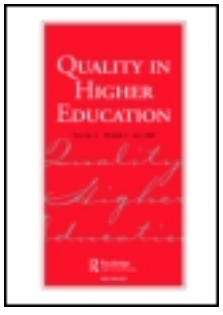

Quality in Higher Education
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/cqhe20

Factors Influencing the Successful Introduction of Portfolios

Jan Van Tartwijk [a], Erik Driessen [b], Cees Van Der Vleuten [c] & Karel Stokking [d]

[a] Leiden University, The Netherlands

[b] Maastricht University, The Netherlands

[c] Maastricht University, The Netherlands

[d] Utrecht University, The Netherlands

Version of record first published: 03 Apr 2007.

To cite this article: Jan Van Tartwijk, Erik Driessen, Cees Van Der Vleuten & Karel Stokking (2007): Factors Influencing the Successful Introduction of Portfolios, Quality in Higher Education, 13:1, 69-79

To link to this article: http://dx.doi.org/10.1080/13538320701272813

Quality in Higher Education, Vol. 13, No. 1, April 2007

Factors Influencing the Successful Introduction of Portfolios

JAN VAN TARTWIJK*, ERIK DRIESSEN, CEES VAN DER VLEUTEN & KAREL STOKKING

Leiden University, The Netherlands; Maastricht University, The Netherlands; Maastricht University, The Netherlands; Utrecht University, The Netherlands

ABSTRACT *Factors influencing the successful introduction of portfolios are described. A portfolio is a purposeful collection of all kinds of documents and other artefacts that together give an impression of how tasks were fulfilled and how competence has developed. A portfolio can also contain reflections and plans for future development. Although portfolios are often promoted as valuable instruments in innovative educational practices, the introduction of portfolios in everyday education often leads to disappointment. Factors that influence the success of the introduction of portfolios are the match between the purpose of using a portfolio and the portfolio content and structure; the educational configuration in which the portfolio is introduced; the support of teachers, students and educational leaders; and the availability of an adequate infrastructure.*

Keywords: Portfolio; educational change; portfolio introduction; portfolio purposes; competence-oriented education

Introduction

The word 'portfolio' originally has the meaning of a portable case for keeping, usually without folding, loose sheets of papers, drawings or photographs (Lyons, 1998). Traditionally, artists, architects and designers compile portfolios that give an impression of their work, with the aim of convincing prospective customers of its quality. In the last 20 years, the use of portfolios has gained popularity in higher education (Keesen *et al.*, 1996, Wright *et al.*, 1999; Davis *et al.*, 2001; Baume & Yorke, 2002). However, experiences with the actual introduction of portfolios have frequently been disappointing (Koretz, 1998; Pearson & Haywood, 2004).

At least three factors influence the successful introduction of portfolios. The first factor is concerned with the match between the goals that portfolios are supposed to help realise, and their content and structure. In the last 20 years, the use of portfolios has been proposed to attain various educational goals. As a consequence, the content and structure of portfolios has diversified. Originally, portfolios were suggested as instruments that could be used to assess skills and competencies where traditional assessment instruments are not valid (Bird, 1990). These portfolios contained a purposeful collection of documents and

*Corresponding author. Leiden University, ICLON—Graduate School of Teaching, P.O. Box 9555, NL-2300 RB Leiden, The Netherlands. Email: jtartwijk@iclon.leidenuniv.nl

ISSN 1353-8322 print; 1470-1081 online/07/010069-11
DOI: 10.1080/13538320701272813

other artefacts that together give an impression of how tasks were fulfilled and competence had developed. Compared to other assessment instruments, such as assessment-centre procedures and low-inference observation schedules tied to lists of competencies, these portfolios provided a new opportunity for assessors to see how the person compiling the portfolio performs in authentic contexts and to take account of the limitations and opportunities that such varying contexts provide (Edgerton *et al*., 1991; Shulman, 1998). In the years following its introduction as an instrument for assessment, portfolios were promoted for other educational purposes as well. First, portfolios were advocated as an instrument for stimulating reflection (Wade & Yarbrough, 1996; Spandel, 1997; Driessen *et al*., 2005). Reflection can be defined as the mental process of trying to structure or restructure an experience, a problem, or existing knowledge (Korthagen *et al*., 2001). Learners need cognitive tools like refection to be able to understand their development (Klenowski, 2002) and plan their learning (Korthagen *et al*., 2001). Developing a portfolio can stimulate reflection because collecting work samples, evaluations and other types of illustrative artefacts require people to look back at what they have done and analyse what they have accomplished. Reflective thinking is also stimulated, simply because often people developing a portfolio are asked to write reflections and include them in their portfolios. Examples of such written reflections included in portfolios are reflective journals or diaries (Snadden *et al*., 1999), reflective essays (Wade & Yarbrough, 1996), mission statements and self evaluations (Seldin, 1997). Second, the portfolio was promoted as an instrument to support the planning and monitoring of professional development (Järvinen & Kohonen, 1995). To realise this goal, written learning objectives and development plans were included in portfolios (Mathers *et al*., 1999; Snadden *et al*., 1999; Oermann, 2002). A consequence of the increased educational multi-functionality of portfolios is that the label portfolio refers to a broad range of instruments nowadays. Educational developers and managers that want to purchase a portfolio system or design one themselves, can easily get lost while they try to find their way in a forest of goals and portfolio content. Students and teachers trying to use a portfolio very often have no clear idea as to exactly which goals the portfolio is supposed to help them attain and how they should proceed to achieve those goals (Carroll *et al*., 1996; Anderson & DeMeulle, 1998; Darling, 2001).

A second factor influencing the success of the introduction of portfolios regards the learning environment in which portfolios are used. Portfolios are embraced by a growing number of schools and universities as an instrument that will help them implement innovative educational practices that are given labels such as lifelong learning, situated learning, authentic learning, self-directed learning, and competence-based education. In theory, in these innovative educational practices learning environments are to be realised in which students are challenged and stimulated to act as active and self-directed learners, and in which they acquire new knowledge and skills in the context of authentic, complex task situations (Elshout-Mohr *et al*., 2002). In such learning environments, portfolios have great potential as instruments for assessment that take the authentic context into account, and as instruments that stimulate reflection and facilitate the systematic planning of learning. In practice, however, the new learning environments are not fully implemented. As a consequence portfolios are often used in learning environments for which they are less suited (Driessen *et al*., 2005).

A third factor influencing the success of portfolios has to do with the context of their introduction. Very often, portfolios are introduced as part of major educational innovations in which new educational practices are introduced. These innovations mean that teachers and students have to change their routines: for instance, from lecturing and listening to

coaching and self-directed learning. Resistance to such a change of routines is easily projected onto the portfolio as one of the most visible symbols of such innovations.

In this article, the available literature is used to catalogue the main obstacles for a successful introduction of portfolios in education. Solutions will be suggested by answering three questions: How should the content and structure of a portfolio vary with the intended purposes? When is it functional to work with a portfolio? What conditions must be met to facilitate successful implementation of a portfolio in higher education?

How should the content and structure of portfolios vary with the intended purposes?

Portfolios have been advocated as instruments for assessment, stimulating reflection and monitoring and planning the development of competence. This has had consequences for the content and structure of portfolios. An example of a portfolio that is only intended for assessment purposes is described by Peterson (1995). This portfolio, Peterson prefers to refer to it as 'dossier', only holds documents or other artefacts with which someone can show competence presented in a pre-structured format. An example of a portfolio aimed at stimulating reflection is described by Driessen *et al*. (2003). Written reflections have a central place in this portfolio. Documents and artefacts are primarily used to underpin these reflections. Snadden and Thomas (1998) describe a portfolio that is (also) used for tracking progress and plan future development. This portfolio contains, amongst others, descriptions of routine experiences and learning plans.

Because portfolios can differ so much, Spandel (1997) compared the introduction of a portfolio in education with buying shoes: 'One size does not fit all and the best choice depends on purpose'. With this analogy, Spandel criticised the practice that very often portfolios are adopted by schools or universities without first carefully scrutinising whether the structure and content of the portfolio that are to be used match the educational goals that portfolios are supposed to help realise.

This means that, after answering the question whether it is functional to work with a portfolio, the next problem is how to design or select a portfolio that fits the intended purpose (Wolf & Dietz, 1998). Portfolios tailored to one particular school or university and working perfectly in that context, may be unfit for other schools or universities. This problem is even more obvious when schools and universities purchase electronic portfolio systems that are built by software companies. Very often these companies have specific educational purposes in mind. For instance, the purposes of the school or university that was their partner in the development of the portfolio system. However, those are not necessarily the purposes for which other schools or universities want to use a portfolio.

How a portfolio can be critically scrutinised to establish its suitability is illustrated by the triangle depicted in Figure 1. The triangle enables the location of a portfolio in different positions in accordance with its principal objectives.

A portfolio can be used for a combination of goals. When working with portfolios is intended to help realise such a combination of goals, its position on the triangle will shift towards the centre as the weight should be more equally distributed over evidence, overviews and reflections. In practise, most portfolios are not located in one of the extreme corners of this triangle.

A controversial issue in the literature on the use of portfolios in education is the use of one portfolio for both assessment and reflection (Snyder *et al.*, 1998; Wolf & Dietz, 1998; Tigelaar *et al.*, 2004). An argument against combining these goals is that assessment can jeopardise the quality of reflection, thereby reducing the portfolio's effectiveness for coaching purposes.

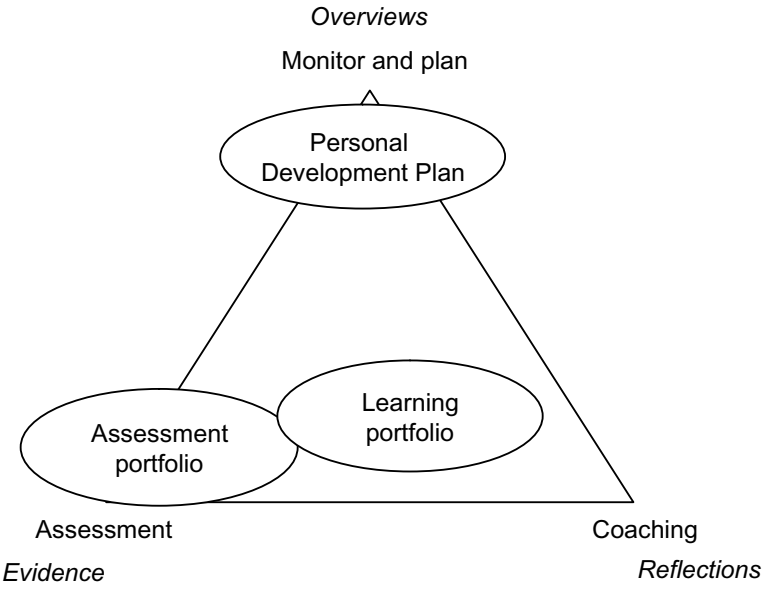

FIGURE 1. Purposes and content of portfolios

Reflection can be hampered because students may be reluctant to show their less successful efforts at specific tasks and reflect on what they can do to improve, if they run the risk that showing the less successful effort will turn against them in an assessment situation. A counter argument is that assessment directs the activities of students (Frederikson, 1984; van der Vleuten *et al.*, 2000), implying that when the portfolio is not assessed, students are less likely to invest time in compiling one. In a discussion about this dilemma, Snyder and his colleagues wrote that: 'The tension between assessment for support and assessment for high stakes decision making will never disappear. Still, that tension is constructively dealt with daily by teacher educators throughout the nation' (Snyder *et al.*, 1998, p. 59). Striking the right balance here is the challenge for the assessors/coaches with whom students discuss their portfolios.

When is it functional to work with portfolios?

Elshout-Mohr and her colleagues (2002) have developed a typology of educational configurations that is helpful for identifying learning environments in which portfolios can be useful. They distinguish three typical educational configurations: teacher-directed education, standard-oriented education, and competence-oriented education. The functionality of portfolios in these configurations will be described below. In this description, a distinction is made between the educational goals for which portfolios are to be used; the learning activities students must undertake to achieve these goals; and the type of learning environment that will be most conducive to these learning activities. Portfolios can be regarded as one of the instruments that constitute the students' learning environment.

Teacher-directed education focuses primarily on knowledge acquisition. The educational goals, intended learning activities, and the learning environment are typically uniform for all students. All students follow the same programme, based on the implicit assumption that all students learn in a similar manner and at a similar pace. Student learning is usually assessed by uniform written tests. Because portfolios are useful for monitoring, planning,

discussing and/or assessing the development of individual students, they have no useful role to play in teacher-directed education.

In standard-oriented education, learning goals include writing, research, and communication skills. These goals are usually identical for all students. They are formulated in the form of a fixed set of standards or criteria. However, skill development depends, among other things, upon the individual student's starting competence, abilities and learning style. Students are likely to vary with regard to how, where, and when they practice skills. This requires a flexible learning environment. In this type of learning environment, portfolios can have a useful function in monitoring, planning, and directing students' development and as a stimulus for students to reflect on their development. Although a portfolio could be used for assessment in this configuration, it seems more efficient to have some form of assessment of performance in a standardised situation.

Finally, in competence-oriented education, the learning goals, learning activities, and learning environment can differ for each student. Competence refers to the ability to perform certain tasks in often hectic and complex day-to-day work settings, and this requires successful integration of knowledge, skills, attitudes, and personal characteristics (Stoof *et al.*, 2002). There are several ways in which tasks can be completed successfully. Moreover, tasks are performed in different contexts (i.e. learning environments) that vary in nature and difficulty. This means that the difference between success and failure can be subject to debate. An example of competence learning is learning to teach in everyday classrooms. Classroom contexts can vary enormously. One student teacher may teach underprivileged students in a hectic inner-city school, whereas another student teacher may work in a school in a quiet wealthy suburb. With such varying contexts, portfolios can be an excellent instrument for students to show which tasks they have fulfilled in which contexts, how well they have achieved their goals given the circumstances in which they worked, how their competencies are developing over time, how they have reflected on their development, and what actions they have taken to improve their performance. In competence-oriented education, portfolios can be useful not only for monitoring, planning and coaching students' development, but for assessment as well. The assessment instruments used in competence-oriented education should be able to deal with variations in individual student's approaches and circumstances and give students an active role in the assessment process. The portfolio was introduced as an assessment instrument precisely to enable such flexible assessments (Edgerton *et al.*, 1991; Shulman, 1998).

The question 'When is it functional to work with portfolios?' can be answered by saying that the more flexible the educational configuration, the more functional a portfolio is likely to be. Reports of successful introductions of portfolios usually originate from the context of teacher education (Freidus, 1998), medical education (Davis *et al.*, 2001), and professional development (Fry *et al.*, 2002), where learning in authentic situations is a key feature of the curriculum and education is aimed at the development of competence. Teacher-directed learning environments often prove to be less fruitful learning environments for working with portfolios (Driessen *et al.*, 2005). For educational policy-makers this should be a warning against introducing a portfolio without first ascertaining that the educational configuration is suited for the envisaged goals.

What conditions must be met to facilitate a successful introduction of portfolios in higher education?

In the previous sections, it is argued that it is important to tailor portfolios to the intended purposes and to introduce portfolios only in educational configurations in which they serve

a useful purpose. However, this will not suffice to guarantee successful introduction. In the literature on educational change, winning the heart and minds of the people involved, the teachers and students, and the quality of leadership are identified as key factors for lasting educational improvement (Martin *et al.*, 2003Hargreaves & Fink, 2004; Darling-Hammond *et al.*, 2005). For many schools and universities, introducing a portfolio is only one aspect of making a shift to another educational configuration. Making such a shift can cause resistance and asks a lot from the educational leaders. Frustrations are easily projected onto the portfolio as one of the most visible symbols of such innovations. Figure 2 provides a model in which portfolios are presented as part of the learning environment and in which three conditional factors are presented that influence the success of the introduction of portfolios in education: people (the teachers and students), leadership, and infrastructure. The importance of these three conditional factors for a successful introduction of portfolios will now be discussed.

People

In traditional teacher-directed education, gathering knowledge is regarded as the central goal of education. Introducing educational methods that involve the use of portfolios usually signifies a transfer to another type of educational configuration. In these new educational configurations, teachers are expected to invest more time and effort in coaching students' skills and competence development and in using authentic assessment methods. They will spend less time with theoretical instruction and can rely less on traditional testing (Vermunt, 1995). Almost inevitably, this change in roles and routines will cause uncertainty and evoke resistance (Hammerness *et al.*, 2005). Not only does it imply that teachers need to rethink key ideas, practices, and even values, for many teachers it also means that they need to invest in developing new competencies for coaching and assessment. Teachers are more likely to support and invest in these changes if they acknowledge and subscribe to the educational value of the new learning approach, internalise and support the innovation, and are empowered to assume ownership of it. They are more likely to do so, when it is clear to them how the innovations helps solve concrete problems that they have to cope with themselves in their everyday practise (Hargreaves *et al.*, 1998; van Veen *et al.*, 2005).

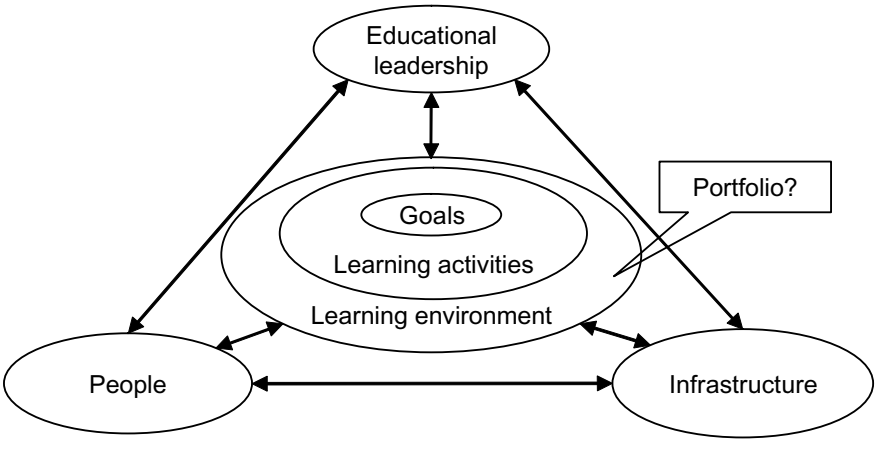

FIGURE 2. Model of factors influencing the successful introduction of portfolios in education

In many educational innovations that involve the use of a portfolio, attention tends to be focused on the portfolio as a technical instrument and less attention is being paid to the problems it is supposed to solve or the new possibilities it may generate. The portfolio is, as it were, the face of the educational innovation. As a consequence, resistance to the innovation is likely to be projected onto the portfolio. This risk can be reduced if teachers are involved in educational innovations at an early stage of decision-making. They are more likely to support and invest in working with a portfolio if they have chosen to work with this instrument themselves because they understand and endorse the educational innovation and the role of the portfolio in the new educational configuration. From this perspective, the option should be kept open of not using a portfolio when a better alternative is found. Teachers who have a say in the choice for working with portfolios will be more strongly committed and will be more prepared to look for solutions and are less likely to lay the instrument aside when problems and inevitable design faults in the curriculum and the portfolio show up.

In the literature on educational change the importance of teachers as change agents is emphasised (Darling-Hammond *et al.*, 2005; van Veen *et al.*, 2005) but the input of students is crucial too. The successful introduction of a portfolio in education also depends on how much time and energy students are willing to invest in developing a portfolio. In general, students will only put effort into portfolios if this effort is rewarded in some way. The most obvious reward is that the portfolio is graded. In education, a very strong relation exists between summative assessment and learning: assessment drives student learning (Frederiksen, 1984; Black & Williams, 1998; Driessen & van der Vleuten, 2000; van der Vleuten *et al.*, 2000).

Although assessment influences whether students will accept and put effort into the portfolio, assessment in itself is not enough. For students, developing a portfolio implies putting a lot of effort into making their development visible. Thus, it is very frustrating for them if they discover that nobody takes a good look at the result of all their hard work. Coaches who take an interest in the students and their portfolios have been found to be a key factor in students' appreciation of working with portfolios (Freidus, 1998; Pearson & Heywood, 2004; Tigelaar *et al.*, 2006).

A last condition related to student support, is students' understanding of the reasons for developing a portfolio and of what working with portfolios entails. Experience has shown that, although in theory portfolios can have a clear function in education, in practice the introduction of portfolios often leads to confusion (Anderson & DeMeulle, 1998; Darling, 2001). Most students are used to traditional teacher-centered education when they start working with a portfolio for the first time. Darling reports an interview with a student who found the idea of a portfolio so alien to her previous experience 'that it was intimidating' (Darling, 2001, p. 114). Clear instructions, for instance using analogies with the aim to relate portfolios to students' existing frames of reference, are important. Examples of portfolios and assistance of students who have experience with portfolios can also help students get the idea of the portfolio.

Educational leadership

Commitment by educational leaders is another vital condition for the successful introduction of portfolios. In a study on perceptions of leadership in academic contexts, Martin *et al.* (2003) found that the quality of student learning is affected by the way leadership is constituted and experienced in academic contexts. A group of educational leaders was identified who were successful in stimulating their teachers to adopt a student-focused approach to

teaching. A characteristic of these educational leaders is that they do not impose changes but discuss and negotiate these changes with the teachers: but discussing and negotiating alone is not enough. Commitment is also reflected in the allocation of sufficient financial resources to ensure that the intended changes can actually be implemented. Herman and Winters (1994) even emphasised that a huge scale of investment is necessary to help teachers develop the skills needed to make an educational success of portfolios. When educational innovations ask teachers to change their roles and routines, these teachers must know that they can rely on educational leaders who support and value their commitment in every respect (Malden, 1994; van Veen, 2003).

Infrastructure

An increasing number of educational institutions are choosing to work with electronic rather than paper portfolios. The first reason for this preference for electronic over paper portfolios is related to infrastructure: paper portfolios are difficult to store and transport because of their bulk (Wolf, 1991). Imagine a teacher who needs to take more than 25 paper portfolios home! Furthermore, there is generally only one copy available of a paper portfolio. Whenever students give their paper portfolios to teachers or assessors, they are literally letting them go out of their hands. Not only do they run the risk of the portfolio getting lost but it also makes it more difficult for them to prepare for discussion of their portfolio. The second reason for the choice of an electronic portfolio is related to content. An advantage of an electronic portfolio can be that, with the aid of hyperlinks, it is easier to make connections between evidence, overviews, and reflections (van Tartwijk *et al*., 2003). The combination of evidence, overviews, and reflections creates a richer picture of students' work and development than these types of content in isolation. Evidence is easier to interpret when there is a link to an overview that shows in which context and phase of a student's development it was collected. Reflections can be supported by links to evidence. Overviews are more lively and meaningful when supported by materials and students' reflections on their development.

Inevitably, there are disadvantages as well. Electronic portfolios can only be used by students and teachers who have sufficient skills in handling the software and hardware, and, even more importantly, electronic portfolios make significant demands on the technical infrastructure. Nowadays a number of dedicated portfolio-programs are available. These programs can take away many of the infrastructural problems and are usually very user-friendly. Another option is to use standard word-processors or HTML-editors, preferably the ones that students and teachers are familiar with (Gibson & Barrett, 2003). Such standard software tools have disadvantages from the perspective of managing access to the portfolio using the internet, but they usually provide all the options students need to produce a portfolio that works well and looks great. Because students have more freedom in creating their portfolio and can give their portfolio a personal touch and tailor it to their personal circumstances, they are more likely to assume ownership of the portfolio and do not regard it as something that is imposed on them. This is likely to motivate them to invest time in their portfolios. Here again, there is a downside: too much 'personal touch' may result in a portfolio that lacks focus and cohesion. Therefore, students should not change the basic structure of their electronic portfolio and remember that it has to be navigable.

Concluding remarks

Common to all portfolios is that they fulfil a role in learning environments that challenge and stimulate students to act as active and self-directed learners in a (dynamic) learning

context that requires authentic and complex professional tasks. Portfolios have great potential for fostering the success of new educational approaches that highlight the students' development. At the same time, portfolios are highly vulnerable to adverse effects and without careful thought and preparation portfolio projects may easily flounder and fail. The introduction of portfolios is often plagued by mistakes and misunderstandings. Resistance to change is easily projected onto the portfolio.

Potential users are well advised to first formulate a coherent vision of the new educational mission and to put considerable energy into building general commitment. Only when this stage has been successfully completed does it make sense to develop a portfolio that is carefully tailored to goals that are aligned with the educational vision. Taking this route to portfolio use will prevent false starts, wasted time and money, and disappointment and frustration. Scrupulous preparation will not only help to steer clear of pitfalls; most importantly, it will help to secure the valuable and unique contribution that portfolios can make to sustainable and effective educational innovations. The elements discussed in this paper can help to make the required careful considerations for successful portfolio implementation.

References

ANDERSON, R. S. & DEMEULLE, L., 1998, 'Portfolio use in twenty-four teacher education programs', *Teacher Education Quarterly*, 25(1), pp. 23–32.

BAUME, D. & YORKE, M., 2002, 'The reliability of assessment by portfolio on a course to develop and accredit teachers in higher education', *Studies in Higher Education*, 27(1), pp. 7–25.

BIRD, T., 1990, 'The schoolteacher's portfolio: an essay on possibilities', in: MILLMAN, J. & DARLING-HAMMOND, L. (Eds) *The new handbook of teacher evaluation: assessing elementary and secondary school teachers* (Newbury Park, CA, Corwin Press).

BLACK, P. & WILLIAM, D., 1998, 'Assessment and classroom learning', *Assessment in Education: Principles, Policy & Practice*, 5(1), 7–74.

CARROLL, J. A., POTTHOFF, D. & HUBER, T., 1996, 'Learnings from three years of portfolio use in teacher education', *Journal of Teacher Education*, 47(4), pp. 253–62.

DARLING, L. F., 2001, 'Portfolio as practice: the narratives of emerging teachers', *Teaching and Teacher Education*, 17(1), pp. 107–21.

DARLING-HAMMOND, L., PACHECO, A., MICHELLI, N., LEPAGE, P., HAMMERNESS, K. & YOUNGS, P., 2005, 'Implementing curriculum renewal in teacher education: managing organizational and policy change', in DARLING-HAMMOND, L., BRANSFORD, L., LEPAGE, P., HAMMERNESS, K. & DUFFY, H. (Eds) *Preparing teachers for a changing world: what teachers should learn and be able to do* (San Francisco, Jossey-Bass).

DAVIS, M. H., FRIEDMAN, B. D. M., HARDEN, R. M., HOWIE, P., KER, J., MCGHEE, C., PIPPARD, M. J. & SNADDEN, D., 2001, 'Portfolio assessment in medical students' final examinations', *Medical Teacher*, 23(4), pp. 357–66.

DRIESSEN, E. W. & VAN DER VLEUTEN, C. P. M., 2000, 'Matching student assessment to problem based learning: lessons from experience in a law faculty', *Studies in Continuing Education*, 22(2), pp. 235–48.

DRIESSEN, E. W., VAN TARTWIJK, J., VERMUNT, J. D. & VAN DER VLEUTEN, C. P. M., 2003, 'Use of portfolio in early undergraduate medical training', *Medical Teacher*, 25(1), pp. 18–23.

DRIESSEN, E. W., VAN TARTWIJK, J., OVEREEM, K., VERMUNT, J. D. & VAN DER VLEUTEN, C. P. M., 2005, 'Conditions for successful reflective use of portfolios', *Medical Education*, 39(12), pp. 1230–35.

EDGERTON, R., HUTCHINGS, P. & QUINLAN, K., 1991, *The teaching portfolio: capturing the scholarship in teaching* (Washington DC, American Association for Higher Education).

ELSHOUT-MOHR, M., OOSTDAM, R. & OVERMAAT, M., 2002, 'Student assessment within the context of constructivist educational settings', *Studies in Educational Evaluation*, 28(4), pp. 369–90.

FREDERIKSEN, N., 1984, 'The real test bias: influences of testing on teaching and learning', *American Psychologist*, 39(3), pp. 193–202.

FREIDUS, H., 1998, 'Mentoring portfolio development', in LYONS, N. (Ed.) *With portfolio in hand: validating the new teacher professionalism* (New York, Teachers College Press).

FRY, H., DAVENPORT, E. S., WOODMAN, T. & PEE, B., 2002, 'Developing progress files: a case study', *Teaching in Higher Education*, 7(1), pp. 97–111.

GIBSON, D. & BARRETT, H., 2003, 'Directions in electronic portfolio development', *Contemporary Issues in Technology and Teacher Education,* 2(4), pp. 559–76.

HAMMERNESS, K., DARLING-HAMMOND, L., BRANSFORD, J., BERLINER, D. C., COCHRAN-SMITH, M., MCDONALD, M. & ZEICHNER, K., 2005, 'How teachers learn and develop', in: DARLING-HAMMOND, L., BRANSFORD, L., LEPAGE, P., HAMMERNESS, K. & DUFFY, H. (Eds) *Preparing teachers for a changing world: what teachers should learn and be able to do* (San Francisco, Jossey-Bass).

HARGREAVES, A. & FINK, D., 2004, 'The seven principles of sustainable leadership', *Educational Leadership,* April, pp. 8–13.

HARGREAVES, A., LIEBERMAN, A., FULLAN, M. & HOPKINS, D. (Eds), 1998, *International handbook of educational change* (Dordrecht, Kluwer Academic Publishers).

HERMAN, J. L. & WINTERS, L., 1994, 'Portfolio research: a slim collection', *Educational Leadership,* 52(2), pp. 48–55.

JÄRVINEN, A. & KOHONEN, V., 1995, 'Promoting professional development in higher education through portfolio assessment', *Assessment and Evaluation in Higher Education,* 20(1), pp. 25–36.

KEESEN, F., WUBBELS, T., VAN TARTWIJK, J. & BOUHUYS, P., 1996, 'Preparing university teachers in the Netherlands: issues and trends', *Journal of Academic Development,* 2(1), pp. 8–16.

KLENOWSKI, V., 2002, *Developing portfolios for learning and assessment* (London, Routledge/Falmer).

KORETZ, D., 1998, 'Large-scale portfolio assessments in the US: evidence pertaining to the quality of measurement', *Assessment in Education: Principles, Policy & Practice,* 5(3), pp. 309–34.

KORTHAGEN, F. A. J., KESSELS, J., KOSTER, B., LAGERWERF, B. & WUBBELS, T., 2001, *Linking practice and theory: the pedagogy of realistic teacher education* (Mahwah, NJ, Lawrence Erlbaum Associates).

LYONS, N., 1998, 'Introduction', in: LYONS, N. (Ed.) *With portfolio in hand: validating the new teacher professionalism* (New York, Teachers College Press).

MALDEN, B., 1994, 'The micropolitics of education: mapping the multiple dimensions of power relations in school policies', *Journal of Educational Policy,* 9(5–6), pp. 147–67.

MARTIN, E., TRIGWELL, K., PROSSER, M. & RAMSDEN, P., 2003, 'Variations in the experience of leadership of teaching in higher education', *Studies in Higher Education,* 28(3), pp. 247–59.

MATHERS, N. J., CHALLIS, M. C., HOWE, A. C. & FIELD, N. J., 1999, 'Portfolios in continuing medical education—effective and efficient?' *Medical Education,* 33(7), pp. 521–30.

OERMANN, M. H., 2002, 'Developing a professional portfolio in nursing', *Orthopaedic Nursing,* 21(2), pp. 73–78.

PEARSON, D. J. & HEYWOOD, P., 2004, 'Portfolio use in general practice vocational training: a survey of GP registrars', *Medical Education,* 38(1), pp. 87–95.

PETERSON, K. D., 1995, *Teacher evaluation: a comprehensive guide to new directions and practices* (Thousand Oaks, CA, Corwin Press).

SELDIN, P., 1997, *The teaching portfolio: a practical guide to improved performance and tenure/promotion decisions* (2nd edn) (Bolton, MA, Anker).

SHULMAN, L. S., 1998, 'Teacher portfolios: a theoretical activity', in: LYONS, N. (Ed.) *With portfolio in hand: validating the new teacher professionalism* (New York, Teachers College Press).

SNADDEN, D. & THOMAS, M., 1998, 'The use of portfolio learning in medical education', *Medical Teacher,* 20(3), pp. 192–99.

SNADDEN, D., CHALLIS, M. & THOMAS, M., 1999, *Portfolio-based learning and assessment: the use of portfolio-based learning in medical education,* No. 11 (Dundee, University of Dundee).

SNYDER, J., LIPPINCOTT, A. & BOWER, D., 1998, The inherent tensions in the multiple uses of portfolios in teacher education, *Teacher Education Quarterly,* 25(1), pp. 45–60.

SPANDEL, V., 1997, 'Reflections on portfolios', in: PHYE, G. D. (Ed.) *Handbook of academic learning: construction of knowledge* (pp. 573–91) (San Diego, Academic Press).

STOOF, A., MARTENS, R. L., VAN MERRIËNBOER, J. & BASTIAENS, T. J., 2002, 'The boundary approach of competence: a constructivist aid for understanding and using the concept of competence', *Human Resource Development Review,* 1(3), pp. 345–65.

TIGELAAR, D. E. H., DOLMANS, D. H. J. M., WOLFHAGEN, H. A. P. & VAN DER VLEUTEN, C. P. M., 2004, 'Using a conceptual framework and the opinion of portfolio experts to develop a teaching portfolio prototype', *Studies in Educational Evaluation,* 30(4), pp. 305–21.

TIGELAAR, D. E. H., DOLMANS, D. H. J. M., DE GRAVE, W. S., WOLFHAGEN, H. A. P. & VAN DER VLEUTEN, C. P. M., 2006, 'Participants opinions about the usefulness of a teaching portfolio', *Medical Education,* 40(4), pp. 371–78.

VAN DER VLEUTEN, C. P. M., DOLMANS, D. H. J. M. & SCHERPBIER, A. J. J. A., 2000, 'The need for evidence in education', *Medical Teacher,* 22(3), pp. 246–50.

VAN TARTWIJK, J., DRIESSEN, E. W., HOEBERIGS, B., KÖSTERS, J., RITZEN, M., STOKKING, K. & VAN DER VLEUTEN, C. P. M., 2003, *Werken met een Elektronisch Portfolio* [Using an Electronic Portfolio] (Groningen, Wolters Noordhoff).

VAN VEEN, K., 2003, *Teachers' emotions in a context of reform* (Nijmegen, Radboud University).

VAN VEEN, K., SLEEGERS, P. & VAN DE VEN, P., 2005, 'One teacher's identity, emotions, and commitment to change: a case study into the cognitive–affective processes of a secondary school teacher in the context of reforms', *Teaching and Teacher Education,* 21(8), pp. 917–34.

VERMUNT, J. D., 1995, 'Process-oriented instruction in learning and teaching strategies', *European Journal of Psychology of Education,* 10(4), pp. 325–49.

WADE, R. C. & YARBROUGH, D. B., 1996, 'Portfolios: a tool for reflective thinking in teacher education', *Teaching and Teacher Education,* 12(1), pp. 63–79.

WOLF, K., 1991, 'The schoolteacher's portfolio: issues in design, introduction and evaluation', *Phi Delta Kappan,* 73(Oct.), pp. 129–36.

WOLF, K. & DIETZ, M., 1998, 'Teaching portfolios: purposes and possibilities', *Teacher Education Quarterly,* 25(1), pp. 9–22.

WRIGHT, W. A., KNIGHT, P. T. & POMERLEAU, N., 1999, 'Portfolio people: teaching and learning dossiers and innovation in higher education', *Innovative Higher Education,* 24(2), 89–103.