# Enfoques de aprendizaje: un análisis de las propiedades psicométricas básicas de tres cuestionarios cortos

*Approaches to learning: an analysis of basic psychometric properties of the Spanish versions of three short questionnaires*

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**RESUMEN:** El modelo educativo resultante de la integración en el Espacio Europeo requiere del profesorado actuar como gestores del contexto de aprendizaje, seleccionando recursos y metodologías de entre las disponibles.

Los cuestionarios que miden los enfoques de aprendizaje pueden ser una herramienta valiosa del profesorado de diagnóstico inicial de las características del alumnado así como de evaluación del impacto de innovaciones.

Existe una demanda de versiones cortas de los inventarios por diversas razones: limitaciones de tiempo y recursos para administrar y procesar los cuestionarios, alta probabilidad de obtener respuestas incompletas, etc.

Sólo una versión corta de un cuestionario de enfoques de aprendizaje se ha validado en España: el Revised SPQ-2f de Biggs et al., (2001) por Hernández Pina et al., (2005). Este es un cuestionario que mide dos factores, profundo y superficial. Sin embargo, la literatura sigue dando soporte a la existencia de un tercer factor: logro. No existe ninguna versión corta de tres factores validada en español. En esta línea, el objetivo de este trabajo es presentar las propiedades psicométricas básicas de tres cuestionarios cortos, dos ya existentes en la literatura y un tercero desarrollado por los autores desde las versiones largas.

Los resultados indican que el cuestionario de dos factores y el desarrollado por los autores (N-SPQ-3f ) presentan propiedades aceptables, mientras que el Short SPQ-3f (Fox et al. 2001) muestra problemas de fiabilidad. Los resultados también proporcionan soporte para considerar la existencia de logro como un tercer factor. En consecuencia, en carreras en las que la motivación es externa (p.e. las relacionadas con administración de empresas) el uso de un cuestionario de dos factores podría resultar en una evaluación incompleta de los enfoques de aprendizaje de los alumnos.

**PALABRAS CLAVE**: Enfoques de aprendizaje, Study Processes Questionnaire, versiones cortas, evaluación de innovaciones.

**ABSTRACT:** The educational model resulted from the integration in the European Higher Education Area demands from the teaching staff to act as managers of the learning context, selecting resources and the appropriate pedagogy among several alternatives.

The questionnaires that measure the approaches to learning of students could be a valuable tool in order to make an initial diagnosis of students' characteristics, as well as to assess the impact of pedagogical innovations.

Short questionnaires are more demanded by practitioners due to several reasons. Frequently form part of a set of measures, there are resource constraints (time and financial) to administer and process the data, and long questionnaires are more likely to be incompletely answered.

Only one version of short questionnaires measuring approaches to learning has been validated in Spanish: the version of the Revised SPQ-2f (Biggs et al., 2001) by Hernández Pina et al., (2005). This is a 20 items version focusing in two approaches: deep and surface. However, further research (e.g. Entwistle et al., 2002; Fox et al. 2001, or Tait et al., 1998) keep supporting the existence of the third approach: achieving.

No short questionnaire measuring these three approaches has been validated in Spanish. In this line the main aim of the paper is to present the basic psychometric properties of the Spanish versions of the three existing short instruments derived from the initial Study Process Questionnaire by Biggs: the Revised SPQ-2f (Biggs et al. 2001), the Short SPQ-3f (Fox et al. 2001) and the N-SPQ-3f (developed by the authors).

The results indicate that the Revised SPQ-2f and N-SPQ-3f presented adequate properties, whereas the SPQ-3f shows reliability problems. Our results also suggest that there is support to consider the achieving approach as an independent construct (contrariwise to the opinion of Biggs et al., 2001, when developing the R-SPQ-2f). Therefore, in degrees where motivation is mainly external, the use of a 2 factor instrument could result in an incomplete view of the approaches to learning of students.

## 1. INTRODUCTION

As Byrne et al. (2010) indicate, it is important that students acquire the capabilities to be lifelong, independent learners so that they can adapt to unanticipated changes that will occur in the future. Fostering such capabilities requires educators to create learning environments which will encourage students to, among other things, think for themselves and develop a personalised understanding of new material, be able to analyse information, solve problems and relate new knowledge to prior knowledge and apply it in emerging situations.

Those ideas are also behind some changes fostered by the educational model resulted from the integration in the European Higher Education Area (EHEA). The integration in the EHEA demands from the teaching staff to act as managers of the learning context, selecting resources and the appropriate pedagogy among several alternatives in order to promote lifelong learning skills and encouraging students to adopt deep approaches, as opposed to surface approaches, to learning in their study activities.

In this context, the existence of reliable, short and easy to administer instruments to measure students' approaches to learning could be useful in order to obtain initial diagnosis of current approaches and/or assess the effect of educational innovations Kember et al. (1997).

As Biggs et al. (2001) state, the point of departure for the emerging conceptual framework known generically as 'student approaches to learning' (SAL) theory were the work of Marton and Säljö (1976a, 1976b), who came up with the powerful idea of approach to learning.

Initially two main approaches were identified: deep and surface. Byrne et al. (2010) stated that a deep approach is characterised by a personal interest in learning. Students adopting this approach intend to understand the material; they interact critically with the contents and relate them to their prior knowledge and experience. In contrast, students adopting a surface approach present a low personal engagement in

the learning process, focus on rote-learning the material in an unrelated manner and they are constrained by the specific task. Later examination of the influence of assessment on student learning resulted in the identification of a third approach: achieving (or strategic) approach. Achieving approach is defined by the aim of obtaining academic success by planning tasks, effort and time. In the pursue of this success, these students change their strategies to fit with the perceived characteristics of each specific course (mainly the assessment system) and will adopt a meaningful or rote learning approach as they perceive it as being necessary for success (Entwistle and Ramsden, 1983; Biggs, 1987).

Two main streams of research developed instruments to measure students' approaches to learning (see table 1).

**Table 1. Main instruments and versions**

| Instruments developed in the research line of Entwistle and Ramsden |
|---|
| Entwistle (1979) Approaches to Studying Inventory (ASI, 60 items) |
| Entwistle and Ramsden (1983) Revised Approaches to Studying Inventory (RASI, 38-30 items) |
| Tait, Entwistle and McCune (1998) Approaches and Study Skills Inventory for Students (ASSIST, 52 items) |
| Entwistle, McCune and Hounsell (2002) Approaches to Studying Inventory (ALSI, 36 items) |
| **Instruments developed in the research line of Biggs** |
| Three approaches |
|       Study Process Questionnaire, SPQ, Biggs (1987, 42 items) |
|       Shortened Study Process Questionnaire (Fox, et al. 2001, 18 items) |
|       *Spanish versions*: |
|       CEPEA (Barca Lozano, 1999, 42 items) |
|       CPE, Abalde et al. (2001, 42 items) |
| Two approaches |
|       Revised Two Factor Study Process Questionnaire, R-SPQ-2F, (Biggs et al., 2001, 20 items) |
|       *Spanish version*: |
|       CPE-2F (Hernández Pina et al., 2005, 20 items) |

A clear trend in the development of these questionnaires has been to obtain short and reliable instruments, mainly in the later versions of the SPQ. The development of short versions is supported by several arguments:

Biggs et al. (2001) highlight that, in a period of changing teaching contexts, accountability, and concerns with quality assurance and particularly with quality enhancement, put stress on assessment and evaluation of changes and teaching effectiveness. Fox et al. (2001) point to the usability, short instruments are easier to administer to students, as part of a large questionnaire containing multiple other scales, and to make it more suitable for repeated administration.

In our opinion, resource constraints (time and financial) to administer and process the data are also important reasons to choose reduced versions. Long questionnaires are more likely to be incompletely answered and finally, the use of complex models (including several variables) to be modelized and analyzed by using structural equation models require parsimonious measures.

Despite the reasons to develop short measures, in Spain, only one of these short versions has been translated and validated: the CPE-2F (Hernández Pina et al., 2005) which is a version of the Revised Two Factor Study Process Questionnaire, R-SPQ-2F, (Biggs et al., 2001) focusing only on two approaches: deep and surface.

However, as highlighted by Arquero et al. (2015), accounting and business students select their degree because of the professional status, prospective of good jobs, higher salaries, etc. (quoting Arquero et al., 2006, Byrne and Flood, 2005; Byrne et al., 2012). This external motivation could relate more strongly effort with an achievement approach, rather than with a deep approach. In fact, Kyndt et al. (2011) highlighted that prior research has shown that students from different disciplines can differ significantly from each other regarding learning approaches (e.g. Hayes and Richardson, 1995; Kember et al., 2008; Smith and Miller, 2005).

Given the inexistence of reduced versions of short instruments measuring approaches to learning in Spanish, the main objective of this paper is to assess the psychometric characteristics of three short instruments, two of them, the Spanish versions of existing English language questionnaires (S-SPQ-3f and R-SPQ-2f) and a new short version of the SPQ developed by the authors (N-SPQ-3f).

## 2. METHOD

### 2.1 Sample

A total of 732 students from the University of Granada (Spain), enrolled in Accounting subjects participated in this study.

Data were obtained in the framework of an innovation project, from 2008-09 to 2011-12 courses. Students had to answer a set of questions (including those regarding approaches to learning) via internet.

By gender the total sample was 482 female and 250 male students (65.85% - 34.15%).

### 2.2 Instruments and translation

Two published versions existed of the full SPQ in Spanish, as well as a version of the R-SPQ-2f. As all the short instruments used largely derived from the SPQ, references for the translation of the items were available.

Some minor adaptations were made in order to facilitate comprehension by students and increase face validity of the items.

A brief description of the structure of the instruments and the number of responses obtained for each instrument are presented in table 2.

**Table 2. Internal structure of the instruments and sample**

|  | Number of factors | Number of items | n |
|---|---|---|---|
| S-SPQ-3f | 3 factors: deep, surface, achieving | 18 items (6 x approach) | 446 |
| R-SPQ-2f | 2 factors: deep, surface | 20 items (10 x approach) | 202 |
| N-SPQ-3f | 3 factors: deep, surface, achieving | 18 items (6 x approach) | 380 |

### 2.3 Data treatment

In order to assess the psychometric properties of the questionnaires, reliability, validity and goodness of fit tests were performed.

Structural equation modelling was considered the most suitable approach and Smart PLS and AMOS were used.

Regarding reliability, SmartPLS allows obtaining two indexes: Cronbach's alpha and composite reliability (pc: Werts, Linn & Jöreskog, 1974).

SmartPLS also provides the average variance extracted (AVE, Fornell & Larcker, 1981). The AVE of a construct is a measure of its internal convergent validity, and the comparison of the root of AVE of a given construct with the correlation between this construct and the other constructs of the model is a measure of the internal discriminant validity.

## 3  RESULTS

Table 3 presents the results of the reliability analyses (alpha and composite reliability) at scale level for the three questionnaires, as well as the average variance extracted (AVE). AVE represents the overall amount of variance in the indicators accounted for by the latent construct

**Table 3. Reliability and AVE by instrument and scale**

|  | S-SPQ-3F | | | R-SPQ-2F | | | N-SPQ-3F | | |
|---|---|---|---|---|---|---|---|---|---|
|  | $p_c$ | Alpha | AVE | $p_c$ | Alpha | AVE | $p_c$ | Alpha | AVE |
| **Deep** | .798 | .707 | .402 | .844 | .796 | .355 | .841 | .775 | .470 |
| **Surface** | .675 | .620 | .302 | .849 | .799 | .362 | .832 | .761 | .454 |
| **Achieving** | .753 | .604 | .367 | n.a. | n.a. | n.a. | .805 | .707 | .410 |

A commonly acceptable threshold value for composite reliability (pc) is 0.7 (Hair et al., 1998) and it is interpreted in the same way than Cronbachs' alpha.

The results indicate that the S-SPQ-3F presents, with this sample, problems of internal consistency in two of the scales (surface and achieving). Contrariwise, for the N-SPQ-3F the reliability in all the three scales is acceptable. For the R-SPQ-2F, both scales could be considered reliable.

Fornell and Larcker (1981) recommend a minimum value for the AVE of 0.5. A value over 0.5 indicates that the latent variable (scale) shares more variance with its indicators that with the other constructs in the model. All the AVE values obtained are below this threshold, although it is to be noted that the instrument that obtains better values for all the scales is the N-SPQ-3F.

Validity measures the extent to which the set of indicators accurately represents a construct (Hair et al., 1998). Two validity measures tested include convergent validity and discriminant validity.

Discriminant validity is examined by comparing the correlation between the construct and the square root of AVE. The square root of AVE should be greater than the correlations between the construct and the other latent variables in the model for adequate discriminant validity (Bhattacherjee, et al. 2004; Wixom, et al. 2005).

As it is presented in table 4, for all the instruments and scales, the correlations between constructs are smaller than the root of AVE, suggesting that there are no problems of discriminant validity.

**Table 5. Correlations between scales by instrument and root of AVE***

|  | S-SPQ-3F | | | R-SPQ-2F | | N-SPQ-3F | | |
|---|---|---|---|---|---|---|---|---|
|  | **Deep** | **Surface** | **Achiev.** | **Deep** | **Surface** | **Deep** | **Surface** | **Achiev.** |
| **Deep** | **,634** |  |  | **,596** |  | **,686** |  |  |
| **Surface** | -,214 | **,550** |  | -,457 | **,602** | -,293 | **,674** |  |
| **Achieving** | ,478 | -,092 | **,606** | n.a. | n.a. | ,561 | -,066 | **,640** |

*Root of AVE, represented in the diagonal, bold

Convergent validity measures the extent to which the items truly represent the intended latent construct. An initial evidence of convergent validity could be assessed by composite reliability measures (presented in table 3), a second evidence is the analysis of factor loadings (Hair et al., 1998). There is evidence of convergent validity if all items in the scale are reliable. An item is considered to be reliable if the standardized loading value is greater than 0.7; that is, the amount of variance in an item is due to underlying construct rather than to error (Chau, 1997, p. 324); however, in learning environments a standardized factor loading of 0.5 and above is considered acceptable (Johnson and Stevens, 2001). For this study we are going to consider an intermediate level of 0.6 as cut-off value.

This analysis is usually complemented with a cross-loading analysis, which allows obtaining further evidence on discriminant validity: each item should present a higher loading on its own construct that in any other of the model (Barclay et al., 1995).

As results in table 5 suggest, the S-SPQ-3F, presents problems of convergent validity. A total of 8 items out of 18 (two items ascribed at the deep approach scale, three at the surface approach and another three at the achieving approach) presents loadings under 0.6, some with values as lower as 0.015 or 0.130. Some of these items present higher loadings on other scales.

Regarding the second three factor questionnaire (N-SPQ-3F), the results on table 5, only one item is clearly below the limit of 0.6. Other two present a loading of 0.597. No item presents higher loading in other scale than in its own.

Finally, for the R-SPQ-2F, 7 items out of 20 (4 for deep scale, 3 for surface scale) present factor loading below 0.6 (another one at surface scale is close: 0.592). No item presents a high loading in other scale.

AMOS was used to obtain evidence on the goodness of fit data-model. As the models differ in terms of items, number of items, sample etc. we are presenting the results of one absolute fit index, the Root Mean Square of Approximation (RMSEA).

**Table 6. RMSEA by instrument**

|  | S-SPQ-3F | R-SPQ-2F | N-SPQ-3F |
|---|---|---|---|
| **RMSEA** | ,080 | ,076 | ,091 |

A value for RMSEA below 0.05 is indicative of a good fit (MacCallum, Browne and Sugawara, 1996). According to Kenny (2012) 0.10 could be considered as the limit for an acceptable fit. As could be seen in table 8, none of the models present a good fit, and all of them are close to the limit for acceptable.

## 4. DISCUSSION

The approach to learning taken by a student is a key variable that explains the level of commitment with the learning task and has influence in performance and persistence, among other variables.

Given the relevance of the approaches there appears to be a need for a shorter version of instruments to measure it, such as the SPQ, that can be administered quickly

and easily by a regular teacher, for use in monitoring teaching contexts (Biggs et al. 2001), making it easier to administer to students, as part of a large questionnaire containing multiple other scales, and to make it more suitable for repeated administration (Fox et al., 2001; Tooth, Tonge & McManus, 1989).

Table 5. Loadings and cross-loadings by instrument

**S-SPQ-3F**

| Ítem | Deep | Surf. | Ach. |
|------|------|-------|------|
| **Deep** | | | |
| Fox03 | **.516** | -.122 | .168 |
| Fox10 | **.680** | -.160 | .339 |
| Fox11 | **.585** | .036 | .246 |
| Fox01 | **.604** | -.224 | .262 |
| Fox08 | **.782** | -.200 | .444 |
| Fox17 | **.603** | -.048 | .261 |
| **Surface** | | | |
| Fox02 | -.095 | **.601** | -.068 |
| Fox13 | -.055 | **.568** | -.068 |
| Fox16 | .072 | **.015** | .009 |
| Fox05 | -.161 | **.768** | -.105 |
| Fox12 | -.172 | **.644** | -.009 |
| Fox15 | -.039 | **.354** | .019 |
| **Achieving** | | | |
| Fox07 | .402 | -.123 | **.773** |
| Fox04 | .321 | -.092 | **.765** |
| Fox14 | .234 | .111 | **.616** |
| Fox06 | .328 | -.267 | **.584** |
| Fox09 | .236 | .078 | **.533** |
| Fox18 | .103 | .229 | **.130** |

**N-SPQ-3F**

| Ítem | Deep | Surf. | Ach. |
|------|------|-------|------|
| **Deep** | | | |
| Nspq_03 | **.669** | -.145 | .332 |
| Nspq_10 | **.717** | -.172 | .328 |
| Nspq_11 | **.756** | -.191 | .517 |
| Nspq_01 | **.606** | -.249 | .301 |
| Nspq_08 | **.750** | -.204 | .487 |
| Nspq_17 | **.597** | -.262 | .257 |
| **Surface** | | | |
| Nspq_02 | -.230 | **.764** | -.080 |
| Nspq_13 | -.162 | **.630** | -.039 |
| Nspq_18 | -.184 | **.636** | -.019 |
| Nspq_05 | -.257 | **.762** | -.079 |
| Nspq_12 | -.149 | **.615** | .018 |
| Nspq_15 | -.169 | **.620** | -.027 |
| **Achieving** | | | |
| Nspq_04 | .346 | .042 | **.676** |
| Nspq_07 | .456 | -.035 | **.683** |
| Nspq_14 | .235 | .131 | **.518** |
| Nspq_09 | .370 | -.191 | **.673** |
| Nspq_16 | .294 | -.091 | **.597** |
| Nspq_06 | .399 | -.082 | **.677** |

**R-SPQ-2F**

| Ítem | Deep | Surf. |
|------|------|-------|
| **Deep** | | |
| Rspq01 | **.500** | -.171 |
| Rspqq05 | **.601** | -.235 |
| Rspqq09 | **.707** | -.383 |
| Rspq13 | **.731** | -.348 |
| Rspq17 | **.442** | -.112 |
| Rspqq02 | **.635** | -.234 |
| Rspqq06 | **.609** | -.298 |
| Rspq10 | **.607** | -.323 |
| Rspq14 | **.486** | -.152 |
| Rspq18 | **.578** | -.279 |
| **Surface** | | |
| Rspq03 | -.337 | **.679** |
| Rspq07 | -.226 | **.424** |
| Rspq11 | -.282 | **.592** |
| Rspq15 | -.249 | **.629** |
| Rspq19 | -.250 | **.627** |
| Rspq04 | -.276 | **.635** |
| Rspq08 | -.279 | **.602** |
| Rspq12 | -.356 | **.668** |
| Rspq16 | -.234 | **.566** |
| Rspq20 | -.201 | **.556** |

In Spanish, there is only one adaptation of the short versions of the SPQ. Therefore, the objective of this paper is to present evidence on the psychometric properties of three short instruments derived from the SPQ.

Our results indicate that, regarding reliability, the R-SPQ-2f and N-SPQ-3f presented adequate properties, whereas the S-SPQ-3f shows reliability problems.

A further analysis of internal validity shows that several items of the S-SPQ-3f present lower loadings and incoherent cross-loadings.

The results on discriminant validity and reliability obtained for the N-SPQ-3f for the three scales suggest that the achieving approach can be considered an independent construct (contrariwise to the opinion of Biggs et al., 2001, when developing the R-SPQ-2f).

Therefore, in degrees where motivation is mainly external (e.g. accounting and business administration,xxx E+T, 2015), the use of a 2 factor instrument could result in an incomplete view of the approaches to learning of students. In this line, the usage of the N-SPQ-3f, with 18 items, allows measuring the 3 approaches with an adequate level of reliability, whereas the R-SPQ-2f only measure 2 with 20 items. Our results suggest that the S-SPQ-3f should not be used due to its problems of reliability.

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## Annex. N-SPQ 3f Items

| | |
|---|---|
| Nspq_01 | Cuando estudio, tiendo a buscarle utilidad real a lo que estoy aprendiendo. |
| Nspq_02 | Creo que puedo arreglármelas en la mayoría de los exámenes memorizando las partes más importantes, en lugar de intentar comprenderlas. |
| Nspq_03 | En ocasiones, estudiar me proporciona un sentimiento de profunda satisfacción personal. |
| Nspq_04 | Mi objetivo es obtener buenas notas en cuantas asignaturas pueda, de forma que esté en situación de escoger los mejores trabajos cuando acabe la carrera. |
| Nspq_05 | Aprendo algunas cosas de memoria, repitiéndolas una y otra vez hasta que las sé mecánicamente, aunque no las haya entendido |
| Nspq_06 | Para obtener buenas calificaciones, intento distribuir bien el tiempo de trabajo y estudio a lo largo del semestre y entre materias. |
| Nspq_07 | Se me podría definir, básicamente, como una persona con ambiciones que quiere estar entre los mejores en cualquier cosa que haga. |
| Nspq_08 | Para sentirme satisfecho tengo que trabajar en los contenidos de las asignaturas hasta que llego a mis propias conclusiones. |
| Nspq_09 | Organizo el tiempo de estudio cuidadosamente para aprovecharlo mejor. |
| Nspq_10 | Creo que estudiar puede ser, a veces, tan interesante como una buena novela o película. |
| Nspq_11 | Pongo mucho empeño en mis estudios, porque el material a estudiar me parece interesante. |
| Nspq_12 | Creo que los profesores no deberían esperar que los alumnos pierdan tiempo estudiando temas que no entran en las pruebas y evaluaciones. |
| Nspq_13 | Creo que no es práctico estudiar los temas en profundidad. Te lías más y malgastas tiempo, cuando todo lo que necesitas es saber lo justo para aprobar. |
| Nspq_14 | Considero que obtener calificaciones altas es una especie de juego competitivo y yo juego para ganar. |
| Nspq_15 | Pienso que la mejor forma de aprobar las asignaturas es intentar recordar las respuestas de cuestiones que caen frecuentemente en el examen. |
| Nspq_16 | Creo que soy bastante sistemático y organizado a la hora de repasar para los exámenes. |
| Nspq_17 | En las explicaciones, o cuando estudio, intento ir relacionando los nuevos contenidos con conceptos o conocimientos que he aprendido antes. |
| Nspq_18 | No encuentro sentido a aprender algo que es poco probable que entre en el examen. |

**All items are to be answered with the following scale**

| | |
|---|---|
| 1 = | esta frase no me es aplicable nunca, o en raras ocasiones |
| 2 = | es cierto a veces |
| 3 = | más o menos la mitad de las veces es cierto |
| 4 = | es frecuentemente cierto |
| 5 = | siempre, o casi siempre |

**Scoring**

| | | |
|---|---|---|
| **Deep** | **Motive** | Nspq_03 + Nspq_10 + Nspq_11 |
| | **Strategy** | Nspq_01 + Nspq_08 + Nspq_17 |
| **Surface** | **Motive** | Nspq_02 + Nspq_13 + Nspq_18 |
| | **Strategy** | Nspq_05 + Nspq_12 + Nspq_15 |
| **Achieving** | **Motive** | Nspq_04 + Nspq_07 + Nspq_14 |
| | **Strategy** | Nspq_06 + Nspq_09 + Nspq_16 |