

An integrated model of competences related to academic performance: a mixed methods approach

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Abstract

Purpose: The evaluation of the academic performance is commonly addressed by assessing cognitive skills. Furthermore, conclusions of these studies are based on quantitative results, what makes difficult the interpretation of the causes originating the outputs. The aim of this study is to apply a mixed methods framework where different sources of information are integrated in order to draw a comprehensive model about competences in students related to their academic performance.

Method: two sources of information were used: First, previous studies were examined through a systematic review. Then, experts' answers about the variables perceived as relevant were extracted from the narratives obtained by conducting different focus groups.

Results: A convergence model was obtained by integrating results from the two sources. A total of 43 competences were obtained through two sources of information. All the competences were grouped as cognitive and non-cognitive and both were included in a comprehensive model. The relative importance of each variable was considered.

Conclusions: A mixed methods approach seems useful to develop a broad model of competencies. Future steps will focus on adding components to the model in order to reflect all the variables affecting the academic performance.

Keywords: Mixed methods, prediction, academic performance, systematic review, focus groups.

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1. Introduction

Traditionally, within the university context, the prediction of the academic performance has been addressed through the assessment of the construct “intelligence” (Donnon et al., 2007). From this approach, many protocols have been developed such as the Scholastic Assessment Test (College Board, 2017), the Medical College Admissions Test (Association of American Medical Colleges, 2018) or the Graduate Record Examinations (Educational Testing Service, 2015).

Other approaches have focused on analysing the influence of non-cognitive competences on academic performance such as: personality traits, learning strategies or interpersonal skills, (Albanese et al., 2003; Richardson et al., 2012; West and Sadoski, 2011; Zhou et al., 2016; Zimmermann et al., 2017); attitudinal variables as intrinsic / extrinsic motivation, empathy and the quality of interpersonal relationships (Carrothers et al., 2000; Petrides and Furnham, 2000).

Previous studies reviewing the non-cognitive competences associated with academic performance have grouped the competences by using different classifications. For instance, Richardson et al. (2012) divided the 43 competences found on a review in 5 groups: personality traits, motivation factors, self-regulatory learning strategies, students approach to learning and psychosocial and contextual influences.

The diversity of approaches when studying the variables associated to the academic performance is also linked to the lack of protocols for assessing the competences influencing the academic performance. Identifying those relevant academic competences from the first moment career begins, would help to improve students' academic success (Ferguson et al., 2002). Identifying those relevant academic competences of undergraduate students before starting university would help improve their academic journey in order to improve their academic success (Sommerfeld, 2011),

Moreover, the inclusion of the intended variables in a single protocol could improve the predictive validity of models related to academic performance. That is, in addition to intelligence (cognitive skills) and previous qualifications, the evaluation of people's characteristics and their context could be useful for developing a comprehensive protocol for evaluating competences (Furnham et al., 2002). In this regard, mixed methods approaches provide a useful framework to obtain a more comprehensive model to gather the intended competences and to interpret the results. This approach would allow the researcher to better understand complex issues and develop a more complete understanding of the topic (Creswell and Plano Clark, 2011).

For this reason, the aim of this work is to obtain a model of competences based on a mixed methods approach through two sources of information: (1) a systematic review of studies

analyzing variables related to academic performance of new university students; (2) experiences of teachers and professionals about academic competences connected to academic success collected through focus groups. Both sources of information are integrated in order to analyse the overlap between them and proposing a classification of the core competences determining the academic performance of students.

2. Method

2.1. Systematic review

A systematic literature review was conducted based on the preferred reporting items for systematic reviews and meta-analyses (PRISMA). In this case, PRISMA for abstract 12-item checklist was followed (Beller et al., 2013).

The inclusion and exclusion criteria were defined as they are shown in Table 1:

Table 1. Inclusion and exclusion criteria.

Criteria	Inclusion criteria	Exclusion criteria
Population	College students or undergraduate students.	Others: clinical population, childhood, non-university adults and elderly persons.
Assessment: competences	Competence/s is/are assessed studies into an assessment protocol.	There are no measures of a competences or there are no included in a protocol.
Period of assessment	Before starting university.	During of after graduation.
Assessment: academic performance	The relationship of competences with college academic performance is analyzed.	Predictive validity of competence/s is/are not analyzed.
Design	Correlational non-intervention designs.	Other designs.
Language	English or Spanish.	Other languages.

The literature search was performed through the following electronic bibliographic databases: Web of Science, Scopus, ERIC, PsycINFO and PsycTEST. Grey literature was also examined. The following search terms and derivatives were used and combined using Boolean operators: *undergraduate student*, *prediction*, *competence*, *admission assessment* and *academic performance*.

The studies selection was conducted by two independent researchers in two different phases: first, a screening of titles and abstracts was analysed to their eligibility; and second, full text articles were reviewed for final inclusion. Risk of bias was addressed by the Newcastle-Ottawa Scale (NOS) for non-randomised studies (Wells et al., 2009).

2.2. Focus groups with experts

Relevant information was collected through the focus group methodology. 30 university professionals were recruited into four groups (denery, course coordinators, degree coordinators and college services).

Interviews were recorded and later transcribed in July 2019. An analysis was carried out for identifying academic competences which were considered relevant in academic performance. These competences were coded and analyzed according to different characteristics (frequency, consensus, discrepancy, number of arguments...) in a coding template developed in Excel (Onwuegbuzie et al., 2011; Rabiee, 2004).

3. Results

3.1. Systematic review

A total of 2,681 articles were identified after removing duplicates. Finally, 22 articles were included in the study according to the review conducted by two independent researchers.

A total of 20 different competences were identified, both cognitive and non-cognitive. Table 2 illustrates the competences and specifies whether these competences significantly predicted subsequent academic performance. We used the model proposed by Richardson et al. (2012) for grouping the competences.

3.2. Focus groups with experts

The focus groups narratives were transcribed and coded by identifying the competences described by the experts. A list of 38 competences relevant to university academic performance were obtained.

The experts participating in the different focu groups describe 23 specific competences: *Social skills, social commitment, humilty, gratitude, honesty, otherness, service vocation, respect, proactivity, community participation, university role, reasoning, maturity, resilience, autonomy, self-efficacy, self-confidence, academic orientation, interest to other cultures, self-criticism, patience, creativity and teamwork.*

Table 2. Relevant competences obtained by the systematic review, using Richardson categories.

Cognitive abilities^c	n^a	%^b	Personality traits	n^a	%^b	Motivation factors	n^a	%^b
Mathematical ability	9	77.8	Emotional intelligence	6	16.7	Motivation	7	28.6
Verbal ability	13	61.5	Conscientiousness	2	50.0	Locus of control	1	100.0
Spelling	13	61.5	Leadership ^d	2	100.0	Effort ^d	1	100.0
			Procrastination	1	100.0			
			Agreeableness	1	100.0			
			Extraversion	1	100.0			
Learning strategies	n^a	%^b	Psychosocial influences	n^a	%^b			
Critical thinking	4	50.0	Adaptation	3	33.3			
Time management	2	50.0	Stress/Anxiety	3	33.3			
Concentration	4	25.5	Communication skills ^d	3	66.7			
Perseverance	3	33.3						
Organization	4	25.0						

^a Number of articles used for assessing the competence.

^b Percentage of articles in which the competence evaluated correlates significantly with academic performance.

^c Category not identified by the author.

^d Competences not identified initially by the author.

3.3. Integration of results

Next step consisted in analyzing the convergence between the competences extracted by the systematic review and the focus groups. A total of 15 competences appears in both sources of information: *spelling, verbal ability, mathematical ability, conscientiousness, motivation, critical thinking, communication skills, effort, leadership, adaptation, concentration, perseverance, time management, organization and emotional intelligence.*

4. Conclusions

The aim of the study was to propose a convergence model of competences related to academic performance. To do that, a systematic review and focus groups with were developed.

A total of 43 competences were obtained from the two sources of information. Among them, 15 competences were common to both sources whereas 5 competences appeared only in the systematic review and 23 were described by experts.

As expected, including experts experiences as a source of information helped us to interpret relevant competences that have already been obtained previously and build a broader model of academic competences.

The non-cognitive competences classification of Richardson et al. (2012) was useful for defining the number of non-cognitive competences that could be relevant to academic performance. Relevant non-cognitive competences were grouped by using four categories: personality traits (6 competences), motivational factors (3), self-regulatory learning strategies (5) and contextual influences (3).

These results provide a model of competences which will be used for designing an assessment protocol composed by evaluation instruments focused on measuring all the relevant competences. Future steps will focus on improving the model by incorporating specific indicators of the importance (weight) of each competence into the model. In addition, additional sources of information will be included to optimize the utility of the model.

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