Information Literacy Competencies among Social Sciences Undergraduates: A Case Study Using Structural Equation Model

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Abstract. The Information Literacy profile of a randomly selected sample of students in Social Sciences from three Spanish universities is analysed, on the base of a mixed assessment model, both subjective-objective, and centred on perceptions and evidences. The measurement tool, based on the IL-HUMASS survey, includes twenty six variables (competences) and three scales: one is based on subjective perceptions (deployed in both motivation and self-efficacy), and the other two point out at objective evidences regarding individuals' knowledge (to know) and skill (know-how). Competencies are clustered in four categories (search, evaluation, processing, communication & dissemination). The application of the structural equation model (SEM) which combines multiple regression and confirmatory factor analysis techniques, provides knowledge of the relationships among the four sets of categories. Results show a strong correlation between the pairs of categories search-evaluation and evaluation-communication with regard to the attitudinal scales (motivation and self-efficacy). As a consequence, further research is needed.

Keywords: Information competences, information literacy, IL HUMASS Test, self-assessment, assessment, structural equation models.

1 Introduction

The aim of this study was to determine the psychometric properties of three scales used for diagnostic evaluation of the set of skills that make up the overall information literacy competencies. These competencies are clustered in four categories or macro-competencies (search, evaluation, processing, communication & dissemination). The IL-HUMAS survey is used as a singular and complex diagnostic tool that approaches the information literacy issue from the double internal dimension of motivation and self-efficacy. Therefore, EVALCI-K and EVALCI-S surveys provide insights into

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individuals' knowledge (to know) and skills (know-how), and measure respectively knowledge and ability to apply information skills for problem solving.

On the one hand, we focus on the information competencies that are designated as more useful, that are the most accomplished and that show greater skill. On the other hand, we estimate correlations between macro-competences in order to develop effective training programs

2 Literature Support

In the field of Higher Education, most experts agree that information skills play an important role in the overall education of students, both in their learning process and in subsequent practice. We refer to the command of a set of attitudes, competencies and skills related to information access, retrieval, evaluation and analysis.

We are thus facing an interdisciplinary view of information literacy and a socialization of its principles, where IL is being recognised as a key to accessing and making fair use of information [28]. Information education is moving towards a deeper focus on information competences training and on applying active methods to each context, to foster a greater autonomy among students to solve information related problems [1], [6], [12], [15], [33], [37].

A diagnosis of the perceptions of students regarding their own information literacy and its competences can be achieved through the application of self-assessment tests, and their respective "self-report measures" [22], [34]. There is a large number of works that make use of self-assessment as a diagnostic method that provides information about students' training perceptions and needs [5], [8], [10], [17], [25-26], [35].

Nevertheless, self-assessment initiatives don't usually come up in an isolated way, and there are many instances in which self-assessment is combined and/or compared with an objective assessment [2], [24] . It is a matter of knowing "how students' self-assessment of their ability compares to their actual skill as demonstrated through testing" [34]. This combination of objective and subjective tools provide a look at the "association between scores on an IL skills test and students' estimates of their IL skills [10-11]. In this sense, we refer to [28-29], where subjective and objective instruments are simultaneously applied for measuring information skills among undergraduate students.

Nowadays there are multiple information competences diagnostic assessment experiences available for an ample breadth of scientific subject areas.

In Social Sciences and Humanities there are a considerable number of studies which are available already. In the particular field of Translation and Interpreting studies [28], [31-33], [36], existing research provides evidence of information behavior and the degree of acquisition of information competences among a group of students, teachers, and professionals, thus allowing a better design of training proposals. A self-assessment experience is reported by the ACEJMC survey [38], which measures the perceptions of Journalism students about their information competences. Journalism Studies have also deserved attention by [3], from the view of authentic evaluation, who used real cases addressing professional practice. Alternatively, self-assessment methods have also been

applied to Psychology Studies to diagnose information competences, in addition to interviews with experts, as [39], and blended methods that triangulate data gathered from in-class task assignments with questions relating to students' process of solving information-related problems, and from semi-structured interviews with students [14]. Recently, [20] published another interesting study where students' perceptions about their efficiency in information-related tasks were measured by a number of tools (namely, questionnaire, test, focus groups, and students' tasks). [7] undertook a research focused on MBA students and made use of the InfoIQ model.

Finally, in the field of Library Information Science (LIS) there is outstanding multinational research dated 2013 that has included undergraduate students in 19 countries, including Turkey [18] and Zagreb in Croatia [9] among others. The PIL survey instrument, that addresses aspects about LIS students' research experience, information behavior and information literacy skills, has also been used. Results emphasize the importance of transferability of information skills in the field of LIS, where it is often assumed that professionals master them.

3 Methodology

The research was conducted in Spain, and its scope focused on higher education within the field of Social Sciences and Humanities. The data gathering was collected during the 2012–2013 academic year at three Spanish Higher Education institutions: Faculty of Communication and Information Science at Granada University and Faculty of Communication and Information Science at Complutense of Madrid, Faculty of Psychology at Granada University and Faculty of Translation and Documentation at Malaga University.

The goal at this initial stage of the research was restricted to a descriptive analysis of the variables and categories of the three scales (that is, four dimensions: motivation, self-efficacy, knowledge and know-how), which provided us information on the nature and characteristics of the collected data. The analysis was developed using SPSS 20.0 software.

In a second stage, we have applied Structural Equation Modeling (SEM) to quantify the overall level of knowledge and skills acquired, the level of Importance and Self-efficacy declared in IL-HUMASS and, finally, possible correlations between macro-competences considering the above four dimensions. This analysis was developed using LISREL software.

Structural equation models, which combine multiple regression and factorial analysis, are a very useful tool in order to identify relationships between the macro-competences that cannot be directly measured. We can find these techniques in [4], [19], [21], [23], to name a few.

In the structural equation model, we can identify two main components: (a) a measurement model that represents the relationships of latent variables (or macro-competencies) with its indicators (or observed variables), and (b) a structural model which describes the relationship between the latent variables. As the data did not present a Normal behavior, inter-item polyseric-correlation matrices and their asymp-

totic variance-covariance matrices were calculated and we have used the weighted least squares (WLS) model using PRELIS [13].

4 Results

The recruitment of participants was done using a simple random sampling, stratified by courses. The distribution of the sample attending the University of origin and degree is collected in Table 1.

Across the course, subjects were distributed, 27.7% in the first year, 53.3% in second year, and 19% in third year. Of the surveyed students 24.1% were male and the remaining 75.9% were women.

Table 1. University and degree of participants

	Information Science	*Translation Interpretation*	*Psychology*	*Total*
Complutense Madrid	25	0	0	25
Granada	52	0	40	92
Málaga	0	78	0	78
Total	77	78	40	195

The scales have been extensively validated in previous studies [25-26], [30]. With regard to reliability, Cronbach's alpha shows how well the IL-HUMASS works. The internal consistency achieved was high 0.94. Similar results were obtained for EVALCI-K and EVALCI-S (0.87 and 0. 83, respectively) showing that the surveys can be assumed to be reliable.

Descriptive statistics were calculated to uncover data location through the most representative measure of the central tendency (mean). As expected, on the subjective side, the overall mean score was higher in the dimension of belief in importance (7.96) than in self-efficacy (6.71). Objective mean scores relating to the students' knowledge and skills are somewhat lower (5.97 and 5.32, respectively).

Table 2. Mean results considering the scale and the competence category

	Dimension			
Competencies	Importance	Self-efficacy	Knowledge	Know-how
Information search	7,93	6,83	5,96	5,31
Information evaluation	7,88	6,76	6,96	5,24
Information processing	7,72	6,36	5.03	5,94
Communication	8,30	6,87	5,95	4,77
Global	**7,96**	**6,71**	**5,97**	**5,32**

SEM provided the measurement models specifying the relationships between observed and latent variables, their reliability, and the contribution of each item to its respective construct and the goodness of fit statistics.

In a first step, a measurement model for each dimension was designed to specify the relationships between observed variables and latent competencies. More significant items were maintained and the high dimensionality of the problem was reduced. Results obtained [27], showed an acceptable fit, with values of GFI, NFI and RMSEA above 0.90 and below 0.06 respectively [16].

We also studied the correlations between macro-competencies for each scale. Selected items are considered inthis paper. If we take into account the Importance dimension, the results included in Table 3 and Figure 1 show the strong correlation between the latent variables, with the highest relationship being between Evaluation and Processing.

Table 3. Correlation matrix between latent competencies for motivation

	Search	*Evaluation*	*Processing*	*Communication*
Search	1.00			
Evaluation	0.77	1.00		
Processing	0.64	0.82	1.00	
Communication	0.75	0.81	0.66	1.00

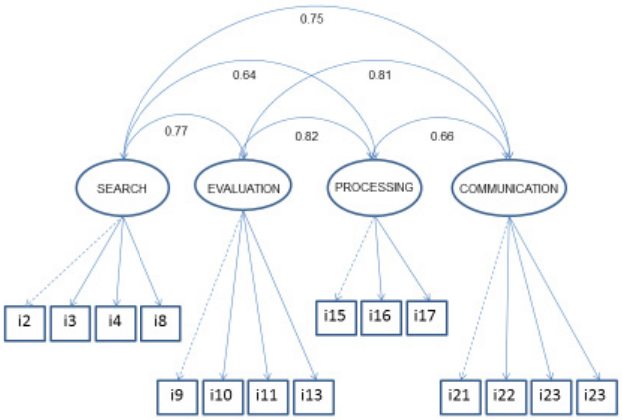

Fig. 1. Structural model for importance dimension

Correlations between latent competencies for Self-efficacy are included in Table 4. These results confirm a very strong correlation between the pairs of categories search-evaluation and evaluation-communication.

With regard to the knowledge scale, Table 5 shows that the correlations, although significant, are somewhat weaker. Strongest correlations have been found among the categories of evaluation, processing and communication.

Table 4. Correlation matrix between latent competencies for self-efficacy

	Search	*Evaluation*	*Processing*	*Communication*
Search	1.00			
Evaluation	0.77	1.00		
Processing	0.55	0.51	1.00	
Communication	0.51	0.78	0.48	1.00

Table 5. Correlation matrix between latent competencies for knowledge

	Search	*Evaluation*	*Processing*	*Communication*
Search	1.00			
Evaluation	0.40	1.00		
Processing	0.51	0.83	1.00	
Communication	0.44	0.73	0.98	1.00

Finally, concerning the know-how scale, values in Table 6 show the low correlation found between macro-competencies. In this case, as with the observed items, correlations between constructs are very weak, with none exceeding 0.27. Some measures were not significant.

Table 6. Correlation matrix between latent competencies for know-how

	Search	*Evaluation*	*Processing*	*Communication*
Search	1.00			
Evaluation	0.18*	1.00		
Processing	0.13*	0.13	1.00	
Communication	0.20	0.27	0.09	1.00

* not significant

5 Conclusion

The categories of Information Search and Information Evaluation show a similar global mean behavior. Regarding the results of the knowledge test, there is a higher variation in the mean results. Considering information skills, Information Management gets almost 6 as a global mean. It's surprising that, this same category gets the lowest mean value in the knowledge test.

In general terms, the greater the motivation an individual gives to a given variable, the higher the level of self-efficacy is declared. Clearly, global average results achieved

by respondents indicate high levels of motivation for most variables, but their levels of knowledge and skills are significantly lower. That is, when they are asked to demonstrate in practice their knowledge and know-how, the average level achieved drops significantly, being even lower in know-how. Therefore, it is essential to develop subsequent research on evaluating information competencies training, as we have seen that what seems most important is not always what they have learnt best.

SEM models are consolidated as a useful tool for modeling latent variables like the macro-competencies considered. Furthermore, SEM allows us to estimate the existing correlations between latent competencies. Results obtained reveal a strong correlation between the pairs of categories search-evaluation and evaluation-communication concerning motivation and self-efficacy scales. With regard to the knowledge scale, strongest correlations have been found among the categories of evaluation, processing and communication. On the contrary, the same comparison of categories regarding the know-how scale shows lower results.

The analysis and evaluation of these correlation structures will contribute as a basis for future intervention strategies in Information Literacy teaching-learning in order to offer an effective academic response.

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