



## Best evidence on the educational effects of undergraduate portfolios

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### SUMMARY

**Background:** The great variety of portfolio types and schemes used in the education of health professionals is reflected in the extensive and diverse educational literature relating to portfolio use. We have recently completed a Best Evidence Medical Education (BEME) systematic review of the literature relating to the use of portfolios in the undergraduate setting that offers clinical teachers insights into both their effects on learning and issues to consider in portfolio implementation.

**Methods:** Using a methodology based on BEME recommendations, we searched the literature relating

to a range of health professions, identifying evidence for the effects of portfolios on undergraduate student learning, and assessing the methodological quality of each study.

**Results:** The higher quality studies in our review report that, when implemented appropriately, portfolios can improve students' ability to integrate theory with practice, can encourage their self-awareness and reflection, and can offer support for students facing difficult emotional situations. Portfolios can also enhance student-tutor relationships and prepare students for the rigours of postgraduate training. However,

the time required to complete a portfolio may detract from students' clinical learning. An analysis of methodological quality against year of publication suggests that, across a range of health professions, the quality of the literature relating to the educational effects of portfolios is improving. However, further work is still required to build the evidence base for the educational effects of portfolios, particularly comparative studies that assess effects on learning directly.

**Discussion:** Our findings have implications for the design and implementation of portfolios in the undergraduate setting.

**Portfolios can improve students' ability to integrate theory with practice**

**It can be difficult to extract coherent messages from individual studies on the benefits or otherwise of portfolio use**

## INTRODUCTION

In recent years, an increasing emphasis on reflective, competency-based practice has led to an expansion in the use of portfolios in the education of doctors and other health professionals.<sup>1,2</sup> Educators and researchers have reported extensively on portfolio developments, such that there is now an extensive body of literature on the subject that reflects the varied and complex array of portfolios in use.

What should the clinical teacher make of this body of literature? Faced with a requirement to mentor or assess students keeping a portfolio, or to decide whether and how to introduce a portfolio for a particular group of students, it can be difficult to extract coherent messages from individual studies on the benefits or otherwise of portfolio use. Portfolios vary widely, both in content and method of implementation,<sup>3,4</sup> and there is much debate about the pros and cons of using portfolios as educational tools.<sup>5,6</sup> The findings of our recently completed Best Evidence Medical Education (BEME) collaboration systematic review will help undergraduate clinical teachers to navigate their way through the maze of literature on portfolios to inform their own pedagogic practice, to assist in decision making and the effective deployment of resources, and to identify avenues for research.<sup>7</sup>

Our review addressed the question 'How does the use of a portfolio affect student learning in undergraduate medical education?' It included all available primary research studies that investigated the effects, direct or indirect, of using a portfolio in an undergraduate setting. We defined portfolios as either a 'collection of evidence' of student learning, as a 'learning journal' or 'learning diary', or as a 'hybrid'

containing both of these two elements. We defined 'undergraduate' as a course of initial training leading to a degree qualification, and so included the experience of graduate entry courses, such as can be found in the UK, USA and elsewhere. We wished to draw on the experience of all clinically focused health professionals, some of whom have considerable experience of using portfolios, and therefore included studies relating to nursing and other allied health professions. In other respects our review was exploratory. We did not exclude studies on the basis of outcome measure, language of publication or geography, nor, in the initial stages, on the grounds of methodological quality.

Full details of our literature search and selection methods can be found elsewhere.<sup>7</sup> We searched 10 databases, from inception through to February 2007: MEDLINE, EMBASE, PsycInfo, CINAHL, British Education Index, Australian Education Index, British Nursing Index, ERIC, ASSSIA and Web of Science. We also hand searched the reference lists of articles identified as relevant for further studies. Applying the selection criteria outlined above to the results of our searches yielded a total of 69 relevant studies: 18 from medicine, 32 from nursing, and 19 from dentistry and other professions allied to medicine. To assess the strength of the evidence base for the educational effects of portfolios, we assessed all included studies against the Kirkpatrick hierarchy as modified for use in educational settings,<sup>8</sup> and against our own checklist of 11 quality indicators.

Only one study (from nursing) reported a change in the learners' behaviour that was assessed as level 3 on the Kirkpatrick hierarchy as a result of using a portfolio. Other studies were either at level 1 (learners' views of the



portfolio) or level 2 (change in knowledge, skills or attitudes of learners), with most studies being post hoc evaluations of learner or tutor perceptions. Nineteen studies met seven or more of our quality indicators, and were considered to be of 'higher quality'. Analysis of quality 'score' against year of publication identified significant increases in the quality 'score' of studies published in 2004 or later, as compared with older studies, suggesting an encouraging trend in the quality of research and study reporting.

Our review indicates that more work is required to build the evidence base for the effects of portfolios on undergraduate student learning, particularly direct observational or controlled studies. However, the higher quality studies in our review suggest some clear messages for practising clinical teachers who are part of, or who wish to develop, a portfolio within their undergraduate curricula.

## MAIN MESSAGES FOR CLINICAL TEACHERS

Table 1 summarises the main outcomes from the higher quality studies in our review, together with references to the relevant primary research studies for further reading.

### Improvements in knowledge and understanding

Several studies across different professions (Table 1) reported that using a portfolio helped students to identify their learning needs, to improve their knowledge and understanding

**Table 1. Key sources of evidence and further reading for the effects of portfolios on undergraduate student learning**

Effect on learning	Key sources of evidence and further reading
Improvement in knowledge and understanding, especially the ability to integrate theory with practice.	Grant A, Kinnersley P, Metcalf E, Pill R, Houston H. Students' views of reflective learning techniques: an efficacy study at a UK Medical School. <i>Med Educ</i> 2006; <b>40</b> :379–398. Rees C, Sheard C. Undergraduate medical students' views about a reflective portfolio assessment of their communication skills learning. <i>Med Educ</i> 2004; <b>38</b> :125–128. Lonka K, Slotte V, Halttunen M, Kurki T, Tiitinen A, Vaara L, Paavonen J. Portfolios as a learning tool in obstetrics and gynaecology undergraduate training. <i>Med Educ</i> 2001; <b>35</b> :1125–1130. Finlay IG, Maughan TS, Webster DJT. A randomized controlled study of portfolio learning in undergraduate cancer education. <i>Med Educ</i> 1998; <b>32</b> :172–176. Fakude LP, Bruce JC. Journaling: a quasi-experimental study of student nurses' reflective learning ability. <i>Curationis</i> 2003; <b>26</b> :49–55. Tiwari A, Tang C. From process to outcome: the effect of portfolio assessment on student learning. <i>Nurse Education Today</i> 2003; <b>23</b> :269–277.
Encouragement to attain self-awareness and reflection.	Duque G, Finkelstein A, Roberts A, Tabatabai D, Gold SL, Winer LR, and Members of the Division of Geriatric Medicine, McGill University. Learning while evaluating: the use of an electronic evaluation portfolio in a geriatric medicine clerkship. <i>BMC Med Educ</i> 2006; <b>6</b> :4. Driessen EW, van Tartwijk J, Overeem K, Vermunt JD, van der Vleuten CP. Conditions for successful reflective use of portfolios in undergraduate medical education. <i>Med Educ</i> 2005; <b>39</b> :1230–1235. Kok J, Chabeli MM. Reflective journal writing: How it promotes reflective thinking in clinical nursing education: A students' perspective. <i>Curationis</i> 2002; <b>25</b> :35–42. Schaffer MA, Nelson P, Litt E. Using portfolios to evaluate achievement of population-based public health nursing competencies in baccalaureate nursing students. <i>Nurs Educ Perspectives</i> 2005; <b>26</b> :104–112. Dahllof G, Tsilingaridis G, Hindbeck H. A logbook for continuous self-assessment during 1 year in paediatric dentistry. <i>Eur J Paediatr Dent</i> 2004; <b>5</b> :163–169. Spence W, El-Ansari W. Portfolio assessment: Practice teachers' early experience. <i>Nurse Educ Today</i> 2004; <b>24</b> :388–401. Richardson G, Maltby H. Reflection on practice: Enhancing student learning. <i>J Adv Nurs</i> 1995; <b>22</b> :235–242. Tryssenaar J. 1995. Interactive journals: An educational strategy to promote reflection. <i>Am J Occup Ther</i> 1995; <b>49</b> :695–702. Plus Grant <i>et al.</i> 2006; as listed above.
Influence on the quality of tutor awareness of student need and pedagogic practice.	Lonka <i>et al.</i> 2001; Dahllof <i>et al.</i> 2004; Tryssenaar 1995; as listed above.
Emotional support for students facing difficult situations.	Nairn S, O'Brien E, Traynor V, Williams G, Chapple M, Johnson S. Student nurses' knowledge, skills and attitudes towards the use of portfolios in a school of nursing. <i>J Clin Nurs</i> 2006; <b>15</b> :1509–1520. Plus Grant <i>et al.</i> 2006; Finlay <i>et al.</i> 1998; Driessen <i>et al.</i> 2005; Kok & Chabeli 2002; Dahllof <i>et al.</i> 2004; as listed above.
Preparation for postgraduate training.	Rees C, Shepherd M, Chamberlain S. The utility of reflective portfolios as a method of assessing first year medical students' personal and professional development. <i>Reflect Pract</i> 2005; <b>6</b> :3–14. Plus Rees & Sheard 2004; as listed above.
Effects on other (clinical) learning.	Davis MH, Ben-David MF, Harden RM, Howie P, Ker J, McGhee C, Pippard MJ, Snadden D. Portfolio assessment in medical students' final examinations. <i>Med Teach</i> 2001 <b>23</b> :357–366. Plus Rees 2005; Kok & Chabeli 2002; as listed above.
Enhancement of IT skills.	Davis 2001; Rees 2005; as listed above.
Improvement in organisational skills.	Tiwari & Tang 2003; as listed above.
Development of collaborative learning.	
The influence of assessment.	Grant 2006; Driessen 2005; Davis 2001; Richardson and Maltby 2005; as listed above.

Several studies across different professions reported that using a portfolio helped students to identify their learning needs

**Portfolios have the potential to enhance undergraduate students' learning significantly**

and, particularly, to integrate theory with practice. However, this did not always translate into improved assessment scores.

**Self-awareness and reflection**

Similarly, several studies across different professions (Table 1) reported that using a portfolio highlighted students' self-awareness, and encouraged them to reflect on their practice. However, analysis of the quality of the reflective entries in the portfolios of student nurses suggested that using a portfolio was, in itself, insufficient to enable students to engage in *high quality* reflection.

**Effects on feedback and student-tutor relationships**

The influence of portfolios on the quality of student-tutor relationships was also apparent across all professional groups, with improvements in the quality of tutorial discussions and tutor feedback, in tutor awareness of students' learning needs, and in levels of trust between students and tutors all being reported.

**Emotional support for students in difficult situations**

Studies from medicine, nursing and dentistry suggest that the opportunity to reflect, and the tutor support offered by the completion of a portfolio, helped students to deal with difficult emotional situations, such as coping with a patient's death or managing uncertainty. However, a study from nursing (Table 1) reported that their students often did not want to reveal their emotions in a semi-public forum. Similarly, a study from medicine (Table 1) suggested that keeping a portfolio could force students to confront difficult situations in their personal life that they found difficult to deal with.

**Preparation for postgraduate training**

Two studies in medicine reported that keeping a portfolio provided students with the opportunity

to prepare for the requirements of postgraduate training.

**Time requirements and effects on other learning**

Completing and reviewing portfolios was widely viewed as time consuming and burdensome, by both students and tutors. For medical students, this could reach the point where it affected their clinical learning or detracted from their clinical skills.

**The influence of assessment**

Assessment of portfolios, either formative or summative, was the norm amongst higher quality studies. However, reports of the influence of assessing the portfolio on student learning were mixed, with some authors reporting that assessment was a major driver for portfolio completion, without which students would not engage in the effort required, and others suggesting that assessment inhibited students' willingness to engage in honest and open reflection.

**IMPLICATIONS FOR CLINICAL TEACHERS**

It is clear from the literature that portfolios have the potential to enhance undergraduate students' learning significantly. However, for these benefits to be realised, careful consideration must be given to the design and implementation of portfolios in

educational programmes (Box 1). Specific support in the development of reflective skills is required, particularly in the early stages of portfolio completion, and the portfolio should be used for as long a duration as possible, in order to allow these complex skills to develop. Undergraduate portfolios should mirror, as far as possible, the demands of postgraduate training, and their time demands, on both students and staff, should be reasonable. Clear, specific aims and objectives that are well understood by both tutors and students, and that align to course outcomes, are needed, and clear guidance to tutors and students on requirements, word limits and expected time commitments should be provided.

For clinical teachers who wish to contribute to the evidence base for the effectiveness of portfolios, many questions remain unanswered. The effects of levels of academic attainment on how successfully students engage with portfolios, how electronic formats affect student learning and student-tutor relationships, and how best to deploy portfolios for the improvement of students' reflective skills are all areas requiring further consideration. In engaging in research to answer such questions, clinical teachers may wish to consider comparative studies that measure educational effects directly, and to pay

**Box 1. Maximising the educational benefit of portfolios: some issues for clinical teachers to consider**

- How will you support the development of students' reflective skills, particularly in the early stages of portfolio use?
- For how long will your students complete a portfolio, bearing in mind that complex skills such as reflection take time to develop?
- How will you ensure that the time demands of portfolio completion do not detract from the students' other clinical learning?
- How will you align the requirements of the undergraduate portfolio with the requirements of postgraduate training?
- How will the implementation of your portfolio programme contribute to the building of the evidence base for the educational effects of portfolios on undergraduate student learning?

particular attention to the quality and thoroughness with which they report their work.

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