

Achievement among first-year university students: an integrated and contextualised approach

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Received: 24 October 2011 / Revised: 25 April 2012 / Accepted: 27 May 2012

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Abstract This paper presents a prospective study aimed at identifying the predictors of academic achievement among first-year university students. It tries to develop an inclusive view of academic achievement by taking into account the possible differential impact of several predictors in two different faculties of the university. Some 317 university students from the two faculties (science and physical education), who were in their first year at university, participated in the study. During the academic year, these students completed a questionnaire. The outcome variable was their average academic mark at the end of the year. Multiple regression analyses were performed to identify the most powerful predictors of achievement. The results showed that past school failure, parental education and self-efficacy beliefs predicted achievement in both programs. Age, secondary-school specialisation, reasons for choosing the program, deep processing, time spent studying and intention to persist have also been highlighted as significant predictors of success, but only in one of the two faculties. Self-efficacy was the most powerful predictor of achievement in physical education courses, whereas intention to persist was the most powerful predictor in science. These results show the importance of adopting an integrated and contextualised approach to exploring the predictors of academic achievement at university.

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Keywords Higher education · Academic achievement · College students · Self-efficacy

Introduction

Context

In recent years, a large number of studies have tried to identify predictors of achievement among university students. These studies have pointed to the importance of many factors such as socioeconomic status (Arulampalam et al. 2004), past performance (DaDeppo 2009), attendance (Dollinger et al. 2008), self-efficacy (Bandura 1997), social support (Fass and Tubman 2002), self-regulatory strategies (Minnaert and Janssen 1999) and certainty of study choice (Husman and Lens 1999).

However, the overall picture from these studies is scrappy because the aforementioned factors are seldom studied altogether. Most studies included only a few predictors, making it difficult to identify the most powerful influences (Galand et al. 2005). For instance, the study of Minnaert and Janssen (1999) has tested the impact of self-regulation and intellectual abilities on academic achievement without taking the potential effect of motivational and behavioral factors into account. Given the high probability of association between the predictors, some effects could disappear when they are all included simultaneously in multivariate analyses. In other words, some previous findings may simply reflect covariance between predictors and would not be incrementally predictive of academic achievement. In correlative studies, the control of variance relies exclusively on the inclusion of relevant covariates, and so it is important to cover all the relevant variables. Recent surveys have underlined the insufficiency of a single-factor approach to understand the complex processes of academic achievement (Eccles and Wigfield 2002; Neuville et al. 2007). Some recent studies have adopted a more inclusive approach to estimating the relative contribution of various predictors to student achievement (Bruinsma 2004; Lizzio et al. 2002; Robbins et al. 2004; Sandler 2000; Schmitz et al. 2010). Their results point to the incremental contribution of different factors (e.g. study skills, perceived learning environment, motivational beliefs and learning strategies) to predict achievement in higher education.

The majority of studies of academic achievement have either relied on a sample of students from the same field of study [e.g. psychology (Perry et al. 2001), law (Diaz et al. 2001)] or tested a general model assuming that the effects are the same in different programs (e.g. Phan 2009). However, differences between institutions or programs in admission procedures, student body, requirement, assessment, etc. could result in specific learning environments leading to different relationships between the variables. A few studies have indeed suggested that the effects of some variables could be different in different programs or institutions. Lizzio et al. (2002) investigated possible difference between the faculties of humanities, commerce and science. Their results indicated that the relationships between prior achievement (at secondary school), learning strategies and university achievement differed between departments. However another study investigating differences in learning processes among students from different programs at a Japanese university (Webster et al. 2009) failed to replicate these results. Given the limited number of studies that have investigated differences between courses and their inconsistent results, this topic deserves further investigation. However, in order to ensure a better understanding of the factors investigated in this study, this topic would only be addressed from the hypothesis of this study and not in the introduction.

The present paper tries to develop a more inclusive and contextualised approach to academic achievement. This is important both from a theoretical point of view, to get a better understanding of achievement processes, and from a practical point of view, to design better adapted and more effective interventions. We conceptualized achievement as the result of an interplay between background, cognitive, social, volitional, motivational, contextual and behavioural variables. We decided to use prospective study to identify the most powerful predictors of achievement among first-year university students when socio-cultural background, previous performance, volitional and motivational factors, learning strategies and perceptions of the learning environment are considered together. This prospective study was carried out in two different departments to see if the same factors emerged and if they had the same predictive power in the two settings.

As strong inclusive theoretical framework does not exist in the extant literature, the selection of the variables introduced below is based on several existing theories (e.g. future time perspective, socio-cognitive theory, self-determination theory...) and models depicted in recent integrative studies (Bruinsma 2004; Lizzio et al. 2002; Robbins et al. 2004; Sandler 2000). The choice of the variables was also underpinned by an extensive review of the literature about freshmen adaptation to the academic context. In this line, background, cognitive, social, volitional, motivational, contextual and behavioral variables extensively documented as being related to academic achievement among first year at the university were collected.

The selected variables were then grouped into different categories. The classification established between the different categories of variables have been settled by drawing on the 4P model of student learning (Price and Richardson 2003) based on Biggs's previous works (Biggs 1985; Trigwell and Prosser 1997) and on the model of student engagement (Appleton et al. 2008) based on Skinner's previous works (Skinner et al. 1990).

On the one hand, the 4P model of Price conceptualized student learning as a process consisting of four types of factors: presage, perception, process and product factors. Presage factors describe the situational characteristics that define the learning environment and the personal characteristics of the student to face it. Perception factors refer to the students' perception of their learning environment. Process factors gather variables reflecting how students engage in the learning task. Finally, product factors highlight the learning outcomes.

On the other hand, Appleton's model is a four dimensions model including the social context, the self-system process, the patterns of action and the outcomes. The social context represents student's perception of the learning environment. The self-system processes describe the motivational, emotional and cognitive student's self-assessment. The patterns of action refer to the actual cognitive, behavioral and emotional engagement of the student in the task. Eventually, the outcomes depict the developments and achievements resulting from the student's engagement.

In order to obtain a clear picture of freshmen achievement process, these two models were framed within a classification depicting four sets of variables temporally organized from more distal to the more proximal one. Firstly, according to the 4P model, constitutive characteristics of the student were introduced as the more distal category of variables and were labeled *background* variables. Secondly, according to the two models, student's perceptions of the academic context were introduced through two categories of variables: *study choice* and *experience of the program*. Thirdly, student's motivational, cognitive and behavioral processes were introduced in our classification as the most proximal variables of academic achievement and were labeled: *motivational beliefs*, *learning strategies* and *behavioral engagement*. This third set of variables is analogous to the process factors of the 4P model and the patterns of action of Appleton's model. Finally, *academic achievement* was introduced as the last stage of our classification. Figure 1 represents the temporal classification of the different categories of variables analyzed in this study.

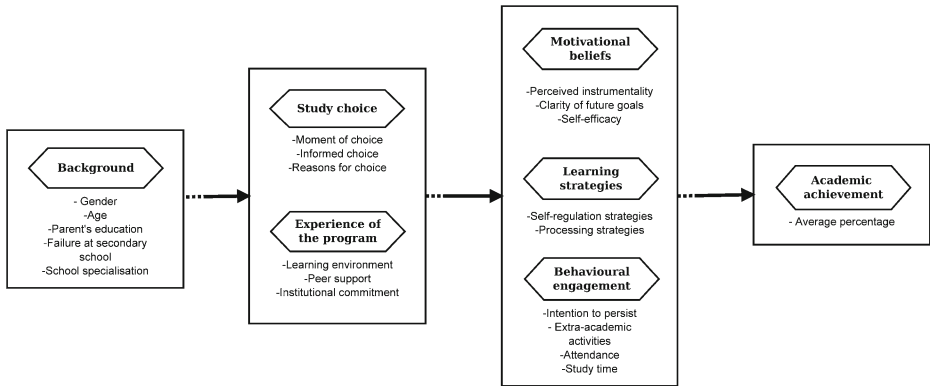


Fig. 1 Temporal classification of the categories of variables from the more distal to the more proximal of achievement. Note: Adapted from Price and Richardson (2003) and Appleton et al. (2008)

Background

In this section, we will review several categories of variables that have been documented as predictors of academic achievement among first-year college and university students. Student *background characteristics* (such as gender, age, parental educational level and socioeconomic status, and past academic performance or standardised achievement test score), are probably the potential predictors of achievement which have been most extensively studied. Many studies have indicated that women tend to get higher grades than men in higher education (Van den Berg and Hofman 2005) and that age is negatively associated with academic performance (Bruinsma 2004; Osborne et al. 2003). Moreover, students from lower educational or socioeconomic background have sometimes been found to achieve less well (Robbins et al. 2004; Sirin 2005). Other studies have failed to replicate this however, claiming that socioeconomic status has no direct effect on achievement at university when scores on the admission test are controlled (Sackett et al. 2009).

Past academic performance [i.e. secondary-school diploma or standardised achievement test (SAT) scores] is documented in many studies as the most powerful predictor—sometimes the only significant one—of achievement in college or at university (Díaz et al. 2001; Perry et al. 2001; Vandamme et al. 2005). These predictors are, however, far from explaining all the variance in achievement, suggesting that other variables could also play a role. Indeed, Robbins et al. (2004) showed in a meta-analysis that background variables account approximately for 22% of the variance in academic achievement. The results also confirmed that psycho-social factors make an incremental contribution to predicting college achievement.

Study choice

Surprisingly, very few studies have assessed the impact of the study-choice process on achievement. This neglect of the choice process could be due to the fact that the large majority of available studies were conducted in countries (such as the US and the UK) where access to higher education is highly contingent on school performance and/or SAT scores. Nevertheless, in countries like The Netherlands and Belgium, where access

to university is much more open, study choice process would play a key role in academic achievement. In such educational systems, the successful completion of any secondary school diploma allows any student to enter almost any university course without passing an admission test. Students thus have a very large choice when they move from secondary school to university. In these open educational systems, the study-choice process could be initiated later than in more restrictive systems. Therefore, it could be crucial to take into account the impact of the study-choice process on achievement among first-year university students.

Study choice is a complex process that can be approached through several indicators such as the moment of choice, informed choice and reasons for choice. *Moment of choice* and *informed choice* could be characterised as the ‘when’ and ‘how’ of students’ engagement with a specific university course. Research on future time perspective has highlighted the importance of these two components of the choice process: Students who made informed and thoughtful study choices are generally more satisfied with their courses, more involved in adaptive learning strategies and achieve better academically (Biémar et al. 2003; Lens 1993; Lens et al. 2002).

Reasons for choice is the component of the choice process, which refers to ‘why’ a student enrolls in a specific university course. Research about self-determination suggests that students who were autonomously regulated when choosing their course get higher marks than those who based their choice on more extrinsic reasons (such as pressure from others) (Deci and Ryan 2000; Simons et al. 2004). The concept of autonomous regulation can be defined as the decision to initiate an activity oneself, without being influenced by external factors. A good example of autonomous regulation is deciding to study a specific subject because of a passion for it.

Experience of the program

Many new students have difficulty adjusting to the new academic environment. New students are separated from their previous social networks and need to create new ones. This is one of the first difficulties that freshers have to cope with (Schmitz et al. 2010). The experience of university, defined as the way the student connects to peers, teachers and the specific university, may have an impact on engagement and achievement (Rayle et al. 2006). Three social variables stand out in the literature: perception of the learning environment, peer support and institutional commitment.

Several studies found a relationship between *perceptions of the learning environment* and academic achievement (Lee and Burkam 2003; Lizzio et al. 2002; Patrick et al. 2007; Van den Berg and Hofman 2005). A survey by Lizzio et al. (2002) indicated that the perception of good teaching was positively associated with academic grades, whereas the perception of a heavy workload and inappropriate assessment were negatively associated. Teacher support was also found to be positively correlated with achievement (Patrick et al. 2007).

Peer support also emerged as a predictor of academic achievement in some studies (Fass and Tubman 2002; Hackett et al. 1992; Larose et al. 1998; Robbins et al. 2004). However, the impact of peer support on academic achievement may be indirect. Fass and Tubman (2002) found that peer support was a good predictor of scholastic competence, which is the main predictor of academic achievement.

In addition, several studies have suggested that *institutional commitment* may be important for academic success. According to Strauss and Volkwein (2004, p. 209), this construct can be defined as ‘a student's overall sense of belonging to the institution’. Many studies

showed a direct impact on persistence (Mannan 2001; Robbins et al. 2004) and the intention to persist (Braxton et al. 2000; Sandler 2000), which are both predictors of academic achievement. Nonetheless, no studies seem to indicate that institutional commitment has a direct impact on academic achievement.

Motivational beliefs

Research on *perceived instrumentality* indicates that students who perceive their study as instrumental to their goals, and who appreciate both the immediate and the long-term utility of their course, tend to get higher marks, to invest substantially more effort (Phan 2009), and to show greater retention than those who do not (Simons et al. 2004). Research on future time perspective also indicates that the *clarity of future goals* has a role in promoting engagement and achievement (Husman and Lens 1999; Lens et al. 2002). In other words, first-year university students who have clear future goals tend to get higher grades.

Moreover, students enter university with a set of beliefs about their abilities. Self-efficacy theory (Bandura 1997) claims that confidence in one's ability and chance of success is important in the prediction of achievement, and numerous studies in higher education support this claim (Bruinsma 2004; Chemers et al. 2001; Elias and MacDonald 2007; Robbins et al. 2004). According to Bong and Skaalvik (2003), academic *self-efficacy beliefs* are strongly correlated to performance as well as to goal orientation, intrinsic motivation, self-regulated learning, effort ratings and engagement in classroom activities. Torres and Solberg (2001) showed that self-efficacy beliefs foster social integration and the intention to persist, while reducing the perceived stress of college students. Moreover, Fenollar et al. (2007) argued that self-efficacy is a strong predictor of deep-processing study strategies. These results widely support the idea that academic self-efficacy is a key process in student achievement and the learning process in higher education.

Learning strategies

In addition to motivational beliefs, learning strategies (i.e. how students regulate their learning and process information) is another field of research into academic achievement. The results can be divided into two areas of investigation. On the one hand, prior studies in cognitive psychology have accumulated consistent empirical evidences to show that *self-regulation* is a crucial factor in understanding student learning and academic performance (Minnaert and Janssen 1999; Nota et al. 2004; Perry et al. 2001; Pintrich and De Groot 1990; Valle et al. 2008). Self-regulation can be defined as an active process in which students try to monitor, regulate and control their cognition while performing a task. According to several researchers (Miller and Brickman 2004; Shell and Husman 2008), self-regulation leads students to be a 'good strategy user' in that they become able to observe and evaluate their own learning approaches and, as a consequence, react when they move away from their study goals.

On the other hand, previous studies of the relationships between *level of processing* and academic achievement have produced less consistent findings. Some studies have found a positive association between deep processing strategies and achievement (Fenollar et al. 2007; Neuville et al. 2007; Vermunt 2005; Ward and Walker 2008), while others have reported positive associations between achievement and both surface and deep processing strategies (Jakoubek and Swenson 1993), and still others did not find any significant correlations with achievement (Bruinsma 2004).

Behavioural engagement

Some scholars claim that indicators of behavioural engagement, such as attendance and study time, are the most proximal predictors of academic performance (Credé et al. 2010; Marks 2000). *Class attendance* is one of the most widely investigated factors in the achievement literature. Dollinger et al. (2008) conclude that attendance account for 6–10% of achievement variance among undergraduate students. Similar results were found by Piro and De Ketele (2000) among first year university students. Moreover, a meta-analysis from Credé et al. (2010) revealed a strong relationship between class attendance and academic marks ($r=.41$), leading the authors to claim that class attendance is the single best predictor of achievement.

Study time could be another relevant predictor of achievement. Vandamme et al. (2005) found that the number of hours per week spent in study was moderately correlated with final grades in the first year at university. Robbins et al. (2004) also found a direct link between study time and academic marks. Finally, according to Van den Berg and Hofman (2005), time devoted to study is positively associated with achievement, while *extra-academic activities* (such as paid work) are negatively associated.

Another line of research focused on the *intention to persist*. This can be taken as an indicator of commitment to the course (Cabrera et al. 1993; Hausmann et al. 2009). Intention to persist has been found to predict academic persistence and achievement (Neuville et al. 2007). DaDeppo (2009) also found a positive association between the intention to persist and academic achievement among students with learning disabilities.

The present study

The aim of the present study is to contribute to a more integrated and contextualised understanding of achievement among first-year university students. More precisely, a prospective study was conducted in order to answer the following questions:

1. What are the most powerful predictors of achievement among first-year university students when background, study choice process, experience of the university, motivational beliefs, learning strategies and behavioural engagement are all considered together?
2. Do the same factors emerge and is their predictive power the same in different programs?

From the previous research reviewed above, it was expected that younger students, female students, students whose parents had a high educational level and students with better performance at secondary school would get higher marks. We also predicted that students who had made an informed and long-standing study choice, motivated by intrinsic reasons, would achieve better than other students. Turning to student experience of university, a positive correlation between perceived academic support and achievement and a negative one between perceived organisational problems (work overload and inconsistent assessment) and performance was expected (Lizzio et al. 2002). Moreover, students perceiving peer support and feeling committed to their university were predicted to get higher grades (Tinto 1997). Students with clear future goals and strong self-efficacy beliefs, and those who perceived their study to be instrumental to their long-term goals, were expected to perform better (Simons et al. 2004). Adaptive self-regulation and deep-processing learning strategies were expected to

be positively associated with achievement, while maladaptive self-regulation and surface processing strategies were expected to be negatively related or unrelated to achievement (Fenollar et al. 2007). Finally, behavioural engagement, as manifested in the intention to persist, attendance and time devoted to study were expected to be positively linked to achievement, while extra-academic activities—which could compete with academic work—were expected to have a negative effect (Van den Berg and Hofman 2005). As no previous study has considered all these variables simultaneously, it was uneasy to set a prediction about the most powerful predictors. However, based on the extant literature, past school failure and self-efficacy could be assumed as being highly related to achievement (Elias and MacDonald 2007; Vandamme et al. 2005). Concerning contextual variable, differential impacts of the aforementioned factors on achievement were expected among two contrasted programs.

Method

Participants and procedure

A prospective study was conducted in the faculties of Physical Education (PE) and Science (SC) at the Université catholique de Louvain (Belgium). These two faculties were chosen because they have a common core of scientific courses, such as biology, chemistry and physics, while clearly having different requirements and learning outcomes. A questionnaire was administered during regular lecture time. Students were informed of the aims of and the procedure for the study 1 week before the administration of the questionnaire by the Dean of their faculty. Participation was voluntary and confidential. The questionnaire was administered by members of the research team, who explained the instructions, answered any questions from the students and collected the completed questionnaires. Students' achievement scores were collected, with their consent, from the faculty at the end of academic year.

Physical education students Out of the 224 students registered in the first year of PE, 136 participated in the study (a participation rate of 61 %). Twenty-five participants of these participants were excluded from the analyses because they were not new entrants to the Bachelor program, but repeating students due to previous failure of their first year at the university. The remaining 111 new entrants students were 18–22 years old (with a mean of 19), and 44 % were male. Some 19 % had repeated at least 1 year in secondary school,¹ and 70 % had parents who had completed at least a college degree.

Science students Out of the 364 students registered in the first year of the science faculty, 259 participated in the study (a participation rate of 71 %). As for Physical Education, some 53 participants who were repeating their first year were excluded from the analyses. The remaining 206 new entrants students were 17–21 years old (with a mean of 18), and 55 % were male. Some 14 % of them had failed at least 1 year at secondary school, and 74 % had parents who had completed at least a college degree.

¹ Grade retention is widespread in Belgium, with more than 50 % of students having failed at least 1 year by the end of secondary school.

In neither group were there any significant differences between the participants and the non-participants on achievement ($p > .10$).

Measures

Most of the scales had been used in previous studies of French-speaking university students and had shown good reliability and validity (Galand et al. 2003; Galand and Frenay 2005; Galand et al. 2010). Unless otherwise specified, scales consisted of a number of items, which were graded by the students on a five-point Likert scale from 1 (totally disagree) to 5 (totally agree).

Background

Parental education The participants were asked to indicate their mother's and father's highest educational level [from 1 (primary school) to 4 (university degree)]. These were added together to give an indicator of educational background.

Failure at secondary school The students were asked if they had ever repeated a year at secondary school (0 = 'no', 1 = 'yes').

School specialisation Three items covered the number of classes per week participants had attended in *French*, *mathematics*, and *science* during their last year of secondary school (from '0' to '6 or more'). No overall achievement scores being available, failure at secondary school and school specialisation (maths being the most selective option and French the least selective) were used as a proxy for past academic performance.

Study choice

Moment of choice Two items referred to the timing of participant study choice (from 1 = 'just before registering' to 3 = 'several years ago') ($r_{PE} = .54$; $r_{SC} = .45$).

Informed choice This variable was operationalised as the number of sources consulted by the student in process of choosing what subject to study. Participants were asked to indicate which of eight sources of information (e.g. teacher, former student, counsellor) they had consulted while they were making their choice. In this line and based on the conception of choice process of Germeijs and Verschueren (2006) and Germeijs et al. (2012), informed choice can be understood as the exploratory behaviour undertaken and the information gathered by the student to make his own study choice.

Reasons for choice Participants were asked to indicate how strongly they agreed with seven possible reasons for studying their particular subject. These reasons were selected to reflect different levels of self-determination (Deci and Ryan 2000) and different kinds of instrumentality (endogenous and exogenous) (Husman and Lens 1999): I chose this subject... (a) because I have a real passion for this subject and I want to learn more about it (*passion*), (b) because it is a good opportunity to prove what I am able to do (*self-image*), (c) because it prepares students for the occupation I would like to have later on (*vocation*), (d) because it is where I have the most chance of success (*probability of success*), (e) for the occupational opportunities it provides (*job opportunities*), (f) to avoid some courses that I would have to take in other faculties (*course avoidance*) and (g) because some people encouraged me to do it (*pressure from others*).

Experience of the program

Perceived learning environment Items relating to perceptions of the learning environment were adapted from previous studies (Galand and Philippot 2005; Galand et al. 2010) and grouped into two scales according to the results of an exploratory factorial analysis. Eight items assessed participants' perception of the extent to which their teachers provided them cognitive and emotional support, and promoted authentic learning and transfer of learning to a 'real-life' context (*academic support*) ($\alpha_{PE}=.79$, $\alpha_{SC}=.66$). Six items assessed participants' perception of the extent to which they were confronted with a heavy workload in their courses and the extent to which they perceived the learning assessment process (tests and exams) to be unfair, inappropriate or inconsistent (*organisational problems*) ($\alpha_{PE}=.70$, $\alpha_{SC}=.60$).

Peer support Four items assessed the participants' perceptions of the help and support students gave each other (e.g. 'I know I can rely on some other students to help me') ($\alpha_{PE}=.72$, $\alpha_{SC}=.77$).

Institutional commitment Three items assessed participants' commitment to their university (e.g. 'I feel that I belong to this university') ($\alpha_{PE}=.81$, $\alpha_{SC}=.77$).

Motivational beliefs

Clarity of future goals Three items assessed the clarity and precision of participants' future goals (e.g. 'I have a precise idea of what I want to do later in my life') ($\alpha_{PE}=.88$, $\alpha_{SC}=.89$).

Perceived instrumentality Three items assessed the perceived utility of different components of the program (e.g. 'I see clearly what are theoretical courses useful for'; $\alpha_{PE}=.65$, $\alpha_{SC}=.70$).

Self-efficacy Five items adapted from Galand (2004) assessed participants' confidence in their ability to succeed in their first year at university (e.g. 'As long as I do my work, I'm sure I can succeed this year') ($\alpha_{PE}=.72$, $\alpha_{SC}=.67$).

Learning strategies

Self-regulation strategies Items related to the use of various self-regulation strategies were adapted from previous studies (Galand and Frenay 2005; Galand et al. 2010) and grouped into two scales according to the results of an exploratory factor analysis. Ten items covered participants' reports of self-supervision, control and management when executing a learning task (*adaptive strategies*) ($\alpha_{PE}=.71$, $\alpha_{SC}=.63$). Six items were concerned with participants' views on facing difficulties in managing potential distractions from learning and low persistence when facing problems (*maladaptive strategies*) ($\alpha_{PE}=.61$, $\alpha_{SC}=.66$). These items were answered on a five-point Likert scale ranging from 1 (never) to 5 (very often).

Processing strategies Items related to the use of various processing strategies were also adapted from previous studies (Galand and Frenay 2005; Galand and Philippot 2002) and grouped into two scales according to the results of an exploratory factor analysis. Twelve

items assessed participants' reports of making links between different pieces of information, trying to establish the relevance of their learning material to real-life situations and having a critical stand towards the learning material (*deep processing*) ($\alpha_{PE}=.80$, $\alpha_{SC}=.84$). Six items assessed participants' reports of underlining, summarising, memorising and rehearsing learning material (*surface processing*) ($\alpha_{PE}=.60$, $\alpha_{SC}=.56$). These items were answered on a five-point Likert scale ranging from 1 (never) to 5 (very often).

Behavioural engagement

Attendance Participants were asked to indicate the percentage of classes they attended on a ten-point scale ranging from 10 to 100 % (Finn and Rock 1997).

Study time Participants were asked to indicate how many hours per week they usually spent on academic work outside classes on a ten-point scale ranging from '0 to 3' to '30 or more'.

Extra-academic activities Participants were asked to report if they were involved in five different kinds of extra-academic activities (e.g. paid job, sports club, youth organisations). The number of activities in which they participated was used in subsequent analyses.

Intention to persist Four items assessed participants' intention to persist in their present course or to change to another course (e.g. 'I would like to change to another course' (reverse scoring) ($\alpha_{PE}=.80$, $\alpha_{SC}=.83$).

Outcome variable

Achievement Academic achievement in the first year at university was represented by the average percentage obtained for all subjects at the end of the academic year. This measure was collected from departmental records. As each student of the same faculty attended the same curricula, the internal consistency of the outcome variable was assessed by analyzing the reliability coefficient of the exams scores for the two faculties ($\alpha_{PE}=.81$, $\alpha_{SC}=.89$).

Results

The means and standard deviations for the variables in the study are presented in Table 1, separately for the two samples. Except for the higher proportion of girls in physical education, there were no significant differences in the background characteristics or the learning strategies between the two groups of students. However, there were several significant differences in study choice and experience of university. Students in SC made their study choice before students in PE and consulted more sources of information in their choice-making process. Their choice was motivated more by concern about their self-image and job opportunities, and less by vocation, probability of success and pressure from others. SC students also reported less clearly defined future goals, higher self-efficacy beliefs and higher perceived utility. PE students perceived more academic support, fewer organisational problems and less peer support than SC students. They also reported higher institutional commitment, stronger intentions to persist and more extra-academic activities. Attendance and study time did not differ significantly between the two groups. Students in PE tended to receive higher grades than students in SC.

Table 1 Means and standard deviations for the two samples

Means and standard deviations for the two samples	Range	Physical Education (<i>n</i> =111)		Science (<i>n</i> =206)		
		M	SD	M	SD	
Background						
Gender ^a	0–1	–	–	–	–	
Age	17–22	18.8	1	18.1	0.7	***
Parents' education	1–4	3.1	0.7	3.1	0.7	
Failure at secondary school ^b	0–1	–	–	–	–	
School specialisation						
Language	2–6	4.3	0.7	4.4	0.8	
Math	2–6	5	1	5.5	0.9	**
Science	2–10	6.2	2.9	6.3	2.4	
Study choice						
Moment of choice	1–3	1.8	0.6	2.1	0.6	***
Informed choice	0–8	3.3	1.6	3.9	1.8	**
Reasons for choice						
Passion	1–5	4.4	0.8	4.5	0.7	
Self-image	1–5	2.7	1.2	3	1.2	*
Vocation	1–5	4.5	0.7	4.2	1	**
Probability of success	1–5	2.4	1.1	2	1.2	**
Job opportunities	1–5	2.7	1.4	3.1	1.3	*
Course avoidance	1–5	1.5	0.9	1.5	1	
Others pressure	1–5	2.4	1.3	1.8	1	***
Experience of the program						
Perceived learning environment						
Academic support	1–5	3.3	0.4	3	0.5	***
Organizational problems	1–5	2.5	0.5	2.8	0.5	***
Peer support	1–5	3.8	0.5	4.1	0.6	***
Institutional commitment	1–5	3.6	0.7	3.4	0.9	*
Motivational beliefs						
Clarity of future goals	1–5	3.8	1	3.3	1.1	***
Perceived instrumentality	1–5	3	0.7	3.8	0.7	***
Self-efficacy	1–5	2.9	0.6	3.1	0.5	**
Learning strategies						
Self-regulation strategies						
Adaptive	1–5	3.1	0.5	3.1	0.4	
Maladaptive	1–5	2.3	0.5	2.3	0.6	
Processing strategies						
Deep processing	1–5	3.1	0.5	3.2	0.6	
Surface processing	1–5	3.1	.06	3.1	0.6	
Behavioural engagement						
Intention to persist	1–5	4.3	0.8	4	0.9	**
Extra-academic activities	0–5	1.3	0.6	1.1	0.9	*
Attendance	1–10	9	1.1	9.2	1	
Study time	1–10	4.2	2	4.4	1.9	
Achievement	0–100	49	16	44	23	*

* $p < 0.05$; ** $p < .01$; *** $p < .001$ ^a 56% of students in PE are girls and 45% of SC are girls^b 19% of PE and 14% of SC have been retained in secondary school

Table 2 shows the zero-order correlations between the variables for the two groups of students separately. In both groups, achievement was positively associated ($p < .05$) with parents' education, specialising in maths at school, making an informed choice, having strong self-efficacy beliefs, using adaptive strategies and deep processing, intending to persist and attending class regularly. It was negatively associated with age, past school failure, and maladaptive strategies. In SC, positive correlations emerged with passion, perceived utility, peer support, extra-academic activities and study time. Achievement was also negatively associated with course avoidances and organisational problems. In PE, a negative correlation between achievement and pressure from others appeared.

Multiple regression analyses were performed in order to identify the most powerful predictors of achievement in each program. According to the classification presented above (Fig. 1), variables were entered in the regression equation in three blocks from the more distal set of variable to the more proximal one. The variables were entered into the regression equation in three blocks. In the first stage, only the background variables were included in the analysis. Next, variables related to the study choice process and students' experience of university were added to the equation. Finally, the variables relating to students' motivational beliefs, learning strategies and behavioural engagement were entered into the equation. Given the large number of variables, a stepwise method was used at each stage to include only variables having an incremental contribution to the prediction of achievement and to avoid artificial inflation of the explained variance (Bressoux 2010).

The results of these analyses are presented in Table 2. The predictive power of all three blocks together was different in the two groups of students. The model explained 33 % of the variance in PE, compared to 48 % in SC. Nevertheless, in both faculties, each block accounted for a substantial proportion of the variance in achievement. In both samples, students whose parents had higher educational qualifications, who had never repeated a year in secondary school and who were confident about their ability to succeed got higher grades.

All the other effects were specific to one group. In PE, students using more deep processing strategies and feeling less pressured by others in their choice-making process got higher grades. In SC, younger students and those who had taken more mathematics at secondary school got higher grades, as did students reporting a stronger intention to persist and more time spent studying. Moreover, SC students who chose their course because they were passionate about the subject and those who felt supported by their peers got higher grades, although these two effects disappeared when intention to persist and study time were included in the equation.

Finally, the single most powerful predictor of achievement was different in the two groups. Academic success in PE was mainly predicted by self-efficacy, while academic success in SC was mainly predicted by intention to persist.²

Discussion

This study focused on two distinct questions, namely what is the strongest predictor of academic achievement when an inclusive approach is adopted, and do the various predictors

² Analyses with all the variables entered together (no blocks) gave similar results.

Table 2 Zero-order correlations and standardized coefficients for multiple regressions (stepwise) with achievement as dependant variable

	Physical Education (<i>n</i> =111)				Science (<i>n</i> =206)			
	<i>r</i>	Step 1	Step 2	Step 3	<i>r</i>	Step 1	Step 2	Step 3
Background								
Gender	-.12				-.08			
Age	-.15*				-.35***	-.20*	-.20*	-.17*
Parents' education	.29**	.31**	.31**	.21*	.16*	.13*	.13*	.10
Failure at secondary school	-.18*	-.17*	-.19*	-.21*	-.37***	-.19*	-.23**	-.19*
School specialisation								
Language	-.10				-.10			
Math	.16*				.30***	.26***	.20*	.15*
Science	-.10				-.09			
Study choice								
Moment of choice	.04				.04			
Informed choice	.13*				.23**			
Reasons for choice								
Passion	-.02				.21**		.17*	.04
Self-image	-.06				-.04			
Vocation	.04				.07			
Probability of success	-.07				-.06			
Job opportunities	-.08				.04			
Course avoidance	.04				-.18*			
Others pressure	-.20*		-.22*	-.16*	.03			
Experience of the program								
Learning environment								
Academic support	.05				.07			
Organizational problems	-.10				-.15*			
Peer support	.06				.25***		.19*	.10
Institutional commitment	.00				.05			
Motivational beliefs								
Perceived instrumentality	.11				.22**			
Clarity of future goals	-.09				-.04			
Self-efficacy	.40***			.35***	.34***			.17*
Learning strategies								
Self-regulation strategies								
Adaptive	.20*				.25***			
Maladaptive	-.18*				-.34***			
Processing strategies								
Deep processing	.24**			.18*	.24**			
Surface processing	.06				.01			
Behavioural engagement								
Intention to persist	.25**				.48***			.31*
Extra-academic activities	.02				.15*			
Attendance	.16*				.22**			
Study time	.06				.28***			.13*
R ²		.13	.18	.33		.25	.33	.48
ΔR ²		.13*	.05*	.15*		.25*	.08*	.15*

Gender: 0=female, 1=male

* $p < 0.05$; ** $p < .01$; *** $p < .001$

of academic achievement have a differential impact among students studying different subjects.

Towards an integrated and contextualised approach

Our results confirm the expected effect of past performance and the importance of parents' education. Even at this level of the educational system, social inequalities are still clearly apparent. The effect of background variables on achievement is quite similar at each step and does not seem to be mediated by study choice, experience of the university, motivational beliefs, approaches to learning or behavioural engagement. The difference between the proportion of variance explained in the two faculties (33 % in PE and 48 % in SC) was mostly related to the larger proportion of variance accounted for background variables in SC (step 1). Self-efficacy beliefs also emerged as a significant predictor of academic achievement in both programs. Consistent with our assumption and previous research, self-efficacy appears to be a key predictor of performance in both compulsory (Schunk and Pajares 2005) and higher education (Elias and MacDonald 2007; Robbins et al. 2004).

The results of the present study also show that several categories of predictors are useful in understanding achievement. In addition to academic background and motivational beliefs, some variables related to the study-choice processes, experience of university, learning strategies and behavioural engagement were directly associated with achievement in at least one program. Therefore, our findings support the idea that a multifactor, integrated conceptualisation is needed to capture the dynamic of achievement among first-year university students. This is consistent with the fact that students experience a multitude of social, academic and emotional stressors in their first year at university (DeBerard et al. 2004). Questions remain about the relevance of all those categories of variables to predicting academic achievement once students have become more accustomed with university life.

Another issue raised by this study was the differences and similarities in predictors of achievement in two faculties with a common core of courses but different requirements. Many zero-order correlation coefficients are within the same range in both programs, but some are two or three times larger in one faculty than in the other. Even when a predictor of achievement is important in both programs, it does not necessarily have the same predictive power. In fact, the single best predictor of achievement differs from one faculty to the other. Moreover, different effects emerged from the multivariate analyses, suggesting that the covariance matrix could be specific to each program. For instance, the zero-order association between deep-processing strategies and achievement was similar in the two programs, but the multivariate effect was only significant in PE. These variations between faculties are consistent with the results of Lizzio et al. (2002). However, no variable was found to have opposite relationships with achievement in the two groups of students, and all the significant effects were in the expected direction.

These differences between faculties point to the importance of paying more attention in future to the characteristics of the subject being studied and the characteristics of the program. Such an approach may explain the inconsistent findings in the present literature. For example, the inconsistent findings about the relationships between surface processing, deep processing and academic achievement (Bruinsma 2004; De Clercq et al., manuscript submitted for publication; Ward and Walker 2008) could perhaps be explained by the learning activities and assessment tools used in different programs (Donche et al. 2007).

Some variables, such as the moment of choice, institutional commitment, and clarity of future goals, were not associated with achievement in any program. Some

other variables such as the reasons for choice and the peer support lost their predictive power on academic achievement after inclusion of motivational beliefs, learning strategies and behavioural engagement. It could be that those variables are not important for achievement in the faculties investigated or that they only have an indirect effect on achievement. This study has focused on direct effects and has not tested for mediation effects. The effect of the study-choice process could be mediated by motivational beliefs and behavioural engagement (Boudrenghien et al. 2012). Or the effect of the perceived learning environment could be mediated by learning strategies and behavioural engagement (Donche et al. 2007; Fass and Tubman 2002). The comparison of regression coefficients between steps 2 and 3 in Table 2 is consistent with these hypotheses in SC, but not in PE. These results could also highlight that these two sets of variables would not be incrementally predictive of academic achievement when an inclusive approach is undertaken, bearing out the need to further investigate multifactor conceptualisations. Eventually, the results have mainly highlighted that background variables explained a significant proportion of variance of achievement (13 % in PE and 25 % in SC) and remain significant predictors of achievement after inclusion of more proximal variables. It can be assumed that background variables have a direct impact on achievement. This finding therefore insists on the need to consider the achievement process from the beginning of the academic year, taking freshmen's entrance characteristics into account.

While our results emphasise the importance of developing a more inclusive and more contextualised model, they also show the theoretical challenges that such a model has to undergo: which categories of predictors are important to take into account, and which specific variables within each category? How are these various predictors related, and do they have direct or indirect effects? What characteristics of the courses are important to measure and how do they moderate the effects of the predictors?

Limitations and perspectives

The results of the present study are limited to two faculties in an open-access university. Some replication of our integrated methodology in other faculties and other educational systems is needed to confirm the robustness and the generalisability of the findings. Additional integrated and contextualised studies could shed light on the reasons for different factors being effective in different faculties. We need to answer questions such as whether and how the effects are related to the composition of the student body in each program and to the content and organisation of each course? There was no significant background differences between the participants in the two faculties investigated in this study. However, the participation rate was different, so a selection bias could not be totally excluded. Moreover, students' intellectual abilities were not directly assessed in this study, but were only indicated by past performance and school specialisation. The results might be different if a more standardised measure of student knowledge and skills when arriving at university were available.

Although this study endorsed an integrated and inclusive approach, we cannot be sure that all the relevant categories of predictors were included in our model. For instance, it might be interesting to include more emotional variables, some of which have already been shown to be associated with achievement in higher education (Chemers et al. 2001; Diaz et al. 2001; Hackett et al. 1992) in future models. It is also bare noting that some stability coefficients of our scales were quite low, which induce a careful consideration of certain results. Moreover, several variables, such as attendance and study time, were measured through self-reported

questionnaire. This kind of procedure could impede the measurement validity of the variable. In a certain extent, students misrepresent their actual behavior implying a gap between actual and self-reported measure of a variable (Kuncel et al. 2005). Therefore the above findings should be taken with caution.

Beyond the inclusive approach endorsed by this study, another way to improve our understanding of achievement at the university could be by investigating the interrelations between the different variables introduced in our analyses. Based on two models of learning and engagement (Appleton et al. 2008; Price and Richardson 2003), a dynamic classification of several categories of variables has been proposed. However, despite the assumed interrelations between these categories of variables in the initial models, these different variables were only investigated through their relations with academic achievement. Therefore, future studies could go a step further in the investigation of academic achievement among first year at the university by considering the interaction between these variables. It can be assumed that the impact of a variable on achievement is contingent on the way it combines with others variables. Such an aim could be undertaken using a typological approach. Distinct combinations of variables could be identified through cluster analysis. In this way, distinct achievement profiles of first-year students could be identified, each of them being a different combination of the same set of variables.

The correlative nature of our data precludes any demonstration of causality. Nevertheless, the results provide some hints about how failure rates among first-year university students could be decreased. Preventive interventions could be targeted at students from less advantaged socio-cultural backgrounds and/or students who had repeated a year during compulsory education. Interventions that foster academic self-efficacy among students (Galand and Vanlede 2004) and promote study choice based on intrinsic reasons could be particularly effective. Moreover, our results suggest that the interventions should be suited to the characteristics of each program.

Acknowledgements This research was supported by grants from the Louvain Foundation, from the Université catholique de Louvain (FSR) and the Fonds de la Recherche Scientifique (FNRS - FRFC). The authors would like to thank the lecturers and students of the Departments of Physical Education and Science for their support and participation.

References

- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools*, 45(5), 369–386.
- Arulampalam, W., Naylor, R., & Smith, J. (2004). Undergraduate medical education factors affecting the probability of first year medical student dropout in the UK: A logistic analysis for the intake cohorts of 1980–92. *Medical Education*, 38(5), 492–503.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New-York: Freeman.
- Biémar, S., Philippe, M.-C., & Romainville, M. (2003). L'injonction au projet: paradoxale et infondée ? Approche longitudinale du choix d'études supérieures. [Project injunction: paradoxical and unfounded ? Longitudinal approach to study choice in higher education]. *L'orientation scolaire et professionnelle*, 32, 31–51.
- Biggs, J. B. (1985). The role of metalearning in study processes. *The British Journal of Educational Psychology*, 55, 185–212.
- Bong, M., & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? *Educational Psychology Review*, 15(1), 1–40.
- Boudrenghien, G., Frenay, M., Bourgeois, E. (in press). La transition de l'enseignement secondaire vers l'enseignement supérieur [Transition from high school to college]. In S. Neuville, M. Frenay, B. Noël V.

- Wertz (Ed.), *Persévérer et réussir à l'Université [Persistence and Performance at University]*. Louvain-la-Neuve: Presses Universitaires de Louvain.
- Braxton, J. M., Milem, J. F., & Sullivan, A. S. (2000). The influence of active learning on the college student departure process: Toward a revision of Tinto's theory. *Journal of Higher Education*, 71(5), 569–590.
- Bressoux, P. (2010). *Modélisation statistique appliquée aux sciences sociales [Statistical modeling applied to social sciences]* (2nd ed.). Bruxelles: Deboeck.
- Bruinsma, M. (2004). Motivation, cognitive processing and achievement in higher education. *Learning and Instruction*, 14(6), 549–568.
- Cabrera, A. F., Nora, A., & Castaneda, M. B. (1993). College persistence: Structural equations modeling test of an integrated model of student retention. *Journal of Higher Education*, 64(2), 123–139.
- Chemers, M. M., Hu, L.-t., & Garcia, B. (2001). Academic self-efficacy and first-year college student performance and adjustment. *Journal of Educational Psychology*, 93(1), 55–64.
- Credé, M., Roch, S. G., & Kieszczynka, U. M. (2010). Class attendance in college: A meta-analytic review of the relationship of class attendance with grades and student characteristics. *Review of Educational Research*, 80(2), 272–295.
- DaDeppo, L. M. W. (2009). Integration factors related to the academic success and intent to persist of college students with learning disabilities. *Learning Disabilities Research and Practice*, 24(3), 122–131.
- DeBerard, M. S., Spielmans, G. I., & Julka, D. C. (2004). Predictors of academic achievement and retention among college freshmen: A longitudinal study. *College Student Journal*, 38(1), 66–80.
- Deci, E.-L., & Ryan, R.-M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268.
- Díaz, R. J., Glass, C. R., Arnkoff, D. B., & Tanofsky-Kraff, M. (2001). Cognition, anxiety, and prediction of performance in 1st-year law students. *Journal of Educational Psychology*, 93(2), 420–429.
- Dollinger, S. J., Matyja, A. M., & Huber, J. L. (2008). Which factors best account for academic success: Those which college students can control or those they cannot? *Journal of Research in Personality*, 42(4), 872–885.
- Donche, V., De Maeyer, S., Van Petegem, P. (2007). *Teachers' conceptions of learning and teaching and their effect on student learning*. Education-line. <http://hdl.handle.net/10067/655210151162165141>.
- Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, 53, 109–132.
- Elias, S. M., & MacDonald, S. (2007). Using past performance, proxy efficacy, and academic self-efficacy to predict college performance. *Journal of Applied Social Psychology*, 37(11), 2518–2531.
- Fass, M. E., & Tubman, J. G. (2002). The influence of parental and peer attachment on college students' academic achievement. *Psychology in the Schools*, 39(5), 561.
- Fenollar, P., Roman, S., & Cuestas, P. J. (2007). University students' academic performance: An integrative conceptual framework and empirical analysis. *The British Journal of Educational Psychology*, 77(4), 873–891.
- Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *The Journal of Applied Psychology*, 82(2), 221–234. doi:10.1037/0022-0663.84.4.553.
- Galand, B. (2004). Le rôle du contexte scolaire et de la démotivation dans l'absentéisme des élèves [The role of school context and disengagement in student absenteeism]. *Revue des sciences de l'éducation*, 30, 125–142.
- Galand, B., & Frenay, M. (2005). *L'approche par problèmes et par projets dans l'enseignement supérieur: Impact, enjeux et défis [Problem and project based learning in Higher Education: Impact, issues, and challenges]*. Louvain-la-Neuve: Presses Universitaires de Louvain.
- Galand, B., & Philippot, P. (2002). Style motivationnel des élèves du secondaire: développement d'un instrument de mesure et relations avec d'autres variables pédagogiques [Achievement goals orientation in middle school: Validation of a scale for French-speaking students and its relationships with other motivational variables]. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, 34(4), 261–275.
- Galand, B., & Philippot, P. (2005). L'école telle qu'ils la voient: Validation d'une mesure des perceptions du contexte scolaire par les élèves du secondaire [School as they see it: validation of a measure of perceived goal structures and teachers-students relationships for secondary school students]. *Canadian Journal of Behavioral Science*, 37, 138–154.
- Galand, B., & Vanlede, M. (2004). Le sentiment d'efficacité personnelle dans la formation: Quel rôle joue-t-il ? D'où vient-il ? Comment intervenir ? [Self-efficacy beliefs in education: What role do they play? Where do they come from? How to intervene?] *Savoirs, Hors-série «Autour de l'oeuvre d'Albert Bandura »*, 91–116.
- Galand, B., Bourgeois, E., Frenay, M. (2003). *Instructional and motivational influences on deep learning: Contrasting theoretical models in higher education*. Paper presented at the annual meeting of the American Educational Research Association, Chicago, USA.

- Galand, B., Neuville, S., & Frenay, M. (2005). L'échec à l'université en Communauté française de Belgique: comprendre pour mieux prévenir [Failure at university in the French speaking Community of Belgium]. *Cahiers de recherche en éducation et formation*, 39, 5–17.
- Galand, B., Raucant, B., & Frenay, M. (2010). Engineering students' self-regulation, study strategies, and motivational beliefs in traditional and problem-based curricula. *International Journal of Engineering Education*, 26(3), 1–12.
- Germeijs, V., & Verschueren, K. (2006). High school students' career decision-making process: development and validation of the study choice task inventory. *Journal of Career Assessment*, 14(4), 449–471. doi:10.1037/0022-0167.36.2.196.
- Germeijs, V., Luyckx, K., Notelaers, G., Goossens, L., Verschueren, K. (2012). Choosing a major in higher education: profiles of students' decision-making process. *Contemporary Educational Psychology*, 37, 229–239. doi: 10.1016/j.cedpsych.2011.12.002.
- Hackett, G., Betz, N. E., Casas, J. M., & Rocha-Singh, I. A. (1992). Gender, ethnicity, and social cognitive factors predicting the academic achievement of students in engineering. *Journal of Counseling Psychology*, 39(4), 527–538.
- Hausmann, L., Ye, F., Schofield, J., & Woods, R. (2009). Sense of belonging and persistence in white and african american first-year students. *Research in Higher Education*, 50(7), 649–669.
- Husman, J., & Lens, W. (1999). The role of the future in student motivation. *Educational Psychologist*, 34(2), 113–125.
- Jakoubek, J., & Swenson, R. R. (1993). Differences in use of learning-strategies and relation to grades among undergraduate students. *Psychological Reports*, 73(3), 787–793.
- Kuncel, N. R., Credé, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Review of Educational Research*, 75(1), 63–82.
- Larose, S., Robertson, D. U., Roy, R., & Legault, F. (1998). Nonintellectual learning factors as determinants for success in college. *Research in Higher Education*, 39(3), 275–297.
- Lee, V. E., & Burkam, D. T. (2003). Dropping out of high school: the role of school organization and structure. *American Educational Research Journal*, 40(2), 353–393.
- Lens, W. (1993). La signification motivationnelle de la perspective future [Motivational meaning of future perspective]. *Revue québécoise de psychologie*, 13(1), 69–84.
- Lens, W., Simons, J., & Dewitte, S. (2002). From duty to desire: The role of students' future time perspective and instrumentality perceptions for study motivation and self-regulation. In F. Pajares & T. Urdan (Eds.), *Adolescence and education. Vol. 2. Academic motivation of adolescents*. Greenwich: Information Age Publishing.
- Lizzio, A., Wilson, K., & Simons, R. (2002). University students' perceptions of the learning environment and academic outcomes: implications for theory and practice. *Studies in Higher Education*, 27, 27–52.
- Mannan, M. A. (2001). An assessment of the academic and social integration perceived by the students in the University of Papua New Guinea. *Higher Education*, 41, 283–298.
- Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. *American Educational Research Journal*, 37, 153–184.
- Miller, R. B., & Brickman, S. J. (2004). A model of future-oriented motivation and self-regulation. *Educational Psychology Review*, 16(1), 9–33.
- Minnaert, A., & Janssen, P. J. (1999). The additive effect of regulatory activities on top of intelligence in relation to academic performance in higher education. *Learning and Instruction*, 9(1), 77–91.
- Neuville, S., Frenay, M., & Bourgeois, E. (2007). Task value, self-efficacy and goal orientations: Impact on self-regulated learning, choice and performance among university students. *Psychologica Belgica*, 47(1–2), 95–117.
- Neuville, S., Frenay, M., Schmitz, J., Boudrenghien, G., Noël, B., & Wertz, V. (2007). Tinto's theoretical perspective and expectancy-value paradigm: A confrontation to explain freshmen's academic achievement. *Psychologica Belgica*, 47(1), 31–50.
- Nota, L., Soresi, S., & Zimmerman, B. J. (2004). Self-regulation and academic achievement and resilience: a longitudinal study. *International Journal of Educational Research*, 41(3), 198–215.
- Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education*, 25(9), 1049.
- Patrick, H., Ryan, A. M., & Kaplan, A. (2007). Early adolescents' perceptions of the classroom social environment, motivational beliefs, and engagement. *Journal of Educational Psychology*, 99(1), 83.
- Perry, R. P., Hladkyj, S., Pekrun, R. H., & Pelletier, S. T. (2001). Academic control and action control in the achievement of college students: A longitudinal field study. *Journal of Educational Psychology*, 93(4), 776–789.
- Phan, H. P. (2009). Amalgamation of future time orientation, epistemological beliefs, achievement goals and study strategies: Empirical evidence established. *The British Journal of Educational Psychology*, 79(1), 155–173.

- Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82(1), 33–40.
- Pirot, L., & De Ketele, J. M. (2000). L'engagement académique de l'étudiant comme facteur de réussite à l'université. Étude exploratoire menée dans deux facultés contrastées. [Student's academic commitment as achievement factor at the university]. *Revue des sciences de l'éducation*, 26(2), 367–394.
- Price, L., & Richardson, J. T. E. (2003). Why is it difficult to improve student learning? In C. Rust (Ed.), 11th Improving Student Learning Symposium, Improving Student Learning: Theory, Research and Scholarship. Oxford: The Oxford Centre for Staff and Learning Development.
- Rayle, A. D., Kurpius, S. E. R., & Arredondo, P. (2006). Relationship of self-beliefs, social support, and university comfort with the academic success of freshmen college women. *Journal of College Student Retention: Research, Theory and Practice*, 8(3), 325–343.
- Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, 130(2), 261–288.
- Sackett, P. R., Kuncel, N. R., Arneson, J. J., Cooper, S. R., & Waters, S. D. (2009). Does socioeconomic status explain the relationship between admissions tests and post-secondary academic performance? *Psychological Bulletin*, 135(1), 1–22.
- Sandler, M. E. (2000). Career decision-making, self-efficacy, perceived stress, and an integrated model of student persistence: A structural model of finances, attitudes, behavior, and career development. *Research in Higher Education*, 41(5), 537–580.
- Schmitz, J., Frenay, M., Neuville, S., Boudrenghien, G., Wertz, V., Noël, B., et al. (2010). Etude de trois facteurs clés pour comprendre la persévérance à l'université [Study of three key factors to understand university persistence]. *Revue française de pédagogie*, 172, 43–61.
- Shell, D.-F., & Husman, J. (2008). Control, motivation, affect, and strategic self-regulation in the college classroom: a multidimensional phenomenon. *Journal of Educational Psychology*, 100(2), 443–459.
- Schunk, D. H., & Pajares, F. (2005). Competence perceptions and academic functioning. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 141–163). New York: Guilford.
- Simons, J., Dewitte, S., & Lens, W. (2004). The role of different types of instrumentality in motivation, study strategies, and performance: Know why you learn, so you'll know what you learn! *The British Journal of Educational Psychology*, 74(3), 343–360.
- Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, 75(3), 417–453.
- Skinner, E. A., Wellborn, J. G., & Connell, J. P. (1990). What it takes to do well in school and whether I've got it: A process model of perceived control and children's engagement and achievement in school. *Journal of Educational Psychology*, 82, 22–32.
- Strauss, L. C., & Volkwein, J. F. (2004). Predictors of student commitment at two-year and four-year institutions. *Journal of Higher Education*, 75(2), 203–227.
- Tinto, V. (1997). Classrooms as communities. Exploring the educational character of student persistence. *Journal of Higher Education*, 68(6), 599–623.
- Torres, J. B., & Solberg, V. S. (2001). Role of self-efficacy, stress, social integration, and family support in Latino college student persistence and health. *Journal of Vocational Behavior*, 59(1), 53–63.
- Trigwell, K., & Prosser, M. (1997). Towards an understanding of individual acts of teaching and learning. *Higher Education Research and Development*, 16, 241–252.
- Valle, A., Núñez, J. C., Cabanach, R. G., González-Pienda, J. A., Rodríguez, S., Rosário, P., et al. (2008). Self-regulated profiles and academic achievement. *Psicothema*, 20(4), 724–731.
- Van den Berg, M. N., & Hofman, W. H. A. (2005). Student success in university education: A multi-measurement study of the impact of student and faculty factors on study progress. *Higher Education*, 50(3), 413–446.
- Vandamme, J.-P., Superby, J. F., Meskens, N. (2005). *Freshers' Achievement : Prediction Methods and Influential Factors*. Paper presented at the Higher Education, Multijurisdictionality and Globalisation Conference, Mons, Belgium.
- Vermunt, J. (2005). Relations between student learning patterns and personal and contextual factors and academic performance. *Higher Education*, 49(3), 205–234.
- Ward, P. J., & Walker, J. J. (2008). The influence of study methods and knowledge processing on academic success and long-term recall of anatomy learning by first-year veterinary students. *Anatomical Sciences Education*, 1(2), 68–74.
- Webster, B. J., Chan, W. S. C., Prosser, M. T., & Watkins, D. A. (2009). Undergraduates' learning experience and learning process: Quantitative evidence from the East. *Higher Education*, 58(3), 375–386.

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Most relevant publications in the field of Psychology of Education:

De Clercq, M., (2011, July) Motivation, Learning environment and Entrance profiles in first year at the university: 'Development of an integrative understanding of academic achievement'. Poster presented at the 16th ELSIN conference, Anvers, Belgium.

De Clercq, M., Galand, B., Frenay, M., (2012) Chicken or the Egg: Longitudinal analysis of the causal dilemma between goal orientation, Self-regulation and learning strategies in higher education. Manuscript submitted for publication.

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Most relevant publications in the field of Psychology of Education:

Galand, B. & Bourgeois, E. (Eds.) (2006). *(Se) Motiver à apprendre*. Paris: Presses universitaires de France.

Galand, B., Dernoncourt, O. & Mirzabekiantz, G. (2009). Caractéristiques relationnelles et émotionnelles des auteurs et des victimes de violences à l'école. *Revue suisse des sciences de l'éducation, numéro thématique sur le violence à l'école*, 31, 33-56.

Galand, B., Raucourt, B., & Frenay, M. (2010). Engineering students' self-regulation, study strategies, and motivational beliefs in traditional and problem-based curricula. *International Journal of Engineering Education, Special issue on Methodology for the study of PBL in Engineering Education*, 26(3), 523-534.

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Most relevant publications in the field of Psychology of Education:

Dupont, S., Meert, G., Galand, B., & Nils, F. (2011). Comment expliquer le dépôt différé du mémoire de fin d'étude? Les cahiers de recherche du Girsef, 85.

Dupont, S., Meert, G., Galand, B., & Nils, F. (2011). Postponement in the Completion of Final Dissertation: An underexplored dimension of achievement in higher education. Manuscript submitted for publication.

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Most relevant publications in the field of Psychology of Education:

Frenay, M., Galand, B., Milgrom, E. & Raucent, B. (2007). Project- and problem-based learning in the engineering curriculum at the University of Louvain. In E.de Graaf & A.Kolmos (Eds.), *Management of change: Implementation of problem-based and project-based learning in engineering* (pp. 93–108). Rotterdam: Sense Publisher.