

# Communication of Information in the Digital Age among Social Sciences Students: Uncovering a Synthetic Indicator of Performance

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## Abstract

**Purpose:** The paper aims to analyze the informational behavior of a group of future professionals in the field of Social Sciences, in terms of their competence in the communication-dissemination of information.

**Methodology:** The IL-HUMASS, EVALCI/KN and EVALCI/SK tests regarding the affective (attitudes, motivations) and cognitive (knowledge, skills) dimensions are distributed to a stratified sample of five universities and eight degree courses in Spain. Infographics and non-parametric methods allow to compare the disciplinary profiles with regard to gender, academic course and academic degrees. A ILCom synthetic indicator based on Structural Equation Model includes the subjective and effective dimensions to measure the holistic learning outcomes in communication-dissemination of information.

**Findings:** Significant differences regarding the informational behavior of future professionals in Social Sciences are discovered. The synthetic indicator allows academic degrees to be ranked in order to identify those in need of initiatives aimed at improving communication-dissemination competence.

**Originality/value:** The paper puts forward the first evidence-based study on communication-dissemination competence among future Social Sciences professionals, as no similar research has been found in the scientific literature. It is also the first time that the definition of a predictive performance indicator, based on a powerful statistical methodology, has been proposed.

**Practical implications:** Findings must be taken into account to design effective learning programs. This methodological approach can be expanded to scientific and academic environments.

**Keywords:** Communication, Information, Social Sciences Students, Higher Education, Informational competences, Informational behavior, Synthetic Indicator of Performance

**Paper type:** Research paper

## **1. Introduction**

Few studies have addressed the topic of learning informational competences from an empirical perspective and in an integral manner that agglutinates the different dimensions involved, especially the combination of the affective and cognitive aspects of learning. In line with the latest trends in the evolution of information literacy (IL), and its redesign as metaliteracy, mainly derived from the ideas put forward by the [ACRL Board \(2016\)](#), there is a need for a renewed picture of the relationship between individuals and information. Moreover, a more holistic and inclusive perspective is required. Yet the subject of IL is so comprehensive that this paper is self-restricted to the communicative-disseminating behavior of individuals in relation to information, since this is probably one of the areas that have received less attention within the wide range of IL-related tasks. The case of future professionals in the different Social Sciences (SS) disciplines is a special one from the point of view of the communication-dissemination of information, since these tasks play a key role within the profile of SS activities. To this end, this study addresses a number of degree courses restricted to the SS.

This research is pioneering and original for a number of reasons. It is the first evidence-based study on communication-dissemination competence among future SS professionals, as no similar research has been found in the scientific literature. It is also the first time that the definition of a predictive performance indicator, based on a powerful statistical methodology, has been proposed. The idea fits with the recommendations of international organizations on the need to define indicators for measuring learning effectiveness. In this

way it would be possible to predict patterns of informational behavior among future SS professionals that may guide the design of effective learning programs on the communication-dissemination of information.

The research questions posited in this work are the following:

Q1. In terms of the communication-dissemination of information, what are the levels of competence of a large group of future SS professionals as regards the cognitive (knowledge/skills) and affective (attitudes/motivations) learning dimensions?

Q2. From the disciplinary point of view, are there any significant similarities and differences related to learning dimensions, genres, and academic courses with regard to communication-dissemination competence?

Q3. Based on the cognitive and affective dimensions of learning, would it be possible to design a synthetic indicator that predicts learning outcomes performance? According to this indicator, how would the different degree courses involved be ranked?

## **2. Literature review**

There is no doubt about the relevance and potential of competence-based learning, and more especially of transversal skills such as IL. Within the IL framework, the importance of communicative competence is evident in the new globalized and digitalized world of Information ([ACRL Board, 2016](#); [Davis-Kahl, 2012](#); [Davis-Kahl & Hensley, 2013](#); [Garcia-Marco, 2017](#); [Gibson & Jacobson, 2014](#); [Mackey & Jacobson, 2011](#); [Ogburn, 2011, 2013](#); [Pinto, 2010](#)).

University students are becoming increasingly aware of the importance of communication-dissemination competence for both academic development and their future career within the overall framework of their learning. This is consistently confirmed by the few empirical studies conducted on the issue, since they all conclude that students consider this capability as being especially important (Bordonaro, 2008; Lopes & Pinto, 2016; M. Pinto et al., 2016; Maria Pinto, Garcia-Marco, Sales, & Cordon, 2010; Sales, 2008). A recent empirical study that addressed a range of university degree courses, however, showed there was an important need for students of all the courses to improve in this communication-dissemination competence (M. Pinto & Sales, 2015).

Innovative and collaborative technologies constantly challenge and push forward the traditional definitions of IL. “The emergence of social media and collaborative online communities requires a reframing of information literacy as a metaliteracy that supports multiple literacy types... Metaliteracy promotes critical thinking and collaboration in a digital age, providing a comprehensive framework to effectively participate in social media and online communities.” (Mackey & Jacobson, 2011: 62). As part of this metaliteracy reframing, competence in information communication and dissemination, that is, skill in producing and sharing information, are critical activities in the dynamic digital environment of contemporary teaching, learning, and scholarship. It should be remembered that IL is more significant now than in the past, and must be related to the literacy types addressed to ongoing technological shifts.

As Garcia-Marco (2017) puts forward, communicative competence can be integrated into IL programs chiefly from two perspectives. On the one hand, from the viewpoint of the knowledge creation and sharing cycle, communicative

competence plays an essential role in the final stage of any research project. This viewpoint is very important, but it is quite limited to scholarly, academic, and R&D settings. On the other hand, communication is a key phenomenon of human life. This perspective is more comprehensive and may offer very interesting developments, but it becomes somehow blurred from a disciplinary point of view. Indeed, due to its transdisciplinary nature, teaching communicative competence is frequently scattered across many different subjects and activities through syllabi and non-academic programs, and it is seldom treated in an integral manner. In particular, IL programs usually deal with issues concerning communicative competence that are closely related to Library and Information Science (LIS), e.g., the production, dissemination, and impact of academic documents and scientific publications.

Despite its complexity, communication-dissemination competence has always been present in IL programs ([M. Pinto, 2010](#); [Maria Pinto et al., 2010](#)). In an Internet-driven media convergence environment, IL requires a new paradigm, in tune with the metaliteracy view ([Garcia-Marco, 2017](#); [Jacobson & Mackey, 2013](#); [Mackey & Jacobson, 2011, 2014](#)).

At the same time, the evolution of the Internet towards social networking requires a new kind of trainees who are also proactive content creators, capable of publishing, sharing, and linking, instead of being mainly information users. This need is perceived at the highest levels of the IL paradigm. Recently, the ACRL proposed, among other aims, to specifically address students as content creators, acknowledging the essential changes in scholarly communication and data management that have occurred in recent years (ACRL, 2013).

All in all, communication-dissemination is an increasingly important field of action and practice when designing IL programs, due to its transversal relevance. It is also essential for any educational approach to be undertaken from a critical perspective, while at the same time accepting the disciplinary nature of learning and the specific underlying needs in each domain (Coonan, 2011; Middendorf & Pace, 2004).

In consonance with the universality of the IL phenomenon and its adaptation to the socio-technological progress made in recent years, ACRL's *Framework for Information Literacy for Higher Education* offers an expanded definition of IL that stresses aspects such as dynamism, flexibility, individual growth, and community learning: "Information literacy is the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning" ([ACRL Board, 2016: 3](#)).

If the communication-dissemination of information has historically been an essential component of IL, now it is far more so because of the renewal of postulates and the growing role of trainees: "students have a greater role and responsibility in creating new knowledge, in understanding the contours and the changing dynamics of the world of information, and in using information, data, and scholarship ethically. Teaching faculty have a greater responsibility in designing curricula and assignments that foster enhanced engagement with the core ideas about information and scholarship within their disciplines" ([ACRL Board, 2016: 2](#)). We should not forget that this Framework draws significantly upon the concept of metaliteracy, which, as we have previously put forward,

offers a renewed vision of IL as “an overarching set of abilities in which students are consumers and creators of information who can participate successfully in collaborative spaces. Metaliteracy, indeed, demands behavioral, affective, cognitive, and metacognitive engagement with the information ecosystem” (ACRL Board, 2016: 2). Metaliteracy expands the scope of traditional information skills (determine, access, locate, understand, produce, and use information) to include the collaborative production and sharing of information in participatory digital environments (collaborate, produce, and share). This approach requires an ongoing adaptation to emerging technologies and an understanding of the critical thinking and reflection required to engage in these spaces as producers, collaborators, and distributors.

Students now face expectations to perform more research, use more tools and technology, embed media in their work, create graphic material and documents in diverse formats, assemble attractive portfolios, and publish while still engaged in their studies. These expectations have given rise to a need for higher-order skills equal to the task of higher-level research and problem solving. Indeed: “Understanding the social world of academic communication, discourse, and publication practices goes hand-in-hand with students developing the skills to discover, evaluate, and use scholarly information in their academic research projects. Thus academic information literacy sits on the bedrock of scholarly communication—it is completely based on how scholars create, share, and vet new knowledge, as well as their specific rhetorical and citation traditions. It requires knowledge and skill in how to discover and access scholarly information using a variety of search tools, or how to successfully

engage with a library, itself a complex culture with its own internal norms and literacies” (Duckett & Warren, 2013: 31).

In any case, we must recognize the growing role of the activities related to the communication-dissemination of information: “awareness of, and engagement with, issues such as open access, public access, creator rights, and the economics of publishing should become part of our mission and vision of undergraduate education so students can become effective advocates for access to their own work, or for access to research that can aid them in becoming informed and critical researchers, consumers, and citizens” (Davis-Kahl, 2012: 212).

Competence in the communication-dissemination of information calls for a shift from the above-mentioned framework of metaliteracy to multiliteracies (B. Cope & Kalantzis, 2000; Bill Cope & Kalantzis, 2009, 2015; Kalantzis & Cope, 2016). Such multiliteracies, due to the intrinsic multimodality of communication, particularly in the context of today's new media, are constantly incorporating new formats, tools, and types of content that students have to deal with on a day-to-day basis. For teaching faculty, this implies the need to continually update their knowledge on topics such as ownership, authorship, and copyright, the structure and drafting of academic assignments and presentations, and informational ethics. Critical thinking (Albitz, 2007), ubiquitous learning (Bill Cope & Kalantzis, 2009), and collaborative learning (Wang, 2007), from the pedagogical context of socio-cultural learning, are also strategic aspects in this new changeable environment.

The growing interest in the measurement of learning outcomes is also evidenced in the literature. In this line, Cheetham & Chivers (2005) analyze

competence across several professions. The outcomes of this study show an interactive model of professional competence including knowledge, values, skills, self-confidence, and empathy.

Hardly any studies have been conducted on the use of a synthetic indicator. One of them worth highlighting is that of [Archibugi, Denni & Filippetti \(2009\)](#), which analyzes the technological capabilities of different nations by comparing the synthetic indicators considered to date for capturing the multidimensional nature of technological capabilities. [Scheerens, Luyten & Ravens \(2011\)](#) review the input/output/outcomes/context framework and define an exhaustive set of education indicators from TIMSS and PISA standards.

[Meschi & Scervini \(2014\)](#) measure educational inequality in forty-eight countries over the last century, proposing several synthetic indicators of educational level and dispersion. [Caspersen, Smeby & Olaf Aamodt \(2017:20\)](#) measure learning outcomes, producing a comprehensive synthesis of the relevant literature and arguing that “the assessment of what students learn and know may be used as an indicator of the quality of institutions and study programs”.

In another recent study, on environmental education, [Roczen, Kaiser, Bogne, et al. \(2014\)](#) consider behavior knowledge and attitudes using the SEM methodology to propose a competence model that has the potential to guide us in more evidence-based ways of promoting the overall ecological engagement of individuals.

### **3. Methodology**

The informational behavior of a significant number of future professionals in the field of the Social Sciences with regard to their competences in the communication-dissemination of information is addressed from both the affective (attitudes / motivations) and the cognitive (knowledge / skills) perspectives. On the affective side, attitudes and motivations refer to the levels of belief-in-importance (BI) and self-efficacy (SE) concerning these competences. The cognitive dimension deals with actual levels of declarative knowledge (KN) and procedural skills (SK) concerning the same capabilities.

#### *3.1. Tools*

The following instruments were used to gather data (available at <http://infocompetencias.org/evalci>): a) The IL-HUMASS questionnaire, for the affective dimensions (BI and SE), collects data on a series of twenty-six IL competences grouped into the categories of searching, evaluation, processing, and communication-dissemination of information; b) the EVALCI/KN questionnaire, for the assessment of the actual levels of knowledge about IL, is an objective test to measure the real knowledge (KN) about IL competences, also composed of twenty-six items, with four response options for each of them; and c) EVALCI/SK, for the assessment of the actual level of IL skills, is used to analyze the procedural component of knowledge about IL, through tasks that the student has to solve by testing his/her knowledge.

In these three cases, for the purposes of this research, tests were restricted to the communication-dissemination competences. The implementation of these instruments makes it possible to obtain affective

(attitudes and motivations) and effective information (knowledge and skills) about students' levels of competence (M. Pinto & Fernandez-Pascual, 2017).

The competences evaluated from the BI, SE, and KN dimensions are: communicating in public (c20), communicating in other languages (c21), writing a document—report, academic assignment, etc. (c22), knowing the code of ethics in your academic—professional field (c23), knowing the laws on the use of information and intellectual property (c24), creating academic presentations—PowerPoint, etc. (c25), and disseminating information on the Internet—webs, blogs, etc. (c26). In the dimension of communication—dissemination abilities (SK) only three competences (c21, c24, and c25) were explored.

### *3.2. Study universe*

The study universe was made up of the groups of students enrolled in the 2013-2014 academic year in five Spanish public universities (Granada, Murcia, Jaime I of Castellón, Málaga, and Complutense of Madrid), in eight degree courses: Information Science, Audiovisual Communication, Journalism, Psychology, Education, Pedagogy, Social Work, and Tourism.

Data collection was carried out through a stratified sampling process with proportional allocation, which guarantees the representativeness of the information obtained and allows for inferences with sufficient consistency. After completing the fieldwork, involving the gathering of online questionnaires, the data processing and analysis were performed using the programs SPSS, Lisrel, and Visually.

### 3.3. *Methods*

Various types of descriptive procedures related to the students and disciplines involved were initially developed and displayed, in some cases using the corresponding infographics, as image-based data visualization is often more effective than text. According to [Veszelszki \(2014: 100\)](#), “the aim of visualizing information is to make certain information accessible for those who are interested in them but are not specializing in data analysis”.

Since the instruments used are mostly applied to ordinal variables and normality is not fulfilled, non-parametric interpretation methods are used: while the Mann-Whitney U test allows some comparison of distributions among groups of students with regard to gender and academic course, the Kruskal-Wallis test makes it possible to determine whether there are any statistically significant differences among academic degrees.

But the main goal of this research is to find a synthetic indicator allowing a holistic perception of learning on the basis of a series of IL competences in the communication-dissemination of information. This indicator, which includes affective (BI and SE) and effective dimensions (KN and SK), is based on multilevel Structural Equation Modeling (SEM) ([Luque-Martinez & Barrio-Garcia, 2016](#)). This technique considers both factor analysis and linear regression models in order to carry out empirical adjustments to the relationships among the variables based on the correlations or the covariances. The SEM methodology may provide a type of synthetic indicator from a formative perspective ([Coltman, Devinney, Midgley, & Venaik, 2008](#)). All four dimensions are assumed to have an impact on the levels of mastery in communication-dissemination of information competence. As a result one can

get a better understanding of how dimensions contribute to the indicator (Luque-Martinez & Barrio-Garcia, 2016; Sun & Liu, 2013). More in-depth knowledge of this technique may be found in the specific literature (Jöreskog, 1973; Jöreskog & Sörbom, 2005; Kline, 2015).

Any SEM model has the facets of measurement and structure. The *measurement* side (first-order model) measures the contribution of competences to the constructs, assuming that these latent constructs depend on the observed competences. The *structural* side (second-order model), on the other hand, allows the contribution of the constructs to the synthetic indicator to be revealed, assuming that variations in the latent constructs cause some variation in the indicator. We assume that a positive perception of the informational competences and high levels in actual knowledge have a positive impact on the levels of mastery in communication-dissemination competence.

#### **4. Results and Discussion**

As a consequence of the various types of analysis applied to the data, the following results stand out: consistency of scales and characteristics of the sample; overall average results for each of the four dimensions; a comparison of the disciplinary profiles concerning academic degree and competence; and, finally, a proposal for a formative indicator, synthesizing the affective and cognitive dimensions involved in communication-dissemination competences.

##### *4.1. Consistency of the tools*

The scales have been widely validated in previous studies (M. Pinto, 2010, 2011; M. Pinto et al., 2016; M. Pinto & Fernandez-Pascual, 2017). Results reflect the reliability and consistency of the instruments with regard to

the category of communication-dissemination of information (Table 1). Specifically, the levels of internal consistency needed to guarantee the sampling adequacy of the data collected for SEM analysis were obtained.

Table 1: Cronbach's alpha values for the instrument and communication category

#### *4.2. Sample features*

The sample consisted of 1575 respondents, distributed amongst the third (1101) and fourth (474) years of the degree courses. The gender parity index (UNESCO, 2009) was 2.15, indicating a disparity in favor of women. The average age was 22.23 years, with a range between 19 and 59 years. Distribution by academic degree is shown in Table 2.

Table 2: Sample distribution by academic degree

#### *4.3. Global mean levels in communication-dissemination*

Respondents were aware of the importance of communication-dissemination competences, in line with their high levels of actual knowledge. BI and KN scores were the highest. In contrast, levels of motivation (SE) were lower, far more so in the case of the verified abilities (SK) (Figure 1).

Figure 1: Global mean results from the four dimensions: belief in importance (BI), self-efficacy (SE), knowledge (KN), and skills (SK)

Sample data visualization is displayed in Figure 2. The perception of future SS professionals on the importance of communication-dissemination competence is largely located between 7 and 9 points, with little dispersion. Self-efficacy is situated below 7 points, there is greater dispersion, and we can see several individuals whose stated BI is below 5 points. Effective knowledge

in this competence yields some very satisfactory results, as a great deal of stability is found in the band of scores centered around 8 points, and few isolated anomalous scores can be seen. With regard to the communicative skills evidenced by future graduates, there is a wide dispersion of scores.

Figure 2: Sample data visualization regarding the four dimensions: belief in importance (BI), self-efficacy (SE), knowledge (KN), and skills (SK)

#### *4.4. Disciplinary profiles by dimensions, gender, and academic course*

The relative positions of the degree courses are collected according to their levels in the affective (BI, SE) and cognitive (KN, SK) dimensions (Figure 3).

Figure 3: Communication-dissemination behavior of SS students by dimension and degree course

The dimensions of the affective scale (BI and SE) offer similar levels in almost all the academic degrees, with higher scores in BI. Students of Journalism reach the highest score in both cases (BI and SE).

Higher scores on respondents' actual knowledge (KN) affect all the degree courses. Results are rather homogeneous. A somewhat surprising finding is the low score obtained for the mastery of informational skills (SK) across all the academic degrees.

As for the influence of gender in each of the dimensions and academic degrees considered, statistically significant differences between men and

women were found in all the degree courses with regard to the average levels of importance (BI) granted to the competences of communication-dissemination of information (Mann–Whitney U,  $p < 0.05$ ). As for motivation (SE), statistically significant differences between genders were found only in competences c24 (knowing the laws on the use of information and intellectual property) and c25 (creating academic presentations—PowerPoint, etc.). Concerning mean levels of actual knowledge (KN), statistically significant differences were found between genders in all the degree courses and competences, except in c21—communicating in other languages. In any case, the average levels reached by the group of female students were higher than those reached by their male counterparts. As for the skills dimension (SK), there were no significant differences between genders in the different degree courses. Levels of skills were somewhat higher in the male group, in the three competences analyzed from this perspective (c21, c24, and c25).

With regard to academic course, no significant differences were found in any competence or dimension (Mann-Whitney U,  $p > 0.05$ ).

#### *4.5. Disciplinary profiles by competences*

A comparison among average levels of belief-in-importance (BI), self-efficacy (SE), actual knowledge (KN), and verified skills (SK) of future professionals in SS with regard to the issue of IL competences in communication-dissemination yielded significant differences between the different academic degrees (Kruskal-Wallis,  $p < 0.05$ ). Cells marked in gray indicate competences and dimensions in which statistically significant differences have been found (Figure 4).

Figure 4: Significant differences among academic degrees (Kruskal-Wallis,  $p < 0.05$ ), highlighted in gray

#### *4.6. A formative synthetic performance indicator for communication-dissemination of information (ILCom)*

With the aim of measuring the levels of mastery of IL communication-dissemination competence from a multivariate perspective, the ILCom (Information Literacy Communication) formative synthetic indicator is proposed. It has been assumed that the effective knowledge of some competence is the result of the combination of the affective (BI-SE) and actual (KN-SK) dimensions. The derived model is representative of the components of the learning of communication-dissemination competences on the part of future SS professionals. This indicator allows overall comparisons to be performed of the future professionals' levels of literacy in the communication-dissemination of information. It can therefore underpin the design of specific teaching-learning processes and programs ([Roczen et al., 2014](#)).

From a theoretical perspective, this methodological approach provides a synthetic indicator without the need to resort to the subjective weighting of the composite indicators. The proposed approach focuses on a broad concept of the communication-dissemination competence that comprises several dimensions: BI, SE, KN and SK.

Firstly, the results concerning the measurement side of the ILCom model are provided: standardized coefficients, t-values,  $R^2$ , and goodness of fit statistics (the evaluation of fit between model expectations and relations observed in the data), with regard to the four dimensions and seven

competences of the present research (Table 3). Results show an acceptable fit, given that both the Goodness of Fit (GFI) and the Normed Fit Index (NFI) exceed 0.90 (Byrne, 1994; Schumacker & Lomax, 2004) and the root-mean-square error of approximation (RMSEA) is less than 0.08 (Browne & Cudeck, 1993). As the indicators are Likert-scale items, the polychoric correlation matrix, the asymptotic covariance matrix, and robust weighted least squares (WLS) were considered. The model was derived using the LISREL software application (Jöreskog & Sörbom, 2005). The size of the standardized estimates (loadings) provides an indication of convergent validity (this value should be at least >0.50 and ideally >0.70). The t-values are much higher than the critical values of  $t=1.96$  with  $p<0.05$ ,  $t=2.58$  with  $p<0.01$ , or  $t=3.29$  with  $p<0.001$ . The reliability of the indicators,  $R^2$ , is equivalent to the square of the correlation between the indicator and the latent variable, and shows the amount of variance of the latent variable that is explained by the observed variable in each equation.

Table 3: Statistical details regarding the measurement side of the ILCom model  
(coefficients and Goodness of Fit)

Secondly, the results involved in the structural side of the model are considered: internal consistency values, with composite reliability (CR) and average variance extracted (AVE) showing values above the recommended limits (0.7 and 0.5 respectively) (Hair, Black, Babin, & Anderson, 2010) (Table 4).

Table 4: Statistical details regarding the structural side of the model: measures of reliability, composite reliabilities (CR), and average variance extracted (AVE) of the latent indicators

As expected in formative constructs, low correlation among indicators is found (Coltman et al., 2008; Franke, Preacher, & Rigdon, 2005) (Table 5).

Table 5: Correlation matrix of independent latent variables

The figure below shows a 4x4 matrix of the scatter plots of all the pairs of independent latent variables under study (absolute levels in Latent-BI, Latent-SE, Latent-KN, and Latent-SK) for a random 10% of the sample. As can be seen, there is no strong correlation among the latent scores (Figure 5). If we analyze the distribution of the data from each of the four latent dimensions, grouped by pairs around the affective and cognitive circumstances of the respondents, different behaviors and low correlations are observed. As for the affective dimension, while attitudes (Latent-BI) are concentrated in the upper part of the diagram, motivations (Latent-SE) are scattered around lower scores. Lower correlation appears in the arena of the latent cognitive dimension, since values of knowledge (Latent-KN) on the part of the respondents is concentrated in the upper zone and their skills (Latent-SK) display more dispersion in significantly lower positions.

Figure 5: Scatter plots among latent variables for a random 10% of the sample

Finally, the SEM model showing the relationships of underlying variables within the ILCom indicator is provided (Figure 6). Using conventional LISREL notation, rectangles represent items observed, while ovals symbolize latent categories. Boxes show the relative loadings of communication-dissemination competences (standard errors in parentheses). Direct arrows indicate causal relationships. Main standardized results are displayed. Strong relationships were found between the first-order dimensions (Latent-BI, Latent-SE, Latent-

KN) and the ILCOM construct, while Latent-SK is the latent dimension with the lowest loading in the model. These loadings are significant ( $p < 0.05$ ).

Figure 6: ILCOM model for communication-dissemination

#### *4.7. Evaluation and implications of the model*

These findings warrant closer examination. On analyzing the relevance of each competence in the model, we find, for example, that when we measure effective knowledge, the most salient predictors are c20 (communicating in public), c21 (communicating in other languages), and c24 (knowing the laws on the use of information and intellectual property). When it comes to evaluating importance and self-efficacy, however, the competences with the highest loadings are c21 and c24. The relative importance of each competence regarding each dimension in the ILCOM measurement model is displayed in Figure 7. As can be observed, competence c20 (communicating in public) becomes more important when evaluating latent knowledge. Competences c21 (communicating in other languages) and c24 (knowing the laws on the use of information and intellectual property) contribute in a similar way to the four latent dimensions. Competences c22 (writing a document) and c26 (disseminating information on the Internet) stand out in latent self-efficacy. c23 (knowing the code of ethics in your academic/professional field) is more salient in the dimension Latent-BI. In contrast, c25 is a better predictor in Latent-KN and Latent-SK.

The implications of these results in the complex process of evaluating competences must be taken into account when designing possible educational

interventions to improve overall competence within the area of communication-dissemination, since the global training estimated by the empirical ILCom indicator considers the loading of each competence in the set individually (Figure 7).

Figure 7: Comparison of the relative weight of the latent variables Latent-BI, Latent-SE, Latent-KN, and Latent-SK of the competences studied

Greater efforts will therefore have to be made to implement a strategic intervention of educational improvement so that, given the known effects of each dimension and competence on the overall levels of communication-dissemination competence, teachers and students alike can be made aware of the importance of the communication-dissemination of information in the academic world and in the future professional setting of each SS degree course.

The interrelations among the variables of interest and their contribution to the multilevel indicator proposed in this work provide a number of clues with respect to the strengths and weaknesses that appear during the process of acquiring IL competences. In particular, as can be observed in Figure 8, in order to improve the overall score (ILCom indicator) of communication-dissemination competence, efforts would have to be focused on ensuring that future SS professionals acquire a greater awareness of the importance of competences c21 (communicating in other languages), c23 (knowing the code of ethics in your academic/professional field), and c24 (knowing the laws on the use of information and intellectual property). Likewise, it would be necessary to increase the levels of self-efficacy in c21, c22 (writing a document [report,

academic assignment, etc.]), and c24, and to investigate how to improve knowledge in competences c20 (communicating in public), c21, and c24.

As a strategic intervention to improve the levels in these competences, it could be productive to offer a subject (optional, extracurricular or in whatever way each university deemed best) that is common to all social science degree courses, structured in two parts. One would be transversal, in which the relevance of communication-dissemination competence is evidenced in a manner that is specific and common to the field of social sciences. The second would be a specialized part that has a different profile for each degree course, taking into account the needs for improvement detected in each case and contextualizing the examples and tasks in accordance with the reality and demands of the professional profile of each field.

Figure 8: Contribution of each competence to the latent variables Latent-BI, Latent-SE, Latent-KN, and Latent-SK

#### *4.8. Evaluation of academic degrees according to the ILCOM indicator*

If we consider that knowledge can be defined as a cluster of personal perceptions, interrelated skills, and effective knowledge, then effectiveness in communication-dissemination competences can be evaluated using the ILCOM communication-dissemination model and its corresponding indicator. The evaluation of future SS professionals will take into account not only the values of the six communication competences from the four dimensions considered (measurement model) but also the weight of each of the four latent indicators (structural model). After the implementation of the ILCOM model, scores on the communication-dissemination competence of future professionals by degrees

are obtained. To facilitate comparisons, ILCCom values are centered within each latent dimension. Scores below and above “zero” for the various academic degrees are then provided (Table 6).

Table 6: Contribution to the ILCCom indicator of each latent variable within each discipline

With regard to communication-dissemination competences, students from Journalism, Psychology, and Pedagogy display the highest latent *belief-in-importance* (Latent-BI) of these capabilities, while Information Science students are in the opposite situation. Journalism and Audiovisual Communication students show the highest levels of latent *self-efficacy* (Latent-SE), whereas Social Work students display the lowest. Information Science and Audiovisual Communication students' scores on latent *actual knowledge* (Latent-KN) are at the top, while Tourism students' scores are at the bottom. Finally, Psychology and Audiovisual Communication students display the highest results in latent *procedural skills* (Latent-SK), while Information Science students display the lowest. The relative location of these scores by academic degree is given in Figure 9.

Figure 9: Comparative location of the centered latent scores by discipline

Finally, the average value of the ILCCom indicator from the set of disciplines under study provides a ranking of the academic degrees (Figure 10).

Figure 10: Values of the ILCCom indicator on communication-dissemination for the various disciplines

To sum up, the ILCOM indicator on communication-dissemination of information is composed of a blending of latent attitudes, motivation, actual knowledge, and demonstrated skills by future SS professionals, which synthesize their level of mastery on the use of the competences related to the communication-dissemination of information. This model provides a guide to the evaluation of IL competencies, as we have identified the contribution (weight) of each dimension (Latent-BI, Latent-SE, Latent-KN, and Latent-SK) in the ILCOM indicator ([Roczen et al., 2014](#)).

The academic degrees of Journalism, Audiovisual Communication, and Information Science, due to their specific disciplinary profile, display the highest positions in the ranking of the ILCOM indicators of the various disciplines. It should be noted that, at least for the universities involved, these three disciplines offer specialized instruction on IL and information management within their programs, including competence in information communication-dissemination.

As for the Psychology, Education, Pedagogy, Tourism, and Social Work degree courses, the below-average results reveal the need to incorporate programs of instruction on IL, specifically in the category of communication-dissemination of information. Communicative competence is essential for professionals in these SS disciplines, but curricula and programs do not consider this circumstance, as this research has proven.

## **5. Conclusions and implications**

Based on the average levels of SS students' competences from the affective (BI-SE) and cognitive (KN-SK) perspectives, results show the existence of significant differences between the participating academic degrees, as far as the category of communication-dissemination of information is concerned. These differences are reflected in the overall ILCOM synthetic indicator for each degree.

These findings can increase the levels of awareness of stakeholders on the need to offer instruction on communication-dissemination competence as a key to enhancing future professional capabilities. The combination of findings can be essential when designing new kinds of instruction for the various academic degrees involved. These might include elements such as sessions on awareness and motivation (affective side of the competences), as well as formative and instructive courses (cognitive side of the competences), with regard to communication-dissemination of information, bearing in mind the specific instruction needs required by each area.

This is a pioneering quantitative study in the joint research on subjective (BI-SE) and objective (KN-SK) IL dimensions among future SS professionals in relation to the communication-dissemination of information. The use of multidimensional analysis techniques has revealed the similarities and differences among the academic degrees involved. The implementation of SEM provides the ILCOM synthetic indicator of the mastery of the communication-dissemination of information, which allows the impact of the four dimensions involved to be quantified ([Drisko, 2015](#)).

Furthermore, the methodology used here can be applied in a similar way to derive synthetic competence indicators with regard to the other three dimensions of the questionnaires (searching for, evaluating, and processing information). It could also be expanded to scientific and academic environments (Cheetham & Chivers, 2005). This would allow a better understanding of what academic degrees and competences are most in need of pedagogic support in the different scientific and academic fields, and to draw up proposals to improve the future professionals' instruction. Researchers are encouraged to uncover the underlying characteristics of other possible relationships, as with the ILCom indicator proposed here.

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