

Instrumentos para medir la habilidad de comunicación: una revisión sistemática

Instruments to Measure Communication Skill: A Systematic Review

Instrumentos para medir habilidades de comunicação: uma revisão sistemática

Francisco León Pérez

Universidad Autónoma de Querétaro, México

fleon29@alumnos.uaq.mx

<https://orcid.org/0000-0002-6701-391X>

Alexandro Escudero Nahón

Universidad Autónoma de Querétaro, México

alexandro.escudero@uaq.mx

<http://orcid.org/0000-0001-8245-0838>

María del Carmen Bas Cerdá

Universitat de València, España

maria.c.bas@uv.es

<https://orcid.org/0000-0002-1221-0641>

Resumen

Existe un amplio consenso respecto al hecho de que hay una brecha entre las habilidades propias del siglo XXI que el mercado laboral demanda a los nuevos profesionales y las habilidades que estos adquieren en el ámbito de la educación superior. Diversos estudios demuestran que la habilidad de comunicación es de las más demandas por los empleadores, a la vez que una de las más precarias entre los recién egresados.

El objetivo del presente trabajo fue establecer el estado actual de la investigación respecto a instrumentos de medición de la habilidad de comunicación en estudiantes de educación superior. Se realizó una revisión sistemática de la literatura especializada en instrumentos para medir la habilidad de comunicación en estudiantes con base en el método Prisma. Fueron revisados textos publicados desde 2014 a la fecha en las bases de datos Scopus y Web of Science.

Se hizo énfasis en el análisis del riesgo de sesgo, realizado con la herramienta de la colaboración Cochrane. Así, se obtuvieron 243 artículos y se analizó el texto completo de aquellos que cumplieron los primeros criterios de selección, a saber, 130 artículos, de los cuales se eligieron 12 por cumplir con todos los criterios establecidos. A partir de ello, se obtuvo, entre otros, datos de población y muestra, número de ítems, proceso de validez y riesgo de sesgo.

Un hallazgo relevante es que en el área médica se han diseñado más instrumentos para medir la habilidad de comunicación, además, se basan en dimensiones comunes y cuentan con procesos de validez de contenido bien descritos; sin embargo, la validez de constructo se realizó con más detalle en un instrumento del área de ingeniería. Otro hallazgo importante es que parece que el éxito del proceso comunicativo depende, en gran medida, de la preparación del mismo por parte de los participantes. La combinación de las dimensiones del área médica y los procesos de validez de constructo de otras áreas podría generar instrumentos más precisos para medir tanto las habilidades de comunicación como las habilidades digitales de comunicación, hoy en día necesarias en una economía del conocimiento.

Palabras clave: comunicación, instrumento, medición, método Prisma, revisión sistemática.

Abstract

There is a broad consensus regarding the fact that there is a gap between the skills of the 21st century that the labor market demands from new professionals and the skills they acquire in the field of higher education. Several studies conclude that communication skill is one of the most demanded by employers as well as one of the most precarious among recent graduates.

The aim of the present work was to establish the current state of research regarding the measurement of communication skills in higher level students. A systematic review of the literature specialized in instruments to measure communication skill in students based on the PRISMA method was conducted. Texts published from 2014 to date were reviewed in Scopus and Web of Science databases. Emphasis was placed on the analysis of the risk of bias, made with the Cochrane collaboration tool. Thus, 243 articles were obtained and the text-full of 130 that met the first selection criteria was analyzed, of which twelve were selected by satisfying all established criteria, obtaining, among others, population and sample data, number of items, validity process and risk of bias.

A relevant finding is that, in the medical area, more instruments have been designed to measure communication skill. In addition, these instruments are based on common dimensions and have well-described content validity processes, however, the construct validity was carried out in more detail in an instrument of the engineering area. Another important finding is that, likely, the success of the communication process depends, mainly, on its preparation by the participants. The combination of dimensions of the medical area and the construct validity processes of other areas could generate more precise instruments to measure both communication skills and digital communication skills, nowadays necessary in a knowledge economy.

Keywords: communication, instrument, measurement, PRISMA method, systematic review.

Resumo

Existe um amplo consenso em relação ao fato de que existe uma lacuna entre as habilidades do século XXI que o mercado de trabalho exige de novos profissionais e as habilidades que adquirem no campo do ensino superior. Vários estudos mostram que as habilidades de comunicação estão entre as mais exigidas pelos empregadores, bem como uma das mais precárias entre os recém-formados.

O objetivo do presente trabalho foi estabelecer o estado atual da pesquisa sobre instrumentos de mensuração da capacidade de comunicação em estudantes do ensino superior. Uma revisão sistemática da literatura especializada em instrumentos para medir as habilidades de comunicação em estudantes foi realizada com base no método Prism. Textos publicados de 2014 até hoje foram revisados nas bases de dados Scopus e Web of Science. A ênfase foi colocada na análise do risco de viés, feito com a ferramenta de colaboração Cochrane. Assim, foram obtidos 243 artigos e analisado o texto completo daqueles que atenderam ao primeiro critério de seleção, ou seja, 130 artigos, dos quais 12 foram escolhidos por atenderem a todos os critérios estabelecidos. A partir disso, obtivemos, entre outros, dados populacionais e amostrais, número de itens, processo de validade e risco de viés.

Um achado relevante é que na área médica mais instrumentos foram projetados para medir a capacidade de comunicação, além disso, eles são baseados em dimensões comuns e têm processos de validade de conteúdo bem descritos; entretanto, a validade de construto foi realizada com mais detalhes em um instrumento da área de engenharia. Outra constatação importante é que

parece que o sucesso do processo comunicativo depende, em grande parte, da preparação dos mesmos pelos participantes. A combinação das dimensões da área médica e os processos de validade de construto de outras áreas poderiam gerar instrumentos mais precisos para medir tanto as habilidades de comunicação quanto as habilidades de comunicação digital, hoje necessárias em uma economia do conhecimento.

Palavras-chave: comunicação, instrumento, medida, método Prism, revisão sistemática.

Fecha Recepción: Julio 2018

Fecha Aceptación: Enero 2019

Introduction

21st century skills and digital skills of the 21st century

At present, the skills that the labor sector requires from workers are different from those required in previous decades. The responsibility of identifying them adequately and promoting their development can be assumed by the educational institutions during the training process of the students. However, there is a gap between what educational institutions promote and what the productive sector needs (Cisco-Intel-Microsoft, 2011). Therefore, "it is necessary to address the disconnection between the skills that are forged in school, and those that are demanded in the labor market" (Ramos and Yermo, 2015, p.1). This is accentuated in developing countries, as there is "evidence from international measurements suggesting that some developing countries and economies in transition are lagging far behind developed nations in providing their population with the necessary skills in the knowledge economy." (Alfaki, 2016, p.601). The skills mentioned above are known as 21st century skills. And the Organization for Economic Cooperation and Development (OECD) defines them as "those skills and competences that young people must have to be effective workers and citizens in the knowledge society of the 21st century" (Ananiadou and Claro, 2009, p. 8).

There are several conceptual approaches that define the 21st century skill set, such as Wegerif and Mansour (2010), Fullan and Langworthy (2013), Anderson (2010), and the World Economic Forum (Ballr et al. , 2016), that of the International Development Research Center (International Development Research Center & Foundation for Higher Education and Development, 2016) and that of Cisco, Intel and Microsoft (Cisco-Intel-Microsoft, 2011). All of them define between 6

and 10 skills, and those that are recognized in common are the following: communication, critical thinking, creativity, collaboration, problem solving and technological skills.

Recently, coupled with what has been reported, a new concept has emerged called 21st century digital skills, which are defined as those needed to participate in the knowledge-based workforce and to put employees in charge of their own learning. . The essence is what employees can do with knowledge to support 21st century skills and make the most of information and communication technologies (ICT) (Van Laar, Van Deursen, Van Dijk and De Haan, 2017). For this definition, the authors added the meaning of the digital term to the concept of 21st century skills, taking into account the concepts of digital competence, digital literacy, digital skills and electronic skills. In this way, they present the concept of 21st century digital skills as a novel possibility for research.

Importance of communication skills and digital communication skills

The communication skill has received great attention during the last decade and is considered an important skill in the 21st century (Siddiq, 2016). Communicative competence is a function of the ability to adapt to different social constraints (Duran, 2009), so it is important for proper development in current professional practice, as well as the importance of communication in the conduct of Global business, good communication skills are a prerequisite for successful leadership (Itani and Srour, 2016). However, recent studies converge in indicating that graduates still lack it (Amani, 2017, Bodnar and Clark, 2017, Jung, Lee, Kang, and Kim, 2017, Seth and Carryon, 2017). In higher education, current students are digital natives who have more facility to adapt to digital environments, but "you have to work with them the basic processes of information management and the development of communication skills" (Gutiérrez-Portlán, Román- García, and Sánchez-Vera, 2018, p.92).

In today's education, where face-to-face attendance is not a requirement thanks to virtual learning environments, this type of skills is essential to achieve the objectives set. As digital skills, communication skills are defined as "the skills to use ICT to transmit information to others, ensuring that the meaning is expressed effectively" (Van Laar et al., 2017, page 18). However, despite there being general research on digital skills and competences, there is no such

thing as the ability to communicate as a 21st century digital skill. Knowing how communication skills are measured can support the generation of tools to measure digital communication skills.

The question on which the development of this work revolves is the following: What is the current state of research regarding instruments for measuring communication skills in higher education students? With the development of a systematic review is expected to respond to it, by describing in the results the instruments that meet specific criteria and present the dimensions that have been considered in them. Care has been taken to follow a solid methodology that provides reliability to the results, which emphasizes the analysis of the risk of bias, both in the reviewed works and in the systematic review itself.

Method

The systematic review was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Prism) method (Moher, Liberati, Tetzlaff, Altman and The Prisma Group, 2010), which is an approach that presents a checklist of 27 elements for conducting systematic reviews and meta-analysis, as well as a flowchart through which the procedure to be followed in the selection of reviewed papers is summarized. It should be noted that not all the elements of the checklist applied to this work, since some only correspond to the meta-analysis. From now on, the headings of this document correspond to Prisma's checklist (including those of the results, conclusions and discussion sections).

Eligibility criteria

The eligibility criteria provide operational and conceptual definitions of the types of studies that are eligible to be included in the systematic review. As a first criterion, studies finalized and published in important databases between 2014 and 2018 were considered. The second criterion was to contemplate studies that would consider upper level students and written in English or Spanish. The third criterion was to consider studies in which the communication ability was exclusively measured, and in which a new instrument was generated, not that an existing one was used. General criteria were also defined based on the Populations, Interventions, Comparisons, Outcomes, Study Design (Picos) framework, which establishes that populations, interventions, comparisons, results (or outcomes) and study designs that are considered must be

considered. of research interest (Centro Cochrane Iberoamericano, 2012, p.105, Moher et al., 2010, p.339). The characteristics that studies should meet to be eligible, according to Picos, are the following:

- Populations. Eligible studies should consider measuring the communication of higher education students.
- Interventions. The instruments that used questionnaires, surveys or checklists as intervention means were considered eligible.
- Comparisons. The comparisons between the studies will be carried out through their validity processes, when considering measurement instruments as study units. Therefore, such processes must be clearly described.
- Results. The nature of the review requires that the results presented in the works include statistics consistent with the objective of the investigation. Trust in them depends, to a certain degree, on the size of the sample considered. To obtain reliable statistics, an acceptable sample size is required. Therefore, eligible studies must present statistical results with significant samples or justified minor samples.
- Design. The diversity of research designs makes research rich in terms of results and contribution to knowledge. Therefore, the only criterion of eligibility regarding the design of the study is that they present a structured design, although it is essential that they explain the process of content and construct validity.

Information sources

The sources of information were the databases included in the scientific information services ISI Web of Science and in the Scopus database. Searches were conducted from February to May 2018. The last search was on May 28, 2018.

Search

The concepts that were sought in the articles were: 1) instrument, 2) measurement and 3) communication ability. The first concept was represented by the terms instrument in English and instrument (in Spanish). The second concept with the terms measure and measurement in English and measure and measurement in Spanish. The third with the terms communication skill in

English and communication skills in Spanish. The "*" wildcard was used to consider the plural, which avoided extending and making the search statement more complex.

The terms included in each search concept were linked with the OR logical operator. The three indicated concepts should be present in the studies, so all were joined by the AND logical operator. Finally, the search items in English and Spanish were joined by the OR logical operator to include the studies in one or another language. Thus, the search sentence was the following:

("communication skill" AND (measurement* OR measure*) AND instrument*) OR ("habilidad de comunicación" OR "habilidades de comunicación") AND (medida OR medir) AND instrumento*)*

Selection of studies

The process of selecting studies was carried out considering the following two aspects:

1. Evaluation of eligibility criteria. Review compliance with the eligibility criteria. Initially, by reading the summary, and, later, by reading the entire article.
2. Evaluation of the role of the measurement instrument. Select the studies that generate a new measurement instrument. If an article uses an already created instrument, look in the references to the article where its creation is described, and, if it is found, then submit that article referenced to this selection process.

Risk of bias in individual studies

To determine the risk of bias in individual studies, the risk of bias was evaluated at the level of results, which consists in analyzing in each selected study the processes carried out to give validity and confidence to the results obtained. According to Prism, "an outcome-level assessment involves evaluating the reliability and validity of the data for each important outcome by determining the methods used to assess them in each individual study" (Moher et al., 2010, p.337).

Risk of bias through studies

We assessed the risk of publication bias, the risk of selection bias and the risk of selective reporting bias to determine the risk of bias through the studies.

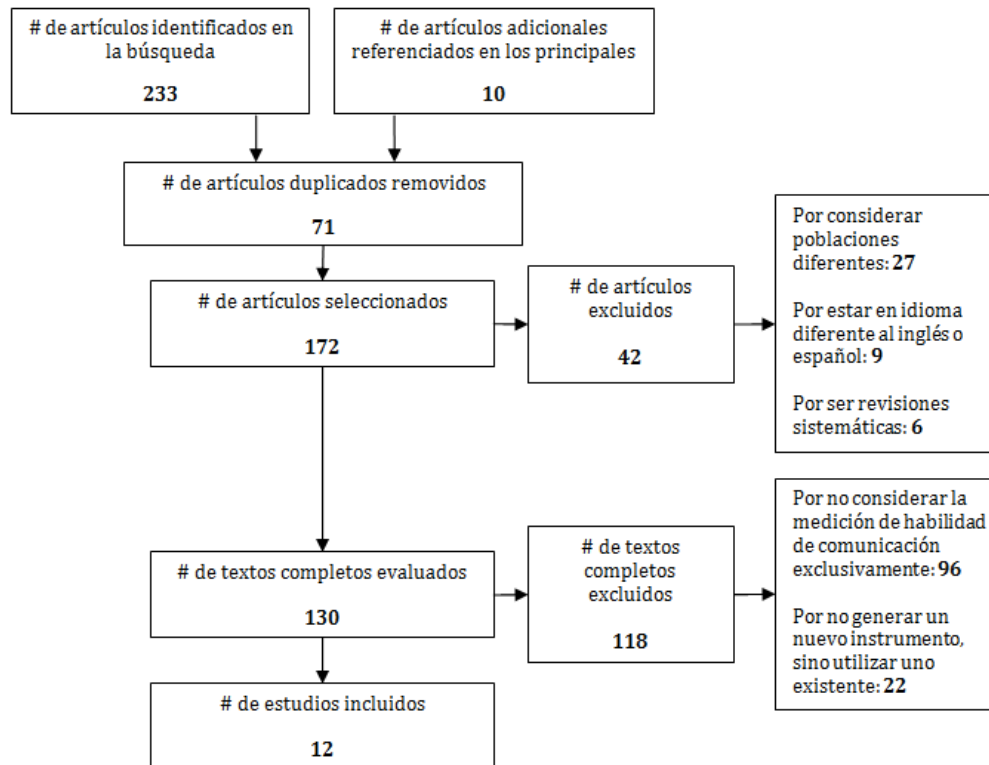
The risk of publication bias consists of the possibility of omitting studies that could be paid to the present work due to the selection criteria established with respect to the eligible publications. The risks of selective selection and selection bias were assessed for each study that met all the eligibility criteria. The selection bias consists of the error that occurs when choosing the sample for the study, and the risk of selective notification bias occurs when the results of the studies could present only convenient results to the study, leaving out others that should also be included. . These last two risks of bias were evaluated according to the tool presented for this purpose in the Cochrane Collaboration (Centro Cochrane Iberoamericano, 2012), which consists of the evaluation of certain domains in which biases can be found.

Results

Selection of studies

Searches on the platforms yielded a total of 233 articles. In addition, 10 articles were added describing the construction of instruments that were referenced in some of the previous ones, for which a total of 243 articles were reached. The selection process was carried out as shown in the flow chart of Figure 1, as requested by the Prism method.

Figura 1. Proceso de selección de artículos, según el diagrama de flujo de Prisma



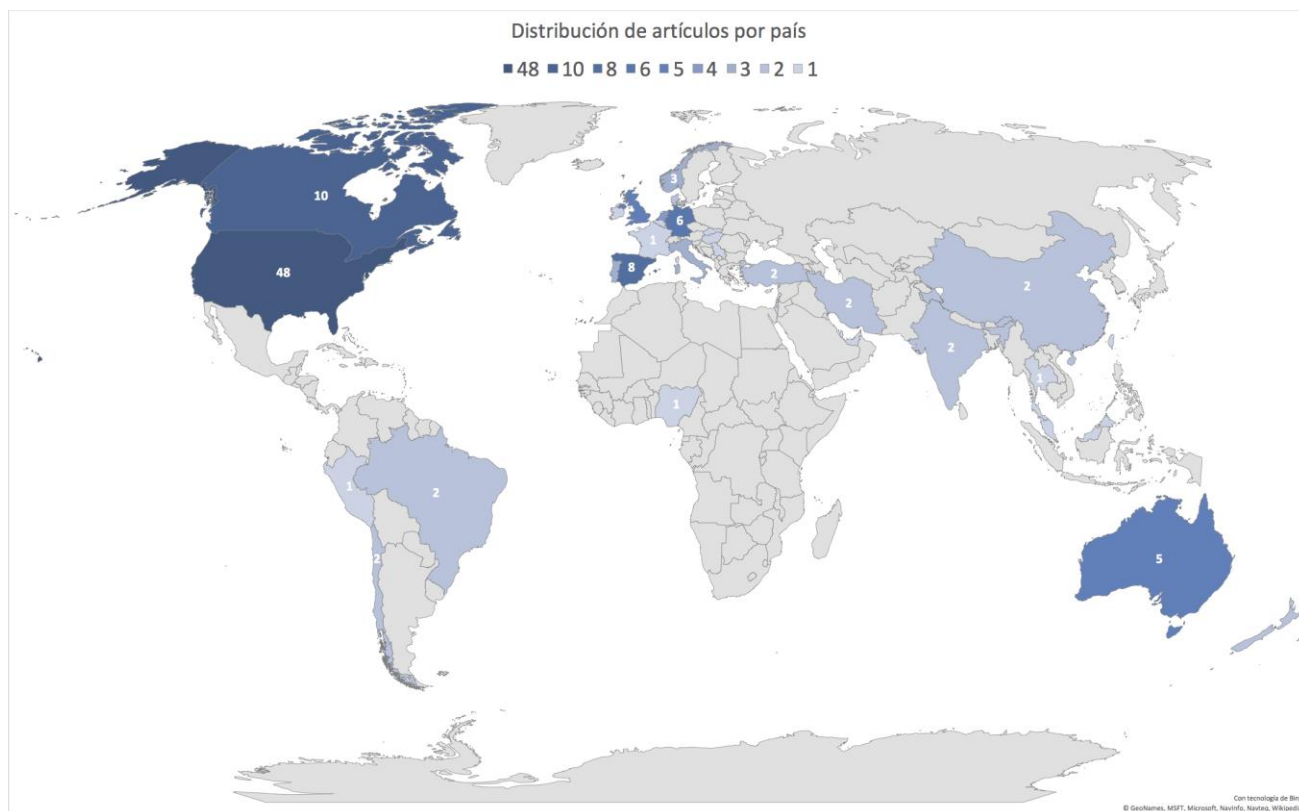
Fuente: Elaboración propia

Characteristics of the studies

Of the 130 studies whose full text was analyzed, 127 were published as research articles in indexed journals and 3 as conferences of congresses (two from the Institute of Electrical and Electronics Engineers [IEEE] and one from the American Institute of Physics [AIP]).

The majority were performed in the United States (48); and Canada was the second country with the most articles (10). Figure 2 presents graphically the distribution of articles worldwide.

Figura 2. Distribución de artículos por país

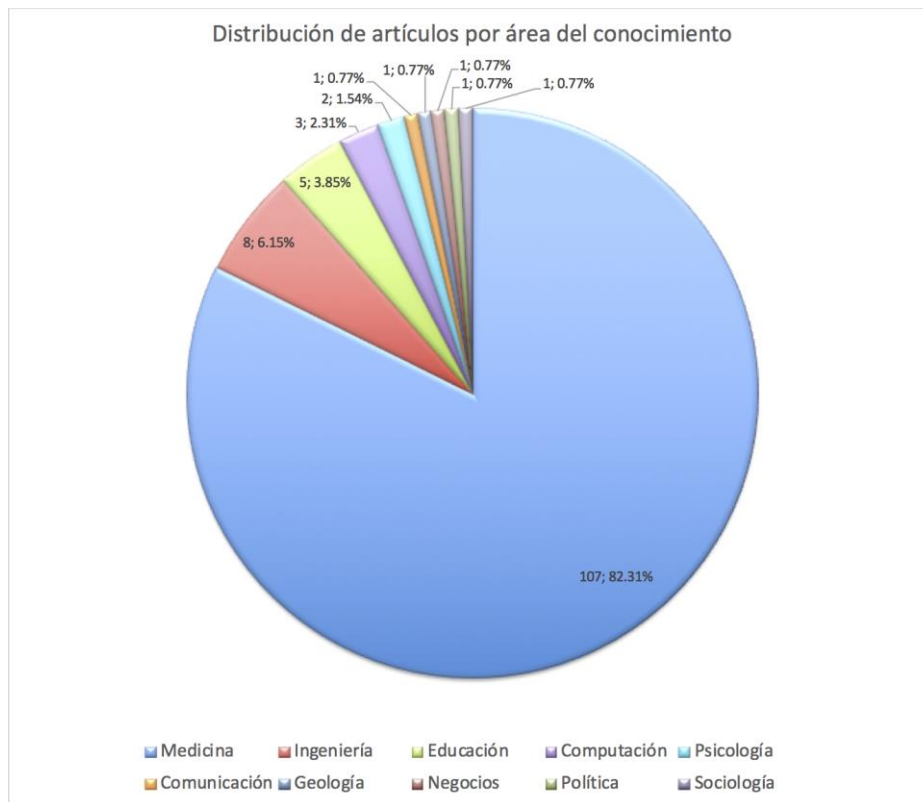


Fuente: Elaboración propia

Regarding the area of knowledge, the research to measure the communication ability is overwhelmingly inclined to the medical area, with 82.31% of the articles. The complete distribution by area of knowledge is presented graphically in Figure 3, which shows both the number of items per area and the corresponding percentage.

There were 81 different journals in which 130 articles were published. Of the total of these, six stood out: Patient Education and Counseling, which contributed 14 articles, Journal of Surgical Education and BMC Medical Education with 9, and American Journal of Surgery, Nurse Education Today and Computers Education with 3 each. Only the last one is not from the medical area. The other 75 journals published only 1 or 2 articles each, totaling the remaining 89 articles. There were magazines on the cutting of engineering, education, communication, politics, business and geology.

Figura 3. Distribución de artículos por área de conocimiento



Fuente: Elaboración propia

After reading the full text of the 130 articles, 12 of them were selected, each of which presented the generation of an instrument for measuring communication ability. Those that were not selected implied the measurement of other constructs, or they used an already generated instrument.

The general characteristics of the 12 selected studies are presented in Table 1. Studies one and eight did not indicate the name of the instrument built, so it was assigned one according to the title of the article that presents it, and was included in parentheses.

Tabla 1. Datos de identificación de los estudios

#	Nombre del instrumento	Referencia	Año	Área	País
1	(Medición de habilidades comunicativas en un contexto de investigación formativa)	(García, Paca, Arista, Valdez y Gómez, 2018)	2018	Educación	Perú
2	Patient-centered Communication Tools (PaCT)	(Grice <i>et al.</i> , 2017)	2017	Medicina	Estados Unidos
3	Instrument for Communication skills and Professionalism Assessment (InCoPrA)	(Abu Dabrh <i>et al.</i> , 2016)	2016	Medicina	Estados Unidos
4	Family Meeting Behavioral Skills Checklist (FMBSC)	(Gustin, Way, Wells y McCallister, 2016)	2016	Medicina	Estados Unidos
5	Escala sobre Habilidades de Comunicación en Profesionales de la Salud, EHC-PS	(Leal-Costa, Tirado-González, van-der Hofstadt, & Rodríguez-Marín, 2016)	2016	Medicina	España
6	STEM Interpersonal Communication Skills Assessment Battery	(Wilkins, Bernstein y Bekki, 2015)	2015	Ingeniería	España
7	Patient Centered Observation Form (PCOF)	(Keen, Cawse-Lucas, Carline, y Mauksch, 2015)	2015	Medicina	Estados Unidos
8	(Medición de creencias de autoeficacia de la habilidad de comunicación)	(Hagemeier, Hess, Hagen y Sorah, 2014)	2014	Medicina	Estados Unidos
9	Global Consultation Rating Scale (GCRS)	(Burt <i>et al.</i> , 2014)	2014	Medicina	Reino Unido
10	Communication Assessment Tool (CAT)	(Makoul, Krupat y Chang, 2007)	2007	Medicina	Estados Unidos
11	Four Habits Coding Scheme (4HCS)	(Krupat, Frankel, Stein y Irish, 2006)	2006	Medicina	Estados Unidos
12	SEGUE framework	(Makoul, 2001)	2001	Medicina	Estados Unidos

Fuente: Elaboración propia

It should be noted that 8 of the 12 studies were conducted in the United States. Of the remaining four, two were made in Spain, one in the United Kingdom and one in Peru. In relation to the study area, the number of instruments in the medical area (10) is much higher than the studies in other areas (2).

On the other hand, the size of the sample varied greatly from one study to another, and the reason that small samples were presented (as in the studies identified with numbers 4, 5, and 9) is that they used video recordings, which is common in the medical area and its process of obtaining data is done through the analysis of them, which differs considerably from surveys answered directly by those affected. Regarding the types of measurement, the Likert scale was used in eight instruments, from three to 10 options; the rubric in one, and the checklist in three. Table 2 presents this information in detail.

Tabla 2. Datos de población, muestra y tipo de medición de los estudios

#	Población	Tamaño de la muestra	Tipo de medición / Medición
1	Estudiantes del primer semestre de Ciencias de la Educación	77 grupo experimental 63 grupo de control	Examen y rúbrica / Total de aciertos ÷ total de ítems
2	Estudiantes de Farmacia	216	Escala / Likert, cinco opciones
3	Residentes del Mayo Clinic-Rochester, Minnesota	74	Escala / Likert, tres opciones
4	Becarios y estudiantes de medicina paliativa	16	Lista de verificación / [Sí / No / No aplica]
5	Especialistas de la salud (médicos, enfermeras, ayudantes de enfermería)	9	Escala / Likert, seis opciones
6	Estudiantes de doctorado en áreas de ingeniería	301	Escala / Likert 10 opciones
7	Estudiantes de medicina, enfermeras y médicos	211	Lista de verificación / [Sí / No]
8	Estudiantes de enfermería, medicina y farmacia de East Tennessee State University's (ETSU's) Academic	192	Escala: Likert, cinco opciones
9	Médicos generales	21	Escala: Likert, tres opciones
10	Pacientes del Colorado Permanent Medical Group (CPMG)	950	Escala: Likert, cinco opciones
11	Videograbaciones de atención médica	100	Escala: Likert, cinco opciones
12	Estudiantes de segundo año de la escuela de Medicina de Northwestern	Diverso, en varias pruebas de validez	Lista de verificación / [Sí / No]

Fuente: Elaboración propia

Regarding the dimensions measured by the instruments reviewed, they are presented in Table 3, eliminating those that, being conceptually equivalent, are repeated in the studies. Each identified dimension is presented and the percentage of articles in which it appears.

Tabla 3. Dimensiones identificadas en los instrumentos elegidos en la revisión

#	Dimensión	Porcentaje de artículos en que aparece
1	Contexto para la discusión	58 %
2	Comunicación y gestión	50 %
3	Cierre de la comunicación	42 %
4	Compartir información con el interlocutor	42 %
5	Comprender la perspectiva del interlocutor	42 %
6	Empatía	25 %
7	Mantener una buena relación	25 %
8	Planear y compartir decisiones	25 %
9	Escucha activa	17 %
10	Expresión no verbal	17 %
11	Organización	17 %
12	Profesionalismo	17 %
13	Autenticidad	8 %
14	Confianza	8 %
15	Estilo de preguntas efectivo	8 %
16	Expresión verbal	8 %
17	Lenguaje apropiado a la alfabetización del interlocutor	8 %
18	Respeto	8 %

Fuente: Elaboración propia

The dimension that is contemplated in more than half of the instruments reviewed is the one that has to do with the context for the discussion, that is, to establish the adequate conditions to initiate the communicative process. Communication and management refers to the ability to bring the communicative process into good shape and, in general, to properly manage the information; this dimension is measured in half of the instruments. The rest of the dimensions are found in less than half of the instruments.

Risk of bias within the studies

The risk of bias within the studies was assessed in each study individually through the risk of bias at the level of results, considering the reliability and validity of the results presented. Later, in table 4 and figure 4, the results of the evaluation of risks of bias are presented, including the level of results.

Risks of bias through studies

At the beginning of this research, two of the most recognized platforms in the indexing of scientific journals were chosen, namely, Web of Science and Scopus; However, this does not imply that there are no good quality instruments published in other spaces, such as Scielo, Dialnet, LatIndex or Doaj. Neither was the so-called gray literature contemplated: doctoral theses, technical reports or workbooks, which can present an instrument of sufficient quality to be considered in this work. Therefore, there is a risk of publication bias in this regard in the present systematic review.

The results of the risks of study bias determined in the present work are shown in Table 4. It includes the risks of bias through the studies (selection [RSS] and selective notification [RSNS]), and the risks of bias within the studies (at the level of results [RSNR]). In green, a low risk of bias is indicated, a high risk of bias is indicated in red, and a risk of bias that is unclear or can not be determined in yellow is indicated in yellow.

Tabla 4. Resultados de riesgo de sesgo por estudio

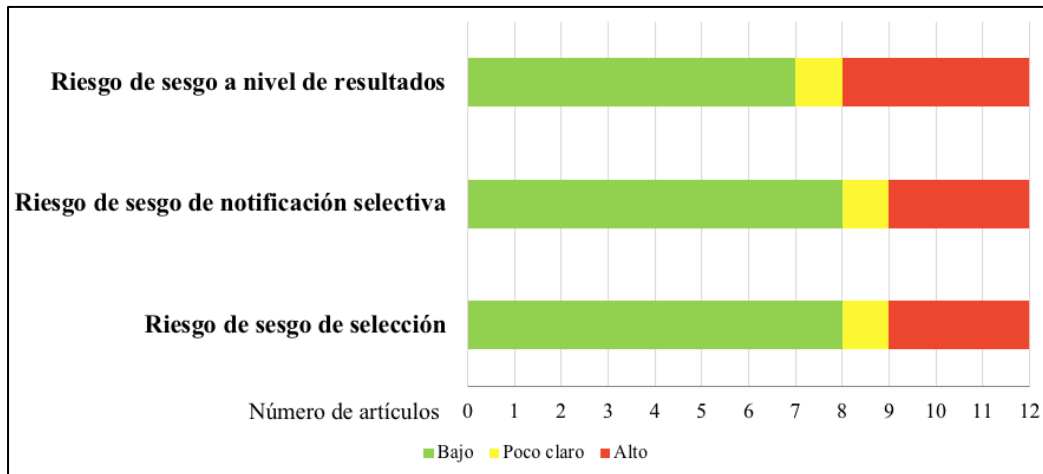
#	Instrumento	RSS	RSNS	RSNR
1	García <i>et al.</i> (2018)	Green	Red	Red
2	Grice <i>et al.</i> (2017)	Green	Red	Green
3	Abu Dabrh <i>et al.</i> (2016)	Red	Green	Red
4	Gustin <i>et al.</i> (2016)	Red	Red	Green
5	Leal-Costa <i>et al.</i> (2016)	Yellow	Yellow	Yellow
6	Wilkins <i>et al.</i> (2015)	Green	Green	Green
7	Keen <i>et al.</i> (2015)	Red	Green	Red
8	Hagemeier <i>et al.</i> (2014)	Green	Red	Red
9	Burt <i>et al.</i> (2014)	Green	Green	Green
10	Makoul <i>et al.</i> (2007)	Green	Green	Green
11	Krupat <i>et al.</i> (2006)	Green	Green	Green
12	Makoul (2001)	Green	Green	Green

Fuente: Elaboración propia

As can be seen in table 4, 5 of the 12 articles present low risks of bias: 1 of the engineering area, number 6 (in which the factorial analysis performed to determine the factor to be measured in the instrument is described in detail), and 4 of the medical area, from 9 to 12, which are internationally recognized instruments or frames and used as a basis for other measurements. In fact, the last three, the Communication Assessment Tool (CAT), the Four Habits Coding Scheme (4HCS) and the Segue framework, were found because they are used in many recent studies. In contrast, there are five instruments (those identified with numbers 1, 3, 4, 7 and 8) that present two risks of high bias, almost all coinciding with the high risk of bias at the level of results, since they do not present completely the methods used to give reliability and validity to the results. Work number five is a special case, since it presents the measurement instrument and its content validation process, but does not present the application of it to validate the construct and evaluate results in a statistical way, so it was considered a risk assessment of unclear bias in the three risks of bias analyzed. The other article, number two, presents only a high risk of bias, in terms of selective notification.

Figure 4 presents the summary graph of the risk of bias, accumulating the number of items for each type of risk. The color notation is the same as the one used in table 3.

Figura 4. Resumen de los riesgos de sesgo



Fuente: Elaboración propia

Discussion

Summary of the evidence

Most of the articles included in this review do not report risks of bias, which can be a factor that reduces their reliability and the results they document. However, one task of this work was to determine the risk at the level of results, selection and selective notification, and it was found that almost half of them present a low risk of bias, which provides them with reliability in these aspects.

The instruments to measure the communication ability in the medical area are mainly focused on the validation of content, since the research on the underlying dimensions has supported for them to be accepted in a general way (mainly based on frameworks such as Segue, Kalamazoo or the four habits). The instrument in the area of engineering (number six) establishes a detailed factor analysis, which highlights the need to identify dimensions in the measurement of communication, in contrast to instruments in the medical area. Although the education area instrument (number one) meets the eligibility criteria and is intended to measure communication skills, it lacks a solid theoretical-conceptual foundation, nor does it present statistical results in addition to the difference of pretest-posttest stockings.

The results obtained in this work were contrasted with the six systematic reviews that were found during the search process. The systematic reviews are the following: "Measurement of physician-patient communication: A systematic review" (Zill et al., 2018), which presents results of 20 articles; "Assessing patient-centered communication in teaching: a systematic review of instruments" (Brouwers, Rasenberg, Van Weel, Laan and Van Weel-Baumgarten, 2017), which presents results of 14 articles; "Tools for Assessment of Communication Skills of Hospital Action Teams: A Systematic Review" (Rehim, Demoor, Olmsted, Dent and Parker, 2017), which presents results of 10 articles; "An integrative review" (MacLean, Kelly, Geddes and Della, 2017), which presents results of 19 articles; "Assessing Communication Skills of Medical Students in Objective Structured Clinical Examinations (Osce): A Systematic Review of Rating Scales" (Cömert et al., 2016), which presents results of 12 articles, and "Reliability and validity of Osce checklists used to assess the communication skills of undergraduate medical students: A systematic review "(Setyonugroho, Kennedy and Kropmans, 2015), which presents results of 34 articles.

Similarities were identified regarding the number of studies reviewed and the data obtained from the analysis of the articles, which means that this review has followed a common line for this type of research. However, the risks of bias, to which special attention has been paid in this work, are barely considered in those. Another important difference is that in the last review (Zill et al., 2018) psychometric properties are obtained, which are especially useful when performing meta-analyzes, but not so much in systematic reviews.

The instruments selected in this review have a maturely defined basis of dimensions to be measured, in contrast to what Setyonugroho et al. (2015), who, in a systematic review on the assessment of communication skills in medical graduates, concluded the following: "We demonstrate a clear absence of consensus between researchers in the interpretation and definition of domains of Cs (Communication Skills). Included papers generally failed to satisfactorily identify the underlying constructs and learning outcomes that were being assessed "(page 8). This may be because their work, despite having been published in 2015, includes articles mostly before 2010, including the last century, and only one of 2012.

The fact of following a methodology like Prism in this systematic review and giving special emphasis to the evaluation of the risk of bias in the selected articles represent the main strengths of this work, since they assign a high level of confidence to the conclusions obtained.

Limitations

The present systematic review is not free of risks of bias. In the search strategy there is a risk of publication bias, since the sentence was defined with the aim of finding the studies that met the search criteria as closely as possible. However, it is possible to include the word tool to consider the measurement instrument as a tool; In the same way, the word competence can be included to include the concept of skill as a competence.

Another risk of bias is that only the Scopus databases and the Web of Science information service were considered, leaving out others and those of free access. It will also be interesting to search for studies that cover a longer period of time and contrast the quantity and quality of the results with those of this research.

Conclusions

In most of the instruments included in this review and in the systematic reviews that were found, the object of study is the student. This shows the concern in measuring communication at the school level, but this per se will not reduce the gap that was raised at the beginning of this work, since it seems essential to make more measurements in the labor field, and then it will be possible to identify the contrast between both .

An important finding is that the quantity of studies in the medical area represents the great majority of the selected studies. This proportion is interesting, since the platforms that served as sources of information include databases of all areas of knowledge, not only medical ones. The foregoing shows that the intention to measure communication skills is overwhelmingly inclined to the area of health care. One of the main reasons for this is that the medical area has a structured process for the development of measurement processes, and in the other areas it is lacking.

Another finding is that the dimension that most appears in the measuring instruments is the context for the discussion, and dimensions such as respect, trust and authenticity are little mentioned explicitly. This could imply that the way in which the communicative process is

carried out depends, to a large extent, on the preparation of the same by the participants. A confirmatory factorial analysis could be a good alternative to obtain conclusions about these dimensions and the possible correlation between them.

From the results of this work, and given that most of the articles come from the context of health care, two interesting lines emerge where future research can be directed. The first suggests using the dimensions identified for the construction of new instruments to measure communication skills in areas other than medicine. The instruments of measurement in the medical area are directed to the communicative evaluation of the doctor, unilaterally, so the possible generalization of the dimensions defined in these instruments towards other contexts will be very interesting if the evaluation of the communicative process occurs bilaterally. The second is aimed at designing instruments in the medical area with more dedication to construct validity processes.

Therefore, the combination of the dimensions of the medical area and the construct validity processes of other areas could generate more reliable instruments for the measurement of communication skills. This will mainly benefit the non-medical areas, since it will allow them to establish a structured process for the development of communication measurement instruments, including the measurement of communication as a 21st century digital skill, necessary to participate with better perspectives in the environments virtual learning that is currently being developed in the educational area.

References

- Abu Dabrh, A. M., Murad, M. H., Newcomb, R. D., Buchta, W. G., Steffen, M. W., Wang, Z., ... Steinkraus, L. W. (2016). Proficiency in identifying, managing and communicating medical errors: Feasibility and validity study assessing two core competencies. *BMC Medical Education*, 16(1), 1–8. <http://doi.org/10.1186/s12909-016-0755-5>
- Alfaki, I. M. A. (2016). Assessment and Dynamic Modeling of the Size of Technology Transfer. *Knowledge Economy*, 7(2), 600–612. <http://doi.org/10.1007/s13132-014-0231-6>
- Amani, J. (2017). Prevalence of, and Factors Associated with, Unemployment among Graduates: Evidence from Tanzania. *Africa Education Review*, 14(3–4), 230–244. <http://doi.org/10.1080/18146627.2017.1300064>
- Ananiadou, K. y Claro, M. (2009). *21st century skills and competences for new millennium learners in OECD countries*. OECD Education Working Papers. Paris. Recuperado a partir de <https://doi.org/10.1787/218525261154>
- Anderson, J. (2010). *ICT Transforming Education: A Regional Guide*. Bangkok: UNESCO Bangkok. Recuperado a partir de <https://bit.ly/1dPIdo9>
- Ballr, S., Di Battista, A., Browne, C., Drzeniek, M., Crotti, R., Gómez, D., ... Marti, G. (2016). *The Global Competitiveness Report 2016-2017* (Vol. 5). Recuperado a partir de <https://bit.ly/2d8uv4W>
- Bodnar, C. y Clark, R. (2017). Can Game-Based Learning Enhance Engineering Communication Skills? *IEEE Transactions on Professional Commuication*, 60(1), 24–41. <http://doi.org/10.1109/TPC.2016.2632838>
- Brouwers, M., Rasenberg, E., van Weel, C., Laan, R. y van Weel-Baumgarten, E. (2017). Assessing patient-centred communication in teaching: a systematic review of instruments. *Medical Education*, 51, 1103–1117. <http://doi.org/10.1111/medu.13375>
- Burt, J., Abel, G., Elmore, N., Campbell, J., Roland, M., Benson, J. y Silverman, J. (2014). Assessing communication quality of consultations in primary care: Initial reliability of the Global Consultation Rating Scale, based on the Calgary-Cambridge guide to the Medical interview. *BMJ Open*, 4(3), 1–9. <http://doi.org/10.1136/bmjopen-2013-004339>
- Centro Cochrane Iberoamericano. (2012). *Manual Cochrane de Revisiones Sistemáticas de Intervenciones Versión 5.1.0 [actualizada en marzo de 2011] [Internet]*. The Cochrane

- Collaboration*. Barcelona: Centro Cochrane Iberoamericano. Recuperado a partir de <https://bit.ly/2QQRQKb>
- Cisco-Intel-Microsoft. (2011). *Transforming Education: Assessing and Teaching 21st Century Skills*. Recuperado a partir de <https://bit.ly/2NtrTSH>
- Cömert, M., Zill, J. M., Christalle, E., Dirmaier, J., Härter, M. y Scholl, I. (2016). Assessing communication skills of medical students in Objective Structured Clinical Examinations (OSCE) - A systematic review of rating scales. *PLoS ONE*, *11*(3), 1–15. <http://doi.org/10.1371/journal.pone.0152717>
- Duran, R. L. (2009). Communicative adaptability: A measure of social communicative competence. *Communication Quarterly*, *31*(4), 320–326. <http://doi.org/10.1080/01463378309369521>
- Fullan, M. y Langworthy, M. (2013). *Towards a new end: New pedagogies for deep learning. Collaborative Impact*. Seattle: Collaborative Impact. Recuperado a partir de http://www.newpedagogies.nl/images/towards_a_new_end.pdf
- García, N. M., Paca, N. K., Arista, S. M., Valdez, B. B. y Gómez, I. I. (2018). Investigación formativa en el desarrollo de habilidades comunicativas e investigativas. *Revista de Investigaciones Altoandinas*, *20*(1), 125–135. <http://doi.org/10.18271/ria.2018.336>
- Grice, G. R., Gattas, N. M., Prosser, T., Voorhees, M., Kebodeaux, C., Tiemeier, A., ... Juang, P. (2017). Design and validation of patient-centered communication tools (PaCT) to measure students' communication skills. *American Journal of Pharmaceutical Education*, *81*(8), 33–48. <http://doi.org/10.5688/ajpe5927>
- Gustin, J. L., Way, D. P., Wells-Di Gregorio, S. y McCallister, J. W. (2016). Validation of the family meeting behavioral skills checklist an instrument to assess fellows' communication skills. *Annals of the American Thoracic Society*, *13*(8), 1388–1393. <http://doi.org/10.1513/AnnalsATS.201601-021OC>
- Gutiérrez-Portlán, I., Román-García, M. y Sánchez-Vera, M. del P. (2018). Estrategias para la comunicación y el trabajo colaborativo en red de los estudiantes universitarios [Strategies for the communication and collaborative online work by university students]. *Comunicar*, *26*(54), 91–100. <http://doi.org/10.3916/C54-2018-09>
- Hagemeier, N. E., Hess, R., Hagen, K. S. y Sorah, E. L. (2014). Impact of an interprofessional

- communication course on nursing, medical, and pharmacy students' communication skill self-efficacy beliefs. *American Journal of Pharmaceutical Education*, 78(10), 1–9.
<http://doi.org/10.5688/ajpe7810186>
- International Development Research Centre, y Fundación para la Educación Superior y el Desarrollo. (2016). *Construcción de Metodologías Comparativas e Indicadores para medir el uso de TIC y sus Impactos*. Recuperado a partir de <http://www.fedesarrollo.org.co/wp-content/uploads/Libro-TIC.pdf>
- Itani, M. y Srour, I. (2016). Engineering Students' Perceptions of Soft Skills, Industry Expectations, and Career Aspirations. *Journal of Professional Issues in Engineering Education and Practice*, 142(1), 1–12. [http://doi.org/10.1061/\(ASCE\)EI.1943-5541.0000247](http://doi.org/10.1061/(ASCE)EI.1943-5541.0000247)
- Jung, D., Lee, S. H., Kang, S. J. y Kim, J.-H. (2017). Development and evaluation of a clinical simulation for new graduate nurses: A multi-site pilot study. *Nurse Education Today*, 49, 84–89. <http://doi.org/10.1016/j.nedt.2016.11.010>
- Keen, M., Cawse-Lucas, J., Carline, J. y Mauksch, L. (2015). Using the patient centered observation form: Evaluation of an online training program. *Patient Education and Counseling*, 98(6), 753–761. <http://doi.org/10.1016/j.pec.2015.03.005>
- Krupat, E., Frankel, R., Stein, T. y Irish, J. (2006). The Four Habits Coding Scheme: Validation of an instrument to assess clinicians' communication behavior. *Patient Education and Counseling*, 62(1), 38–45. <http://doi.org/10.1016/j.pec.2005.04.015>
- Leal-Costa, C., Tirado-González, S., van-der Hofstadt, C. J. y Rodríguez-Marín, J. (2016). Creación de la Escala sobre Habilidades de Comunicación en Profesionales de la Salud, EHC-PS. *Anales de Psicología*, 32(1), 49–59. Recuperado a partir de <https://bit.ly/2NpHQ0>
- MacLean, S., Kelly, M., Geddes, F. y Della, P. (2017). Use of simulated patients to develop communication skills in nursing education: An integrative review. *Nurse Education Today*, 48, 90–98. <http://doi.org/10.1016/j.nedt.2016.09.018>
- Makoul, G. (2001). The SEGUE Framework for teaching and assessing communication skills. *Patient education and counseling*, 45(1), 23–34. [http://doi.org/10.1016/S0738-3991\(01\)00136-7](http://doi.org/10.1016/S0738-3991(01)00136-7)
- Makoul, G., Krupat, E. y Chang, C.-H. (2007). Measuring patient views of physician

- communication skills: Development and testing of the Communication Assessment Tool. *Patient Education and Counseling*, 67(3), 333–342.
<http://doi.org/10.1016/j.pec.2007.05.005>
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G. y The PRISMA Group. (2010). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *International Journal of Surgery*, 8(5), 336–341. <http://doi.org/10.1016/j.ijisu.2010.02.007>
- Ramos, G. y Yermo, J. (2015). *México: Políticas prioritarias para fomentar las habilidades y conocimientos de los mexicanos para la productividad y la innovación*. OCDE. Recuperado a partir de <https://bit.ly/29dS4ZA>
- Rehim, S. A., Demoor, S., Olmsted, R., Dent, D. L. y Parker-raley, J. (2017). Tools for Assessment of Communication Skills of Hospital Action Teams: A Systematic Review. *Journal of Surgical Education*, 7(2), 341–351. <http://doi.org/10.1016/j.jsurg.2016.09.008>
- Seth, D. y Carryon, G. N. (2017). Investigating Undergraduate Students' Communication Self-Efficacy during an Engineering Design Course. En *47th IEEE Frontiers in Education Conference* (pp. 1–9). Indianapolis: Institute of Electrical and Electronics Engineers Inc. <http://doi.org/10.1109/FIE.2017.8190674>
- Setyonugroho, W., Kennedy, K. M. y Kropmans, T. J. B. (2015). Reliability and validity of OSCE checklists used to assess the communication skills of undergraduate medical students: A systematic review. *Patient Education and Counseling*, 98(12), 1–10.
<http://doi.org/10.1016/j.pec.2015.06.004>
- Siddiq, F. (2016). Teachers' Emphasis on Developing Students' Digital Information and Communication Skills (TEDDICS): A new construct in 21st century education. *Computers & Education*, 93(C), 1–14. <http://doi.org/10.1016/j.compedu.2015.10.006>
- Van Laar, E., Van Deursen, A. J. A. M., Van Dijk, J. A. G. M. y De Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, 72, 577–588. <http://doi.org/10.1016/j.chb.2017.03.010>
- Wegerif, R. y Mansour, N. (2010). A dialogic approach to technology-enhanced education for the global knowledge society. En M. S. Khine & I. M. Saleh (Eds.), *New Science of Learning: Cognition, Computers and Collaboration in Education* (pp. 325–339). Springer-Verlag New York. http://doi.org/10.1007/978-1-4419-5716-0_16

- Wilkins, K. G., Bernstein, B. L. y Bekki, J. M. (2015). Measuring Communication Skills: The STEM Interpersonal Communication Skills Assessment Battery. *Journal of Engineering Education*, 104(4), 433–453. <http://doi.org/10.1002/jee.20100>
- Zill, J. M., Christalle, E., Müller, E., Härter, M., Dirmaier, J. y Scholl, I. (2018). Measurement of Physician-Patient Communication — A Systematic Review. *PLoS ONE*, 1–12. <http://doi.org/10.1371/journal.pone.0112637>

Rol de Contribución	Autor (es)
Conceptualización	Alexandro Escudero Nahón
Metodología	Alexandro Escudero Nahón (principal) Francisco León Pérez (apoya)
Software	NO APLICA
Validación	María del Carmen Bas Cerdá
Análisis Formal	Francisco León Pérez
Investigación	Francisco León Pérez (principal) Alexandro Escudero Nahón (apoya)
Recursos	Francisco León Pérez
Curación de datos	NO APLICA
Escritura - Preparación del borrador original	Francisco León Pérez
Escritura - Revisión y edición	Alexandro Escudero Nahón (igual) María del Carmen Bas Cerdá (igual)
Visualización	Francisco León Pérez (principal) María del Carmen Bas Cerdá (apoya)
Supervisión	Alexandro Escudero Nahón (igual) María del Carmen Bas Cerdá (igual)
Administración de Proyectos	Alexandro Escudero Nahón (igual) Francisco León Pérez (igual)
Adquisición de fondos	Francisco León Pérez