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Portfolio Assignments in Teacher Education: A Tool For Self-regulating the Learning Process?

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Abstract

This study examines the effects of a portfolio programme on self-regulation – and thus among third year students of teacher education training to be secondary school teachers. Data collection was by means of self-reporting before, during and after the portfolio programme and via perception questionnaires. The study indicates a significant increase in self-regulation. The portfolio programme therefore improves students' capacity to go through their learning process independently, although the analysis also shows that the rising score with respect to the construct 'self-regulation' stems from the increase of only one sub-scale (regulation). The comparison of the students' own opinions with those of the portfolio supervisors also reveals the weak links in the self-regulation cycle. Students have difficulty evaluating and re-orientating their learning process. It also appears that students do not set and/or implement new objectives themselves, which means that they cannot regulate their own learning process on a completely independent basis because they have not thoroughly mastered all the components of the self-regulation cycle.

Introduction

Self-regulation and Reflection in Teacher Education

The curricula of current teacher education courses distinguish between two sorts of competencies. Firstly, future teachers need to acquire the necessary educational competencies, which include all aspects of teaching, such as preparing lessons; using a pedagogically sound approach; responding to pupils' needs, etc. Secondly, teachers are expected to engage in life-long learning. Students in teacher education therefore need to be capable of continuing to learn on their own throughout their teaching careers (Meeus & Van Looy, 2005).

The independent learning cycle consists of the following phases: (1) orientation; (2) planning; (3) performing; and (4) evaluation (Pintrich, 1999; Zimmerman, 2001). The greater the number of phases that a student can go through independently, the greater his or her capacity for self-regulation will be. Reflection is the basic component of all the various phases of the cycle of self-regulated learning and can even be considered a necessary prerequisite to self-regulation (Puustinen & Pulkkinen, 2001; van Grinsven, 2003). Reflection is, therefore, a central element in the learning process. More importantly still, reflection offers students vital skills which are required for professional

activities such as: linking information; critically examining new information; and integrating new information into existing cognitive structures (Sluijsmans, 2003). A portfolio assignment may well be a suitable instrument for the exercise of reflective skills (Dochy & McDowell, 1997; De Rijdt et al, 2006).

Characteristics of Portfolio Assignments as Used in Teacher Education
The last ten years have seen a great deal of experimentation with portfolio assignments as a supervision and assessment tool in higher education. There are many different portfolio formats depending on function, content or application (van Tartwijk, Driessen, Hoeberigs, Kösters, Stokking & Vleuten, 2003). Yet despite this great diversity, portfolio assignments used in teacher education share three general characteristics.

- *Competency-orientation*
  Competency-orientated education methods with integrated clusters of knowledge elements, skills and attitudes require specially adapted assessment methods. Portfolio assessment is one such method and permits the integral evaluation of competencies.

- *Cycle of action and reflection*
  In order to learn from his or her own teaching performance, the student has to carry out teaching activities and then reflect on his or her performance.

- *Use of a wide variety of media and materials*
  In order to illustrate their competencies in a creative and personalized manner, students must make a well-considered selection of media and materials, such as text extracts, illustrations, photographs, audio and video material.

A portfolio assignment is an instrument which is very well suited to the assessment of independent learning (Meeus & Van Looy, 2005) and enables the student to illustrate his or her teaching competencies. However, assessment by means of portfolio assignments focuses on the degree of independent learning exhibited by the student. A portfolio assignment of this type is called a 'learning portfolio assignment'.

Portfolio Implementation in Teacher Education
Well-planned implementation is a vital pre-condition to obtaining optimal results. This section discusses a number of aspects which need to be taken into account to ensure optimal implementation.

- *Defining the target group*
  Research into the progressive addition of content in teacher education courses shows that portfolio assignments are best used towards the end of the course. In the first years of their degree course, students should primarily acquire knowledge and work on their skills. Later on they learn to function in complex and authentic contexts (Meeus, Van Looy & Van Petegem, 2005a). In addition to the abovementioned content-related learning lines, students in the target group of Darling's study (2001) expressed a further concern about portfolio assignments: students need 'models' to guide them through early phases of putting together a portfolio assignment. Research by Dochy (2004) describes learning paths which indicate that there is a progressively increasing degree of self-regulation on degree courses. This means that teacher education curricula should be structured in a progressive manner starting from limited and well-defined problem-based learning tasks with intensive supervision in authentic professional situations, working towards independent work and reflection on complex assignments and professional tasks or learning in the classroom with extensive supervision.

Students who are at the end of their degree course are thus better equipped to put together a good portfolio.

- *Careful implementation*
  Research shows that great care needs to be taken when introducing portfolio programmes into existing curricula. Portfolio implementation is a very complex process, both in terms of content and organization and is beset with numerous pitfalls. Successfully introducing portfolio assessment depends on instructors arriving at a common vision and adapting their teaching methods accordingly. The training of – and regular consultation between – instructors also appears to be a necessary component for the optimal implementation of portfolio programmes (Challis, 2001; Smith & Tillema, 2001).

- *Achieving its objective*
  A portfolio assignment must achieve its objective and all those involved must be clear about the intention behind the portfolio assessment. Students and instructors with limited experience in using portfolio assignments often find that their interpretation of the objectives is not in line with that of the other party to the process (Elshout-Mohr, van Daalen-Kapteijns & Meijer, 2003). Thus, instructors tend to see a portfolio assignment primarily as a tool with a reflective function, while students often perceive it as a means of communicating with their instructors. This discrepancy reduces the validity of portfolio assessment. These problems can generally be prevented by effective portfolio supervision (Sambell, Mc Dowell & Brown, 1997).

- *Continuous supervision*
  Instructors guide students as they work on their portfolios with a view to getting them to become aware of their own vision of education and to help them optimize those visions. In this process it is important to bear in mind that students need a certain period of time to get used to reflective learning before experiencing its benefits (Grant et al., 2007). Moreover, analyses of portfolio assignments show that students tend to approach portfolios in terms of a description of the situation, followed by an evaluation of this situation. The differences between expected and real results are due to the fact that the students have a frame of reference which is too limited, which in turn prevents them from reflecting independently. Continuous supervision is therefore required. (Mansvelder-Longayroux, 2002). Finally, it is absolutely vital that the relationship between student and instructor should be based on mutual trust so that students feel they can discuss possible mistakes in their teaching performance (Meeus, Van Looy & Van Petegem, 2005b).

- *Reliable assessment*
  The nature of portfolio assignments does not lend itself to strict standardisation, which in turn poses problems with regard to the reliability of portfolio assessment (Dierick, van de Watering & Muijtjens, 2002). Equally, evaluators must be able to deal with the considerable freedom of interpretation in the same manner. There are a number of techniques which may prove helpful in this regard. Firstly, holistic marking is preferable to analytical marking. Holistic marking awards a total mark on the basis of a qualitative assessment of individual aspects and the general impression of the assessors. Marks are thus not awarded for individual assessment components (Meeus et al., 2005a). Secondly, assessment indicators must be explicitly stated in order to provide a structure for students and assessors alike (McMullan, Endacott, Gray, Miller, Scholes & Webb, 2003). Thirdly, instructors have to be trained in how to assess portfolio assignments (Walther-Thomas & Brownell, 2001). A notable finding of Tillema and Smith's study (2007), exploring criteria used in portfolio appraisal, was the lack of explicit and shared

criteria between assessors. Fourthly, researchers advocate consultation between the various assessors (Janssens, Boes & Wante, 2002). Finally, in the practical component of teacher education multiple measures must be used in order to obtain a comprehensive view of what a programme actually teaches the students (Darling-Hammond, 2006).

Description of the Portfolio Programme

Research Population
The portfolio programme was tried out on 31 third-year students from the Department of Teacher Education at the XIOS *Hogeschool* in Limburg (Flanders).

Description of the Programme
The programme covers the three characteristics of the learning portfolio assignment: competency-orientation; the cycle of action and reflection; and the use of a wide variety of media and materials.

- All students taking part in the study were set a portfolio assignment based on the following competency: '*the teacher can, depending on the case, divide the contents into different steps, differentiated tasks, themes and projects*'. Allowing the students to choose the competency for themselves – given that this in turn implies making choices – would have been a time-consuming process. For this reason we opted to choose this competency ourselves. The choice of this competency was based on certain gaps in the curricula, detected by third-year students from previous years.

- Students went through two subsequent cycles of action and reflection, in two different semesters. The literature stresses the importance of supervision during the programme in order to encourage students to reflect. For this reason a series of supervision moments was built into the programme:

    o An initial plenary meeting to outline the goals of the programme.

    o An initial group session during the first cycle led by both the supervisor and the instructor in order to find out students' different experiences.

    o Two individual supervision appointments were then made with the supervisor during the second cycle in order to guide students' reflection.

    o There was also the possibility of arranging individual contact moments with instructors for content-related and didactic support, if necessary.

- Students were asked to illustrate their experiences using relevant media and materials, such as assessment reports from classroom teachers, lesson plans, text extracts illustrations of pupils' experiences, and worksheets completed by pupils.

Self-regulation
The portfolio programme aims to offer students the possibility of working in a self-regulating manner. This section describes the ways in which students were encouraged to make decisions on their own:

- In the orientation phase we opted for 'differentiation' as the theme of the portfolio programme. Students were allowed to decide for themselves what form of differentiation they wished to work on. They also chose the subject of their portfolio assignment, with a maximum of three students being allowed to choose

the same subject. This meant that two-thirds of the students were able to do their portfolio assignment on a subject which had been their first choice.

- Students were allowed to decide for themselves which lessons they felt would be best suited for the differentiation activity and thus when they wanted to carry it out. They also chose the most appropriate moments for individual supervision. Finally students were allowed to decide for themselves how and when they wished to work on the assignment, bearing in mind the deadlines.

- Students were asked to prepare at least one differentiation activity for each teaching practice posting. The structure, duration, differentiation method and content of the activity were left up to them. Their choices were based on their own vision, engagement and factors relating to the teaching environment at the host school. They were also allowed to ask their instructors for guidance in carrying out the assignment.

- Students were assessed jointly by their supervisor and by the instructor responsible for their chosen subject. At the start of the portfolio programme students were notified of the assessment criteria to ensure that they were in a position to evaluate their own preparation and performance during the process. In the second cycle every student was allowed to request an individual supervision meeting in order to discuss the results of the first assessment.

Supervision
The portfolio programme stipulates that there must be clear communication between supervisors and the researcher. Before the start of the programme supervisors were informed about the aims and method of the study and with regard to the various roles and responsibilities of the different participants. The department held a regular monthly meeting to ensure that the progress of the programme was formally monitored and to encourage informal contacts between instructors and the researcher.

Assessment
Based on the recommendations which emerged from the literature study, we took the following steps to assess the portfolio programme as clearly as possible.

- First of all we tried to minimize possible assessor effects. Students and instructors were notified of the assessment criteria at the very start of the programme. The instructor and supervisor then made all the assessment decisions about the students' performances on the portfolio programme jointly and in a holistic manner.

- Valid assessment has to be based on instruments that actually measure what they are intended to measure. The portfolio programme thus allowed for an extra assessment moment at the end of the first cycle. In this way students had the opportunity to accustom themselves to the process of putting together a portfolio assignment.

- The separation of assessment of learning competences on the one hand and educational competences on the other was embedded in the structure of the portfolio programme by separating 'action' and 'reflection'. The roles of instructor and supervisor are thus strictly differentiated. The instructor assesses the quality of the differentiation activity, while the supervisor is concerned with the quality of the student's reflection. Thus the portfolio programme was divided into two parts. The 'action' part describes how students plan and perform their differentiation activity. For this part of the programme the students could count on support from their instructor, who was also the person who assessed this part of the

programme. The students then went on to examine what was successful and what was unsuccessful in the 'reflection' part. This part of the programme was covered during individual supervision and was thus supported and exclusively assessed by the supervisor.

Research Questions

The aim of this study was to evaluate the effectiveness of portfolio assignments as a means of promoting self-regulation, with specific emphasis on the role of reflection. The following research question was posed: 'Do portfolio assignments promote students' self-regulation?'

Research Method

This study is a single case study with a time series, based on perception questionnaires. Three measurements were used to record students' self-regulation and capacity for reflection. The perception questionnaires provided information which supplemented the results of the quantitative research in order to arrive at an overview of how students and instructors perceive portfolio assignments. The single case study involved only students (N=31), while the questionnaires were filled out by both students and their instructors (N=12).

Time Series

Three measurements recorded the students' self-regulation and capacity for reflection before, during and after the intervention. The differences in score between the first and the last two measurements were considered as an evolution in the students' self-regulation and capacity for reflection (Christensen, 2001).

As a measuring tool we used 2 parallel versions of a self-reporting questionnaire for metacognitive qualities, namely the Awareness of Independent Learning Inventory AILI (A) and AILI (B). The 45 questions it contains were scored on a 7-point Likert scale, ranging from 'absolutely not true for me' to 'absolutely true for me' (Elshout-Mohr, van Daalen-Kapteijns & Meijer, 2001a; Elshout-Mohr, van Daalen-Kapteijns & Meijer, 2004a; Elshout-Mohr, van Daalen-Kapteijns & Meijer, 2004b). The questionnaire yields self-reporting about aspects of declarative knowledge concerning students' own study methods (metacognitive knowledge); self-regulation (metacognitive regulation); and students' attitudes towards learning to learn (metacognitive development). The final result expresses the students' metacognitive competence and their general reflective skills. Students' self-regulation is revealed on the AILI scale 'metacognitive skill' which records views regarding orientation, monitoring and evaluation of problem-based tasks. The total AILI score represents the students' reflective skills (Elshout-Mohr et al., 2001b). Table 1 gives an overview of the AILI scales and sub-scales, illustrated in each case with an example item.

Table 1. Scales and sub-scales from the AILI, illustrated with example items

	SCALES AND SUBSCALES	AILI EXAMPLE ITEMS
Metacognitive **knowledge**		
K1	Students' knowledge	I think it is also important that students learn from each other during the degree course.
K2	Knowledge of study strategies	If students do not work systematically, I can't think of any solutions.
K3	Knowledge of study tasks	I can tell by looking at a programme whether or not this will fit in with the students' learning objectives.
Metacognitive **regulation**		
R1	Orientation	I don't know what I want to learn from a programme

		before I start it.
R2	Monitoring	When I have studied the obligatory material, I ask myself if I have found it interesting.
R3	Evaluation	When I'm reading something I don't think very much about whether it is going to mean anything to me.
	Metacognitive **development**	
O1	Responsiveness with regard to internal feedback in the form of metacognitive experiences	I have never had the feeling that a programme suddenly starts to become interesting.
O2	Receptiveness to external feedback at a metacognitive level	I don't take any notice of instructors' comments on how I organize my work.
O3	Critical attitude with regard to students' own functioning	If a programme appears useless, I try to find out why that is.

The internal consistency of self-regulation and reflective skills of the AILI (A) and the AILI (B) questionnaires was checked using the Chronbach's alpha reliability index. The scale 'total metacognition/reflection skills' proved very reliable, with a Chronbach's α of .86 for AILI (A) and .91 for AILI (B). The scale 'metacognitive regulation/self regulation' also scored highly on internal consistency, with Chronbach's α coefficients of .88 for the AILI (A) and .85 for AILI (B).

This section explains the factors which might jeopardize internal quality.

- A response-shift could take place in the event of repetitive withdrawal of the AILI. This means that students score better on the first questionnaire they fill out than they do on the second. This is caused by students overestimating their own capacities at the start of the programme. If students reconsider their own performance in the course of the programme, they will interpret the scales of the measurement instrument differently during the second measurement (Elshout-Mohr et al, 2001b). The research method allowed for this phenomenon by establishing three measuring moments. In the event of a decreasing evolution after the second measurement, only the difference between the second and the third measurements were used to assess the evolution of reflection and self-regulation.

- The portfolio programme was run concurrently with other components of the curriculum, such as the teaching practice placement, academic courses, and working on cultural and social projects. Inevitably, one or more of these activities will influence the students' self-regulatory and/or reflective skills. We can therefore not exclude the possibility of an historical effect. The only effective way to check this is to work with a control group and the absence of such a control group is definitely a serious inadequacy in this study. We tried to limit the history effect by explicitly relating the AILI measurements to the portfolio programme.

- The portfolio programme is an integral part of the curriculum and is thus an obligatory assignment for all final year students. In this way we hoped to avoid students dropping out. However, changes in the composition of the research group have to be taken into account: 4 students left during the year on international exchanges and 4 students ended their studies or decided to postpone this part of the curriculum. When these cases have been allowed for, the research group consisted of 25 participants.

- With self-reporting instruments such as the AILI questionnaire there is always the possibility that students will respond by saying what they think they ought to say, rather than expressing what they really think. We tried to limit this participants'

effect by making it abundantly clear to students that the results of the AILI would not have any bearing on their assessment.

Perception Questionnaires

Perception questionnaires provided supplementary information and offered an overview of the experiences of both students and instructors. On the basis of the literature study two perception questionnaires were drawn up: one for students and one for instructors. Both groups were asked to give their views regarding the objectives, working method, supervision and evaluation of the programme.

The questionnaires included both open and closed questions. The closed questions were structured according to a four-point scale with hierarchically arranged answer categories, ranging from 'very little' to 'very much', from 'not true' to 'true' and from 'of very little importance' to 'very important'.

Data Analysis and Research Results

Effects on the Perception of Students' Self-regulation

The evolution of the AILI-scales 'self-regulation' and 'reflection skills' are an indication of the effect of the intervention. Both scales consist of the sum of the scores of the positively formulated questions and the inverse scores of the negatively formulated questions. A high sum score means that the student evaluates him or herself positively with regard to the skills concerned.

Given that the scales contain data at ordinal level, non-parametric tests had to be used to compare the average scores of the different measuring moments. We opted for the Wilcoxon Test because our study had a within subject design making it possible to compare results from the same research group. The average score of the three measurements for each scale was then compared in pairs: measurement 1 with measurement 2; measurement 1 with measurement 3; and measurement 2 with measurement 3.

Table 2 shows the results of the Wilcoxon test, which represents the effects of the intervention on students' self-regulation at three AILI measuring moments.

Table 2. Overview and results of the Wilcoxon Signed Ranks Test for 'self-regulation' from the AILI

	N	μ	Sd	Measurement 1 – measurement 2		Measurement 2 – measurement 3		Measurement 1 – measurement 3	
				N	p(W)	N	P(W)	N	p(W)
Measurement 1	31	73.23	8.18	29	.159				
Measurement 2	30	76.67	11.04						
Measurement 3	27	78.04	11.81			27	.411		
Measurement 1	31	73.23	8.18					26	.042*

N: number of participants, n: number of items, μ: average score on construct, Sd: standard deviation, p(W): two-sided p-value from the Wilcoxon Signed Ranks Test, *$p < 0.05$.

The measurements 1 and 2 (p=.159), and the measurements 2 and 3 (p=.411) do not exhibit any significant differences. However, the increase from measurement 1 to measurement 3 is indeed significant (p=.042), indicating that students believed that they were better able to regulate their learning process after completion of the portfolio programme than before.

It is also worth noting that of the three sub-scales of 'self-regulation' ('orientation', 'monitoring' and 'evaluation') only the sub-scale 'monitoring' shows a significant increase between measurements 1 and 2 (p=.00) and between measurements 1 and 3 (p=.012). Table 3 shows that the general increase in the construct 'self-regulation' throughout the intervention is only caused by the sub-scale 'monitoring'.

Table 3. Overview of the statistical comparison between averages with the Wilcoxon Signed Ranks Test for the scales 'orientation', 'monitoring, 'evaluation' and 'self-regulation'

	Measurement 1 – measurement 2		Measurement 2 – measurement 3		Measurement 1 – measurement 3	
	N	p(W)	N	p(W)	N	p(W)
Orientation	29	.515	27	.079	26	.130
Monitoring	29	.00*	27	.228	26	.012*
Evaluation	29	.760	27	.201	26	.178
Self-regulation	29	.159	27	.411	26	.042*

n: number of items, p(W): two-sided p-value from the Wilcoxon Signed Ranks Test, *p< 0.05.

Table 4 summarizes the comparison between the scale scores of the construct 'capacity for reflection' at the different measuring moments.

Table 4. Overview and results of the Wilcoxon Signed Ranks Test for 'capacity for reflection' from the AILI.

	N	μ	Sd	Measurement 1 – measurement 2		Measurement 2 – measurement 3		Measurement 1 – measurement 3	
				N	p(W)	N	P(W)	N	P(W)
Measurement 1	31	228.90	17.68	29	.347				
Measurement 2	30	233.40	24.74						
Measurement 3	27	241.07	25.95			27	.023*		
Measurement 1	31	228.90	17.68					26	.007**

N: number of participants, n: number of items, μ: average score on construct, Sd: standard deviation, p(W): two-sided p-value from the Wilcoxon Signed Ranks Test, *p< 0.05, **p<0.01.

The average scale scores of the first two measurements show no differences (p=.347). However, significant intervention effects were found between the averages of the measurements 2 and 3 (p=.023) and 1 and 3 (p=.007).

Experiences of Students and Instructors
The data derived from the perception questionnaire contains five sets of questions about students' and instructors' general experiences with the portfolio programme; their experiences with regard to the portfolio objectives and mode of working; experiences regarding supervision; experiences regarding assessment; and views regarding obstacles and difficulties in the programme. Table 5 gives an overview of the most important

experiences of students and instructors.

Table 5. Overview of students' and instructors' experiences with the portfolio programme

STUDENTS	INSTRUCTORS
General	
Common description: "Collection of activities and reflection in order to show evolution and acquire understanding"	*Added value:* ƒ Connecting theory and practice ƒ Important theme 'differentiation' ƒ Open forum between supervisors and students ƒ Thorough, specific, creative, critical
Objectives	
1. Reflection 2. Differentiation 3. Planning 4. Development of critical thinking	1. Differentiation 2. Planning 3. Making choices 4. Understanding students' own learning processes
Supervision	
Role clarified by: ƒ Manual ƒ Informative session ƒ Informal contacts with supervisor ƒ Assessment criteria	*Wishes*: ƒ Advice and support ƒ *Experiences of role*: ƒ Giving feedback ƒ Stimulating thought processes and reflection.
Assessment	
1. Deep reflection 2. Broad reflection 3. Logical structure	1. Creativity 2. High content quality
Obstacles and difficulties	
ƒ Time-consuming (60 hours of study time) ƒ Reflection	ƒ Students' free choice of supervisor ƒ Workload ƒ Compulsory written reporting by students

The answers to the closed questions are expressed numerically in terms of the absolute and relative frequencies for each answer (scores from 0 to 3) for every item. The closed questions included in both perception questionnaires were subjected to the Mann-Whitney test in order to compare the instructors' answer averages with those of the students'. The instructors gave a far lower rating with regard to the extent to which the objectives 'differentiation' ($p= .003$); 'development of critical thinking' ($p= .006$); and 'independently applying the cycle of action and reflection' ($p= .002$) had been successfully achieved than the students. With regard to assessment, the instructors perceived creativity as a more important criterion than the students did ($p=.028$). Equally, students found broad and deep reflection to be a significantly more important assessment criterion than did their instructors ($p=.003$ and $p=.043$, respectively). Table 6 shows the differences in perception with regard to the objectives and assessment criteria of the portfolio programme.

Table 6. Significantly different answers from instructors and students regarding perceptions of objectives and assessment criteria of the portfolio programme, as revealed by the Mann-Whitney test

OBJECTIVES			
Differentiation	U=41.0	p=.003	Students > instructors
Development of critical thinking	U=38.0	p=.006	Students > instructors
Independently applying the cycle action-reflection	U=39.5	p=.002	Students > instructors
ASSESSMENT CRITERIA			
Creativity in developing differentiation activity	U=61.5	p=.028	Instructors > students
Broad reflection	U=43.5	p=.003	Students > instructors
Deep reflection	U=66.0	p=.043	Students > instructors

*p< 0,05

Conclusion and Discussion

With regard to self-regulation we can conclude that the results of the quantitative study confirm our expectations, i.e. that there was an increase in general self-regulation throughout the period of the portfolio programme.

If we then go on to compare the 'self-regulation' sub-scales, we see that this increased self-regulation is only caused by the evolution of the sub-scale 'monitoring'. The scales 'orientation' and 'evaluation' show no increase during the programme. From this we conclude that the portfolio programme does not teach students to master the complete cycle of independent learning, but principally teaches them to plan and perform independently.

Instructors' perceptions with regard to self-regulation on the part of students confirm this finding. According to the instructors, a portfolio assignment helps students to plan independently, to make choices independently and to perform independently in accordance with these choices. However, the instructors also indicated that the portfolio programme is much less successful with regard to orientation towards differentiation and getting students to apply the cycle of action and reflection independently. The portfolio assignment used in the present study is thus a tool which promotes self-regulation up to the level of independent learning.
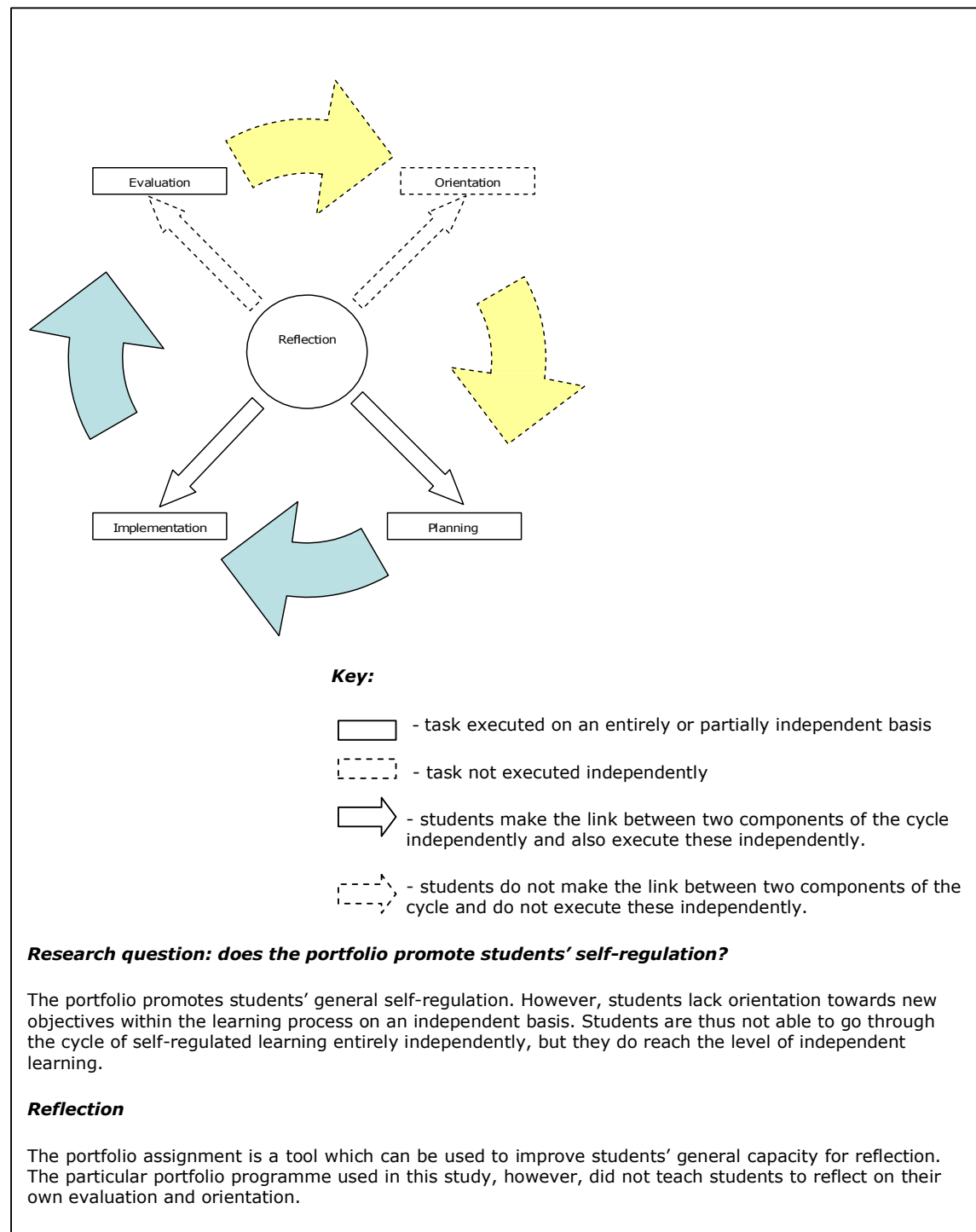
Given the central role of reflection in self-regulated learning, it is important to discuss the evolution of the students' reflective capacity during the portfolio programme. The data from this single case study with time series and students' general perceptions indicate an improvement in the quality of students' reflection in the course of the programme. That said, however, two important caveats need to be made:

- The results of the three AILI measurements could be influenced by differences in the curricula followed by students. As mentioned earlier, students are required to perform a large number of different tasks in the course of their teacher education, all of which may influence their reflective skills. It is thus possible that the results are influenced by tasks other than the portfolio programme. However, the students taking part in the study all stated that the portfolio had helped them to reflect on their activities. They also commented that this kind of reflection assisted

them in becoming competent professional teachers, in developing pedagogical skills and in bridging the gap between theory and practice.

- Students indicated that they went through the second cycle of action and reflection more easily and more rapidly than the first. We see both findings as an indication of differing interpretations of the term 'evolution' on the part of students and instructors respectively. Elshout-Mohr et al. (2003) have already signalled contradictory perceptions of this kind with regard to portfolio programmes. The evolution to which the students refer probably has more to do with efficient working, while instructors are thinking more in terms of didactic aspects and/or content. Students ran through the cyclical sequence of action and reflection more efficiently, but may well have been less interested in setting themselves additional personal objectives and moving further towards taking control of their own learning process.

Figure 1 shows an overview of the learning processes during the portfolio programme.

Figure 1. Conclusions regarding self-regulation and reflection in portfolio

Key:

☐ - task executed on an entirely or partially independent basis

⬚ - task not executed independently

⇨ - students make the link between two components of the cycle independently and also execute these independently.

⇠ - students do not make the link between two components of the cycle and do not execute these independently.

Research question: does the portfolio promote students' self-regulation?

The portfolio promotes students' general self-regulation. However, students lack orientation towards new objectives within the learning process on an independent basis. Students are thus not able to go through the cycle of self-regulated learning entirely independently, but they do reach the level of independent learning.

Reflection

The portfolio assignment is a tool which can be used to improve students' general capacity for reflection. The particular portfolio programme used in this study, however, did not teach students to reflect on their own evaluation and orientation.

Practical Recommendations

The results confirm the findings of Elshout-Mohr & van Daalen-Kapteijns (2003) with regard to different perceptions about the objectives of portfolio assignments. Students saw reflection as a significantly more important assessment criterion than did the instructors. Moreover, they described the portfolio assignment as a tool for promoting reflection and improving independent learning. Instructors, on the other hand, gave more weight to teaching competencies such as the creative development of differentiation and excellence in the performance of activities. They also indicated that the added value of the tool lies primarily in 'differentiation', which was the theme of the portfolio programme. While the portfolio assignment in our study was intended as a tool for the promotion of independent learning, it became apparent after the intervention that instructors had not been clear on this point. This may have led to an obfuscation of the central focus on independent learning, which in turn may have caused confusion on the part of students or may have led them to give a false representation of their reflections (Meeus et al., 2005a). We believe that the explanation for this phenomenon is to be found in the allocation of roles. Subject instructors saw their primary function as one of providing support to students in the area of teaching competencies and this may have led them to place the general focus of the portfolio programme on teaching competencies without taking into account the overall objective of the tool. Providing training for instructors in how to use portfolio assignments is probably the best way to avoid this.

However, should instructors feel that it is desirable for students to run through the cycle of independent learning entirely independently, we believe that it is advisable to devote one individual supervision session wholly and explicitly to this stage. This could be achieved if supervisors and students were to carry out a joint reflection, which would permit a closer monitoring of the learning process.

Follow-up Research

Possible follow-up research could be directed towards the precise mechanisms of self-regulated learning. In this regard, it would be fruitful to develop a measuring tool specifically designed to examine all the phases of the self-regulated learning cycle. It would also be interesting and worthwhile to examine the differences in the breadth and depth of reflection in situations in which teaching and learning competencies are rigorously separated and in learning environments which do not make a distinction between these competencies.

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