an individual's fitness to progress.

Portfolio learning in general practice vocational training in Scotland

A model of portfolio learning has been explored in one training region in Scotland, in terms of its usefulness in general practice training and its relationship to reflective learning. Pilot work (Snadden *et al.*, 1996; Snadden & Thomas, 1998a) suggested that portfolio learning in vocational training enabled GP registrars to gain more from their training period in three ways:

- by making the year less timetable orientated;
- by structuring learning around perceived needs;
- by basing learning around reflection on experiences throughout the year.

Further work was then undertaken with the aims of:

- introducing and monitoring responses to the use of a reflective learning strategy in a training region not familiar with the concept of portfolios;
- mapping the usefulness of a portfolio model in terms of general practice vocational training;
- evaluating the effectiveness of an external facilitator (findings not included here).

GP registrars participating in this scheme were given guidance on how to construct a portfolio containing critical incidents of their experiences with patients, reflections on their difficulties and successes in their training period, and how to use these to trigger reflective learning with their trainers. They were also encouraged to keep a reflective journal/diary. Portfolio development was supported by facilitated workshops.

The researchers found that the portfolios were used in four ways:

- as a tool for reminding, planning, tracking and encouraging reflection;
- as a route to exploring attitudes and values to stimulate feedback;
- as encouragement, not humiliation;
- to act as a bridge from hospital practice to general practice.

A cost-benefit analysis that participants used in deciding whether to initiate and continue with the use of portfolios included the following.

Confidence. The portfolio acted as a useful means of raising the confidence of participants in their transition from hospital to general practice over the initial months of their work in the new environment.

The trainer-GP registrar relationship. The portfolio was most useful when used as an integral part of the teaching and learning process. This encouraged the development of a

trusting relationship and the exploration of difficult areas based on the experience of both trainer and learner. Where there were tensions in this relationship, the portfolio was not used.

Examinations. GP registrars who were working towards their summative assessment and the MRCGP exam tended to concentrate more on these aspects of their training and assessment than the development of their portfolio.

The conclusions of this study were that portfolios work most effectively where one-to-one support is an integral part of portfolio development. Clear ground rules need to be established regarding what is to be included, and how it will be used by both trainer and learner. In general practice vocational training, portfolios are effective:

- as a method of planning the curriculum that reflects the needs of GP registrars;
- as a reminder of what needs to be done;
- as a mechanism to capture examples of significant learning;
- to enhance the relationship between the GP registrar and the trainer;
- to reach the more difficult areas of a GP registrar's experience;
- to assist in the process of giving and receiving feedback.

Specialist registrars (SpRs): examples from Paediatrics and Public Health

One of the principal objectives of 'Calmanization' of higher specialist training was to structure training and to ensure that time was set aside for training issues. An integral part of the process was to ensure annual assessment, which is seen as separate from appraisal, and which seeks to ensure that progress within a training programme is assessed against an established framework. In the case of paediatric training, this framework is provided by the syllabus published by the Royal College of Paediatrics and Child Health, and for public health by the Faculty of Public Health Medicine.

Paediatrics. In order to facilitate the achievement of individual training needs, the paediatric teams in both mid- and north Trent Region decided to adopt a portfolio-based approach. Although there are slight differences between the two schemes, they share common principles. The portfolio is loosely structured, allowing for the progression and changing needs of the SpRs as they move through their years of training. Thus the emphasis during the core training years (1-3) is on evidence-based practice, ethics, good clinical practice and research methods. Later on, audits, management skills and practice in a sub-specialty become more salient features. Each SpR develops a learning plan in consultation with an educational supervisor, and the portfolio reflects progress towards achieving this plan as well as completion of the Royal College's syllabus.

SpRs bring their portfolio with them to their end-of-year assessment interview, for discussion with their assessors. However, prior to this interview, they complete a series of factual and self-assessment forms which form the outline structure for the portfolio. These forms cover:

- an outline of a weekly timetable;
- a self-assessment of confidence in relation to a list of general and acute paediatric procedures;

- self-assessment of expertise in correspondence and outpatient work;
- notes on perceived needs in the area of management of self and others;
- experience in child protection work;
- record of training days attended;
- teaching experience;
- assessment of nutrition and growth.

The forms are copied and kept as part of the SpR's training record. Evidence of activity under each category is presented in the portfolio, and the SpR is encouraged to talk through both his/her established learning and future learning needs on the basis of what has been presented.

Support for portfolio development is mainly given through peer-group meetings. There is great commitment to the scheme by both trainers and trainees, who see the benefit of developing an individual document that allows them to detail their activities and reflect on their learning. However, this enthusiasm is accompanied by some fear that the portfolio may become standardized by the Royal College, which could mean that the portfolios become more syllabus focused and therefore end up saying more about the training programme than about the individual trainee.

Public Health. A somewhat different approach to SpR training has been adopted by the Faculty of Public Health Medicine, which has created a national assessment scheme based on 17 skill areas in which competence should be attained before the SpR can be considered ready to become a competent consultant. On the year-end assessment forms, trainers are required to indicate for each individual skill area the extent of progress made by the SpR towards these statements of competence, using a scale of 0 (area not yet achieved) to 3 (satisfactory to be a consultant). Trainers are also invited to make additional comments on overall development and progress over the last year towards annual training objectives.

The skill areas in which competence statements have been developed are: information; epidemiology; communicable disease control; environmental health; health needs assessment; effectiveness and outcomes assessment; prioritization; NHS organization; management skills; health education and health promotion; communication skills; computing; audit; continuing professional development; technical aspects of public health medicine; research methods; personal.

Each skill area is broken down into a variable number of statements of competence: for example, the area of Epidemiology has two constituent competency statements:

- Knowledge of epidemiological methods and limitations of the different types of epidemiological study
- The ability to undertake an epidemiological investigation from inception to presentation of findings and evaluation of outcomes.

SpRs are encouraged to develop a portfolio which demonstrates their progress towards the stipulated competences, and which can therefore inform the trainer's judgement as recorded on the annual assessment form.

The use of portfolios with general practice trainers in Wessex

The educational competence of general practice trainers is inferred from a range of disparate assessment measures

which include the teaching environment and resources, as well as a subjective judgement of how good a trainer this person is likely to be. There is an assumption that a trainer who can reach some (often unarticulated) 'standard' is competent as a teacher.

The issue of certification and recertification of GP trainers was raised within Wessex by the Joint Committee on Postgraduate Training for General Practice, which, recognizing the difficulties in determining the teaching ability of general practice trainers, suggested the development of a feasible performance-based assessment method. Using valid criteria of 'good' teaching, an assessment tool was used by a panel of experienced trainers to judge a series of video-recorded tutorials between general practice registrars and their trainers. The reliability of judgements about individual 'components', together with an overall global judgement about performance, was studied. The reliability of individual assessors' judgements (i.e. their consistency) was moderate, but inter-rater reliability did not reach a level that could support making a safe summative judgement (Pitts *et al.*, 1998a). Following this work, and in recognition of other considerations concerning the issue of professional competence, a 'new direction' based on portfolios was suggested (Pitts *et al.*, 1998b).

The Wessex course for prospective general practice trainers comprises a residential introductory evening leading in to the first day of the course, and four further separate days, approximately three weeks apart, based around work carried out at home and their practices. During the course, participants, working in groups of five or six, maintain a portfolio to record their personal learning. Whilst guidance about portfolio construction is 'loose' there are areas recommended for consideration. These include: reflections on 'where they are' and 'where they have come from' in educational terms; learning-needs analysis (put into practice as a structured interview); reading in the area of education; the performing and recording of a teaching exercise.

Later in the course 'real' teaching is carried out with a volunteer GP registrar, and feedback obtained from the subject and the group members. Many new areas emerge within the group discussions, particularly regarding the politics and practicalities of training. These often become the subject of reflections within the portfolios. The groups are facilitated by a tutor, and it is recommended, though not compulsory, that participants find a mentor from outside the course. For satisfactory completion of the course, participants are required to submit a 1000-word précis based on their personal learning.

The 'research' aim of the move towards portfolios was to study how a group of assessors, themselves experienced GP trainers, might 'rate' the portfolios, in terms of the authors' abilities to explain, understand and expose their reasoning processes in making observations of learning outcomes, elaboration and application of learning to new tasks. Together with a global judgement based on an overall impression, six assessment criteria based on observable and recordable thought processes have been developed. These are:

- evidence of 'reflective learning';
- awareness of 'where they were', consideration of past learning experiences, identification of personal learning needs;
- recognition of effective teaching behaviours;

- ability to identify with being a learner;
- awareness of educational resources;
- drawing conclusions, overall reflections on the course and their future career development.

The levels of reliability reached were similar to the previous video work and other subjective assessments, and perhaps reflected individuality of personal agendas of both the assessors, and variations in portfolio structure and content.

The experience of course participants was in line with that of many others: the prospect of keeping a portfolio was initially daunting and unfamiliar, but after the course, the process was seen as worthwhile and educationally appropriate. Problems for the assessors stemmed from the individuality of the portfolios, and variation in the 'starting points' of each prospective trainer. Material included within portfolios was not always referred to in the discussion—some participants appeared to be 'squirrels' who merely filed documentation without apparent further thought or connection, while others more clearly used and cross-referred to papers and other literature within their written reflections.

The use of portfolios in supporting continuing professional development of general practitioners in Sheffield

Portfolio-based learning was first offered to GPs in Sheffield from 1994 as a means of obtaining half the yearly requirement for the postgraduate educational allowance (PGEA). Its efficiency and effectiveness were measured against the 'traditional' model of PGEA, based on 30 hours' annual attendance at educational events (Challis *et al.*, 1996). This was achieved through a crossover comparison, whereby 32 volunteer GPs were divided into two cohorts: each cohort spent 6 months following the 'traditional' route to PGEA accreditation and 6 months following the portfolio-based learning route.

The model adopted for support was one of co-mentoring amongst groups of five or six learners, supported by a facilitator who was also a GP and engaged in the process of portfolio development. The process was designed to encourage:

- a proactive approach to learning and development;
- identification of individual learning needs;
- the development of strategies to meet educational needs using appropriate learning activities and styles;
- structured reflection on experience and practice;
- the use of critical incidents (significant events) to modify or reformulate the original objectives of the learning plan;
- the completion of a learning cycle by applying new learning to practice.

The format for the portfolios was not closely defined, but participants were asked to present a portfolio that contained:

- a learning plan with specific learning objectives, appropriate methods for meeting these objectives and demonstration of the application of new learning to professional practice;
- a list of critical incidents, showing how these had led to the formulation of new learning objectives and a revision of the original learning plan;
- a claim for PGEA under the standard three headings of health promotion, disease management and service provision, indicating the number of hours claimed, and types of learning activity undertaken.

In addition, all participants were asked to submit a self-appraisal of their learning during the year to encourage continuing reflective learning. This comprised an assessment of features that they believed had helped or hindered learning, and a learning plan for the forthcoming year.

The portfolios were assessed by the local continuing medical education (CME) tutors, who made recommendations to the Director of General Practice Education for the award of PGEA, using criteria of:

- demonstration of having completed a learning cycle;
- having met the learning objectives of the original learning plan and/or those arising from critical incidents;
- demonstration of an understanding of the learning process.

The study indicated that there was a clear need to streamline the documentation used as this was seen as an encumbrance to the learning process. Participants found the process of building a portfolio difficult at first, and this was heightened by a sense of anxiety at having to share 'gaps' in knowledge with other colleagues. However, over time, this insecurity diminished.

The mentor groups were seen as an effective means of supporting individual learners and in helping them to set realistic objectives and explore ways of meeting them. Whilst most participants indicated that they had spent more time in developing their portfolios than they would have used in more traditional PGEA activities, the educational benefit that they perceived was much greater.

Since the pilot project in 1994, portfolio-based learning has been accepted by the Director of General Practice as an alternative means for GPs to claim their PGEA. Many of those GPs involved in the original pilot groups have opted to continue with portfolio-based learning rather than return to the previous model. In addition, further GPs have chosen to engage in this approach to PGEA (Mathers *et al.*, in press). New recruits are being supported in their co-mentoring groups by participants in the original project, who have engaged in training events relating to the principles of co-mentoring and group facilitation. The process is therefore being extended through a 'cascade' of expertise, and will continue to be monitored, evaluated and developed.

Electronic portfolios: the WISDOM project

Within the developing agenda of a primary-care-led NHS, healthcare professionals need to develop knowledge and skills to utilize the technologies of information management and computer-mediated communication. The embracing of new technology which has been pledged by the significant commitment to NHSnet suggests further that, for future health care professionals, informatics will not only be a tool, but an integral part of their practice (DoH, 1998c). The adoption of Internet technologies by the IM&T strategy confirms how the development of transferable Internet skills such as electronic mail, web browser and database-searching strategies, in parallel with the proposed NHSnet implementation schedule, will be of immediate use in both arenas. However, given the rigours and time constraints that professionals face, flexible study patterns are required to enable them to learn at the pace, place and time of their own choosing, thus necessitating an innovative approach to work-based learning.

It was within this context that the WISDOM project was born. It is an innovative educational project aimed at primary health care professionals, which uses the Internet to create a 'virtual classroom'. It seeks to combine the twin aspects of informatics and continuing professional development into a package that can provide both an explicit and implicit learning environment for participants.

The educational framework within which the electronic portfolio model has been developed is that "Problem based educational approaches are both acceptable and appropriate for health care professionals and education or training must be delivered in a way which is feasible within the context of busy professional schedules" (Mathers *et al.*, in press; Fox *et al.*, in press). Thus, a distance learning approach using the Internet is well suited to the aims of CPD and will be effective by being both collaborative and interdisciplinary.

The original WISDOM pilot evaluated the use of a pure online environment, with no face-to-face contact for participants or facilitators, for the development of informatics skills via the Internet (Fox *et al.*, in press). This indicated that a hybrid approach was required using both physical and virtual learning environments, as a factor affecting uptake was not the lack of interest, but a lack of basic skills to get online in order to participate (the WISDOM project report may be found on the WWW at <http://www.shef.ac.uk/uni/projects/wrp/>).

In its current form, WISDOM is an ongoing study exploring the refinement and evaluation of an effective multi-professional education model, using both workshops and an online-supported learning environment via the Internet and NHSnet, which can be implemented on a wide-scale basis, thus enabling healthcare professionals to embrace the implications of the information age in which they now practice (Roberts & Fox, 1998). Work is currently in progress to gather further data on training and organizational needs and to further evaluate the use of online technologies to support collaborative learning of generic skills within the health communities of the North Trent sub-region. Early indicators suggest that multiple workshop sessions are required in addition to online facilitation for participants to reach the required competence and confidence levels for an effective skills cascade system to function (COGPED, 1998).

The virtual learning environment is the basis of the educational intervention. It consists of a facilitated and archived electronic discussion group in addition to supporting web material including a virtual library, tutorials and a model electronic portfolio. The physical learning environment is a series of locally organized hands-on workshops covering basic aspects of electronic mail, web browser and database-searching strategies. Between each session, these skills are consolidated within the virtual learning environment with the assistance of an experienced online facilitator. A continuous theme of individual needs analysis, in collaboration with the facilitator and other group members, underpins the process to inform future group activity and for inclusion in personal learning plans which are integral to the electronic learning model implemented.

The electronic portfolio model of learning used is based on the principles:

- Content should meet the learning objectives of the participants.

- Process must encourage reflection and the development of a learning cycle.
- Method of assessment should enable evaluation of the extent to which personal learning outcomes have been met.

Within this framework, participants draw up an educational plan and gather evidence to be submitted in an electronic portfolio to demonstrate learning outcomes related to that plan (Fox *et al.*, in press; Mathers *et al.*, in press). For assessment purposes, the portfolio has to contain elements of the following:

- a structure to learning;
- a learning log;
- evidence of reflective practice;
- evidence of a learning cycle.

Given the flexibility of the portfolio model, evidence of learning could relate to core informatics skills (sending email, using the Internet to search for resources) and/or application of these skills in the development of evidence-based practice via information search and retrieval techniques, downloading journal papers etc. Portfolios contain evidence drawn from critical incidents, literature reviews of topics and reflections upon the content and process of the educational activities. From this, and within the spirit of the adult learning model, the Wisdom approach emphasizes not only skills and theoretical knowledge development but how learners incorporate or synthesize their new learning into primary care practice.

Learning Opportunities for Teams ('LOTUS')

The LOTUS programme began in Sheffield in 1997 with the aim of supporting the educational needs of general practice staff. It is a model of practice-based, multidisciplinary education specifically designed for primary health care staff. It is based on principles of adult learning, and utilizes team development plans, portfolios, reflection and group work, all located in a context of local need. The model integrates personal, professional and practice development. LOTUS therefore represents a means of developing the team-based Practice Professional Development Plans (PPDP) envisaged by the Chief Medical Officer in his review of continuing medical education in general practice (DoH, 1998a). Individual learning plans and portfolios of evidence of achievement are embedded within the team-based process.

The model involves two facilitators being attached to a practice for a year. Through a series of workshops, the facilitators enable the team to identify their learning needs and develop a learning programme. The teams choose what they want to learn and how they wish to learn it. The facilitators provide ongoing support and access to educational resources. Throughout the year the practice teams are encouraged to reflect on their learning and its impact on the practice. Individuals record their learning in a personal portfolio, and at the end of the year both the practice and the individuals are awarded PGEA, PREPP accreditation and individual certificates of learning.

Evaluation of the programme to date has revealed the following outcomes:

- learning is mainly practice based, encouraging integration between learning and working and reducing dependence on externally provided courses;

- inter-professional learning opportunities are increased and team working is enhanced;
- Primary Health Care Teams produce individual team-based learning and development programmes that are owned and implemented by the team;
- LOTUS has led to changes in work practices including service initiatives such as the setting up of a well-woman clinic and the development of a counselling service for patients with depression.

Future developments of the LOTUS project include expanding into Europe, and the development of similar initiatives with Primary Care Groups.

Postgraduate Certificate in Medical Education, University of Newcastle upon Tyne

The aim of this course is to allow doctors and dentists to acquire sufficient knowledge of educational process and skill in the use of teaching strategies to allow them to provide effective education for students and staff in a clinical environment.

The course is designed to provide three things:

- meet the learning needs of the clinical teachers who enrol on the course;
- establish the level of competence of performance of the teacher when using certain teaching strategies;
- provide a sound theoretical base for those teachers who wish to take their teacher training further.

The course comprises two modules. Module One focuses on teaching strategies and the aim is to promote an understanding of the relationship between expected learning outcomes, subject content and choice of teaching strategy. The second module addresses issues concerned with planning clinical education and addresses how learning theory underpins effective education.

The assessment requirement for the course is a work-based assignment which will allow participants to apply what they are learning to their current teaching responsibilities. They will be able to exercise independence in their learning by negotiation of the material to be included in the assessment portfolio. Minimum criteria are set for assessment purposes, but feedback on performance against personal standards will be available through observation of teaching and the use of the reflective diary. The mixed mode of delivery (workshops, tutorials and resource-based learning) will allow the pace of learning to be dictated by the participant.

Successful completion of this course requires the submission of an assessment portfolio which shows evidence of the learning that has taken place over the period of the course.

To produce the portfolio teachers are required to plan a course of education for a designated group of learners. The portfolio must contain:

- a written description of the programme of learning that includes: details of the group of learners or trainee; length of the programme of learning; the learners' needs; an explanation of how the learners' needs were identified; the aim of the programme of learning; the expected learning outcomes; the syllabus; lesson plans for a minimum of three sessions (plans to include the expected learning outcome, essential content, teaching strategy and teacher and learner activities); the means by which learning will be assessed; the means by which the teaching was evaluated;

- a discussion of the programme of learning that demonstrates an understanding of the models of learning and the way in which this has informed the design of the programme. It is expected that this section should be in the order of 3000 words and contain approximately 10 references to the literature;
- a record of the demonstration (to the satisfaction of the assessor) of competence in the use of a least one teaching strategy with the designated group of learners. A report of the tutor's visit to the teaching event must be included in the portfolio. This report should be the student's perceptions of the event and the feedback received. It should be countersigned by the tutor;
- a diary for the period of the course providing evidence of reflection on the teaching process and action based on that reflection. The diary should contain a minimum of 10 entries and should show evidence of incremental development. This may be done by selecting one or two themes to be recorded over the period for which the diary is kept.

Conclusion

Portfolio-based learning represents a model of educational development and review that is consistent with current adult learning theory. It is becoming common practice in many areas of higher education and professional development, including medical education (Snadden & Thomas, 1998b). However, it is not without its challenges. If you are considering developing this approach with and for colleagues for whom you have educational responsibility, it might help to consider the following 12 questions. By addressing the issues that they raise, you should be able to ensure that the model you develop meets the learning needs of the learners themselves, and the requirements of the profession to ensure the quality of education and training for current and future doctors.

- Can you identify your projected learner group?
- Is a portfolio an appropriate learning process for them in their context?
- How will you introduce the portfolio to the learners?
- Do you want to prepare standardized documentation for the portfolio?
- Are you intending the portfolio to be a public or private document?
- Will it need to demonstrate that the learner has reached some pre-determined outcomes?
- Will these outcomes and criteria for assessment be negotiated as part of a learning plan, or are they ordained by another body?
- How will the learner be supported during the portfolio development process?
- Who will undertake the review of the portfolio with the learner?
- What training is available to prepare the reviewer/assessor in carrying out this role?
- Who else needs to know what you are proposing to do?
- What will their role be in developing/supporting/assessing the portfolio?

Finally, Table 1 is offered as an indicative guide to stages in portfolio development and review/assessment. It suggests

Table 1. A guide to the stages in portfolio development and review/assessment

What to do	How to do it	Who is involved
Develop a framework and documentation for portfolio	Link the syllabus (if any) to the overall learning objectives of the learning programme Differentiate between the essential and the desirable outcomes Write appropriate guidance notes for learners, supervisors, assessors and other people involved Devise appropriate forms/checklists etc that will be used for review and assessment	Clinical tutor, college tutor, postgraduate dean, GP adviser, course organizer, and/or others as appropriate to the individual training programme
Establish means for supporting the learner during portfolio development	Identify educational supervisors and/or mentors Implement training for those involved in providing support	As above
Introduce portfolio to learners	Present (rather than distribute) and explain documentation—may be appropriately done during induction Name individuals designated to support and review the portfolio	As above
Develop individual action plan	Identify current level of learning in key areas for review Identify areas for future development Agree key learning objectives, linking individual learning needs and relevant syllabus Write these in assessable format, with criteria for assessment if not already included in portfolio documentation Agree means for meeting needs and objectives Educational supervisor and individual learner through negotiation	
Identify sources of evidence of learning appropriate to identified learning needs	Agree which objectives may be met through natural work patterns, and which will need specific training input Identify and arrange training where appropriate Agree what types of evidence would be considered appropriate to demonstrate learning achievement	Educational supervisor and learner
Gather and document evidence of learning	Ensure that appropriate evidence of learning is gathered and its rationale for inclusion in the portfolio is established Supplement with reflective accounts of learning as appropriate Learner in collaboration with mentor if appropriate	
Monitor progress	Review learning objectives and progress towards their attainment Ensure evidence relates to and demonstrates how learning objectives have been addressed Revise learning objectives if necessary	Learner with Mentor and/or educational supervisor
Assess/review portfolio	Select and provide rationale for evidence that demonstrates achievement of learning objectives under review Ensure validity, sufficiency, authenticity of evidence and currency of learning Agree that evidence meets defined assessment criteria Plan further learning opportunities if necessary Devise new learning objectives and personal learning plan	Learner Learner with reviewer/assessor Reviewer/assessor Learner with reviewer/assessor Learner with reviewer/assessor
Report results to appropriate bodies	Complete documentation Make recommendations for progression/additional support needed	Educational supervisor/Clinical tutor

what needs to be done, what action this implies at each stage, and who should be involved in each action. The range of types and purposes of portfolios in use and under development means that in specific circumstances only some stages will be appropriate, and terminology for those involved in supporting and assessing will vary from scheme to scheme. However, this may act as a framework within which to begin to develop a portfolio, whether you approach the process as a learner, an assessor or a manager.

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References

BOUD, D. & LUBLIN, J. (1983) Students' self-assessment, in: G. SQUIRES (Ed) *Innovation Through Recession* (Guildford, SRHE).

BOUD, D., KEOGH, R. & WALKER, D. (Eds) (1985) *Reflection: Turning Experience Into Learning* (London, Kogan Page).

BOUD, D., COHEN, R. & WALKER, D. (Eds) (1993) *Using Experience For Learning* (Buckingham, SRHE/OU).

BOUD, D. & FELETTI, G. (1997) *The Challenge Of Problem Based Learning* (London, Kogan Page).

BROWN, R.A. (1992) *Portfolio Development and Profiling For Nurses* (Lancaster, Quay Publishing).

BROWN, S. & KNIGHT, P. (1994) *Assessing Learners In Higher Education* (London, Kogan Page).

CHALLIS, M. (1993) *Introducing Apel* (London, Routledge).

CHALLIS, M., MATHERS, N.J., HOWE, A.C. & FIELD, N.J. (1996) Portfolio based learning in continuing medical education for general practitioners—a mid-point evaluation, *Medical Education*, 31, pp. 22–26.

COGPED (1998) *Information Management and Technology and Library Services Position Paper* (London, COGPED).

DEPARTMENT OF HEALTH (1998a) *A Review of Continuing Professional Development in General Practice* (London: Stationery Office).

DEPARTMENT OF HEALTH (1998b) *A Guide to Specialist Registrar Training* (London, DoH).

DEPARTMENT OF HEALTH (1998c) *Information for Health: An Information Strategy for the Modern NHS 1998–2005* (London, DoH).

ENGLISH NATIONAL BOARD (1991) *Professional Portfolio* (London, ENB).

FOX, N.J., DOLMAN, E., LANE, P., O'ROURKE, A.J. & ROBERTS, C. (In press) The Wisdom Project: training primary care professionals in informatics in a collaborative virtual classroom, *Medical Education*.

GENERAL MEDICAL COUNCIL (1993) *Tomorrow's Doctors: Recommendations On Undergraduate Medical Education* (London, Stationery Office).

GENERAL MEDICAL COUNCIL (1997) *The New Doctor* (London, GMC).

GENERAL MEDICAL COUNCIL (1999) *The Early Years* (London, GMC).

GIBBS, G. (1992) *Improving The Quality Of Student Learning* (Bristol, Technical and Education Services).

GRAHAM, J. (1989) portfolios and their implications for portability in modular schemes, *British Journal of In Service Education*, 15, pp. 46–50.

HALL, D. (1992) Professional development portfolios for teachers and lecturers, *British Journal of In Service Education*, 18, pp 81–86.

HARDEN, R.M., CROSBY, J.R. & DAVIS, M.H. (1999) An introduction to outcome-based education, *Medical Teacher*, 21(1), pp. 7–14.

HETHINGTON, C. & BARCELO, R. (1985) Womentoring, *Journal Of The National Association on Women Deans Administrators and Counseling*, 9, pp. 2–15.

KNOWLES, M. (1970) Andragogy: an emerging technology for adult learning, in: M. TIGHT (Ed.) *Education for Adults: Adult Learning and Education* (London, Croom Helm).

KOLB, D.A. (1984) *Experiential Learning* (Chicago, Prentice Hall).

MADDEN, C.A. & MITCHELL, V.A. (1993) *Professions, Standards and Competence* (Bristol, University of Bristol).

MARTON, F. & SALJO, R. (1984) Approaches to learning, in: F. MARTON, D. HOUNSELL & N.J. ENTWISTLE (Eds) *The Experience of Learning* (Edinburgh, Scottish Academic Press).

MATHERS, N.J., CHALLIS, M., HOWE, A.C. & FIELD, N.J. (In press) Portfolios in continuing medical education—effective and efficient?, *Medical Education*.

MAY, K. et al. (1982) In: J. DONOVAN (1990) The concept and role of mentor, *Nurse Education Today*, 10, 294–298.

MEZIRROW, J. (1981) A critical theory of adult learning and education, In: M. Tight (Ed) (1983), *Adult Learning and Education* (London, Croom Helm).

NEWBLE, D.I., & ENTWISTLE, N.J. (1986) Learning styles and approaches: implications for medical education, *Medical Education*, 20(3) pp. 162–178.

PIAGET, J. (1929) *The Child's Conception of the World* (London, Routledge & Kegan Paul).

PITTS, J., COLES, C. & PERCY, D. (1998a) Performance based certification and recertification of general practice trainers: a new direction, *Education for General Practice*, 9, pp. 291–298.

PITTS, J., COLES, C. & THOMAS, P. (1998b) Exploring the introduction of a performance based component into the certification and recertification of general practice trainers, *Education for General Practice*, 9, pp. 316–324.

REDMAN, W. (1994) *Portfolios for Development* (London, Kogan Page).

RIEDEL, K.F. (1973) Dialectic operations: the final period of cognitive development, *Human Development*, 16(3).

ROBERTS, C. & FOX, N.J. (1998) General practitioners and the internet: modelling a virtual community, *Family Practice*.

ROYAL COLLEGE OF GENERAL PRACTITIONERS (1993) *Occasional Paper 63: Portfolio-Based Learning In General Practice* (London, RCGP).

SCHON, D. (1983) *The Reflective Practitioner: How Professionals Think in Action* (London, Basic Books).

SCHON, D. (1987) *Educating the Reflective Practitioner: Towards a New Design for Teaching and Learning in the Professions* (San Francisco, Jossey Bass).

SEDA/UCOSDA (1996) *The Staff Developer and Mentoring*, Staff Development Paper No. 3 (Sheffield, SEDA/UCOSDA).

SIMOSKO, S. (1991) *APL: A Practical Guide For Professionals* (London, Kogan Page).

SNADDEN, D. & THOMAS, M. (1998a) Portfolio learning in general practice vocational training—does it work?, *Medical Education*, 32, 401–406.

SNADDEN, D. & THOMAS, M. (1998b) AMEE Guide No 11: The use of portfolio learning in medical education, *Medical Teacher*, 20(3), pp. 192–199.

- SNADDEN, D., THOMAS, M. L., GRIFFIN, E.M. & HUDSON, H. (1996) Portfolio based learning in general practice vocational training, *Medical Education*, 30, 148–152.
- USHERWOOD, T. & HANNAY, D. (1992) Profile based assessment of student project reports, *Medical Teacher*, 14, 189–196.
- USHERWOOD, T., CHALLIS, M., JOESBURY, H. & HANNAY, D. (1995) Competence based summative assessment of a student directed course: involvement of key stakeholders, *Medical Education*, 29, 144–149.
- WATKINS, J., DRURY, L. & BRAY, S. (1996) *The Future of the UK Professional Associations* (Cheltenham, Cheltenham Strategic Publications).
- WISDOM Project Report may be found on the WWW at: <http://www.shef.ac.uk/uni/projects/wrp/>