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Citation for published version (APA):

Segers, M. S. R., Gijbels, D., & Thurlings, M. C. G. (2008). The relationship between students' perceptions of portfolio assessment practice and their approaches to learning. *Educational Studies*, 34(1), 35-44.
<https://doi.org/10.1080/03055690701785269>

DOI:

[10.1080/03055690701785269](https://doi.org/10.1080/03055690701785269)

Document status and date:

Published: 01/01/2008

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

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The relationship between students' perceptions of portfolio assessment practice and their approaches to learning

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This study focuses on students' learning approaches in the context of a competency-based program on Applied Sciences, with portfolio assessment as its core mode of assessment. The study examines students' perceptions of these assessment practices and the relationships to their learning approaches. Additionally, differences in perceptions and learning approaches between first-year students and second-year students, who already have one year of experience with the portfolio assessment practice, are investigated. A total of 110 students completed two questionnaires at the end of the academic year: the Revised SPQ (*Study process questionnaire*) was used to measure their approaches to learning and the AEQ (*Assessment experience questionnaire*) was used to measure their perceptions of the assessment practice. The results indicate that, when implementing portfolio assessment, feedback is essential. Moreover, it seems not to be the assessment design, but rather how it is implemented, and how students' learning is stimulated through the assessment, that influences the quality of learning.

Keywords: assessment; portfolio; learning approaches; perceptions

Introduction

During the past decade, many researchers have argued that assessment drives student learning. Student learning is defined in terms of cognitive gains, as well as in terms of learning approaches. With respect to the latter, it is evident that compared to more traditional knowledge reproduction tests (such as multiple choice tests), new modes of assessment (such as assignments and essays) enhance the adoption of deep approaches to learning (Scouller 1998; Scouller and Prosser 1996; Tang et al. 1999) because they require students to relate, analyse, solve and evaluate. Deep learning is associated with searching for meaning in the task and integration of task aspects into a whole. This kind of learning is driven by an intrinsic motivation to seek meaning and understanding. Surface learning is characterised by only acquiring sufficient knowledge to complete the task. As such, the student relies on memorisation and reproduction of material and does not seek further connections, meaning or the implications of what is learned. This approach is driven by an extrinsic motivation to gain a paper qualification or a reward (Biggs 1987; Entwistle and Ramsden 1983). The Tang and Scouller studies found evidence that students' perceptions of assessment practices act as a filter between the assessment as designed and students' learning approaches. They indicated that, in the context of assignments and essays, students perceive the assessment demands to be deeper and accordingly adopt deeper approaches to learning.

These positive results, as well as the convincing arguments of many authors in the field of new modes of assessment (e.g., Segers, Dochy, and Cascallar 2003), have inspired many teachers

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to redesign their assessment practices. One example is the increased use of portfolio assessment (Davies and Lemahieu 2003; Tillema 2003).

A portfolio is a purposeful collection of examples of learning collected over a period of time, and gives visible and detailed evidence of a person's attainment of competences. It serves primarily as a tool to highlight progression in competence development as it is under the control and responsibility of the students who present the evidence. The construction process of a portfolio over time is found to contribute to individual learning (Zeichner and Wray 2000). Collecting targeted information in a portfolio is a highly reflective process (Hamilton 1998) and underpins meaningful appraisal and subsequent decision-making about (alternative) learning routes to be taken (Messick 1994). However, there are many portfolio formats which may address learning approaches of students unevenly. The arrangement of portfolios may vary from a dossier to a reflective portfolio. The latter is considered to be supportive of learning because it includes self-appraisal of collected evidence, reflective comments on entries and appraisal of prospective learning activities (Smith and Tillema 2003).

Although the arguments are clear, to date there is hardly any empirical evidence for the theorised relationship between portfolio assessment and student learning approaches. A case in point is the explorative study of Tang et al. (1999). It offers empirical evidence that students who engage in portfolio assessment, compared to those participating in a multiple-choice test situation, show deeper approaches to learning. The study of Wade and Yarbrough (1996) indicates the importance of feedback in portfolio assessment; the amount of feedback information given may influence its acceptance and its use for further learning.

In addition to the very weak empirical basis for the relationship between portfolio assessment and students' adoption of a deep learning approach, the recent study by Segers, Nijhuis, and Gijsselaers (2006) showed that implementing so-called new modes of assessment does not always lead to immediate changes in perceptions of the assessment demands and the adoption of deep learning approaches. The study indicated that students in an assessment context where they had to analyse novel problems even used less deep learning than students in a traditional knowledge reproduction test condition. The study indicated that students' perceptions of a heavy workload, associated with a lack of clear goals, might have encouraged them to go back to 'old habits' and the use of surface strategies. The study of Gijbels and Dochy (2006) confirmed these results. Although deeper learning was hypothesised on the basis of prior research, the students changed to a more 'surface approach' to learning after hands-on experience with a formative mode of assessment. These findings imply that the question: "Which aspects of portfolio assessment practice are related to the adoption of a deep approach to learning?", is probably more interesting than asking whether portfolio assessment enhances the adoption of a deep approach to learning. In this respect, the literature on assessment for learning is relevant. Additionally, Segers, Nijhuis, and Gijsselaers (2006) raise the question of to what extent 'sleeping' effects might have occurred: students probably need time to get used to the new approach and to adapt their perceptions and study approaches.

Conditions for assessment to enhance learning

Recent assessment literature, focusing on "assessment for learning", pointed at various conditions for assessment to foster learning. Based on prior research on formative assessment and the role of feedback (such as the pivotal review of Black and William 1998), Brown, Gibbs, and Glover (2003), Gibbs, Simpson, and MacDonald (2003) and Gibbs and Simpson (2004) describe 11 conditions for assessment to enhance student learning. They are summarised in Figure 1.

The first condition is based on previous research from Berliner (1984) on the importance of time-on-task for student achievement. Gibbs and Simpson (2004) refer to the research of Innis (1996), Curtis and Shami (2002) and Paton-Saltzberg and Lindsay (1993), indicating that

Quantity and distribution of student effort	
Condition 1	Sufficient assessed tasks are provided to capture sufficient study time and effort
Condition 2	These tasks distribute student effort evenly across topics and weeks
Quality and level of student effort	
Condition 3	These tasks engage students in productive learning activity
Condition 4	Assessment communicates clear and high expectations to students
Quantity and timing of feedback	
Condition 5	Sufficient feedback is provided, both often enough and in enough detail
Condition 6	The feedback is provided quickly enough to be useful to the students
Quality of feedback	
Condition 7	Feedback focuses on learning rather than on marks or on students themselves
Condition 8	Feedback is linked to the purpose of the assignment and to criteria
Condition 9	Feedback is understandable to students, given their sophistication
Student response to feedback	
Condition 10	Feedback is received by students and attended to
Condition 11	Feedback is acted upon by students to improve their work or their learning

Figure 1. Eleven conditions for assessment to enhance learning (after Gibbs and Simpson 2004).

students who spend more time on assessed tasks perform significantly better than those spending less time. The second condition concerns what students' effort is orientated towards and what quality of effort is involved. By using assessed tasks, students can be stimulated to distribute their time evenly across the course instead of intensive studying for a week, or even less, immediately prior to the exam. The importance for students' performance of their commitment to put effort into tasks is underpinned by research on self-regulated learning (e.g., Boekaerts and Niemivirta 2000). The third condition concerns the kind of study and learning activity involved in tackling assignments or in preparing for tests. This condition clearly refers to students' perceptions of whether the assessment enhances their learning and which kind of learning activities it evokes (such as memorising, relating, analysing). It is closely related to the first strand of research, focusing on students' perceptions of the assessment demands in terms of deep or surface testing. It also refers to the motivational aspect of assessment, referring to the perceived value of the assessment task by the students: it is interesting, challenging, perceived as a tool to learn (Boekaerts and Niemivirta 2000). The fourth condition concerns the clarity of what is expected from students. It is clear from prior research on peer assessment (Dochy, Segers, and Sluijsmans 1999), as well as on portfolio assessment (Tillema 2003), that transparency of the assessment process, including the criteria, is essential in order for students to learn from the assessment. Conditions 5–11 are based on the widespread evidence that feedback influences learning.

A recent study by Gijbels, Van de Watering, and Dochy (2005), on the effect of integrated assessment tasks in a PBL environment, supported the validity of the conditions discerned by Gibbs and Simpson (2004). The results showed that students who participate in assessment

tasks perform better in the final exam than students who do not participate. The results from the questionnaire and the semi-structured interviews indicated the important roles of students' time management, their effort during the course and the feedback they received.

Although each of the 11 conditions discerned is based on evidence from prior research, to date it is unclear how powerful these conditions are in explaining the relationship between assessment practices and students' learning approaches. Empirical evidence on the relationship between these conditions and student learning approaches might offer interesting insights to help teachers to redesign their assessment practices in order to enhance deep approaches to learning.

In the study presented here, we study students' learning approaches in the context of a competency-based program with portfolio assessment as its core mode of assessment. Recent research shows that the way the learning and assessment environment is perceived by students affects, to a large extent, how they cope with the learning environment and their learning approaches (Lawness and Richardson 2002; Segers, Nijhuis, and Gijssels 2006). In this study, therefore, we take a closer look at students' perceptions of assessment practices and the relationships these have with their learning approaches. Additionally, we look at differences in perceptions and learning approaches between first-year students and second-year students who already have one year of experience with portfolio assessment practice.

Method

Participants

In total, 110 applied science students (response rate 52%) participated in the study: 64 first-year students (response rate 66%), 34 second-year students (response rate 38%) and 12 students who were enrolled in the shortened program (three years instead of four years)¹ (response rate 46%). There were 60 male and 50 female students. The average age was 19.75 (see Table 1).

Instruments

To measure the students' perceptions of the assessment practice, we used the *Assessment experiences questionnaire* (AEQ), which is based on, and captures, the 11 conditions for assessment to enhance learning (Gibbs, Simpson, and MacDonald 2003; Gibbs and Simpson 2004). Students' approaches to learning were measured by Biggs, Kember, and Leung's (2001) *Revised two-factor study process questionnaire* (R-SPQ-2F).

The AEQ consists of six five-point Likert scales. The scales "assessment and learning" and "exam" measure the same construct: does the assessment stimulate learning and which kind of learning activities are evoked? The former is related to learning stimulated by assessment assignments as part of the classroom activities; the second is related to learning as evoked by a formal examination situation. Because there is no formal examination in the program under study, we reformulated the questions of the "examination and learning" scale to the portfolio assessment

Table 1. Sample of the study.

	Total (N = 110)	First year (N = 64)	Second year (N = 34)	Short program students (N = 12)
Male	60	32	20	8
Female	50	32	14	4
Mean age (std)	19.75 (2.738)	19.33 (3.252)	19.94 (1.216)	21.50 (1.931)

Table 2. Example for each scale of the questionnaire used in the study.

Scale	Scale example
Scale 1: Amount and distribution of student effort	I only study things that are going to be covered in the assignments; On this course it is possible to do quite well without studying too much
Scale 2: The portfolio assessment and learning	Making the portfolio brought things together for me; The instructions are very clear about what you are expected to do for the portfolio assessment; The portfolio assessment is not very challenging
Scale 3: Quantity and timing of feedback	On this course I get plenty of feedback on how I am doing; The feedback comes back very quickly
Scale 4: Quality of feedback	The feedback helps me to do things better; I can seldom see from the feedback what I need to do to improve
Scale 5: What you do with the feedback	I use the feedback to go back over what I have done in the assignment; I tend to only read the marks

context (replacing "exam" by "portfolio assessment") and integrated this into the "assignments and learning" scale. Because of low alpha coefficients and a negative item-total correlation of one item in two scales, the scores for both items were not taken into account in the analyses. This implies that for scale 1 (Amount and distribution of student effort), item 3 was deleted; for scale 4, item 19 was deleted; and for scale 5, item 30 was deleted. Item 36 was deleted because it was identical to item 9.

An example for each scale used in this study is presented in Table 2. The Cronbach's alpha coefficient of 0.72 indicated a good overall reliability of the questionnaire. The alpha coefficients of the subscales are reported in Table 3.

The R-SPQ-2F is a refined version of Biggs's (1987) original *Study process questionnaire* (SPQ). In the theoretical framework of the SPQ, three approaches to learning (surface, deep and achieving) are proposed, each with a motive and strategy subscale. Kember and Leung (1998) conducted a study with over 7000 Hong Kong students which investigated the construct and internal reliability of the SPQ. The results indicated that a model with two factors had the best fit. Other studies, including cross-cultural research, have also shown that a two-factor solution with deep and surface approaches, rather than the initial three-factor solution, accounted for most of the variance (Snelgrove and Slater 2003; Watkins and Regmi 1996; Zhang 2000). Biggs and colleagues (2001) accordingly refined the SPQ. The revised two-factor SPQ consists of 20 items which are scored on a five-point Likert scale and categorises students into two different types of approaches to learning. These are "surface learning approaches" (referring to students' intentions

Table 3. The Cronbach alpha coefficients for the questionnaire scales used in the study.

Questionnaire scale	Cronbach's alpha
Scale 1: Amount and distribution of effort	0.521
Scale 2: Portfolio assessment and learning	0.703
Scale 3: Quantity and timing of feedback	0.576
Scale 4: Quality of feedback	0.637
Scale 5: The use of feedback by the student	0.553
R-SPQ-2F deep approach	0.659
R-SPQ-2F surface approach	0.746

to learn by memorising and reproducing the factual contents of the study materials) and "deep learning approaches" (associated with students' intentions to understand and construct the meaning of the content to be learned). The alpha coefficients of both scales are acceptable as can be seen from Table 3.

Procedure

To avoid burdening participating students with an extra workload at the end of the academic year, both questionnaires were administered at the same time. During a period of three weeks within various meetings students participated in, they were asked by the teacher/coach to volunteer for the study and to fill in the questionnaire. Additionally, the questionnaire was sent to all students by email.

Learning and assessment environment

The Applied Science program started in September 2004 and lasts four years. During the first year, an orientation in the domain is aimed for; during the second year, students study the domain in more depth; and from the third year on, students can choose different specialisations (e.g., Biomedical Science, Molecular Science and Engineering).

The instructional approach is based on socio-constructivist principles and implements the 4C/ID model of Van Merriënboer (1997). This implies that students collaboratively construct knowledge on the basis of authentic projects (40% of the students' contact hours). Complementary lectures are organised (30% of the total number of contact hours) in order to illustrate the main themes and their relationships within the domain of study, and how problems within this domain can be tackled. Students spend 20% of their time on practicals. Finally, students can subscribe to a range of just-in-time activities (to the competencies and projects related), and where information students might need for their project work is displayed (10% of the total number of contact hours).

The program is competency-based, with a focus on nine competencies: to investigate; to develop; to experiment; to coordinate; to advise; to instruct/coach; to manage (leadership); learning to learn/self-directed learning; and societal responsibility. For each year, a set of professional competencies is developed and made available to the students (competencies, levels and behavioural indicators are described in a student competencies guide), indicating at which level students have to master the competencies and make them operational in directly observable behavioural indicators. The four levels discerned are: to do; to solve; to integrate; and to generate.

A characteristic of the program is that students can follow individual study routes. Based on an intake assessment, students develop a Personal Development Plan (PDP) and a Personal Activity Plan (PAP). Within the PDP, the student reflects on his personal competence development in relation to the levels and behavioural indicators described in the student competencies guide. It is the basis for the coaching interviews with the study coach. The PAP consists of the student's concrete working plan, and the activities he/she will undertake to develop the competencies at the required level. The digital portfolio consists of the student's PDP and PAP, his/her study dossier (the work, including project reports, project products, performance assessments he/she is actually doing/finished) and a private dossier with documents the student wants to keep for personal purposes. Based on this portfolio, the student makes a selection to develop an assessment dossier. At the end of each year, this assessment dossier will be discussed with an assessment committee consisting of teachers and representatives from the professional field. Additionally, the student prepares a show dossier based on his portfolio; this dossier is used for representation when applying for a job. The extent to which – and at which level – students master the competencies is assessed by

a digital portfolio. The development of the digital portfolio is supported by a study coach who has regular meetings with students (individually and in small groups). There is discussion about which competencies, at what level and what specific behavioural indicators, a student will work on.

Method of analysis

In order to understand the relationship between students' approaches to learning and their perceptions of portfolio assessment practice, Pearson correlation analyses were used. In order to understand the differences between first-year students, second-year students and students in the shortened year, *t*-tests, ANOVAs (learning approaches) and MANOVAs (perceptions of the assessment practice) were computed. Because of the differences in group sizes, Box's test of equality of covariances was conducted. On the basis of the results of this test, it was decided to use Pillais's trace test to measure differences between groups on the dependent variables.

Results

Table 4 presents the means and standard deviations for the different scales of the AEQ and the SPQ. With regard to students' learning approaches, it is clear that they employ more deep learning approaches than surface learning approaches. The quality of the feedback and the use of feedback are the most positively perceived aspects of the assessment practice. Students perceive the amount and distribution of effort as the least positive aspect of the assessment practice. Table 5 presents correlation coefficients, indicating the association between the perceptions of various aspects of the portfolio assessment practice and students' learning approaches.

The results indicate a significant positive correlation between a deep approach to learning and what students do with the feedback they receive. This implies that students who adopt a deep approach to learning read the feedback carefully and use it to look critically at their portfolio, then try to improve it based on the suggestions made. There is also a positive correlation between a

Table 4. Mean, standard deviations and number of items per scale.

Scale	Mean (Std) Total (<i>n</i> = 110)	Mean (Std) Y1 (<i>n</i> = 64)	Mean (Std) Y2 (<i>n</i> = 34)	Mean (Std) SP (<i>n</i> = 12)	<i>N</i> items
Amount and distribution of effort	2.263 (0.557)	2.403 (0.581)	2.047 (0.444)	2.126 (0.521)	5
Portfolio assessment and learning	2.921 (0.505)	2.945 (0.498)	2.871 (0.560)	2.940 (0.398)	11
Quantity and timing of feedback	3.099 (0.561)	3.106 (0.560)	3.162 (0.606)	2.884 (0.396)	6
Quality of feedback	3.672 (0.579)	3.625 (0.567)	3.814 (0.531)	3.517 (0.726)	5
The use of feedback by the student	3.612 (0.500)	3.610 (0.497)	3.560 (0.541)	3.767 (0.390)	5
Deep study approach	3.288 (0.4778)	3.245 (0.526)	3.352 (0.403)	3.333 (0.405)	10
Surface study approach	2.368 (0.536)	2.427 (0.561)	2.313 (0.489)	2.208 (0.525)	10

Table 5. The correlation coefficients for deep and surface learning approaches and students' perceptions of various aspects of the portfolio assessment practice.

	1	2	3	4	5	6	7
1. Amount and distribution of effort		-0.118	-0.220*	-.128	-.080	0.097	-0.097
2. Portfolio assessment and learning			0.354**	0.402**	0.383**	0.320**	-0.267**
3. Quantity and timing of feedback				0.337**	0.189*	0.102	-0.236*
4. Quality of feedback					0.317**	0.043	-0.269**
5. Student's use of feedback						0.371**	-0.395**
6. Deep learning approach							-0.424**
7. Surface learning approach							

* = significant on 0.05 level; ** = significant on 0.01 level.

deep learning approach and students' perceptions of portfolio assessment as stimulating learning and being motivating. This implies that those who adopt a deep approach to learning perceive the making of a portfolio as stimulating their thinking and as requiring a deep understanding of the learning materials; they perceive the criteria for the portfolio to be clear and perceive the portfolio assessment as challenging.

There is a negative relationship between students' surface approaches to learning and their perceptions of the quantity, timing and quality of the feedback, what they do with the feedback, how they perceive portfolio assessment to stimulate their learning, how it motivates them and how clearly they perceive what is required from them in the portfolio assessment. In other words, it is the feedback practices, as perceived by the students, and their perceptions of the assessment as being motivating and supporting learning, that are related to student learning approaches, rather than the time and effort students devote to the assessment.

To see whether the means in study approaches and perceptions of the assessment practice were significantly different between the different groups, a MANOVA was used. The results indicate that there were no major differences in deep or surface learning approaches between first-year students, second-year students and students participating in the shortened program ($F[4,204] = 0.658, p = 0.622$).

Discussion and conclusion

In line with the study of Gibbs and Simpson (2004), we investigated students' perceptions of 11 conditions that are argued to enhance student learning. First, the results of this study indicate that, to a large extent, students adopt deep approaches to learning. This finding seems to be in line with previous research from Tang et al. (1999) indicating that, in comparison with a multiple-choice test situation, students adopted more cognitively challenging activities such as application, relation and reflection. Secondly, the results indicate that students' perceptions of various aspects of the portfolio assessment practice are related to their approaches to learning. With respect to a deep approach to learning, the results indicate relationships with what students do with the feedback they receive, how they perceive portfolio assessment to stimulate their learning, and how interesting and stimulating they perceive the portfolio assessment to be. This result confirms earlier research on the role of assessment feedback in student learning (e.g., Higgins and Hartley 2002), indicating that formative assessment feedback is essential to encourage the kind of deep learning desired by teachers.

The results confirm the findings from a former study of Gijbels, Van de Watering, and Dochy (2005), indicating that using assessment tasks as an integrated part of the learning environment,

and providing timely feedback, resulted in enhanced performance. As with the assessment tasks in the Gijbels et al. study, portfolio assessment in our setting requires students to collect continuously, as an integrated part of their learning, evidence of the competencies aimed for, and to reflect on the extent to which they have acquired these competencies. In our setting, intensive feedback at regular intervals was provided, stimulating students to use the suggestions to develop their competencies further. The results indicate that these conditions are favourable for the development of a deep approach to learning.

Although the study offers interesting insights, more work is required in this area. Although many schools implement new modes of assessment, such as portfolio assessment, to enhance deep learning, to date evidence to support the effectiveness of this is scarce. Future research should focus on validating the results in other assessment and learning contexts. Additionally, qualitative research can indicate how students themselves relate their perceptions of assessment practice to how they approach their learning.

In the study presented here, we compared first- and second-year students, and students participating in the shortened program. The MANOVA results indicated that there were no differences in learning approaches between these groups of students. In future research, a longitudinal approach with a repeated measures design may indicate to what extent students' learning approaches develop during their study, and which aspects of the portfolio assessment practice contribute to this development.

For educational practice, our study firstly indicates the crucial role of feedback: more precisely, the students acting on the feedback. This implies the importance of teachers encouraging students to make explicit how they used feedback to reorient, or reshape, their learning activities. Secondly, portfolio assessment can support student learning when it is an integral part of the learning environment, and it is communicated to and discussed with students as a tool for learning. If information and feedback sessions with students focus on the discussion of criteria and illustrate the learning effects of portfolios, students' perceptions of the learning benefits of portfolio assessment might be enhanced. According to the results of this study, this might be beneficial for the adoption of a deep approach to learning.

Note

1. Because they already have a relevant higher vocational education degree.

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