Predictors of the acquisition and portability of transferable skills: a longitudinal Portuguese case study on education

Magda Rocha

Abstract The basis for this longitudinal study was to find the predictors of transferable skills acquisition and portability among university sophomore students. The method employed was the path analysis using as variables: (1) the theoretical framework of transferable skills representations (Evers and Rush in Manag Learn 27(4):275–300, 1996; Evers et al. in The bases of competence: Skills for lifelong learning andemployability. Jossey-Bass, San Francisco, 1998) in the freshman and sophomore years (2) the developmental dimensions of Career adaptability and Vocational development (Savickas in Contemporary models in vocational psychology. Lawrence Erlbaum, Mahwah, 2001, in Career choice and development. Jossey-Bass, San Francisco, 2002, in Career development and counseling: putting theory and research to work. Wiley, Hoboken, 2005, in Life-design International Research Group: Career Adaptability Project Meeting, 2009), and, (3) the grades for Project I and Project II (curricular units specially developed for the acquisition of groups of transferable skills in the first and second years of Economics and Management program at the Catholic University of Porto [herein referred to as Catholic University of Porto]. The criteria used were the grades from two second-year curricular units (Business Law and Statistics). The objective was to observe the impact of other dimensions on actual skills acquisition, considering the influence of the former on the grades of Business Law and Statistics as an indicator of portability of the transferable skills acquisition. All participants were male and female students at the Catholic University of Porto, Faculty of Economics and Management, between 18 and 25 years of age ($M = 18.53$, $SD = 1.37$) at the first assessment ($N = 193$). Results suggest that Project I grades are the best predictor of both Business Law and Statistics grades. However, results also reveal that student's representations of their transferable skills measured at the first and the second year are mediated by Career adaptability measured at the second year. Results are discussed based on the aforementioned frameworks.

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Theoretical framework

"The Bologna process is an indicator of the profound economic and political transfor-
mations that have been taking place in the Western World over the last millennium. The
European reorganisation has turned to the higher education system not only in search of
vocational knowledge, but also to integrate instruments into the curriculum that will favour
the development of transversal competencies" (Rocha 2012, p. 77–78). This led to an
effort on the part of the signatory countries towards the design of innovative programmes
that enable the development of generic skills (besides the technical ones), able to bring to
reality the exercise of any professional activity within the European labour market.

Employability through curriculum innovation and skills development has been a con-
cern for the Catholic University of Porto, namely within its Faculty of Economics and
Management (FEM). In 2005, a curriculum innovation project was started at this small
faculty (Oliveira and Guimarães 2010). In this project, employability refers to the notion of
individual responsibility for obtaining the necessary technical and transferable skills that
allow entering the labour market, but it should be borne in mind that it is also necessary to
obtain a "first labour opportunity" and that it is the market itself which provides general
conditions for that to happen. Nevertheless, in this work, employability is, in a broad sense,
the ability to find a job, to maintain it and to move forward when necessary (see Hillage
and Pollard 1998).

The curriculum innovation that took place at FEG was theoretically supported by the
person-environment fit theories (Swanson and Fouad 1999), which advocate that to
accomplish the goal of finding, maintaining and changing jobs, there must be a close
relationship between personal features and labour market necessities and contexts. This
approach includes the idea that when there is a match between students' skills and future
workplace needs, self-knowledge development will increase and thus will be met with
higher levels of performance and satisfaction. So, universities and employers must have a
common concept of employability and a way of building this mutual concept is to use the
transferable skills notion (Oliveira and Guimarães 2010). Initially the purpose of the
FEM's project was to assess which skills were valued in the labour market. Several in-
depth interviews took place with employers as well as with alumni, identifying a number of
transferable skills clusters as the main gaps in students' education at FEM. This first stage
allowed for a curricular deconstruction, with its main output being "an outline of the new
undergraduate curriculum structure, comprising 180 European Credit Transfer System
credits" (Oliveira and Guimarães 2010, p. 7). These first two stages led to a redeveloped
curriculum in which transferable skills were given great importance. Students are now able
to assess their transferable skills gaps by filling in a skills representations questionnaire that
has evolved since the beginning of the project (the Skills Questionnaire is the one currently
in use; Evers et al. 1998; Rocha et al. 2008 Portuguese adaptation). In addition, a coaching
project (the PIC project) emerged as a way to promote skills for life-long learning, ideally
resulting in an individual skills portfolio (for a review, see Oliveira and Guimarães 2010).
On another 'front', the new three-year Economics and Management programme offered
three curricular units, with a specific focus on transferable skills. During the freshman year,

Project I clearly points to the development of critical thinking and literacy, hence communication and logic are the main focus. Project I involving mainly the development of critical thinking skills, which are internalized through argument and exercises invoking a theme, as well as by building and maintaining a blog with entries made in the logic of the argument, and subjective analysis of a literary work. The curricular unit promotes close reading, active listening and substantive writing skills. During the sophomore year, Project II works towards the acquisition of communication and teamwork skills. During the academic semester, there is the preparation of group work which necessarily results in a written report and its final presentation. Besides the institutional support given by teachers, mentors and PIC's team, there is also the collaboration of managers and company employees in the group project's development. The Final project involves senior undergraduates' use of all the competencies acquired during the previous two years, in addition to the autonomy necessary for capturing systemic thinking skills (Oliveira and Guimarães 2010). Therefore, theoretically, these three curricular units represent strong predictors of acquiring transferable skills. Yet, at the same time, they can be seen as products which can be transposed to other curricular units (different because they are specific to the program) to assess whether this know-how has an influence in other contexts.

Despite the importance of transversal competencies being a long-standing issue (Carnevale et al. 1990; Chickering and Reisser 1993), it is now attracting renewed interest. Evers et al. (1998) started a well-known study on common language between employers, universities and employees. Their model presents four strategies for the transversal competencies required for employability: (1) Management of self, (2) Management of people and tasks, (3) Communication, and (4) Mobilization for innovation and change. "The four competencies were then divided into several transversal capacities commonly applied to all professions, and supporting career development through lifelong learning" (Rocha 2012, p. 78). 'Transferable skills' are defined in many different ways (Cabral-Cardoso et al. 2006; Dacre Pool and Sewell 2007; Washer 2007), but in this study the expression refers to the portability of skills from a specific content context to other different contents contexts (Bennet et al. 1999; Evers et al. 1998).

As many others have already pointed out (for a review, see Rocha 2012), there are several perspectives on how transferable skills can be acquired. But all these approaches underline the assumption that this acquisition is associated with the individual's quality of personal experiences, socio-cultural environment, cognitive and personality functioning (Lopez 2009).

The quality of our contribution to a sense of continuous career building (Savickas 2003; Savickas and Walsh 1996; Yorke 2004) can, in turn boost our transversal competencies and employability processes. For Coimbra and Fontes (2005), career construction refers to entering and remaining within the work sphere, which leads to the topic of transferable skills.

Mark Savickas suggests that 'Adapt-abilities' are psychological characteristics that allow an individual to perform according to an adapted self (Savickas 2002, 2009; Savickas et al. 2009). Vocational development, another key concept, "depends on a game in which emotional resources, personal sense of self, and skills or abilities (especially social and interpersonal ones), interact to enable higher or lower levels of adaptability to career uncertainty and ambiguity" (Rocha 2012, p. 79). Therefore, both adaptability and Vocational development are also expected to be predictors of transferable skills acquisition.

Career construction theory, a constructivist and social constructivism framework (Dix and Savickas 1995; Savickas 2001, 2002, 2005, 2009), attempts to answer how we build our careers. What are the main ingredients for this developmental task? The Career

development stages in Career construction theory comprise five major periods character-ised by change: Growth, Exploration, Establishment, Management, and Disengagement. In the Exploration stage, people are expected to become professionally skilled. For example, in the higher education system, this stage would include students in their senior year. "It is no longer a cognitive matter, but rather for the purpose of experiencing education, training, and work experiences, and carefully looking upon professional role models, exploring them for personal gain" (Rocha 2012, p. 80).

"Career adaptability is a psychological construct that denotes an individual's readiness and resources for coping with current and anticipated tasks of Vocational development. The adaptive fitness of attitudes, beliefs, and competencies – the ABCs of career con-struction – increases along the developmental lines of concern, control, conception, and confidence" (Savickas 2002, p. 156; 2005, p. 46). Vocational development is mostly related with actions that make it possible to respond to the developmental tasks of the Exploration stage. In fact, if the former means action, adaptability is what enables the act to take place, it is what signals that one must act in accordance with surrounding require-ments, to be adjusted (Savickas 2002, 2005, 2009).

This study proposes that freshmen's representations of their transferable skills, as a result of developmental social and vocational opportunities, predict the acquisition process of critical thinking and literacy (Project I curricular unit), communication and team work skills (Project II curricular unit), and systemic thinking (Final Project curricular unit). On the other hand, each of the three types of acquisitions achieved in the Project's courses will boost Career adaptability and Vocational development, the latter in particular, in the three graduation years. During this process, transferable skills representations will be empow-ered, either by the Project's course results, or by the evolution of Career adaptability and Vocational development. Finally, the main predictors of real transversal skills acquisition can be found if we study the combined effects of all these dimensions in FEM courses such as Business Law (a second-year course that consists of: Introduction to Law; Securities; Liability; Contracts; Company Law; Insolvency; and Intellectual Property) or Statistics (a more specific second-year course that consists of: Descriptive Statistics; Probability Theory; Random Variables; Discrete and Continuous Distributions; Point Estimation; Interval Estimation; and Hypothesis Testing). Figure 1 represents the theoretical model to be tested.

Methodology

Objectives and hypotheses

The main goal of this study was to find the best predictors of transferable skills acquisition among second-year university students. To achieve this, the following factors were con-sidered: (1) students' transferable skills representations at the beginning of their freshman year, (2) Project I grades (at the end of the freshman year), (3) Career adaptability and Vocational development, (4) students' transferable skills representation scores at the beginning of the sophomore year, and (5) academic results in Project II and in Business Law and Statistics in students' sophomore year.

It was hypothesized that (a) the personal skills representations at the moment of entering university (beginning of their freshman year) and the subsequent skills representations evaluations would have a positive influence on all courses throughout the FEM program, which included the Project's curricular units; (b) It was also expected that these
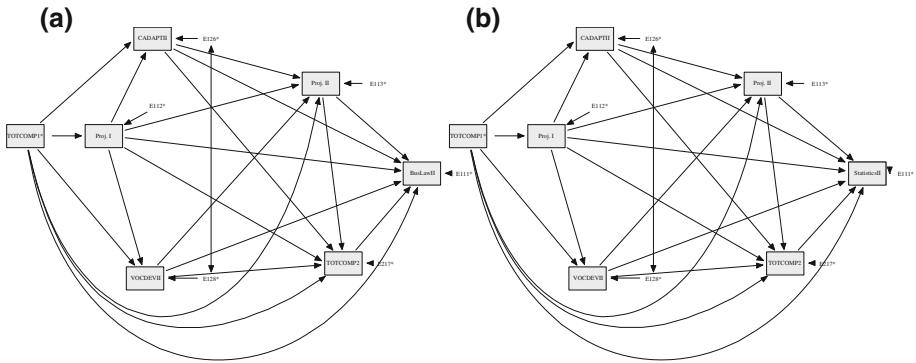
Fig. 1 Theoretical saturated models to be tested accordingly with the actual acquisition of transferable skills in Economics and Management Students (first and second assessment waves). Model **a** represents the tested model for the curricular unit of Business Law; Model **b** represents the tested model for the curricular unit of Statistics. Both curricular units are common to both graduations. TOTCOMP1 = exogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the first assessment; TOTCOMP2 = endogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the second assessment; Proj. I = endogenous variable of students' final grades of Project's I curricular unit at the end of the freshman year; Proj. II = endogenous variable of students' final grades of Project's II curricular unit at the end of the sophomore year; BusLawII = criterion variable of students' final grades of Business Law's II curricular unit at the end of the sophomore year (Model **a**); StatisticsII = criterion variable of students' final grades of Statistics's II curricular unit at the end of the sophomore year (Model **b**); CADAPTII = endogenous variable that constitutes the career adaptability representations at the sophomore's year; VOCDEVII = endogenous variable that constitutes the vocational development representations at the sophomore's year; Theoretically there is the assumption of controlling for the freshman's year scores on career development

representations would have a positive effect on Career adaptability as well as on Vocational development, regardless of when they were evaluated; (c) On the other hand, if the Project's curricular units were specifically designed to develop students' transferable skills, the knowledge gained would be transferred to specific FEM courses, whether the more theoretical or the more traditional ones.

Participants

At the first wave of the study (from September to October, 2009), the total number of participants was 193 students (Males = 65; Females = 54). All the respondents were freshmen, aged 18 to 25 years ($M = 18.53$, $SD = 1.37$), who were attending the course of Economics and Management at The Catholic University of Porto. Since not all students carried out Project's I final exam, the total number of respondents statistically analyzed was 57 % of the initial sample ($N = 111$), aged 18 to 25 years ($M = 18.53$, $SD = 1.37$).

At the second wave (September to October, 2010) the response rate was of 65.8 % ($N = 73$), with respondents between the ages of 19 and 24 ($M = 19.35$; $SD = .82$). It was expected to have some *ignorable nonrandom* sample mortality, i.e., the probability of decrease in response depended "on irrelevant factors external to the study, in the same way for all subjects" (Lindsey 2000, p. 510), since lectures are not mandatory, and no financial incentive or other was given for participation in the study. Of these, 43.8 % were male ($n = 32$) and 56.2 % were female ($n = 41$). When taking into account the curricular unit of Statistics for the model, there were 49 respondents aged between 19 and 21 years of age

($M = 19.24$; $SD = .52$). Of testing these, 17 were male (34.7 %) and 32 were female (65.3 %). When testing the model and taking into account the curricular unit of Business Law, the total number of respondents was slightly higher ($N = 69$), with ages ranging from 19 to 22 years ($M = 19.24$; $SD = .55$). The percentage of males was 40.6 % ($n = 28$) and the percentage of females was 59.4 % ($n = 41$).

Instruments

The Skills Questionnaire (SQ, Evers et al. 1998), in its adapted Portuguese version (Students form; Rocha et al. 2008), was used to assess students' transferable skills representations. The SQ is a broad-scope self-report transferable skills questionnaire, consisting of 89 items on a six-point Likert-type scale, ranging from 'Totally disagree' to 'Totally agree'. The questionnaire underwent confirmatory factor analysis and internal consistency tests, presenting acceptable cut-off values for both analyses ($\alpha > .76$; CFI = .91, SRMR = .08, RMSEA = .07). A detailed description of these findings can be found in Rocha (2012).

The Students Career Construction Inventory (SCCI; Savickas 2009) was used in order to measure Career adaptability and Vocational development. The SCCI is also a self-report questionnaire, where Career adaptability and Vocational development present five indicators or subscales. Adaptability (total score = 35 items; degree of Adaptability) consists of a six-point Likert-type scale, ranging from 'Definitely not like me' to 'Very much like me'. As for Vocational development (total score = 25 items; degree of Vocational development), the subscale also consists of a six-point Likert-type scale, ranging from 'I have not yet thought much about it' to 'I have already done this'. Each of the two scales is organised into five sub-scales (for a review, see Rocha 2012).

The questionnaire underwent confirmatory factor analysis and internal consistency tests, presenting acceptable cut-off values for both analyses ($\alpha > .77$; CFI = .95, SRMR = .06, RMSEA = .08).

Final grades (which range on a scale from 0 to 20) for the curricular units of Projects I and II, as well as for Business Law and Statistics, were collected at the end of the sophomore year (2010/2011).

Design and methods

For this longitudinal study, data from the first evaluation point and data from the second wave were used. The study aimed to evaluate the determinants of transferable skills among students in a private Portuguese University (The Catholic University of Porto), namely from the Faculty of Economics and Management.

Structural Equation Modelling (SEM) is a multivariate analysis technique that allows testing for causal relations between variables, taking into account the latent nature of factors and the error value present at any assessment. SEM allows both confirmatory and exploratory approaches, although in this study it was used to evaluate if a priori theoretical model fits the observed data, both for the Confirmatory Factor Analysis (CFA, used for analysing the psychometric properties of the SQ and the SCCI's, as already pointed out) and for the final model to be tested using path analysis. Using SEM models implies describing how well the theoretical model fits the sample data, using goodness of fit statistics. The literature suggests that the model fit should be evaluated "on the basis of various measures simultaneously" (Schermelleh-Engel et al. 2003, p. 31). Several goodness of fit indices are presented including descriptive measures of overall fit (Standardized

Root Mean Residual-SRMR, Root Mean Square Error of Approximation-RMSEA and the and the Goodness of Fit Index-GFI) and an incremental fit index (the Comparative Fit Index-CFI). CFA is as a method to test construct validity used when there is a priori structure, which is the case when using measurement questionnaires that have been widely used, as was the case with both instruments used in this study.

The study followed the path analysis method (applying Peter Bentler's Structural Equation Modeling Software EQS, version 6.1, by means of Maximum Likelihood Method), with a composite measure of students' transferable skills representation (the mean of the four SQ dimensions, at the first and at the second assessment waves), using the first as the exogenous variable. Grades from Project I (first wave) were predictors for Career adaptability, Vocational development, Transferable skills representations, as were grades from Project II and Business Law/Statistics at the second assessment moment. Project II was also predictive of the total skills representations at the second moment and of Business Law/Statistics grades. Finally, total skills representations at the second moment were predictive of Business Law/Statistics grades.

Since the sample was small, a path analysis was used and the parameters in the models were restrained as much as possible. For this reason, there was one model for Business Law and another model for Statistics, with no latent variables. Along the same lines, data from the second wave were used to assess Career adaptability and Vocational development.

In a first stage, the hierarchical saturated models were tested, in order to determine whether there were non-significant paths and to later on remove them from the models, using the Wald test comparison score as the criterion.

Procedures

Data were collected in September and October in the years of 2009 and 2010, by means of self-administered questionnaires. The administrations took place during classes and lasted approximately 45 min. Subjects were asked to respond to the 89-item version of the SQ and the 60-item version of the SCCI. At the first wave, they were also asked to provide demographic data using a demographic questionnaire specifically created for this purpose. Grades were obtained through the respective university department.

Subjects were asked to answer all questions truthfully, were informed regarding the confidentiality of their responses and the voluntary nature of their participation in this study.

Results

Business Law model

When the Business Law criterion model (Fig. 1a) was tested, measurement equation results indicated that some of the parameters were not significant for the model ($p \leq .05$). There were only significant direct associations between transferable skills representations at the time of entering university and Project I, Career adaptability, Vocational development, and transferable skills representations at the sophomore's year. Project I grades were only significantly associated with Project II and Business Law Grades', and finally, Career adaptability was only significantly associated with transferable skills representations at the sophomore's year. Figure 2 depicts the tested model with standardised beta values, displaying the non-significant paths using the dashed lines. Following these results, the next step was to test whether the removal of all the non-significant paths would undermine the
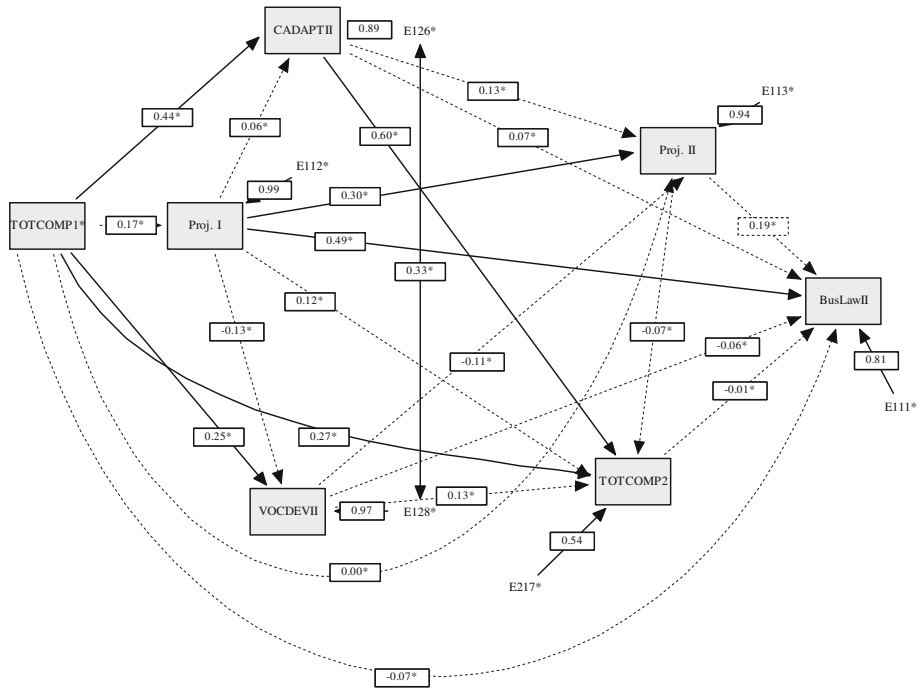
Fig. 2 Saturated model tested accordingly with the actual acquisition of transferable skills in Economics and Management Students (first and second assessment waves) for Business Law II grades (sophomore's year) as criterion. TOTCOMP1 = exogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the first assessment; TOTCOMP2 = endogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the second assessment; Proj. I = endogenous variable of students' final grades of Project's I curricular unit at the end of the freshman year; Proj. II = endogenous variable of students' final grades of Project's II curricular unit at the end of the sophomore year; CADAPTII = endogenous variable that constitutes the career adaptability representations at the sophomore's year; VOCDEVII = endogenous variable that constitutes the vocational development representations at the sophomore's year. BusLawII = criterion variable of students' final grades of Business Law's II curricular unit at the end of the sophomore year (Model **a**). *Dashed lines* = non-significant parameters; *continuous line* = significant parameters. Significance is established at $p \leq .05$

model. An aprioristic Wald test comparison ($p \geq 05$) was performed, with all the parameters included and with the non-significant parameters excluded, resulting in a χ^2 value comparing both models (Wald's χ^2 comparison).

In a first stage, results indicated that the non-significant parameters could be removed without negatively affecting the χ^2 value (Wald's $\chi^2 = 15.58_{(14)}$, $p = .34$). Still, the parameter associating the transferable skills representations at the time of entering university with Vocational development turned out to be non-significant ($p < .05$). However, the result was very close to the cut-off point of significance of 1.95. Nevertheless, the procedure was repeated, including the latter parameter in Wald's aprioristic test. As expected, the χ^2 value increased while the p value decreased (Wald's $\chi^2 = 19.19_{(15)}$, $p = .21$). The fit indices also suffered negative alterations; therefore the decision was made to maintain the parameter in the model. Table 1 summarises these procedures.

The Wald test provided statistical arguments for cleaning the model, and tested it in accordance with the aforementioned results. For testing the last model, the error value was

Table 1 Parameters results in the Wald test for dropping parameters (a priori test) for Business Law II grades as criterion

Model 1	Univariate increment		Model 2	Univariate increment	
Parameters	χ^2	p	Parameters	χ^2	p
Project II grades—TOTCOMP I	.00	.99	Project II grades—TOTCOMP I	.00	.99
Business Law II grades—TOTCOMP II	.00	.97	Business Law II grades—TOTCOMP II	.00	.97
Business Law II grades—Vocational development II	.27	.60	Business Law II grades—Vocational development II	.27	.60
Business Law II grades—Career adaptability II	.14	.71	Business Law II grades—Career adaptability II	.14	.71
Business Law II grades—TOTCOMP I	.30	.58	Business Law II grades—TOTCOMP I	.30	.58
Career adaptability II—Project I grades	.31	.58	Career adaptability II—Project I grades	.31	.58
Project II grades—Vocational development II	.73	.39	Project II grades—Vocational development II	.71	.39
Project II grades—Career adaptability II	.62	.43	Project II grades—Career adaptability II	.62	.43
TOTCOMP II-Project II grades	1.03	.31	TOTCOMP II—Project II grades	1.03	.31
Vocational development II—Project I grades	1.90	.17	Vocational development II—Project I grades	1.9	.17
Project I grades—TOTCOMP I	1.95	.16	Project I grades—TOTCOMP I	1.95	.16
TOTCOMP II—Project I grades	2.23	.14	TOTCOMP II—Project I grades	2.23	.14
TOTCOMP II—Vocational development II	2.94	.09	TOTCOMP II—Vocational development II	2.94	.09
Business Law grades II—Project II grades	3.70	.06	Business Law grades II—Project II grades	3.67	.06
			Vocational development II—TOTCOMP I	3.77	.05

TOTCOMP I = transferable skills' representations at entering college; TOTCOMP II = transferable skills' representations at the sophomore's year. For Wald test comparison if the result is non-significant the parameter can be remove from the measurement equation without significant prejudice of the χ^2 value
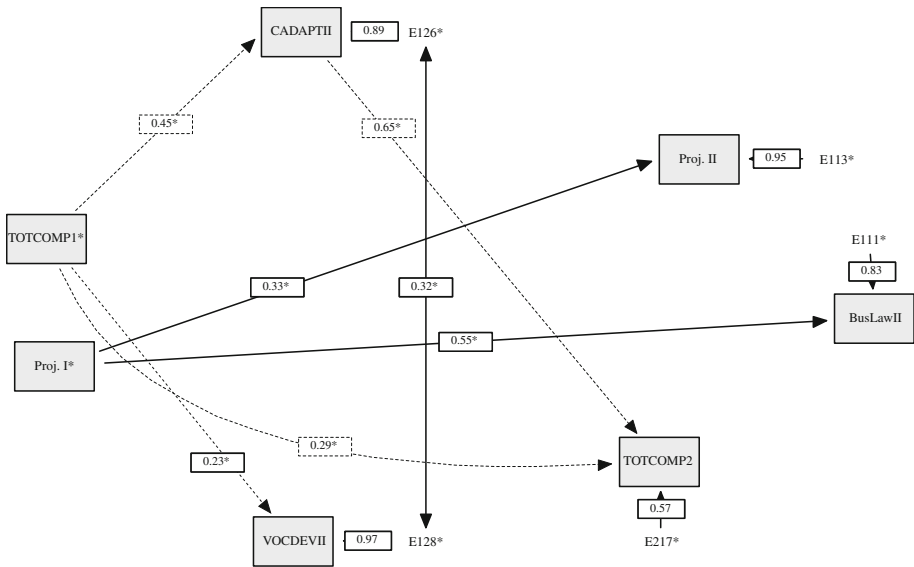
Fig. 3 Final model tested for Business law criterion. The Wald's test was performed for reassuring that the non-significant paths could be removed from the model. This is the final acquisition of transferable skills in Economics and Management Students Model (first and second assessment waves) for Business Law II grades (sophomore's year) as criterion. TOTCOMP1 = exogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the first assessment; TOTCOMP2 = endogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the second assessment; Proj. I = exogenous variable of students' final grades of Project's I curricular unit at the end of the freshman year; Proj. II = endogenous variable of students' final grades of Project's II curricular unit at the end of the sophomore year; CADAPTII = endogenous variable that constitutes the career adaptability representations at the sophomore's year; VOCDEVII = endogenous variable that constitutes the vocational development representations at the sophomore's year; BusLawII = criterion variable of students' final grades of Business Law's II curricular unit at the end of the sophomore year (Model **a**). *Small dashed line* = non-significant parameters kept in the model since the removal undermined the fit indices' values; *continuous line* = significant parameters; *Large dashed line* = represents the mediation hypothesis tested. Significance is established at $p \le .05$

Table 2 Fit indices for nested models having business law grades as criterion

Model	χ^2	df	p	CFI	GFI	SRMR	RMSEA	C.I. 90 %$_{RMSEA}$	$\chi^2_{diff.}$
1	19.19	15	.21	.97	.93	.11	.06	[.00, .14]	$3.61_{(1)}$
2	15.58	14	.34	.99	.94	.09	.04	[.00, .13]	
Critical χ^2 ($p = .05$)									$3.84_{(1)}$

CFI = comparative fit index; GFI = goodness of fit index; SRMR = standardized root-mean square residual; RMSEA = root mean-square error of approximation; C.I. 90 %$_{RMSEA}$ confidence interval for RMSEA. $\chi^2_{diff.}$ = non-significant. Critical $\chi^2 = 3.841_{(1)}$ for $p = .05$

removed from Project I grades, since it seemed to function as an exogenous variable. With the exception of the parameter associating Vocational development with transferable skills representations at the moment of entering university, all the other parameters were significant to the measurement equation and presented weak to strong associations, as shown in Fig. 3.

The decomposition of effects was also analysed and a significant indirect effect ($p < .05$) was found from transferable skills representations at the time of entering university to transferable skills representations at the sophomore year through Career adaptability. Since conditions were found to test the mediation hypothesis it was also carried out, after assuring that Baron and Kenny (1986) criteria met the Sobel test. Sobel test results ($z = 3.71$) indicated that with both one-tailed ($p < .001$) and two-tailed probabilities ($p < .001$), the association between transferable skills representations at the time of entering university and the transferable skills representations at the sophomore year was mediated by Career adaptability at the sophomore year ($\beta_{tot} = .29$). Transferable skills representations at the time of entering university positively predict Career development dimensions at the sophomore year, as well as transferable skills representations at the sophomore year as expected. However, there is no association between transferable skills representations at the time of entering university and the criterion. The latter is only predicted by the grades obtained at moment one in the curricular unit of Project I, more specifically the course that develops the transferable skills of critical thinking and literacy. Curiously, Project II seems to have no significant influence on Business Law, but is influenced by Project I. Figure 3 presents the final model with standardised values.

As is apparent, the comparison for the nested models cannot consider the saturated model in terms of fit indices. However, a χ^2 difference test was performed between the two nested models (with 14 and 15 degrees of freedom), revealing that it was not significant (dif $\chi^2 = 3.61_{(1)}$; critical $\chi^2 = 3.84$ $_{(1)}$, $p = .05$). Even though both models presented acceptable fit indices, the more complex model provided the best results, which is why it was selected over the more parsimonious model. Table 2 presents these results.

Statistics model

When the Statistics criterion model (Fig. 1b) was tested in its saturated form, measurement equation results indicated that the parameters shown in dashed Fig. 4 were non-significant to the model at a p value of $\leq .05$. This means that transferable skills representations at the time of entering university was significantly associated only with Project I grades, Career adaptability, Vocational development and transferable skills representations at the sophomore's year. In turn there were only significant associations between Project I grades, Vocational development and Project II grades. Finally, only another significant association between Career adaptability and transferable skills representations was found at the sophomore's year. These associations were all between weak to moderate.

As in the previously tested model, a subsequent test was carried out to determine whether removing all the non-significant paths would undermine the model. The aprioristic Wald test comparison ($p \geq .05$) was performed, with all parameters included and all non-significant parameters excluded, once again resulting in a χ^2 Wald comparison.

Results indicated that the non-significant parameters could be removed without affecting the χ^2 value (Wald's $\chi^2 = 14.14_{(12)}$, $p = .29$), with the exception of the parameter associating Project I grades with Statistics grades (Model 1). The model was retested without the former value (Wald's $\chi^2 = 9.90$ $_{(11)}$, $p = .54$), but the measurement equation indicated that the parameter associating Project I grades with transferable skills representations at the sophomore year was in fact non-significant (Model 2). Again, another aprioristic Wald test was carried out, introducing the non-significant path into the test (Model 3). The Wald comparison indicated an increment in the χ^2 value (Wald's $\chi^2 = 12.60_{(12)}$, $p = .40$) and showed that the path could be removed without negatively affecting the χ^2 value. The results are presented in Table 3.
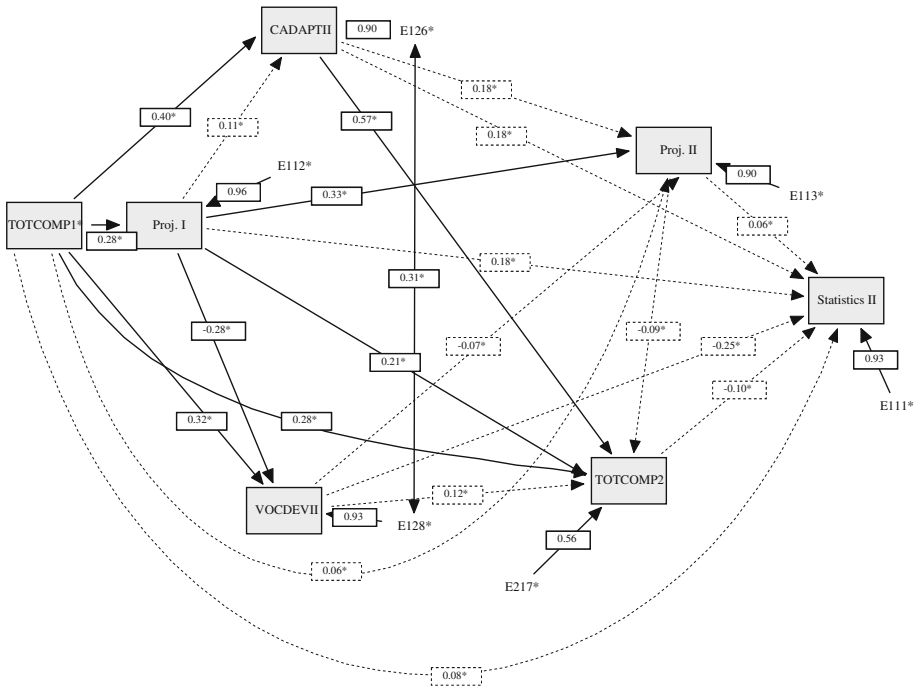
Fig. 4 Saturated model tested accordingly with the actual acquisition of transferable skills in Economics and Management Students (first and second assessment waves) for Statistics II grades (sophomore's year) as criterion. TOTCOMP1 = exogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the first assessment; TOTCOMP2 = endogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the second assessment; Proj. I = endogenous variable of students' final grades of Project's I curricular unit at the end of the freshman year; Proj. II = endogenous variable of students' final grades of Project's II curricular unit at the end of the sophomore year; CADAPTII = endogenous variable that constitutes the career adaptability representations at the sophomore's year; VOCDEVII = endogenous variable that constitutes the vocational development representations at the sophomore's year. Statistics II = criterion variable of students' final grades of Statistics' II curricular unit at the end of the sophomore year (Model **b**). *Dashed lines* = non-significant parameters; *continuous line* = significant parameters. Significance is established at $p \leq .05$

The fit indices also suffered negative alterations in the former in comparison with Model 2. A χ^2 difference test between the three models showed a significant difference between models 1 and 2, and non-significant differences between models 1 and 3 and between models 2 and 3. In the former tests, Model 2 proved to be a better model, with a lower χ^2 and better fit indices. For the second comparison, both models explained the data equally well and revealed that a theoretical model with less free parameters was preferable (Model 2). Since Model 2 had better fit indices and a lower qui-square value, its restrictions were accepted, where all paths were found to be significant, with the exception of the parameter associating Project I grades with transferable skills representations at the sophomore year ($p > .05$). Table 4 summarises these results.

The decomposition of effects were analysed once again, and another significant indirect ($p < .05$) effect was found from transferable skills representations at the time of entering university to transferable skills representations at the sophomore year through Career adaptability. The mediation hypothesis was again at stake, therefore a Sobel test was also

Table 3 Parameters results in the Wald test for dropping parameters (a priori test) for statistics grades as criterion

| Wald test comparison (single results) | Univariate increment | | | | | |
| | Model 1 | | Model II | | Model III | |
Parameters	χ^2	p	χ^2	p	χ^2	p
Statistics II grades—Project II grades	.15	.70	.15	.70	.15	.70
Project II grades—TOTCOMP I	.18	.68	.18	.68	.18	.68
Statistics II grades—Vocational development II	.16	.69	.16	.69	.16	.69
Statistics II grades—TOTCOMP II	.23	.63	.23	.63	.23	.63
Statistics II grades—TOTCOMP I	.15	.70	.15	.70	.15	.70
Career adaptability II—Project I grades	.67	.41	.67	.41	.67	.41
Project II grades—TOTCOMP II	1.17	.28	1.17	.28	1.17	.28
Statistics II grades—Career adaptability II	1.27	.26	1.27	.26	1.27	.26
Project II grades—Career adaptability II	1.91	.17	1.91	.17	1.91	.17
TOTCOMP II—Vocational development II	2.05	.15	2.05	.15	2.05	.15
Statistics II grades—Vocational development II	2.24	.13	2.24	.13	2.24	.13
TOTCOMP I—Statistics II grades	4.75	.03				
TOTCOMP I—Project I grades					2.92	.09

TOTCOMP I = transferable skills' representations at entering college; TOTCOMP II = transferable skills' representations at the sophomore's year. For Wald test comparison if the result is non-significant the parameter can be remove from the measurement equation without significant prejudice of the χ^2 value

Table 4 Fit indices for nested models having statistics grades as criterion

Model	χ^2	df	p	CFI	GFI	SRMR	RMSEA	C.I. 90 %$_{RMSEA}$	$\chi^2_{diff.}{}^{12}$	$\chi^2_{diff}{}^{13}$	$\chi^2_{diff}{}^{23}$
1	14.14	12	.29	.96	.93	.10	.06	[.00, .16]	**4.24**$_{(1)}$		
2	9.90	11	.54	1.00	.95	.07	.00	[.00, .13]		1.59$_{(1)}$	
3	12.59	12	.40	.99	.94	.08	.03	[.00, .14]			2.69$_{(1)}$
Critical χ^2 $p = .05$										3.84$_{(1)}$	

CFI = comparative fit index; GFI = goodness of fit index (Lisrel); SRMR = standardized root-mean square residual; RMSEA = root mean-square error of approximation; C.I. 90 %$_{RMSEA}$ confidence interval for RMSEA. Significance expressed in p value for critical χ^2. In bold the significant Qui-square differences

carried out, after re-assuring for Baron and Kenny assumptions. Sobel test results ($z = 3.11$) indicated that with both one-tailed ($p < .001$) and two-tailed probabilities ($p < .001$) the mediation was significant. Again, the association between transferable skills representations at the time of entering university and the transferable skills representations at the sophomore year was mediated by Career adaptability at the sophomore year ($\beta_{tot} = .60$). Transferable skills representations at the time of entering university positively predicted Career development dimensions at the sophomore year. As expected, it also positively predicted the transferable skills representations at the sophomore year, although there is no association between transferable skills representations at the time of entering university and the criterion, because no significant indirect effect was found ($p > .05$). Yet again, Statistics grades were predicted only by the grades in the curricular unit of Project I
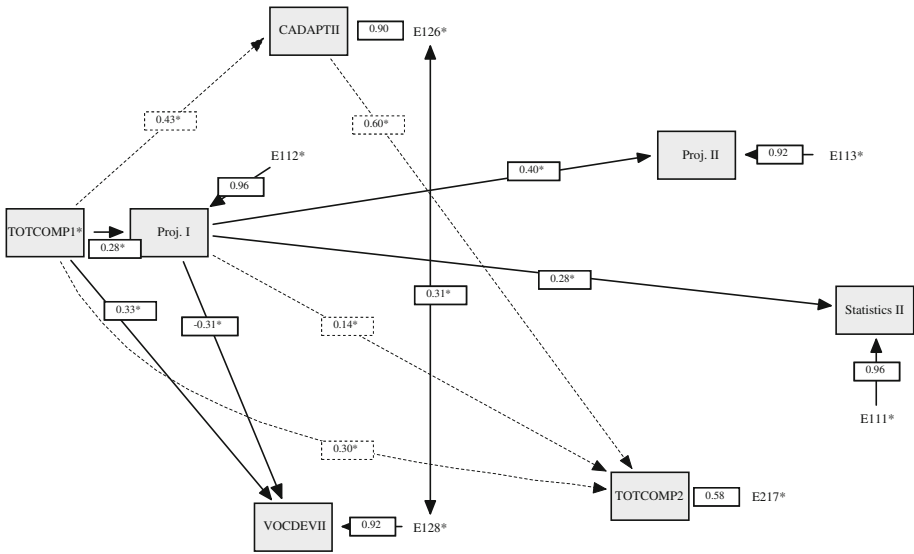
Fig. 5 Final model tested for Statistics II as criterion. The Wald's test was performed for reassuring that the non-significant paths could be removed from the model. This is the final acquisition of transferable skills in Economics and Management Students Model (first and second assessment waves) for Statistics II grades (sophomore's year) as criterion. TOTCOMP1 = exogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the first assessment; TOTCOMP2 = endogenous variable that constitutes the composite measure of the four groups of transferable skills representations at the second assessment; Proj. I = exogenous variable of students' final grades of Project's I curricular unit at the end of the freshman year; Proj. II = endogenous variable of students' final grades of Project's II curricular unit at the end of the sophomore year; CADAPTII = endogenous variable that constitutes the career adaptability representations at the sophomore's year; VOCDEVII = endogenous variable that constitutes the vocational development representations at the sophomore's year; Statistics II = criterion variable of students' final grades of Statistics' II curricular unit at the end of the sophomore year (Model **b**). *Small dashed line* = non-significant parameters kept in the model since the removal undermined the fit indices' values; *continuous line* = significant parameters; *Large dashed line* = represents the mediation hypothesis tested. Significance is established at $p \leq .05$

(critical thinking and literacy). Project II had no significant weight on Statistics, but was once again influenced by Project I. Figure 5 presents the final model with standardised values.

Discussion

This study aimed to determine the best predictors of transferable skills acquisition among second-year university students, considering: (1) students' transferable skills representations at the start of their freshman year, (2) Project I academic results (at the end of the freshman year), (3) Career adaptability and Vocational development as measured at the sophomore's year, (4) students' transferable skills representation scores, and (5) academic results in Project II and in Business Law and Statistics at the sophomore year.

The initially formulated hypothesis was unconfirmed. This suggests that students' representations of their transferable skills at both moments are associated with career development constructs, but at this point in time they have no significant weight on the

courses that work specifically on transferable skills issues, and maybe they will never have. Nevertheless, when the Statistics model was tested in Project I, in which critical thinking and literacy are worked (Oliveira and Guimarães 2010) it had a negative weight on Vocational development, maybe, because the latter concerns the doing, the actions for achieving competences, (Savickas 2005, 2009; Savickas et al. 2009), so perhaps as competences are being worked, there is no need for investing in vocational development. Interestingly, in the Statistics model, Project I grades are influenced by students' representations of their transferable skills at the first moment, and have an effect (though non-significant, but sufficient to be kept in the equation) on students' representations of their transferable skills in the sophomore year. This raises the question about the nature of the courses included in research models, which in turn emphasizes the need to continue the work that Porto's Economics and Management faculty has done with innovative projects such as this one. The integration of transferable skills into curricula seems to benefit the transferable nature of the latter into courses, but it also influences developmental constructs such as those that deal with career development. Therefore, there is a substantial difference between acquired skills and representations of acquired skills. So, self-representations about what one is capable of doing does not influence what we really have to do. As sociocognitive approach may put it, self-efficacy representations must be confirmed by performance conquests (Snowman et al. 2012). Although they influence the self-representations of career adaptability and career development, neither the former, nor the latter have any influence in the real skills acquisition. The positive effects of this group of psychological dimensions are only experienced in the internal sense of the professional self, as it was predictable by our second hypothesis.

The second hypothesis was also only partially confirmed, since the results clearly support what was hypothesized with regard to Project I course. Since all interventions require time to produce results, it is probable that in the third year of the program these effects can eventually be seen. Another possibility is that if another curricular unit had been used as the criterion in a course like Currency and Financial markets, in which critical thinking, oral communication and discussion are at stake, this influence could have been seen. The Business Law model presents itself in a much 'cleaner' perspective than the Statistics model, that is, students' representations of their transferable skills are associated with career development dimensions, and with the grades variables between them. Once again, it is Project I that has an influence on Business Law II, and there is no evidence of a significant effect by Project II on the latter.

The replication of the mediation effect found in both models was both interesting and expected. Part of the variance of students' representations of their transferable skills at the sophomore year is explained by the mediating effect of Career adaptability in the sophomore year (because students' representations of their transferable skills in this year causes the Career adaptability in the year's scores), and not only by the association of the former with representations of their transferable skills at the freshman year. Therefore, Career adaptability, as measured in the sophomore year, has a significant influence on the representations of transferable skills that student's had in their freshmen year. These, in turn, influence transferable skills in the second year of university. The reason why this mediation effect is so clear is likely due to the fact that Vocational development is aggregated with a sense of being able to perform (Rocha 2012).

So an important conclusion withdrawn from this study is that the FEG's curriculum innovation project, which combines curricular units group and individual support for developing transferable skills (a project created by the Catholic University of Porto, Faculty of Economics and Management—PIC and Curricular project units), is doing what

it was meant to do. In other words, the curricular units that were intentionally built to boost transferable skills' (as measured by Project I) had, as predicted by the third hypothesis, a significant effect on further transferable skills acquisition and also on the transference of these skills, by applying them to more specific knowledge (the two technical courses' grades). In fact, the results obtained indicate that Project I is a significant predictor for both Business Law and Statistics courses from the third semester of the Economics and Management program. That is to say that it seems that the personal representations of transferable skills have no weight on the academic results. On the contrary, the interventions objectified for the development of transferable skills seem to have a fundamental weight on the academic performance. Moreover, this weight varies according to the course considered, so that such interventions must be regarded as very important in academic performance which later promotes the labor market integration, according to the personal-environment fit approaches.

In 2010, FEM and Business Association of Portugal (whose goal is to protect the interests of companies and provide services that enhance their competitiveness) carried out an activity which was intended to access the way recruiters, alumni and college teachers positioned themselves relatively to some recruitment and selection criteria. Using a reflection activity based upon Régnier's Abacus, participants were asked to position individually as experts (in their roles as recruiters, teachers or former FEM's alumni) in identifying market valued skills. The results showed with total consensus that flexibility and transferable skills are the most important factors when recruiting. This can be explained by the importance that the development of transferable skills has into employability, since all stakeholders agreed that it was the most valuable criteria when a recruitment process takes place (Rocha et al. 2010).

This project is an example of good practice, recognized in 2010 by the Organization for Economic Co-operation and Development (2010, OECD). According to Professor Gábor Halász: "This is a complex curriculum innovation of the School of Economics and Management, which aims at improving the quality and effectiveness of teaching and learning of its degree programs. The innovation consists in including intensive competence development in the curriculum through collective project work, internship in workplaces and individualized coaching" (OECD 2010, p. 8). This study appears to prove this position.

Conclusions, limitations and recommendations for future research

This study further supports the curriculum innovation project developed by the Faculty of Economics and Management at Porto's Catholic University, as described in the introduction. Since data are longitudinal, the causality of the tested models can be determined. Globally, it seems that transferable skills representations and career construction variables belong to a more aggregated group of dimensions. This group can perhaps be referred to as 'internal', in the sense that the dimensions belong to beliefs (transferable skills representations) and to core facets of personality (career construction dimensions). On the other hand, the Project's curricular units provide support for two major conclusions: (1) Project I grades, which reflect the acquisition of critical thinking and literacy transferable skills, are a predictor of Project II grades, which support Evers et al.'s view (1998) on the interpenetration of the different transferable skills domains; (2) second-year Business Law and Statistics grades, selected specifically due to their differential nature (one being more allied to Social Sciences, and the other traditionally being allied to the Exact Sciences), are both predicted by Project I grades. The idea is that the real action of acquiring competencies

boosts their transferability to different contexts, in this case, to second-year courses. Initially, it was surprising not to find predictions of Project II grades on Business Law and Statistics grades, since the theoretical rationale would support this hypothesis. Then, on the reflection process, acquisitions need time to operate. Since integration is part of the learning process (Campos and Coimbra 1991), Project II grades will likely be predictors of courses in the graduation year. But it is also possible that other second-year courses are, by nature, more likely to be influenced by Project II, namely those that further refer to group work and oral presentations.

Since the possibility of losing subjects in longitudinal studies was always present in this research, it was a risky to employ such method. However, the goal was to observe the quality and efficacy of an innovative educational intervention, so the potential benefits outweighed this risk. Yet, there have been studies that suggest the adequacy of using SEM having only 50 subjects in the sample (Hair et al. 2009). It would be worthwhile to perform the same tested models on all the common courses in the Economics and Management programme, in an attempt to provide answers to the speculations raised in this study regarding the results found.

Future research on education, and more specifically on the transferable skills domain, might find these results to be the outcome of a well-designed curricular intervention. More models should be created and tested, since transferable skills are now on every stakeholder's agenda: governments, professional institutions, trade unions, employers and educational institutions.

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