**The Learning Strategies of Mature Students: A Study of
Social Science Students in Belgium**

Journal:	<i>Journal of Applied Research in Higher Education</i>
Manuscript ID	JARHE-04-2018-0063.R3
Manuscript Type:	Research Paper
Keywords:	mature students, learning strategies, university students, multinomial linear regression

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Introduction

Europeans aged 25 to 64 are encouraged to participate in lifelong learning (European Commission, 2015). Moreover, the European Digital Education Plan explicitly promotes the integration of technologies and the development of innovative learning environments in order to accommodate increasing numbers of diverse groups of learners, among which those who wish to embark on an academic programme later in their lives (European Commission, 2018). Either they decide to enrol for the first time in higher education (HE), or to re-orientate after having obtained a qualification in a different area of study. Often, these learners gained specific life experiences, such as responsibilities and commitments in work, family or communities (McKenzie and Gow, 2004). They are referred to as ‘mature’, ‘mature-age’, ‘adult’ or ‘non-standard’ students (Benn, 1995; Chen, 2014; Richardson and King, 1998; Trueman and Hartley, 1996).

Mature learners benefit significantly from engaging in tertiary education in terms of their ‘capital’, either professional, economical, personal and/or social (Swain and Hammond, 2011). However, mature students may encounter a number of impediments to academic success, as is suggested by the high rates of dropout from HE programmes (Deschacht and Goeman, 2015). Inhibitors can be present prior to deciding upon enrolment in an education programme, and remain throughout learners’ transition to HE and/or during engagement in HE programmes. Previous studies list dispositional barriers next to institutional and situational barriers (e.g., Burton *et al.*, 2011; Saar *et al.*, 2014; Schömer and González-Monteagudo, 2013).

Adult learners may lack so-called 'preparedness' and self-confidence in their academic capabilities. Scholars found that mature students have difficulty with understanding learning contents (Fragoso *et al.*, 2013) or that they are deficient in study skills (Richardson, 1995; Currie and Baldock, 1989). Others have argued that mature students often possess the ideal characteristics to succeed in university studies (McKenzie and Gow, 2004), that they display an approach that is consistent with the avowed aims and purposes of HE (Hayes *et al.*, 1997) or that they are equally successful in HE as compared to standard entry students (Murphy and Roopchand, 2003). Recent studies in ecological settings of online and blended learning point out that adult learners lack adequate self-direction and/or apply 'old school' learning strategies (Alario-Hoyos *et al.* 2017; Vanslambrouck *et al.* 2019).

The aim of this study is to investigate the learning strategies of mature students and the role of personal and contextual characteristics in this relation. Implications for theory building concerning the assessment and classification of learning strategies are discussed and follow-up research is proposed. Additionally, this contribution puts forward recommendations for administrators and instructors in higher education regarding the design of learning environments targeting mature students.

Learning Strategies

Learning strategies are 'the techniques or skills that an individual elects to use in order to accomplish a learning task' (Conti, 2009). Chris Howard and Peter Davies (2013) investigated the role of approaches to learning in the HE decision-making process for mature students. They ascertain that 'students may enter a context with a disposition to learn (individual mechanism) which may influence their interactions and their experiences'. Schmeck (2013) argues that learning strategies are malleable

by instruction, while Ausburn (2004) notes that ‘awareness of personal strategy preferences by both learner and teacher can be used to facilitate adult learning gains in the classroom’.

Why is it important to consider the learning strategies of students? In the first place, to address individual differences and to allow differentiation when designing learning activities and learning spaces. This is beneficial to the way an ‘adult student will appropriate and value knowledge and learning’ (Baptista, 2011). Instructors who match their teaching to learning strategies improve learning outcomes (Entwistle, 1998). Pask (1988) showed that students learned more effectively if material was presented to them in their preferred style. Authors such as Ausburn (2004), Cercone (2008), Gravani and Karagiorgi (2014) emphasise the application of principles of adult learning in developing (online or hybrid) learning programmes and environments for mature students (place, mode, pace, including the learning units and its educational format). This requires the identification of the learning strategies adopted by various groups of students (Gravani, 2015).

Mature and younger students perceive themselves as being different learners, who (prefer to) use other learning strategies. Richardson (1995) compared mature first-year Social Sciences students to their younger counterpart and found evidence that suggests that mature students are more likely to use ‘deep learning’, as opposed to the ‘surface learning’ which is more common among younger students. Zeegers (2001) and Murray-Harvey (1993) revealed that mature-age students use more meaningful deep approaches to learning than younger students, and this has a positive influence on their grades. Fragoso *et al.* (2013) add to this that mature students are slower, have better timing and organisation skills and a greater responsibility towards learning. As a result they tend to engage more actively with their study. Research by McKenzie

and Gow (2004) shows that mature students' performance is best predicted by their learning strategy, which is based on time and effort management.

Prior experiences, both work- and study-related, influence students' learning strategies. As mature students are likely to have other and more life experience, they tend to apply deeper approaches to learning (Baeten *et al.*, 2010; Richardson, 1994), or to be more meaning-oriented when they engage in HE (Rønning, 2009).

Richardson (1994) argues that younger students may acquire a surface approach to learning in their final years of secondary education, which they then maintain in HE contexts.

Learning approaches are also a function of time constraints. As mature students are more likely to work or to have children, they have less time to study. According to Trueman and Hartley (1996), their time management is different compared to that of other students. McKenzie and Gow (2004) noted: 'As it is likely that mature-age students have less spare time to devote to their studies, it is important for them to value the material they are learning and have an intrinsic interest in the subject matter in order for them to use learning strategies to perform the task.'. In contrast: 'For school leavers, the adoption of learning strategies largely relied on their ability to be conscientious and to take personal responsibility for their outcomes. (...) 'school leavers' ability to take personal responsibility is important for learning strategy adoption, with the transition from a more externally regulated learning environment in secondary school to a largely self-regulated learning university'. Kember *et al.* (1995) investigated by means of study diaries the relationship between learning approach, time spent studying, and grades obtained. They found that use of a surface approach to learning was positively correlated with both high class attendance rates and a greater number of hours of independent study time.

Objectives and Hypotheses

This paper examines the learning strategies of mature and non-mature learner groups at university and how contextual factors influence these learning strategies. We address two questions: ‘Are there differences between mature and regular university students with regard to learning strategies? And ‘What factors related to learning context (field of study) and to availability of time (due to having children or a professional occupation) play a mediating role in explaining those differences?’. Previous studies have not yet looked at how the differences in learning strategies between regular and mature students are related to contextual factors. Such knowledge may help to understand *how* universities can create a supportive academic environment for mature learners. If teachers or instructional designers want to build adaptive learning environments they need to be knowledgeable about students’ differences in the ways they accomplish learning activities. First, we examine the relation between student age and learning strategy:

Hypothesis 1. *Mature students have different learning strategies than regular students.*

Second, we assess the mediating effects of a range of student and contextual factors in the relation between student age and learning strategy. The analyses differentiate between general (across learning strategies) and specific mediating effects (per learning strategy). Given the above mentioned theoretical considerations, we formulate the following hypotheses:

Hypothesis 2. *Students’ gender, students’ private context (i.e. available study time, professional occupation or children) and students’ learning context (i.e.*

discipline) mediate the relationship between student age and learning strategy:

H2a *The effect of student age on learning strategy is (partly) explained by the chosen discipline.*

H2b *The effect of student age on learning strategy is (partly) explained by gender.*

H2c *The effect of student age on learning strategy is (partly) explained by students' available time to study.*

H2d *The effect of student age on learning strategy is (partly) explained by the number of children students have.*

H2e *The effect of student age on learning strategy is (partly) explained by professional occupation.*

Method

Participants and Procedure

A sample was drawn from students enrolled in Master's programmes that are organized in two modes (evening or day classes) at two Belgian universities. The total population included 1620 students from 12 different masters, namely Psychology, Accounting and Audit, Political Sciences, Insurance, Law, Social work and Policy, Sociology, Educational studies, Applied Economics, Philosophy, Educational Sciences and Business Administration.

The study was carried out in line with both universities' ethical regulations and procedures. Informed consent was obtained through the produces whereby participants were contacted by e-mail with an invitation to participate in the proposed research and complete the online questionnaire. The final dataset contained responses

from 461 students, a net response of approximately 30%. Due to missing values for 13 students, the analyses below are based on 448 students.

Materials

An online questionnaire was developed, which consisted of three main sections: (1) socio-demographics, (2) study and professional background information, and (3) the Assessing the Learning Strategies of Adults (ATLAS) instrument. In the first part subjects were asked to indicate their gender, age and the number of children (if any). The second section questioned participants' professional occupation, their highest obtained diploma, their field of study and its particular format (either evening or day) and the total of hours they could spent on their current HE studies. The third section included the original, validated version of the ATLAS instrument (Conti, 2009; Conti and Kolody, 1998). This instrument, developed at US-based universities upon the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), is specifically designed to identify the strategies which learners 'have a propensity to use when initiating a learning activity' (Conti and Kolody, 1998). It utilizes a flow-chart design with five items holding two choices, and it can be applied to learners or instructors. Ausburn and Brown (2006) reported ATLAS was extensively tested for its construct, discriminant and criterion validity, and was subject to several test-retest reliability checks. Students also confirmed that ATLAS provides an accurate image of their learning strategies. We translated the ATLAS instrument into Dutch (two-way approach) and pretested a first version with a small group of university students prior to data collection. After minor changes it was integrated in the questionnaire. All survey items, except study time, are closed list questions.

The ATLAS instrument differentiates between three types of learning strategies: navigators, problem solvers and engagers (Conti, 2009):

1) The navigator: a focused, hypercritical learner who charts a personal learning plan and timing, and follows it strictly. Such student looks for external resources that help accomplish learning tasks but does not like to work in a group unless an expert leads it. A navigator's learning environment ideally encompasses elements to achieve efficiency and effectiveness.

2) The problem solver: a self-confident learner who initiates a learning activity by looking at external resources, who generates alternatives based on these resources and by trial-and-error processes. Such student feels comfortable dealing with abstract ideas and regards learning as an adventure. Due to his curiosity and creativity, he does not prefer didactical rigidity. A problem solver's learning environment ideally presents many examples to explain an idea.

3) The engager: a learner who learns best when he actively engages with the learning task in a meaningful way and who loves group work. The engager places high importance on relationships between learners, with instructors, tasks or subject matter. An engager is not interested in developing new or abstract ways of doing things; instead, he will often take the path of least resistance to get to a result. An engager's learning environment is best built around upon social communities in order to engage in learning activities.

Data Analysis

The multivariate analysis uses multinomial logistic regression, a technique which allows to predict a nominal outcome variable with three or more outcome categories.

Based on the ATLAS instrument, the respondents are divided into a particular learning strategy group (dependent variable) with three discrete values: engager, problem solver or navigator. The log odds of the dependent are modelled as a linear combination of the independents. In this study we include the following predictor variables: age, gender, field of study, professional occupation, number of children, number of study hours per week, and format of study programme. Students are divided into two groups based on their age; those of 25 years old or younger were coded as '0' (regular), those above the age of 25 were coded as '1' (mature). Gender is also a dummy variable (0 = female, 1 = male). The number of categories for the variable 'field of study' is reduced by grouping related fields into the following seven clusters: Psychology, Political and Social Sciences (Political Sciences, Sociology, Social Work and Policy), Law, Economics (Applied economics, Business Administration, Insurance and Accounting and Audit), Education (Educational Sciences and Pedagogy), Philosophy, and Others. The continuous variable 'hours of study' measures the number of hours per week a respondent spends on autonomous studying. The professional occupation variable originally consisted of three categories (no job, full-time job, part-time job), but we created a dummy indicator variable for being in a job (1) versus no job (0). The number of children is reduced to a dummy with '0' and '1' meaning respectively 'childless' and 'at least one child'.

The second analysis focuses on potential mediating factors in the relation between student age and learning strategy. The mediation analysis follows the approach of Baron and Kenny (1986), i.e. it assesses to what extent the effect of the predictor variable (mature) on the outcome (learning strategy) changes when controlling for a potential mediator (MacKinnon, 2008; Hayes, 2009). The results are presented using

three tables with estimated marginal effects on the predicted probability of adopting each of the learning strategies.

Results

Descriptive Statistics

Table 1 shows descriptive statistics for all variables. The engagers constitute the largest group with over 40% of the respondents. Almost equally represented are the navigators (38%) and nearly twenty percent are problem solvers. 16% of the students are aged of 25 or more. 7% of the respondents have at least 1 child. More than half the people in our dataset do not have a professional occupation. The mean number of hours per week spent on studying is 23.

Table 1. Descriptive Statistics ($N = 448$)

Variable	Frequency	Mean(SD)
Learning strategy		
Navigator	38%	
Problem solver	19%	
Engager	43%	
Gender: male	32%	
Age		24(6.1)
>25 years	16%	
Children: yes	7%	
Occupation: yes	47%	
Full-time	14%	
Part-time	34%	
Hours of study		23(14.3)
Field of study		
Business	28%	
Educational Studies	18%	
Social Sciences	16%	
Psychology	16%	
Law	12%	
Other	11%	

Learning strategies: mature versus regular students

A chi-square test was performed to compare the ATLAS distribution found among the mature and regular students. Table 2 shows the proportions of each particular subgroup for mature (age >25) versus regular students (aged under 25). In both group the problem solvers are the least represented. More than 50% of the mature students are categorized as navigator and about 28% as engager. Among the regular students, the largest group are engagers. These differences are significant ($\chi^2 = 8.12, p < .05$). This result confirms our first hypothesis, namely that mature and regular students differ significantly in terms of their learning strategies.

Table 2. Cross-tabulation of Learning Strategy and Student Group

	Navigator	Problem solver	Engager	Total	<i>N</i>
Regular	35.5%	18.3%	46.2%	100%	383
Mature	50.8%	21.5%	27.7%	100%	65
Total	37.7%	18.8%	43.5%	100%	448

Note: $\chi^2=8.12, p=0.017$

As illustrated in Figure 1, the older age groups are more likely to be navigators. The relation with age is non-linear: there is a sharp increase in the proportion of navigators between ages 30 and 37, while the proportion remains stable above 37. The proportion of engagers declines in a similar way with age and the proportion of problem-solving students is roughly constant across age.

Figure 1. Frequency of Learning Strategies, by Student Age

Table 3 presents the results of the multinomial regression analysis. Since engagers represent the largest number of respondents, this group is chosen as the reference category of the dependent variable.

Table 3. Multivariate Analysis of Learning Strategies (multinomial logit marginal effects)

	Navigator Coef.	Problem solver Coef.
Mature (ref = Regular)	.159*	.042
Gender: male (ref = female)	.068	.085*
Children: Yes (ref = No)	.015	-.059
Professional occupation: Yes (ref = No)	.058	-.046
Hours of study	.004**	-.003*
Discipline: Psychology	-.015	.018
Discipline: Social sciences	-.007	.054
Discipline: Law	.094	-.037
Discipline: Educational studies	-.021	.072
Discipline: Other	-.114	.036
Constant term	.159*	.042
Log-likelihood	-451.7	
Chi ² (p-value)	31.6 (.047)	
N	448	

* p<.05; ** p<.01.

The predicted probability of adopting a navigator learning strategy is 15.9 percentage points greater for mature students than for other students, holding all the other included variables constant. The corresponding effect for adopting a problem solver learning strategy is only 4.2 percentage points and is not significant. Other significant effects are spotted for the number of hours of study and for gender. To illustrate to importance of gender, Table 4 shows the bivariate relation with learning strategies: men are more likely to be navigators (41.3%) than women (36.1%), whereas women are much more likely to be engagers (48.2% versus 33.6% for men). These differences are significant ($\chi^2_{10.1}$, $p<.01$).

Table 4. Cross-tabulation of Learning Strategy and Gender

	Navigator	Problem solver	Engager	Total	N
Women	36.1	15.7	48.2	100%	305
Men	41.3	25.2	33.6	100%	143
Total	37.7%	18.8%	43.5%	100%	448

Note: $\chi^2=10.11$, $p=0.006$

Mediation analysis

Tables 5, 6 and 7 present the results of the mediation analysis for each learning strategy.

Table 5. Multivariate Analysis: Navigators (multinomial logit marginal effects)

	(1) Coef.	(2) Coef.	(3) Coef.	(4) Coef.	(5) Coef.	(6) Coef.	(7) Coef.
Mature	.153**	.151**	.148*	.133*	.186***	.159**	.159*
Gender: male		.046					.068
Children: Yes			.002				.015
Job: Yes				.033			.058
Hours of study					.002		.004**
Discipline: Psychology						-.046	-.015
Discipline: Social						-.030	-.007
Discipline: Law						.074	.094

Discipline:						-.027	-.021
Educational							
Discipline: Other						-.118	-.114
Log-likelihood	-463.3	-458.6	-463.2	-462.7	-461.0	-460.0	-451.7
Chi ²	8.3	17.8	8.7	9.6	13.1	15.1	31.6
p-value	.015	.001	.069	.048	.011	.234	.047
N	448	448	448	448	448	448	448

* p<.10; ** p<.05; *** p<.01. The coefficients in the table represent marginal effects on the predicted probability of a navigator learning approach.

In general, the probabilities for being a navigator, is 15.3 percent points higher for a mature student than a regular student. In the models predicting a navigator learning approach (Table 5) the estimated coefficient for the variable 'mature' changes most when the job variable (model 4) or the number of study hours (model 5) are included in the models. These mediation effects are only partial effects because the effect of the variable 'mature' remains significant even after including the mediators. Adding the other variables to the model, hardly affects the estimated coefficient of the variable 'mature'. The fact that the estimated coefficient in model 4 is smaller than that in the base model (1) implies that the fact that mature students often adopt a navigator learning approach can partly be explained by the fact that mature students are more likely to be employed. The fact that the estimated coefficient in model 5 is greater than that in the base model indicates that, if mature students would devote the same number of hours to their study as regular students, the probability of mature students adopting a navigator learning approach would be even greater than it is now.

Table 6. Multivariate Analysis: Problem Solvers (multinomial logit marginal effects)

	(1) Coef.	(2) Coef.	(3) Coef.	(4) Coef.	(5) Coef.	(6) Coef.	(7) Coef.
Mature	.033	.026	.052	.055	-.002	.036	.042
Gender: male		.093**					.085*
Children: Yes			-.046				-.059
Job: Yes				-.041			-.046
Hours of study					-.003**		-.003*

Discipline:							
Psychology						.015	.018
Discipline: Social						.055	.054
Discipline: Law						-.052	-.037
Discipline:						.006	.072
Educational							
Discipline: Other						.006	.036
Log-likelihood	-463.4	-458.7	-463.2	-462.8	-461.0	-460.0	-451.7
Chi ²	8.4	17.8	8.7	9.6	13.1	15.1	31.6
p-value	.015	.001	.069	.048	.011	.234	.047
N	448	448	448	448	448	448	448

* $p < .10$; ** $p < .05$; *** $p < .01$. The coefficients in the table represent marginal effects on the predicted probability of a problem solver learning approach.

In the models predicting a problem solver learning approach (Table 6) the estimated coefficient for the variable 'mature' changes most when having children (model 3), being in a professional occupation (model 4) or the number of study hours (model 5) are included in the models. The other variables do not seem to mediate the age-approach relation.

Table 7. Multivariate Analysis: Engagers (multinomial logit marginal effects)

	(1) Coef.	(2) Coef.	(3) Coef.	(4) Coef.	(5) Coef.	(6) Coef.	(7) Coef.
Mature	-.185***	-.176***	-.199***	-.188***	-.184***	-.194***	-.201***
Gender: male		-.139***					-.152***
Children: Yes			.044				.044
Job: Yes				.008			-.011
Hours of study					.000		-.001
Discipline:						.061	-.003
Psychology							
Discipline: Social						-.025	-.047
Discipline: Law						-.023	-.056
Discipline:						.021	-.051
Educational							
Discipline: Other						.112	.078
Log-likelihood	-463.4	-458.7	-463.2	-462.8	-461.0	-460.0	-451.7
Chi ²	8.4	17.8	8.7	9.6	13.1	15.1	31.6
p-value	.015	.001	.069	.048	.011	.234	.047
N	448	448	448	448	448	448	448

* $p < .10$; ** $p < .05$; *** $p < .01$. The coefficients in the table represent marginal effects on the predicted probability of an engager learning approach.

In the models predicting an engager learning approach (Table 7) the estimated coefficient for the variable 'mature' changes somewhat after the inclusion of having

children and the field of study, but overall the estimated coefficient is stable across the different specifications.

Hypothesis testing

Table 8 summarizes the overall findings of this study. We found support for age as a main influencing factor on learning strategy group membership. Based on the results, the first hypothesis is confirmed. Second, having a professional occupation, having children and the amount of study time partially mediate the relationship between age and learning approach. No evidence was found for the other hypothesized mediation effects.

Table 8. Hypothesis Testing Results

H1 <i>Mature students have different learning strategies as compared to regular students.</i>	Supported
H2 <i>Students' gender, private context and learning context mediate the relationship between student age and learning strategy</i>	Partially supported
H2a <i>The effect of student age on learning strategy is (partly) explained by the chosen discipline.</i>	Not supported
H2b <i>The effect of student age on learning strategy is (partly) explained by gender.</i>	Not supported
H2c <i>The effect of student age on learning strategy is (partly) explained by available time to study.</i>	Supported
H2d <i>The effect of student age on learning strategy is (partly) explained by the number of children students have.</i>	Partially supported
H2e <i>The effect of student age on learning strategy is (partly) explained by professional occupation.</i>	Supported

Discussion and conclusions

This study sought to contribute to the body of knowledge concerning the assessment and classification of learning strategies, including a focus on mediators affecting such strategies. We found significant differences with regard to learning strategies between mature and regular university students. Furthermore, having a professional occupation plays a mediating role in explaining learning strategy differences. Possibly, part of the

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2
3 mature learners gained a specific learning strategy during college time which
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5 remained the same over time, and part of them adopted a different learning strategy
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7 during their professional life e.g. via professional development, or due to specific life
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9 experiences. While the learning domain does not affect the age-learning strategy
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11 relationship, the available time for study and having children have a particular impact.
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15 Our data suggest that the navigator strategy develops sharply in a non-linear way
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17 between the ages 30 and 37. We frame these findings by suggesting that these students
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19 are forced to focus on efficiency and goal-oriented learning in order to cope with
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21 work, family and study obligations given a limited time, more than younger or more
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23 senior learners. Some research has suggested that mature students adhere to rather
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25 traditional learning approaches and highly pre-structured learning materials in an
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27 instructor-led learning context (De Mol and Goeman, 2016). Possibly, they applied
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29 such learning strategies successfully in secondary education, they rely on what is
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31 familiar (Levett-Jones, 2005), and they adopt navigator learning strategies.
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35 This study sought to contribute to the body of knowledge concerning the assessment
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37 and classification of learning strategies, including a focus on mediators affecting such
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39 strategies. As strategies determine how mature students approach learning tasks and
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41 the usage of learning materials, which in turn impacts academic performance, such
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43 study underpins instructional design theory (Snyder, 2009). This study raises the
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45 issue of learner-centred HE, with a focus on mature students as a separate group or
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47 among mixed groups. In particular, it challenges us to (re)consider the design of
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49 learning environments in university education, differentiating on the basis of
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51 approaches to learning.
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56 As university populations change and the proportion of mature students increases,
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58 university managers and programme coordinators are in search of suitable course and
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programme formats to cope with changing learner characteristics, and of ways to support these mixed populations. By integrating the ATLAS instrument, mature learners, their instructors and instructional designers can identify learning strategies and take appropriate action to accommodate learners. This study is also relevant for those seeking detailed examinations of mature students' learning strategies, in order to build valuable, targeted academic support services for students of different ages. Belgian HE, for example, promotes access and participation of mature students. Yet, the institutions fail to ensure that mature students remain in HE. Increased pedagogical flexibility, i.e. more flexible educational formats, separate tracks and more varied study arrangements, would allow adult learners to combine work and/or family duties with studies, and their ability to complete HE (Duarte *et al.*, 2018). The retention of mature students may improve by offering modular courses, in blended or distance education, in weekend or evening classes. Moreover, previous research has shown that learning strategies are affected by teaching formats. In this regard, Howard and Davies (2013) indicate that by teaching mature students how to apply particular learning strategies, one facilitates their transition to and their success in HE. In addition, awareness of one's own learning strategy strengthens mature students' decision-making in self-directed learning environments.

Lastly, instructors can also use knowledge on learners' strategies to design and implement more effective instruction. As engagers rely heavily on human resources, pursue active engagement and a strong shared identity, mature learners would benefit from synchronous blended learning (Bower *et al.*, 2015). While navigators prefer highly pre-structured learning scenarios and materials such as can be delivered via learning paths, problem solvers prefer, for example, storytelling scenarios of learning, to fit their eagerness for divergent thinking and reflections (Alterio and McDrury,

2003). To facilitate mature student learning, the learning management system represents an alternative means to increase consistency between learning strategy and online course delivery, and to provide adaptive e-learning (Hermans *et al.*, 2015).

Ausburn (2004) and Gravani (2015) found evidence that personalisation of learning opportunities and customization are highly valued by mature students. Essalmi *et al.* (2010) listed the 16 most commonly personalisation parameters that are used in the e-learning domain. We propose to introduce learning strategy as an additional indicator on the basis of which learning activities are organized via learning management systems.

This study has a number of limitations. First, the analyses rely on data about Social Sciences students in Belgium, so it is not clear to what extent the results are generalizable to other contexts. Second, the type of regression analysis that was carried out, assumes that no omitted variables are producing bias. For example, we did not include motivation as a variable, although this might explain differences in the learning approaches of mature and regular students. According to McKenzie and Gow (2004), Murphy and Roopchand (2003), and Richardson (1994) mature students seem to be more intrinsically motivated. Unlike younger students who are usually motivated by a need for qualifications, they tend to pursue further education they believe to be interesting and they are motivated by the enjoyment of carrying out learning activities. Further research could focus on how these motivational components relate to and mediate the effects on learning strategies. In line with Fragoso *et al.* (2013), we suggest that the impact of working with mixed groups and peer mentoring on withdrawal from HE should be further scrutinized. All of these considerations for future study could be subject to design-based research, in which interventions designed to support mature students' entrance to and progress

throughout HE is formally evaluated in close partnership with instructional designers, student counsellors and programme coordinators.

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