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Use of portfolios in early undergraduate medical training

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SUMMARY *The ability to reflect on one's own action is seen as an important skill for a doctor. A thorough introduction of the portfolio planned in the early stages of their studies seems to be the way to train medical students in reflection. This article describes the use of portfolios in early undergraduate medical training. The literature on portfolios suggests three aspects that are crucial for the effectiveness of portfolios: structure, coaching and assessment. The portfolio system was designed by transposing the experience with portfolio systems outside and inside medical training to a situation of first-year medical students. During the academic year 2001–02 242 first-year medical students compiled a portfolio. Student experience was collected by semi-structured interviews. The majority of students were of the opinion that analysing one's competences in a portfolio was instructive and meaningful. With regard to learning how to reflect and recognize learning needs, however, mentor coaching proved to be necessary. The results thus far show that the portfolio is a worthwhile addition to existing assessment and learning tools.*

Introduction

Traditionally, the study of medicine comprises several years of theoretical learning followed by one or two years of practical training during clerkships. A first problem with this separation between studying theory and learning in practice is that, when students are deemed to perform the task of an independent doctor, they prove to be overwhelmed by the complexity of 'real-life' situations. Their first priority will be to cope with these situations. They will accept strategies that will help them to survive, even if they are incompatible with their insights from the first part of the curriculum. Moreover, particularly during the practical period, it often becomes evident that the students' theoretical knowledge is structured the wrong way: a patient presents him/herself with complaints and symptoms, whereas the students' knowledge is structured around diagnoses (Prince *et al.*, 2000). Clerks are often almost literally told: 'Forget theory: in practice we do things this way'. Thus, they develop practical knowledge and strategies that will guide their performance as doctors, suppressing the theoretical knowledge acquired in the earlier stages of the study.

The gap between theory and practice causes an increasing number of medical schools to revise their curricula in order to teach their students to function in authentic professional situations at an earlier stage of their studies. The combination of authentic learning and theory instruction should better enable students to relate theory to practice.

An important tool for coaching and assessing authentic learning is the portfolio. In a portfolio students look back on their actions systematically, analyse them with the aid of, among other things, theoretical knowledge and designate alternative methods of action. We will refer to such a form of systematic self-regulation as 'reflection' (Korthagen, 2001). In their portfolios students underpin their reflections with illustrative materials.

The literature reports the use of portfolios in several educational contexts, including clerkships in undergraduate medical training, postgraduate training and continuous professional development. Snadden & Thomas (1998) describe how in general practice vocational training the portfolio serves as a tool for reminding, planning, tracking and encouraging reflection. Pitts *et al.* (2001) concluded that portfolios are a valuable source for learning in general practice but their use as an assessment tool may be more problematic. Challis (2001) reviewed the role of portfolios as a tool for assessment. Another example of the use of portfolios is the undergraduate cancer projects at the University of Wales College of Medicine (Finlay *et al.*, 1998). Compiling portfolios enables the students to reflect on a number of emotional and communicative aspects of working with cancer patients throughout the project. At the Medical School of Dundee, portfolios are used for summative assessment of final-year students (Davis *et al.*, 2001). These and other examples are aimed at those phases of medical training that are characterized by a large degree of authentic learning in the workplace.

In the new Maastricht curriculum, authentic learning is already introduced in the first year (http://www.fdg.unimaas.nl/bib/curriculum2001). Naturally, the emphasis is on acquisition of knowledge and skills, but authentic and sometimes genuine cases are used as a starting point. Although the portfolio is especially suited for coaching and assessing authentic learning at more senior levels of training, it was felt appropriate to introduce the portfolio in the early years of the curriculum. The express purpose was to develop the students' reflective ability. For students of both the first and the final year of medical training, reflecting on their own learning is not self-evident (Wade & Yarbourgh, 1996). Students arriving fresh from secondary education are not used to conscious reflection. Outside the domain of medical education, there is substantial evidence showing that students have to learn to reflect on their actions or learning (Ertmer & Newby, 1996). A thorough introduction of the portfolio, planned in

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the early stages of their studies, seems to be the way to provide for this training in reflection (Loughran & Corrigan, 1995; Krause, 1996).

In addition to stimulating reflection, we had three other reasons for an early introduction of portfolio in our curriculum. The second reason was to create a mentoring system in which student could receive pastoral care during their studies. A third was to give students more responsibility for their learning and assessment. The last goal was to make the portfolio part of the assessment system, forcing students to review and integrate all assessment feedback.

In this article, we will describe the Maastricht portfolio as an illustration of an early undergraduate portfolio. We will discuss the reasons for the choices we made in designing the portfolio and report on a first evaluation, focusing on the effects on students' reflective ability.

The Maastricht portfolio in the first year of medical studies

In the period (March 2000 until August 2001) in which we designed the portfolio system, it was not possible to draw on the experience from other programmes with similar portfolio systems. Both Medline and Eric were searched for empirical studies of portfolios. Medline produced studies in the senior years of undergraduate and in postgraduate training and professional nurse training. There are also practical manuals available for the application of the portfolio learning and assessment tool in the final phase of medical studies and for adult education (Snadden *et al.*, 1999; Friedman Ben David *et al.*, 2001).

Not one study found related to first-year medical students. The search in Eric did produce empirical studies of portfolios in the early years of instruction: in most cases they were deployed in teacher training and pre-university education. In addition, Eric yielded studies relating to other phases of non-medical education, of course. In designing our portfolio system, we had therefore to transpose the experience with portfolio systems outside and within medical training to a situation of first-year medical students. Below, we will review a number of essential aspects of the portfolio and discuss the reasons for our choices on the basis of evidence found elsewhere.

Structuring

Many portfolio systems prove to have too much of a prescribed character: the exact content, the volume and the structure of the portfolio have been pre-set in detail (Simmons, 1996). In compiling such a portfolio, students have little or no possibility to bring out their personal qualities. An overly structured portfolio will readily deteriorate into a tick-off list through which students can demonstrate that they have met the expectations. This results in students showing forced study behaviour and being mainly occupied with getting the learning results needed ticked off (Carrol *et al.*, 1996; Gearhart & Wolf, 1997). In addition, it has become evident that, if students are afforded little freedom compiling the portfolio, they will not readily include their observations (Murphy *et al.*, 1997). Student ownership is an important contributor to successful stimulation of reflection.

If, however, little or no structure is provided for the portfolio, students often have no idea how to go about it (Wade & Yarbourgh, 1996; Gearhart & Wolf, 1997). Portfolio systems that provide too little structure often lead to frustrating experiences, especially for students who are compiling a portfolio for the first time.

For the Maastricht first-year portfolio a compromise was sought. Since the aim of the portfolio is to encourage reflection, it is advisable to organize the portfolio around student self-reflection (Gearhart & Wolf, 1997). In the portfolio reflection is structured around four professional roles of the doctor, based on a Dutch national competence profile for doctors: one's role as (a) medical expert; (b) researcher, (c) healthcare worker; and (d) person (Metz *et al.*, 2001). Professional roles were chosen to express competence, because these proved to be easier to comprehend than abstractly formulated competences (Tartwijk *et al.*, 2002). The portfolio has been given structure by including sections, one for each professional role. Self-assessment and analysis of the student's own performance is thus organized on a role-by-role basis, underpinned by systematic reference to illustrative materials.

The structure of the portfolio is as follows:

- curriculum vitae;
- role as medical expert;
- role as researcher;
- role as healthcare worker;
- role as person;
- general:
  - summary of strengths and weaknesses analysis;
  - report of progress interview and/or of exit interview/ advice
- annexes.

Global requirements are set for each professional role. The students themselves determine the content and form of their portfolio. Their self-reflection serves both them when compiling the portfolio and the persons reading it as a guideline. The students are free in their choice of materials. For each professional role, a number of probing questions have been formulated to guide the student in writing the introspective part. Posing probing questions is a way to encourage reflection on learning (Spandel, 1997). The questions structure the students' thought processes.

For each professional role, the students analyse their professional development thus far, draw conclusions from the analysis and set learning objectives for the coming period. They therefore show per professional role what and how they have learned and how they wish to improve.

To aid the students in this, a manual is provided in which each role is explained. The manual also contains the global objectives of the year, possible questions the students may ask themselves and potential sources of information that may be used to document the advancement in the areas of competence in question, illustrated by examples.

To illustrate this Box 1 shows the requirements, probing questions and sources of information for the role as healthcare worker (Appendix 1).

Box 2 contains a sample fragment from a portfolio from an individual student (Appendix 2).

Mentoring

A crucial factor for the effective use of portfolios aimed at stimulating reflection is regular discussion of the portfolio

with others (Wolf *et al.*, 1995; Golberg *et al.*, 1996)—both in one-on-one contacts between the student and the mentor (Snadden & Thomas, 1998) and by students reading and providing comment on each other's portfolios (Freidus, 1998). The Royal College of General Practitioners advocates cooperation between the learner and the mentor in working with portfolios for three reasons (RCGP, 1993). In the first place, the mentor assists the students in recognizing their learning needs and setting up a learning schedule. Learners are often inclined to formulate learning schedules for aspects they have already mastered and ignore areas in which there remains a lot to be learned. In the second place, the mentor ensures that not only the practical but also the emotional aspects of working with patients become part of the learning process. The emotional part of working with patients is often neglected. A third reason for working with mentors is that the mentor is able to validate the portfolio materials. As a result of the personal relationship between mentor and students, the mentor is able to appreciate the value of the evidence.

We opted for a mentoring system. A single mentor provides support for 20 students in developing their portfolios and provides general pastoral guidance. At least twice a year, student and mentor conduct an individual interview, a progress interview and an end-of-year interview. During these interviews, the student's performance in each area of competence is evaluated, strong and weak points are identified and new learning objectives formulated for the coming period. In so doing, the students can better identify the focus of their studies and are able to actively steer their learning. Thus, the students develop skills that are relevant to their subsequent studies and future profession, such as self-reflection and a critical and focused learning attitude.

For the end-of-year assessment, the mentor does not assess his/her own students' portfolios. He/she serves as only coach and adviser.

The mentor's responsibility goes beyond supervising the portfolio: he/she also has a general pastoral function. If a student has a problem or a question that has consequences for his/her studies, he/she may direct him/herself to his/her mentor. If he/she has problems of a structural nature, the mentor can refer the student to a student counsellor or other, specialized professionals.

Assessment

The assessment literature has shown that assessment drives learning and that congruence between training and assessment is imperative (Driessen & van der Vleuten, 2000). Assessment can also be used to steer student learning in a desirable direction. Having students complete portfolios without some form of reward (credits) was considered to be ineffective in the long run. On the other hand, portfolio completion was not to become a 'test-achievement' ritual for the purpose of passing. For this reason, we opted for the portfolio as a modest part of the entire assessment programme, which needed to be carried out properly, however, in order for the student to be promoted to the next year.

Can two different goals—assessment and reflection—be combined in a single portfolio? There is a possibility that students choose not to show their weaknesses if the portfolio is also assessed. In the literature, this is sometimes referred to as "the corruption of portfolios for testing purposes" (Huot, 1994). Such corruption is often the result of strategies employed to improve the reliability of portfolio assessment. Research into the quality of portfolio assessment shows that the reliability of the assessment is one of the weaker aspects of portfolio use in education (Beijaard *et al.*, 2002).

Reliability, perceived of as inter-rater reliability, may be improved by three strategies: portfolio standardization; assessment objectification by using analytical criteria; and increasing the number of assessors. The first two strategies are at right angles with the philosophy underlying the portfolio. Originally, portfolios were introduced to make more qualitative decisions on the basis of authentic materials coupled to unique personal experience (Schulman, 1998). Portfolio standardization and the use of analytical criteria with the aim of improving reliability will threaten validity, because it limits the room for describing students' personal learning experiences in different authentic situations. The third strategy for enhancing inter-rater reliability, i.e. increasing the number of assessors, is an effective strategy in theory. Even low inter-rater reliability may be compensated by involving more assessors. However, for most educational institutions this strategy is too expensive, especially if large numbers of students need to be assessed.

In assessing portfolios, we cannot avoid a more holistic and qualitative approach requiring a more 'professional judgement' on the part of the assessor (Norman *et al.*, 1991). However, some degree of standardization may be introduced. Of relevance here is the credibility or justifiability of the assessment procedure. It must be organized in such a way that assessment at the end of the procedure does not present surprises for the student. A system of checks and balances must be in place enabling the student to work towards an anticipated end result.

To attain this, we introduced multiple portfolio discussion moments in the assessment procedure: progress interviews and exit interviews between mentor and student, followed by a separate assessment of the portfolio by a committee. If a mentor is not satisfied with the quality of the portfolio, he/she brings this up during the interviews. Those aspects that did not work out too well may be improved before the final assessment. By so doing, the student receives intermediate feedback on the quality of his/her portfolio. By including this type of feedback loop into the portfolio procedure, in effect, a combination of information is achieved by building in several moments of measurement. If this procedure is followed correctly, assessment by the assessment committee at the end of the year will not lead to unexpected outcomes. The committee has access to the documented intermediate evaluations and can take these into account in its assessment. A drawback is that, as a result of this, the committee's assessment by the assessment committee is not fully independent. The assessment procedure is organized sequentially: if it is difficult to determine the quality of the portfolio, more than one assessor from the assessment committee is involved in the procedure. If mentor, student and/or assessor disagree on the assessment of the performance shown in the portfolio, an additional assessor will be involved. Subsequently, the complete assessment committee discusses the portfolio. If at the start of the procedure mentor, student and assessor agree on the quality of the performance shown in the portfolio, only one member of the assessment committee reads and grades the portfolio: 'insufficient', 'sufficient' or 'with merit'.

A first evaluation

Two hundred and forty-seven first-year students compiled a portfolio during the academic year 2001–02. Semi-structured interviews were held with a select group of students to explore the effect of the portfolio on reflection. Students from four random mentor groups, 39 in total, were approached and asked if they would be interviewed on the portfolio. With the exception of one student, all students were prepared to take part in the interview. The interview schedule focused on the process of compiling a portfolio and its possible effect on reflective ability. In addition to this, the students were given the opportunity to offer suggestions for improvement.

All students reported that they were capable of compiling a portfolio in the initial stage of their studies. A typical remark was:

> I think it is okay that we start with it [portfolio] so early, because then you can get used to it. (Student 5)

The students had a positive opinion of the portfolio acting as an incentive to reflection on their progress. Indeed, 95% of the students interviewed indicated that the portfolio was an important stimulus to carry out strengths and weaknesses analyses. Typical remarks were:

> Because you have to write down your strong and weak points you are forced to think about yourself. (Student 1)
> Because there are different professional roles [in the portfolio], you approach yourself from different perspectives. (Student 5)
> Normally I put a test on which I scored badly aside . . . but if you put all your illustrative materials next to each other, I can exactly see how I work. (Student 6)

In all, 80% of the students regarded the strength and weaknesses analyses as helpful:

> It is difficult to think about your own functioning, but it is surely useful. (Student 1)
> . . . the self-analyses made me think about myself. (Student 38)

The portfolio therefore encouraged them to work systematically on readjusting their actions: 87% observed that the portfolio had helped them to formulate learning objectives. Typical remarks were:

> . . . I found out what I did wrong, and by formulating learning objectives, I started to study in a different way to achieve what I want to achieve. (Student 3)
> . . . because you have to verbalize it and read it over, you can better find connections and better draw conclusions and thus formulate learning goals. (Student 14)

The structure of the portfolio proved to meet expectations: on the one hand, it gave the students a clear picture of what was expected of them, whereas it also gave them freedom to personalize their portfolio.

> You have much freedom in what you write down . . . . If you just say to somebody 'make a portfolio', then that person has no structure and does not know how to start. This division into four roles provided something to hold on to. (Student 9)

One of the professional roles—that of healthcare worker—proved difficult to perform in practice, because the students had little relevant experience in this area. Some students had resolved this problem by including pre-university experience and experience as patients or as relatives of patients in this section of the portfolio.

Conclusion

The main reason for the introduction of portfolios in early undergraduate medical training was to develop the reflective ability of early undergraduate students. Reflective ability is seen as an important skill to learn from practice and for lifelong learning. The ability to reflect can protect students from the shock of practice when entering their clerkships. The literature suggests that a thoroughly planned introduction in the early stages of study is an effective way for students to learn how to reflect. The first experiences with the portfolio bear out the view that an early introduction of the portfolio in medical training is an effective tool to stimulate students' reflective ability. The portfolio seems to act as an incentive to reflection on behaviour. It encourages students to work systematically on readjusting their actions.

We used experience with portfolio systems outside and within medical training to develop a portfolio for first-year medical students. Literature on portfolios suggests that the factors contributing to portfolio effectiveness include a supportive mentor system, clear portfolio structure, an appropriate assessment procedure and early and unambiguous portfolio introduction. The first experiences with our portfolio suggest that these factors are indeed crucial. The majority of students were of the opinion that analysing one's competences in a portfolio was both instructive and meaningful. With regard to learning how to reflect, however, the mentors felt that coaching by a teacher proved to be necessary. The mentoring system may be a major explanation for the fact that students see the portfolio as effective in stimulating reflective ability. Other studies of the effect of portfolios on reflective ability often show disappointing results (Wade & Yarbourgh, 1996; Beijaard *et al.*, 2002). In many cases, the purpose of portfolios seems unclear to students. As a result, portfolios are often superficial. In other words, students have to learn how to reflect and compile a portfolio. Teacher support is essential to this learning process.

In conclusion, we feel that a portfolio constructed according to the considerations described in this paper is a worthwhile addition to existing assessment and learning tools. Our preliminary findings show that the introduction of such a portfolio in the early stages of medical training seems to be an effective way for students to learn how to reflect on their learning and behaviour. Reflective skills are essential to both learning from practice and lifelong learning. It is our hope, therefore, that early introduction of the portfolio will help develop the appropriate skills for more in-depth portfolio learning and assessment in later stages.

Practice points

- Factors contributing to portfolio effectiveness include:
- supportive academic mentor system to coach the student;
- clear portfolio structure allowing students to determine content and form of the portfolio;
- organization of the portfolio around student self-reflection;
- early and unambiguous portfolio introduction;
- assessment procedure that does not hamper reflection.

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Appendix I: The doctor as healthcare worker

First-year portfolio terms:
Becoming acquainted with healthcare practice; being able to determine and express your position when discussing ethical problems in medical practice.

Role as health care worker

Probing questions for strengths and weaknesses analysis:
(You need not answer all questions literally in your strengths/ weaknesses analysis)
What is your experience as a healthcare worker?; In what way is your experience different from your expectations?; Has your idea of working in healthcare changed?
What was your experience in working together with other healthcare professionals?; How do they deal with one another?
What was your experience in discussing ethical conduct in medical practice with fellow students?; Was it difficult to get your position across?; Did your position on a particular ethical issue change as a result of the discussion?
Did you notice differences in the care systems within the healthcare sector?
Possible sources of information:
Practice reports and practice experience; professional behaviour assessment in practice and instruction; feedback from Medical Practice Supervisor (MPO); possible experience during on-the-side job as healthcare worker; instruction taken at other universities, and so on.

Appendix II: Sample fragment

Strengths and weaknesses analysis fragment

"I had known for a long time that I wanted to study medicine. This has been the main reason why I took an on-the-side job in the care sector (see résumé). This way, you acquaint yourself already with healthcare and you are able to gain a better idea of your future profession. Contributing to the well-being of patients appeals to me, but at times you experience less pleasant things. Each week, you provide care to people and as a result you establish some kind of relationship. It is therefore not so easy when someone passes away.

My idea of healthcare has not changed much since I took up medicine. What did strike me was that as a medical student during a traineeship, you are suddenly assigned a differnt role than when you were an assistant carer. You do not belong, in fact, not with the nurses and also not with the doctors. I really had to get used to that. When discussing ethical questions with other students, I can get really worked up. Some students are quite opinionated when discussing euthanasia or abortion. It should all be possible. I feel that when you take a good look at the healthcare sector, you will get a more balanced view. Because I get irritated about other students' remarks, I find it harder to defend my own position (see feedback MPO supervisor, annex no. 6). I find it much easier to put my position in writing (see feedback report, annex no. 7)."

Learning objective: To be able to properly express my views on ethical questions in discussions with my fellow students