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Providing constructive feedback on learning patterns: An individual learner's perspective

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ABSTRACT

In order to decrease the growing drop-out and failure rates in first year higher education, institutions in Europe often organize learning skill training sessions, or provide feedback on student learning. In this study we question how students perceive the need for such initiatives or interventions and to what extent this is related to individual learner characteristics, such as their learning strategies and their sense of self-efficacy. 113 first-year students enrolled in a first year professional bachelor programme in a Belgian University College participated in this study. Results show that students have different preferences regarding to whether and how they want to change their learning patterns throughout the first year. For some students, external sources for feedback information are needed, such as the reliance on learner coaches, while other students prefer more internal sources and self-improvement. Students' sense of self-efficacy, as well as the way they regulate their own learning, is associated with these preferences for learning pattern feedback. Neglecting these associations, when setting up one-for-all learning pattern feedback initiatives, seems not to be a good option and might result in negative friction for some learner groups. Particularly for those students more at risk, the results indicate that external and not internal sources for learning pattern feedback are preferred.

INTRODUCTION

Higher education in Belgium, as in many other European countries, is confronted with a growing heterogeneous student population, paralleled with an increasing drop-out rate of students in their first year. Empirical studies have shown that there are many direct determinants of study success or persistence in the first year in higher education (Tinto, 1993) and more specifically, pre-entry factors such as gender, study delay, prior education and socio-economic and cultural status (Reynolds and Walberg, 1992). However, there is a body of research indicating that other, more malleable, factors play a significant influencing role and have a direct impact on academic performance, such as individual differences in learning patterns (Donche and Van Petegem, 2011; Vermunt, 2005) and academic self-efficacy (Bandura, 1997; Richardson, Abraham and Bond, 2012). As a reaction to the increasing drop-out rate in higher education, the Flemish (Dutch speaking part of Belgium) government provides resources to institutions to implement coaching initiatives aimed at raising the success rate of first-year students, focussing on these more malleable factors. Although the scope of such programmes is quite diverse, a lot of recent initiatives aim to enhance students' study skills by raising more awareness about the students' learning patterns, through the provision of feedback or by organising study skill training sessions.

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In this study we do not question the value of increasing awareness of individual differences in learning in higher education through the provision of learning pattern feedback or support. Other studies already have pointed out the importance of raising awareness and reflection, regarding one's own learning, as a prerequisite for change (Mezirov and Associates, 1990; Vermetten, Vermunt and Lodewijks, 2002). The first question we are interested in is how first year students think about the need to change their learning patterns, as well as the way they would like to be supported or provided with feedback on how to enhance their learning patterns. This is particularly important since former research regarding interventions within the learning environment have shown that students' preferences and perceptions play an important role and why, so often, well intended interventions to increase the quality of learning can also fail (Trigwell and Prosser, 1991). If students, for instance, are not convinced about the need for change or dislike the idea of being supported with feedback in a particular way, this can mediate or even result in the reverse effect of a well-intended intervention. This leads to the second question central to this study. To what extent students' preferences for learning pattern feedback are associated with individual learner characteristics? Investigating the relationship between preferences and individual differences might reveal a more differentiated view on what kind of learning pattern feedback is needed in the first year and for whom. Exploring this relationship within institutions of higher education can be useful to rethink or reshape, for instance, well intended one-for-all learning coaching activities. Before we report on the specific design and results of this empirical study, we will briefly discuss the main concepts under study.

THEORETICAL BACKGROUND

Preferences for learning pattern feedback

Prior research has shown that providing students with feedback information can be a lever to increase the quality of learning and performance (Hattie and Timperley, 2007). Feedback information sources within the teaching and learning environment can be diverse. A distinction can be made between internal and external sources of feedback information (Nicol and Macfarlane-Dick, 2006). External sources of feedback information are, for example, not only supervisors and peers but also specific tasks and additional information or reflections provided to students. Internal sources of feedback information are related to the way students are intrinsically capable to reflect, steer or evaluate their own processes. Internal and external sources of feedback information may be valued differently by students (Nesbit and Burton, 2006). Studies investigating how students perceive feedback, have underlined that individual differences matter and are partly related to the way they cognitively process information, also known as their cognitive styles (Evans and Warring, 2011).

Previous learning pattern research has indicated that how students cognitively process information, is closely related to their general beliefs and expectations of guidance and coaching in the learning environment. Based on prior experiences, students build up specific conceptions of good ways of teaching and learning, which is part of students' conceptions of learning (Tynjäla, 1997) or mental models of learning (Vermunt, 1998). Research on learning patterns in higher education has indicated clear associations between

student's understanding, or expectations of guidance within learning environments and their actual learning strategies (Vermunt and Vermetten, 2004). Students sharing a traditional view on learning, in which a knowledge transmission view is stressed between teachers and students, usually process the subject matter more superficially and in an externally regulated way. Students, who share a more socio-constructivist view of learning in which knowledge construction processes are of central importance with a less directive teacher role, were found to be more self-regulated learners, relying on deep processing activities when studying. If we aim to investigate how students view the role of feedback sources in developing their learning pattern, it seems important to take into account that internal and external sources of feedback can be valued differently. Students, who are more prone to a constructivist mental model of learning, might prefer a less externally provided learning pattern feedback because they are used to being more self-regulated in their learning. Students, who share a more knowledge transmission model of learning, might prefer more external guidance or support when it comes to developing their learning patterns. However, it remains unclear whether such a dichotomous view, within preferences for learning pattern feedback is present as well as related to these individual differences in learning.

Research on student learning has shown that mental models of learning are not always automatically in line with the actual learning strategies that students undertake. When associations between similar mental models of learning and learning strategies are weak or not even present, studies have pointed out at the presence of 'dissonance' within students' learning patterns. This especially seems to be the case when students are confronted with new learning environments and new learning demands in situations, such as the transition to and within the first year of higher education (Vermunt and Minnaert, 2003). In this period, students' mental models of learning are put under pressure or taken through important transitions. Therefore, if we aim to examine how preferences for learning pattern feedback in the first year are related to individual differences in learning, it seems particularly important to investigate how these are related to the learning strategies students undertake.

Learning strategies

Based upon Vermunt's (1998) model of learning patterns, self-report studies, using the Inventory of Learning Styles (ILS) questionnaire, have indicated that students' learning strategies, in first year higher education, can be described in terms of their use of regulation strategies and cognitive processing strategies (Boyle, Dunleavy and Duffy, 2003; Vermunt and Vermetten, 2004). Usually, a distinction is made between three regulation strategies (self-regulation, external regulation and lack of regulation) and three processing strategies (deep, surface and concrete processing). The ILS has been found predictive for learning outcomes, such as academic achievement, in the first year. In particular, a lack of regulation and, to some extent, surface processing has been found to be negatively related to academic achievement while deep processing was positively associated to it (Donche and Van Petegem, 2011; Vermunt, 2005). Given the negative relationship between the lack of regulatory skills and academic achievement, one can assume that those students who have a lack of regulation in particular, might also prefer more external sources of feedback information and to be externally coached to enhance their quality of learning. Students

using deep processing activities when learning might be less in favour for external feedback, since they are used to self-regulating their own learning process. However, these hypotheses have not yet been examined.

Motivation and self-efficacy

If we aim to have a better understanding of how students' preferences for learning pattern feedback are related to their learning strategies, it is also important to take into account their preference to change their way of learning (Wingate, 2010). This willingness to change can be assumed to be closely related to their self-beliefs and sense of self-efficacy, regarding their own learning (Dweck, 1999). Students entering higher education do not only have a specific repertoire of learning strategies they have acquired throughout their previous school career, they have also developed their own sense of self-efficacy, regarding their own learning (Donche and Van Petegem, 2008). It concerns their personal beliefs about the quality of their own way of learning and their trust of being a skilled learner (Bandura, 1997). It is known that students' sense of self-efficacy is built up, for example, by successful and less successful learning experiences and plays an important role in how students learn (Pintrich, Garcia and McKeachy, 1999). It can be assumed that students' sense of self-efficacy will be related to their preference to change their own way of learning. On the one hand, if study success has been gained and positive self-awareness about their own learning has been built up, one can expect that students might not be that easily motivated, or sensitive, to changing their successful learning strategies. On the other hand, students that have already been confronted with lower academic achievement levels and deficits, regarding their own learning, might be very sensitive to change their way of learning through external sources for feedback and guidance. Longitudinal research, on how learning patterns develop throughout higher education, seems to some extent to support this assumption (Donche, Coertjens and Van Petegem, 2010). Particularly in this study, more unregulated learners entering the first year of higher education underwent more changes within their learning pattern throughout higher education. Self-regulated and deep learners were found to be least changeable in their learning pattern, which may also indicate that this learning pattern is a lever for successful performance in higher education.

This study

In this study we aim to examine students' preferences for learning pattern feedback (research question 1) and how these are related to individual differences in learning (research question 2). As far as we know, preferences for learning pattern feedback have not been examined in depth before. Therefore, regarding the first goal, we will explore how students' preferences for learning pattern feedback can be described and more in particular, whether a distinction can be made between preferences for internal and external sources of learning pattern feedback information. This distinction has already been reported in other feedback literature and seems an interesting starting point to explore differences in learning pattern feedback. In this study, we aim to investigate the extent to which students prefer to self-improve their learning pattern (internal sources), as well as the extent they want it to be provided by the support of others such as learner coaches or peers (external sources). In order to take into account, in this study, that some students might not see the need to

change their learning pattern, we will also explore students' preferences or willingness to change their learning pattern.

The second aim of this study is to better understand the interrelatedness between individual learner differences and the preferences for learning pattern feedback. From the literature discussed above we assume that, not only individual differences in learning but also students' willingness to change and their sense of self-efficacy, might be closely related to their preferences for internal or external sources for feedback information. Although no empirical research has been carried out from this specific angle of research, several theoretical hypotheses will be examined in this study. Based upon the conceptual grounding of learning patterns (Vermunt and Vermetten, 2004) we expect that students who are more externally regulated and apply more surface processing, prefer more external sources of feedback information. Students who are more self-regulated and deep learners are expected to prefer more internal sources of feedback information or self-improvement of their own learning. Students who have a lack of regulation are expected to be more prone to change their own way of learning, as well as being in more need of external coaching and feedback. Based on the conceptual grounding of self-efficacy research (Bandura, 1997; Pintrich et al., 1999) we expect that students with high self-efficacy levels will be eager to change their own way of learning, given their past school career and related positive experiences of study success.

In order to explore in depth, the interrelatedness between students' preferences for learning pattern feedback and individual learner differences, a complementary research perspective is undertaken. In the first step we will examine the strength of the interrelatedness between the variables in this study, using variable-oriented analyses techniques. To better understand how the different variables under study are associated within specific learner groups, a person oriented research perspective will also be carried out (Vanthournout, Donche, Gijbels, and Van Petegem, 2009). This research perspective can provide additional insight into if and how differences in preferences for learning pattern feedback are present in specific learner groups. Describing the different feedback expectations, which might be present among different learner groups, can provide relevant information for the development of future learning pattern feedback initiatives.

METHOD

Context and participants

This study took place during a first year professional bachelor programme in a University College situated in Flanders, the Dutch speaking part of Belgium. In this educational context, no particular learning pattern feedback activities or interventions were organised. We preferred this research context because in this way we were able to map students' preferences more freely, avoiding where possible students' perceptions that this questioning was part of an evaluation study of a particular feedback intervention. 113 first year students participated in this study. All questionnaires were completed voluntarily and all individual data were made anonymous. Consent to use the data for further research purposes was obtained from the institution. No individual student datasets were delivered back to the

institution to fully ensure student anonymity and respect of privacy in the reported research findings.

Measures

Preferences for learning pattern feedback

In order to map preferences for learning pattern feedback we used 15 self-constructed Dutch items; with responses made on a five-point Likert scale, ranging from (1) totally disagree to (5) totally agree. The items were inspired by the conceptual framework of learning patterns of Vermunt (1998) and were developed and discussed within a team of educational researchers. The items tap three dimensions regarding students' preferences: (1) students' disposition to change their own learning pattern (e.g. 'In order to pass in this year of study I realise that I have to change my current way of learning.'); (2) the reliance on internal feedback sources when it comes to changing one's own learning (e.g. 'I know very well how I can change my own way of learning by myself') and (3) the preferences to develop one's learning pattern by means of reliance on external sources (e.g. 'In order to change my way of learning I prefer mostly external guidance (for instance by means of a mentor or learner coach).').

Learning strategies

The questionnaire used in this study, to map students' learning strategies, is abbreviated as the ILS-SV, a shortened, validated, and Dutch version of the ILS (Donche and Van Petegem, 2008). The questionnaire taps three different regulation strategies and four cognitive processing strategies by means of 30 items (Table 1). In line with former ILS research, the four cognitive processing strategies can be integrated within two main processing strategies, tapping the distinction between deep processing and surface processing strategies. Translated exampled of the original Dutch items and internal consistency of the scales, subscales and structure of the ILS-SV questionnaire is given below. Within this questionnaire all items were scored using a five-point Likert scale ranging from (1) 'I never or hardly ever do this' to (5) 'I (almost) always do this'.

ILS-SV-scales	Item example	N
Processing strategies		
Deep processing (α= .76)		8
- Relating and structuring (α= .79)	I try to combine the topics that are dealt with separately in a course into one whole.	4
- Critical processing (α= .76)	I try to be critical of the interpretations of experts.	4
Surface processing (α= .79)		8
- Analysing (α= .66)	I analyze the separate components of a theory step by step.	4
- Memorising (α= .76)	I memorize the meaning of every concept	4

	that is unfamiliar to me.	
Regulation strategies		
Self-regulation (α = .80)	If I do not understand a part of the subject matter well, I try to find other literature about the subject concerned.	4
External-regulation (α = .76)	I experience the additional information and instructions given by the teacher during a course as indispensable guidelines for my studying.	6
Lack of regulation (α = .68)	I notice that I have trouble processing a large amount of subject matter.	4

Table 1. ILS-SV scales, subscales, item examples and number of items

Self-efficacy

Based on previous research in self-determination theory (Ryan and Deci, 2000) and perceived competence (Pintrich et al., 2003), we included a Dutch 4-item measure of self-efficacy, tapping students' level of satisfaction with their own way of learning (e.g. 'I feel confident about my way of learning'; α = .83). This measure has already been validated in a former study (Donche and Van Petegem, 2008). All items were scored using a five-point Likert scale ranging from (1) totally disagree to (5) totally agree.

Analyses

In order to explore whether the assumed dimensionality of preferences for learning pattern feedback is present within the data, we used principal components factor analysis. Next, mean scale scores were calculated, in order to quantify the different dimensions. All total scores were transformed into a scale, with a minimum score of one and a maximum score of five points. In order to examine the reliability of the resulting scales, Cronbach's Alpha values were calculated. By means of Pearson correlation analyses, we explored the interrelatedness between the variables. We applied the criteria of Cohen (1988) to interpret the strength of the correlation patterns, in which $r > .10$ and $< .30$ is indicative for a weak, $r > .30$ and $< .50$ for a moderate, and $r > .50$ for a strong correlation. Person oriented analyses techniques used in this study are (1) cluster analyses, using Wards' method to distinguish learner groups and (2) variance analyses (ANOVA), in order to examine the differences in learning characteristics and preferences between the learner groups.

RESULTS

Preferences for learning pattern feedback

In order to explore the dimensionality of the 15 items, tapping different preferences of learning pattern coaching and feedback, a principal components factor analysis, with varimax rotation, was conducted and an inspection of the scree plot was carried out to

determine the number of factors to be retained. 13 out of 15 of the items could be retained in this study and the analyses yielded 4 reliable factors, with acceptable eigenvalues (ranging from 1.07 to 4.95) and a factor solution accounting for 70.2% of the total variance. A description of each scale, example items and the satisfactory levels of internal consistency are described in Table 2. All items in the table below are translated from Dutch.

Item examples	P1	P2	P3	P4
Willingness to change own way of learning				
In order to pass in this year of study it is important that I change my current way of learning.	.879			
In order to pass in this year of study I realize that I have to change my current way of learning.	.870			
In order to pass in this year of study I want to change my current way of learning.	.850			
Internal sources for feedback information				
I am not in need of additional information regarding my own way of learning.		.785		
I am not in need of support of others in order to change my way of learning.		.700		
I know very well how I can change my own way of learning by myself.		.487		
External sources for feedback information				
In order to change my way of learning I prefer mostly external guidance (for instance by means of a mentor or learner coach).			.851	
In order to change my way of learning I want to follow a course on how I can improve my own way of learning.			.833	
In order to change my way of learning I find it important to discuss with my fellow students how they go about learning.				.843
In order to change my way of learning I use the suggestions about how to learn provided by other students.				.743
Eigenvalues	4.95	1.79	1.29	1.07
% Explained variance	38.10	13.78	9.90	8.24
Cumulative %	38.10	51.88	61.78	70.02
Cronbach's Alpha	.93	.67	.85	.67

Table 2. Pattern coefficients for varimax rotated principal component factor analysis, item examples, eigenvalues and percentages explained variance for preferences for learning pattern feedback.

As expected, three basic preferences emerged from the data. Four items tap a preference or willingness to change one's own way of learning (P1) and four items tap a preference for internal sources for feedback information (P2). The last 5 items tap a preference for

external sources to provide feedback information. In particular, the reliance upon feedback and guidance of others (peers or learner coaches) is stressed. Contrary to our expectations, the preference for external sources for feedback information could be further refined into two preferences for external sources for feedback information (P3 and P4). This distinction is basically related to who is relied upon, when external coaching is provided (tutors or peers) and could be viewed, rather, as subscales of a broader dimension, tapping a preference for external sources for feedback information. Given the strong content association between the third and fourth preference for feedback information and the restriction of only 2 items that were tapping the fourth preference, we decided to use a composite scale, integrating the third and fourth preference. The preference for external feedback information was found reliable (α= .74) and explains 49.1% of the item variance.

Relating preferences for learning pattern feedback and learning strategies

Table 3 provides an overview of descriptive statistics and interrelatedness of the scales. In the first half of the table the relationship between the scales measuring preferences for learning pattern feedback are shown. No strong relationships are present among these scales which indicates that these scales measure different preferences for learning pattern feedback.

Scales	M (SD)	Willingness to change own learning	Internal sources for feedback information	External sources for feedback information
Preferences for learning pattern feedback				
1. Willingness to change own learning	2.94 (.96)	1		
2. Internal sources for feedback information	3.11 (.68)	-.39**	1	
3. External sources for feedback information	2.90 (.69)	.44**	-.46**	1
Learning strategies				
4. Self-regulation	2.74 (.81)	-.18	.07	.02
5. External regulation	3.40 (.60)	.06	-.10	.26**
6. Lack of regulation	2.73 (.71)	.28**	-.26**	.30**
7. Deep processing	3.43 (.53)	-.32**	.29**	.02
8. Surface processing	3.06 (.62)	.07	-.10	.29**
9. Self-efficacy	3.17 (.69)	-.51**	.46**	-.41**

** Correlation is significant at the 0.01 level (2-tailed).

Table 3. Means, standard deviations and interrelatedness between preferences for learning pattern feedback and students' learning strategies

In the second half of the table the interrelationship is shown between the scales measuring students' learning strategies and preferences for learning pattern feedback. We found weak to moderate interrelatedness between the preference scales and students' learning strategies which are generally in line with the assumptions guiding this study. Students' willingness to change goes along with how they regulate their learning, their self-efficacy, as well as their way of processing. Students, who are more prone to change their learning pattern, are found to have a lower sense of self-efficacy regarding their own learning and have more problems with regulation, as well as applying more surface processing strategies. Also, the assumed positive association between lack of regulation and dependence on external sources, regarding learning pattern feedback, is present in the data.

In line with theoretical expectations, we found that students who are more externally regulated in their learning and process information more superficially, prefer more external sources of feedback information in order to change their learning pattern. Internal sources of feedback information were preferred by students undertaking deep learning activities. Contrary to our expectations, self-regulation was not found to be associated with a preference for more internal than external sources of feedback information regarding their own learning. The results underline that differences in students' preferences for learning pattern feedback are in particular associated with differences in self-efficacy and lack of regulation.

Learner groups and preferences for learning pattern feedback

In order to map how differences in preferences for learning pattern feedback are present in different learner groups we decided to take the dimensions of lack of regulation and self-efficacy as a means to define specific learner groups. On the one hand this decision was informed by former research that already indicated that self-efficacy (Boekaert, Pintrich and Zeidner, 2000; Richardson et al., 2012) and lack of regulation (Donche and Van Petegem, 2011;Vermunt, 2005) are important predictors for academic performance; on the other hand it was informed by the moderate to strong associations between preferences for learning pattern feedback and students' lack of regulation and self-efficacy in the present study. By using cluster analyses we were able to map four distinct groups of learners. Variance analyses further indicated that all four groups significantly differ from each other, in the areas of self-efficacy and lack of regulation (Figure 1).

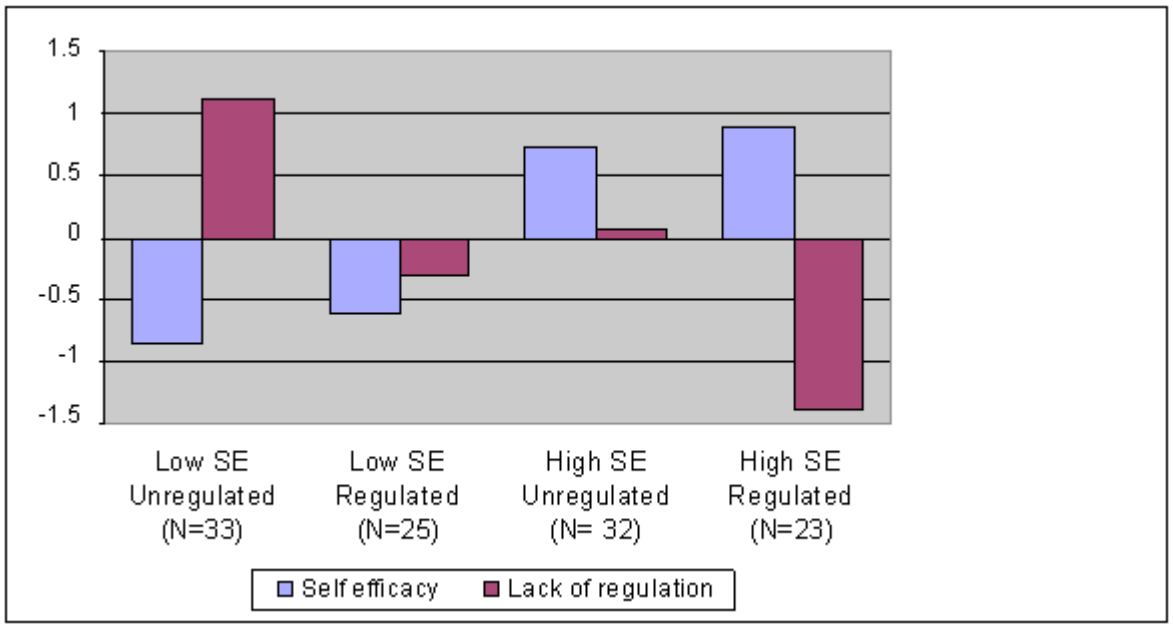

Figure 1. Differences between learner groups

The first group is formed of *low efficacious and unregulated learners (N= 33)*. Compared with the other learner groups, these students have a far lower sense of self-efficacy. This is associated with a higher lack of regulation when learning. The first group strongly contrasts with the fourth group, formed of *high efficacious and regulated learners (N=23)*. The latter group is made up of students who scored the highest scores on the scales measuring self-efficacy and the lowest scores on lack of regulation.

The associations found between these two groups can be related to some extent with former research findings showing that higher levels of self-efficacy are associated with higher levels of self regulated learning (Pintrich et al., 1993) and academic performance (Richardson et al., 2012). In addition unregulated learning has been found to be associated with the use of few to no processing strategies and lower academic achievement (Vermunt, 2005). It seems plausible that the unregulated learner group may have been repeatedly confronted with lower academic achievement levels which has led to less positive beliefs about the efficacy of one's own learning skills compared with self-efficacious learners.

Interesting in this study is the distinction of two other groups of learners, which at first sight reveals a rather incongruent picture of the associations between high or low levels of self-efficacy and lack of regulation. The second group is formed of *low efficacious and regulated learners (N=25)*, who have a lower sense of self-efficacy regarding their learning but have a positive view on the way they regulate their learning. The third group is constituted of *high efficacious and unregulated learners (N=32)*, who, although they have a positive perception of their own learning pattern, tend to be more unregulated when learning. The second and third learner groups differ from each other more clearly, regarding their sense of self-efficacy but show fewer differences regarding their level of

lack of regulation. However, the differences in scores, on the scales between these groups, are significant.

It is obvious that in general the second and the third groups of learners show a more incongruent picture about their sense of self-efficacy and the extent to which they indicated experiencing a lack of regulation when learning. Their perceived competence of their own learning seems not to be in line with their reported way of learning. The presence of these learner groups in the data can to some extent be related to previous self-efficacy research, in which learners, who underestimate or overestimate their self-efficacy in relation to performance, has also been reported (Bandura, 1997). Faulty or inaccurate efficacy judgements may lie at the crux of why these learners are profiled in this way. Learners may have had difficulties in pinpointing the extent to which they experienced regulation problems within their learning. Another explanation may be that their judgements are right according to themselves but are actually slightly over- or underestimated. Prior research indicated that a slight overestimation of one's own capacities is often not bad at all, since these learners were found to be more persistent when they were faced with particular problems in their performance (Bandura, 1997).

In a second step, we investigated whether and how the four learner groups differ in their preferences of learning pattern feedback. The differences in preferences are illustrated in Figure 2.

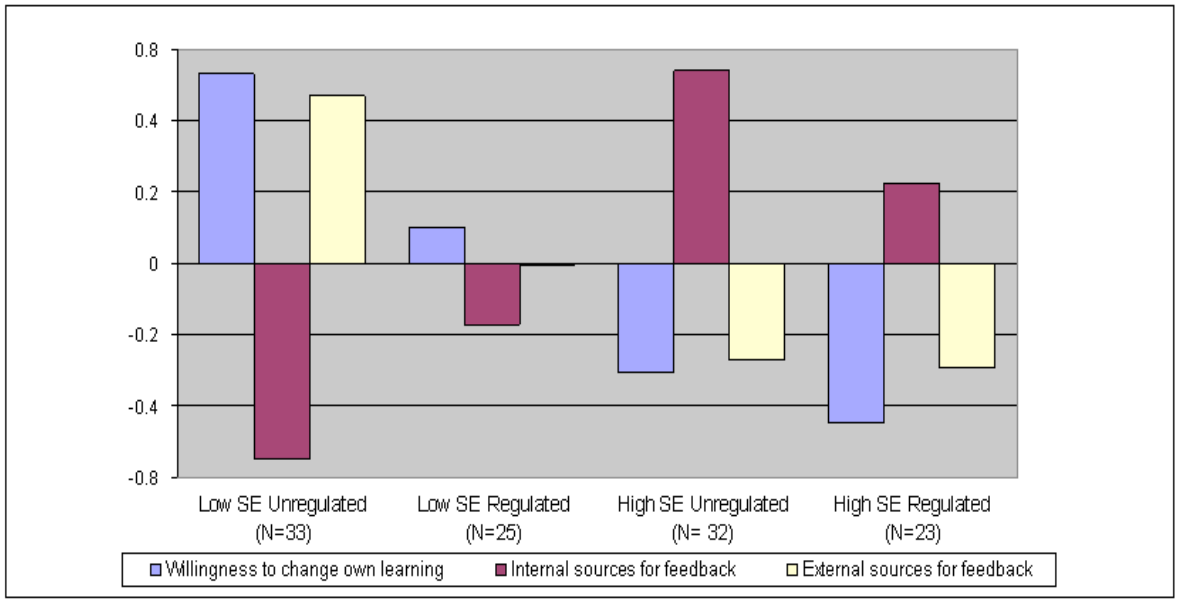

Figure 2. Learner groups and preferences of learning pattern feedback

Analyses of variance reveals that especially *low efficacious and unregulated learners* have a significant preference to change their own way of learning. They also share this willingness to change with *low efficacious and regulated learners.* This is in contrast with *high efficacious and regulated learners*, as well as *high efficacious and unregulated learners*, who generally show the least willingness to change their learning pattern.

Regardless students' way of regulating learning, it seems that in particular, students with lower and higher levels of self-efficacy are respectively more or less willing to change their own learning. Past positive or negative experiences of study success may be an explanation why these learner groups differ in their willingness to change their own way of learning.

Between the four different learner groups, the differences in preferences for internal or external sources for feedback information are significant between the *low efficacious and unregulated learners* and the *high efficacious and regulated learners.* Within these learner groups it is clear that preferences for internal or external sources for feedback information are sharply delineated. The preference for external, above internal, sources for feedback information is most present among *low efficacious and unregulated learners* and, to some extent, also among *low efficacious and regulated learners.* Internal, above external, sources are most present among *high efficacious and regulated learners*, as well as *high efficacious and unregulated learners*. It is clear from these results that both self-efficacy judgements and students' reported lack of regulation are also at the learner group level, associated with different preferences of learning pattern feedback.

CONCLUSION

This study was initiated by the question of whether and how preferences, regarding learning pattern feedback in the first year, are related to individual learner differences. Most of the research findings were in line with the assumptions guiding this study. As expected, we found three main distinct preferences, indicating how students differ, regarding their willingness to change their own way of learning, to what extent they prefer external feedback from peers or learner coaches and to what extent they want to improve their way of learning on their own. Both variable- and person-oriented analyses revealed relationships between students' regulation and processing strategies, their sense of self-efficacy and their preferences for learning pattern feedback, and are generally in line with the theoretical assumptions guiding this study. Particularly students' self-efficacy regarding their own learning and the extent to which they are faced with regulation deficits, are clearly associated with different preferences for sources of feedback information. The differences in preferences are most distinct between those students who are more self-efficacious and regulated in their learning and those who are less self-efficacious and regulated in their learning.

A striking result of this study is that almost one third of the first year students are *low efficacious and unregulated learners.* It is clear from the results of this study that this learner group highlights the need to change their learning patterns through external support and provision of feedback and not through ways of self-improvement. This group of learners may also be more at risk, giving the body of evidence in the literature that especially higher self-efficacy (Boekaerts et al., 2000; Richardson et al., 2012) and higher lack of regulation (Donche and Van Petegem, 2011; Vermunt, 2005) are respectively positively and negatively associated with academic achievement.

Another important aspect of this study is the indication that specific learner groups are also less prone to rely on external sources for feedback information, to improve their own

learning pattern. This is particularly true for the *high efficacious and regulated learners*. The results of this study also show that administering the questionnaires used in this study, such as the ILS-SV and the Preferences for Learning Pattern Feedback (PLPF), might be a useful practice at the start of the academic year, to describe which learners need particular attention in view of support for their learning pattern development. However, we have to be careful by taking a rather dichotomous point of view in this regard. As a starting point, this study was able to describe a limited set of preferences for learning pattern feedback by means of self-report. Follow up studies are needed to explore the expectations and preferences of students in more depth, for instance using in-depth interviews, or the use of structured logbooks, to examine these preferences across time. We also have to stress that when setting up these interventions in practice, it is important to obtain voluntary informed consent of students, so that this feedback information can be treated in a confidential way.

Further, drawing on the conclusions of this study, regarding the associations between individual learner differences and feedback preferences found, it is possible to reflect upon how constructive ways of providing learning pattern can be organised. The previously developed model of Vermunt and Verloop (1999), describing the relationship between students' regulation strategies and the degree to which teachers direct the learning process, can be useful in this regard. Given the relationship found between students' regulation strategies and preferences for external sources for feedback information, it becomes possible to describe the interplay which can occur between students' regulation of learning and preferences for external feedback in a similar manner. In this way, we can delineate in what ways the provision of external sources for feedback information may result in *destructive* or *constructive frictions* among different learner groups, as well as *congruency*.

Degree of student regulation of learning	Degree of reliance on external sources of feedback information		
	Strong	Shared	Loose
High	Destructive friction	Destructive friction	Congruence
Intermediate	Destructive friction	Congruence	Constructive friction
Low	Congruence	Constructive friction	Destructive friction

Table 4. Modelling the interplay between external learning pattern feedback activities and student regulation of learning (based on Vermunt and Verloop, 1999)

Destructive friction might occur when learning pattern feedback activities are too strictly directed, or externally regulated, for those learners who are clearly used to taking their own learning and development into their own hands. If those learners are confronted with too much guidance and obligatory courses, such as study skill training, well-intended initiatives

might have the reverse effect on the learner. Detrimental effects can also possibly occur when learners, who have problems with regulating their own learning, are faced with learning pattern feedback initiatives that are too directed towards self-improvement. For instance, when students are provided with a feedback report on their learning pattern but do not have the opportunity to further discuss their strengths and weaknesses, regarding their learning, with peers or learner coaches. This seems an important practice, especially for students who have a lower sense of self-efficacy. It might raise more awareness about their own learning and, as a result, may adjust also incorrect self-efficacy judgements.

Constructive friction can take place when learning pattern feedback activities, which are organised by others such as tutors or learner coaches, take into account the degree of regulation students have already acquired. Students are then stimulated to undertake specific learning tasks or activities, which they cannot perform solely on their own but with some help from a learner coach or mentor, they can attain it (Vermunt and Verloop, 1999). Building up positive learning experiences through the help of a learner coach can, in this way, be an important lever for students' sense of self-efficacy. The model also makes it clear that constructive ways of learning pattern feedback could be reached for those students who are regulated learners. It seems important, then, that learning pattern feedback activities are organised in such a way as to provide high degrees of freedom for the student, to further improve one's learning pattern by themselves. One might think about initiatives to make students aware of different sources of feedback so they can make informed choices, provision of learning pattern feedback sources that can be voluntarily inspected, or reaching out to opportunities, to improve even further, those learning strategies they are already good at, towards a level of excellence.

Congruency between learning pattern feedback activities and students' regulation strategies occur when equilibrium is present. In this situation, the way feedback activities, provided by learning coaches or mentors are given to students, is in line with the level of regulation they are used to when learning. However, it seems vital to view these positions of congruency merely as transitory stages and to try to gradually develop more constructive ways of learning pattern feedback to these learner groups. Using this perspective, students are gradually stimulated to take their learning development into their own hands, while externally regulated learning pattern coaching activities are gradually diminished. This way of scaffolding the regulation process of students is seen as being of central importance in first year higher education programmes in which individual learner growth or the fostering of lifelong learning skills are found important.

The above mentioned theoretical model of the interplay between student regulation and learning pattern feedback can be useful as an orientation or reflection tool for teachers or policy makers to reflect upon how learning pattern feedback, in their contexts, is generally provided or organised. For example, in combination with data provided through a systematic questioning of students' learning patterns, a more differentiated way of organising learning pattern feedback activities can emerge. It is clear that, for some learner groups, specific internal or external sources for feedback information are needed. The model can also be useful to reflect upon future learning pattern feedback activities and to what extent, given the differences in learner groups present, possible situations of destructive friction can be avoided, as much as possible.

Whether taking more account of this individual learner perspective when providing or carrying out learning pattern feedback as a tutor or learner coach, will result in a positive development of students' learning pattern needs to be examined in future studies. It will be of vital importance to examine these effects in relationship with students' actual use of these learning pattern feedback initiatives as well as how co-regulation takes place when students interact with different internal and external sources of regulation such as tutors, learner coaches but also peers. Examining this research question in future studies is important but also demanding, since a more ecological research perspective needs to be taken into account. Possible mediating effects of the teaching and learning environment, teaching strategies and assessment demands on student learning cannot be overlooked in such research designs (Nicol and Macfarlane-Dick, 2006: Van Petegem and Donche, 2006).

Nevertheless, in this study, a first step was taken to better understand how learning pattern feedback is perceived by students and how this is related to learner characteristics. Why learners prefer internal or external sources of feedback information was found to be consistently related to the way they are able to regulate their learning, as well as their sense of self-efficacy. Neglecting these individual learner differences and feedback preferences, when setting up one-for-all learning pattern feedback initiatives, does not seem to be an ideal way of reaching constructive friction among all students. Taking the individual learner perspective into account might be a more gradual and effective way to foster learner growth.

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