

IQ and non-verbal intelligence: an integrative review of the literature

El coeficiente intelectual y la inteligencia no verbal: revisión integradora de la literatura

QI e inteligência não-verbal: uma revisão integrativa da literatura

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Abstract

This bibliographic review article has the objective of carrying out an integrative review of the literature in English and Spanish on IQ and non-verbal intelligence as references for the consolidation of a holistic state of the art. The scope of the study is retrospective from 2013 to 2023, jointly, the use of the Integrative Review of Literature and its stages as guidelines for information filtering, highlighting the criteria for analysis of bibliographic information in the second stage, jointly, the RedENSO instrument to collate the data. The results denote that the literature related to IQ and non-verbal intelligence is incipient, most of the analyzed studies focus their development on praxis, and the qualitative scientific works are minimal. The relationship between IQ and nonverbal intelligence is complex. While IQ focuses on verbal and logical cognitive skills, nonverbal intelligence encompasses visual and spatial skills, as well as understanding emotions through nonverbal means. Both aspects are important for a full understanding of a person's intelligence, and it is essential to recognize and assess both verbal and nonverbal abilities when assessing intellectual ability.

Keywords: IQ; non-verbal intelligence, Raven's test, progressive matrices, colored scale, fluid intelligence.

Resumen

El presente artículo de revisión bibliográfica posee el objetivo de efectuar una revisión integradora de la literatura en los idiomas inglés y español sobre el coeficiente intelectual y la inteligencia no verbal como referentes para la consolidación de un estado del arte holístico. El alcance del estudio es de carácter retrospectivo desde el 2013 hasta el 2023, conjuntamente, el empleo de la Revisión Integradora de la

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Literatura y sus etapas como directrices para el filtrado de la información, destacando los criterios de análisis de la información bibliográfica en la segunda etapa, conjuntamente, el instrumento de la RedENSO como medio para cotejar los datos. Los resultados denotan que la literatura vinculada al coeficiente intelectual y la inteligencia no verbal es incipiente, la mayor parte de los estudios analizados centran su desarrollo en la praxis, son mínimos los trabajos científicos de corte cualitativo. La relación entre el CI y la inteligencia no verbal es compleja. Mientras que el CI se enfoca en habilidades cognitivas verbales y lógicas, la inteligencia no verbal abarca habilidades visuales y espaciales, así como la comprensión de las emociones a través de medios no verbales. Ambos aspectos son importantes para una comprensión completa de la inteligencia de una persona, y es esencial reconocer y valorar tanto las habilidades verbales como las no verbales al evaluar la capacidad intelectual.

Palabras clave: Coeficiente intelectual; inteligencia no verbal, test de Raven matrices progresivas escala coloreada, inteligencia fluida.

Resumo. O objetivo deste artigo de revisão da literatura é realizar uma revisão integrativa da literatura em inglês e espanhol sobre QI e inteligência não verbal como referências para a consolidação de um estado da arte holístico. O âmbito do estudo é de carácter retrospectivo, de 2013 a 2023, e utiliza-se a Revisão Integrativa da Literatura e as suas etapas como diretrizes para filtrar a informação, destacando os critérios de análise da informação bibliográfica na segunda etapa, e o instrumento RedENSO como meio de recolha de dados. Os resultados demonstram que a literatura ligada ao QI e à inteligência não verbal é incipiente, a maioria dos estudos analisados centra o seu desenvolvimento na praxis, sendo escassos os trabalhos científicos de carácter qualitativo. A relação entre o QI e a inteligência não-verbal é complexa. Enquanto o QI se centra nas competências cognitivas verbais e lógicas, a inteligência não verbal engloba as competências visuais e espaciais, bem como a compreensão das emoções através de meios não verbais. Ambos os aspectos são importantes para uma compreensão completa da inteligência de uma pessoa, pelo que é essencial reconhecer e avaliar as competências verbais e não verbais aquando da avaliação da capacidade intelectual.

Palavras-chave: QI; inteligência não verbal; teste de Raven, matrizes progressivas, escala colorida, inteligência fluida.

INTRODUCTION

The literary trends centered on IQ and non-verbal intelligence are fundamental for the consolidation of theoretical support, and also constitute the cornerstone of research that will revolutionize scientific work in education. This requires that the psycho-pedagogical part generates new concerns, and at the same time, the existing theoretical contributions can be evidenced in practice, specifically in the psycho-pedagogical field, providing solutions for the diversity of problems that arise. Likewise, the conceptual contributions of these categories are focused on diagnosis, application of specialized instruments for the detection of alterations and/or disorders, jointly, to qualify the psycho-pedagogical work in the diverse scenarios. In spite of the usefulness of the subject matter in the psycho-pedagogical field, there is very little research in Spanish, so it can be inferred that it is very little researched, however, the English language opens the range of possibilities and edges from which these categories referenced in essential scientific publications are approached for the theoretical conformation of studies. With the intention of providing these theoretical foundations, a verification of the state of the art necessary for the constitution of a complete theoretical approach is carried out by means of an integrative review of the literature. The present work had as its objective the analysis of the literature in English and Spanish focused on IQ and nonverbal intelligence as a reference for the consolidation of a holistic and integral state of the art.

MATERIALS AND METHODS

The present study was based on the methodology of the integrative literature review, Guirao (2015) refers that it focuses on the search for the understanding of a topic through a systematized process, together with the analysis of the results. This review consists of six stages:

First stage Selection of the guiding question: what does the literature say about IQ and nonverbal intelligence in the infancy stage?

Second stage The following databases were considered: Word Wide Science, National Library of Medicine, The British Psychological Society, Scielo, Dialnet and Redalyc. The temporality was based on a retrospective study Silva Ayçaguer, (2014) delimiting the search

time to eleven years (2012 - 2023). The search descriptors were: IQ, Nonverbal intelligence, Raven's Test Progressive matrices colored scale. It is necessary to highlight, that the search descriptors were associated to others where they are linked to: intelligence, fluid intelligence, mental activity, academic performance, motor, cognitive and thinking skills. The inclusion criteria are focused on children from five to ten years old, scientific articles focused on the area of psychopedagogy, master's theses and doctoral programs. The exclusion criteria are framed by a sample of children from zero to four years old, children from eleven years old to adolescence, young people and adults, as well as undergraduate and technological degree works.

Third stage The studies are presented in table format considering the following criteria: reference, key words, objective of the study, methodology and main contribution.

Fourth stage Analysis of the studies identifying similarities, methodologies and differences with the studied subject.

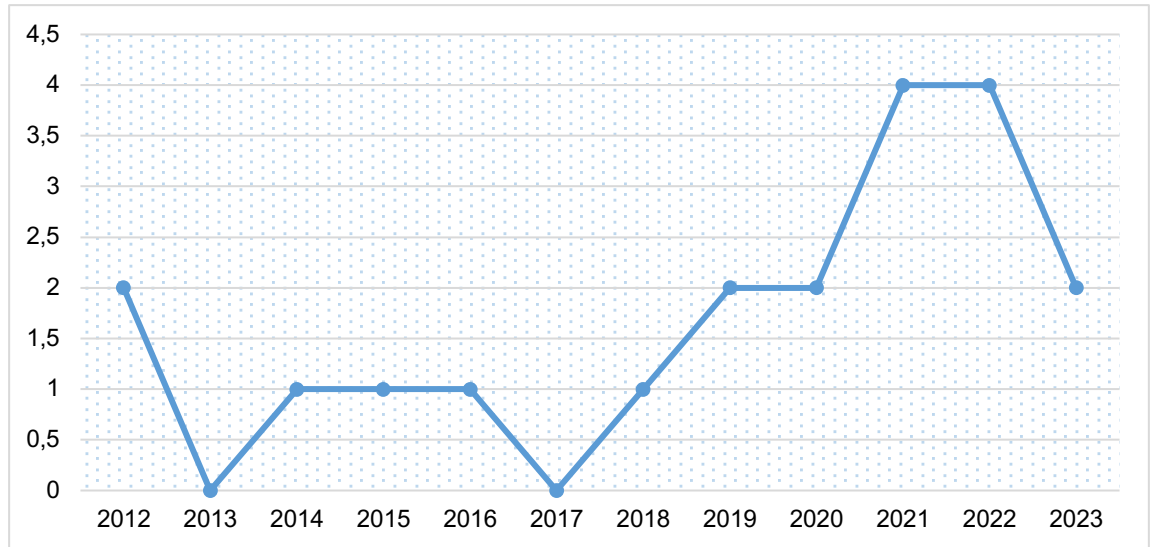
Fifth stage Interpretation of the results grouped according to each category.

Sixth Stage Clearly describe the findings.

RESULTS

A total of 51 documents were reviewed, of which 5 were master's degree works and 46 scientific articles, a comparison was made by means of the instrument adapted from the RedENSO International Palucci Marziale (2015) to identify the contribution to the subject, from this the selection of 20 documents was made, 16 scientific articles and 4 master's degree works, these studies met the inclusion criteria for their selection and validity of the integrative review of the literature. These data set a precedent for the boom and increase in research linked to IQ and nonverbal intelligence, as shown by the trend in the following graph:

Figure 1. Publications on IQ and non-verbal intelligence



Based on the filtering and selection of studies on IQ and nonverbal intelligence, it was noted that most of them are applicative proposals and researches. The documentation revealed the predominance of studies with a quantitative approach in 85%, also, 10% were linked to the mixed approach and 5% to the qualitative approach. The selected studies reflect various designs, it should be noted that a research has the possibility of applying various types of methodological designs to achieve the proposed objective, as shown in the following table:

Table 1. Methodological designs of the selected studies

DISEÑO	CANTIDAD	PORCENTAJE
Explicativo	1	3%
Descriptivo	4	13%
Cuasiexperimental	2	6%
Transversal	7	23%
Longitudinal	3	10%
Observacional	3	10%
Experimental	2	6%
No experimental	2	6%

Exploratorio	1	3%
Correlacional	6	19%

Based on the table, a preponderance of cross-sectional and correlational studies is evident. The level of literary development is at an apogee, evidencing a parity between investigations that intervene and do not intervene with the selected subjects, it is necessary to highlight the passage from descriptive level studies to those of quasi-experimental or experimental cut with the intention of validating in an accurate way the incidence of the IQ in the development of non-verbal intelligence, in order to obtain the ideal techniques and instruments for future studies or interventions.

In terms of language, 55% corresponds to publications in English and 45% in Spanish. It should be noted that there was evidence of more studies in English corresponding to the categories, however, the exclusion criteria did not contemplate the population established in these studies and therefore they were discarded. In addition, there is minimal research in Spanish in these categories.

Based on the integrative review of the literature, the following information themes were established:

IQ as a predictor of cognitive abilities.

The IQ is the figure of the intellectual capacity of the human being according to age. In this regard, Sotero and Barrios (2021) state that intelligence and IQ are developed by the complexity of neuronal systems, which are formed by the person's experiences and nutrition. Likewise, Azeroual et al. (2022) state that IQ is a predictor of cognitive abilities and to some extent school success. However, Józsa et al. (2022) note that external involvement can be a determinant of a child's academic success; these factors involve preschool skill development and the educational level of the caregiver.

The act of categorizing students with labels of “success” and “failure” in school is an ambiguous paradigm that denotes little appreciation and study of the diversity of intelligences and intellectual abilities that a child may possess. Together, Ferrer and Torres (2014) express that the application of instruments focused on the measurement of IQ may denote a numerical assessment, however, the data obtained may not reflect reality, due to a number of variables and qualities that affect at the time of performing the test, the social pressure to obtain a high score for being classified as an outstanding

student, nervousness, among others, are factors that can alter the result.

Obtaining a weighting after the application of an instrument specialized in IQ indicates the high or low abilities of a person, however, a study should be conducted at the same time focused on the domain of multisensory processing and motor skills. Alhamdan et al. (2023) report that people who show difficulties with auditory and visual stimuli in standardized tests will present setbacks at the time of their development, so it is important to perform visual-motor and auditory assessment tests.

On the other hand, extrapolating the subject to socioeconomic areas, these constitute a faithful reference of low intellectual coefficients, corresponding to living standards in low strata, as referred by Zapata et al. (2012), low-income infants present cognitive difficulties, linked to memory, visual and nonverbal information, concentration, attention, among others. The literature mentions that poverty has unfavorable consequences on intelligence scores in children, as well as on academic performance. Mandlik et al. (2019) state that families with a considerably good or stable purchasing power have free access to the full range of tools to develop the potential of their members.

Instruments used in the measurement of intelligence

Raven's Test Progressive Matrices Colored Scale
Huarachi Ortega (2021) refers that it is an instrument used in educational psychology and psycho-pedagogy for the evaluation of non-verbal intelligence, as well as IQ in children from 6 to 11 years old. Albanese et al. (2010) state that the advantages of this test are related to its application in infants without taking into account their culture or motor deficits, in addition, it is economical, can provide entertainment due to its graphic composition, focuses attention, promotes analogical reasoning, exploring and comparing, together with the speed in problem solving. The composition of the test is centered on 3 series with 12 items divided into A, AB, and B. The same that allow measuring the skills of abstract thinking, problem solving and reasoning.

Kaufman Brief Intelligence Test (K-BIT)

The K-BIT was designed for the measurement of verbal and non-verbal intelligence in people aged 4 to 90 years. It consists of a subtest focused on vocabulary measuring verbal ability, which contains expressive vocabulary and definitions. In conjunction, there is a subtest of matrices that measures non-verbal skills, which demand flexibility and problem-solving strategies, denoting visual stimuli of figurative and abstract types. In this regard, Coneo et al.

(2020) state that the evaluated subject responds by selecting the letter he/she considers correct.

Wechsler Intelligence Scale for Children (WISC-IV) Mathiassen et al. (2012) state that the Wechsler Intelligence Scale for Children is a test that measures intellectual abilities in a hierarchical manner, in relation to general intellectual abilities. This test is made up of 15 subtests, which are divided into: total intelligence quotient (TIQ) and four additional indexes: verbal comprehension (VC), perceptual reasoning (PR), working memory (WM) and processing speed (PS). Faerman et al. (2023) refer that this test evaluates crystallized ability, visual processing and perception, fluid intelligence and short-term memory; on the other hand, the ideal age for the application of this test is from 6 to 16 years old.

Nonverbal intelligence and its edges

Baró (2018) points out that nonverbal intelligence refers to the ability to understand and use nonverbal communication, which includes gestures, facial expressions, body postures, tone of voice and other nonverbal aspects. This form of intelligence involves the ability to interpret and transmit information through non-linguistic means.

On the other hand, Ramirez et al. (2016) indicate that fluid or nonverbal intelligence is a psychological concept that refers to a person's ability to solve problems logically, adapt to new situations and learn new skills quickly. Coneo et al. (2020) point out that it is a part of general intelligence that involves the ability to reason abstractly, solve complex problems, understand patterns and relationships. It also tends to be more prominent in the early stages of life, when cognitive potential is developing, and may be influenced by genetic and environmental factors. However, Melzer et al. (2015) expound that they can also continue to develop throughout life through continuous learning, exposure to new experiences and challenges.

CONCLUSIONS

In spite of the great variety of scientific research, the literature related to IQ and non-verbal intelligence is incipient, most of the studies analyzed focus their development on praxis, and there is a minimum of qualitative scientific work. It is evident the predominance of statistical aspects at the moment of supporting hypotheses of the studies, with the purpose of supporting them with a numerical base. Nonverbal intelligence and IQ are two closely related concepts, but also different in their approach and scope. Both refer to cognitive abilities and mental skills, but each addresses different aspects of

human intelligence. In agreement with Caza (2019) IQ is a measure that attempts to quantify a person's general intelligence by conducting standardized tests that assess specific cognitive abilities, such as logical reasoning, memory, mathematical and verbal skills. On a par with Castro (2021), it can be seen that IQ has been criticized for its reductionist approach, because it attempts to measure human intelligence in a limited way and through tests that do not always fully reflect the range of intellectual abilities of a person. Furthermore, concurrently with Ferrer and Torres (2014) it has been argued that IQ tests may have cultural or social biases, meaning that some people may score lower because of their background and experiences, not necessarily because of their actual intelligence. Nonverbal intelligence refers to the ability to process and use information without involving verbal language. This form of intelligence encompasses a broad spectrum of skills, such as visual pattern recognition, spatial skills, emotional understanding, empathy, facial expression, nonverbal communication, and the ability to solve practical problems creatively. It is a type of intelligence that is closely related to the perception and interpretation of visual and sensory stimuli.

Nonverbal intelligence plays an essential role in everyday life and social interactions. For example, the ability to read the facial expressions of others, understanding emotions and responding appropriately in social situations. Likewise, the ability to solve practical and spatial problems can be crucial in certain professions, such as architecture, engineering, design, among others. It is important to understand in correspondence with Shaqiri et al. (2022) that nonverbal intelligence and IQ are complementary and necessary aspects to understand human intelligence as a whole. IQ focuses on the more academic and analytical cognitive skills, such as logical reasoning and verbal skills. However, this does not fully capture the full spectrum of intelligence that encompasses practical, emotional and social aspects of life. Nonverbal intelligence provides a more holistic perspective of intelligence because it involves the ability to understand the world around us through nonverbal stimuli and nonverbal communication. Similarly, the contribution of Martin and Santiago (2021) is shared, which is that the form of intelligence can be equally valuable and relevant in different contexts of daily life and in various professions. It is essential to recognize that each individual possesses a unique combination of verbal and nonverbal intelligence. Some people may have high nonverbal intelligence, which will allow them to excel in artistic, creative or social fields. On

the other hand, there are people with high IQ who may excel in academic and analytical tasks. Human intelligence should not be reduced to a single measure, as it is a complex and multifaceted combination of different abilities.

In conclusion, the literature reviewed includes a variety of enriching postulates, it is essential to carry out an adequate and thorough review to extract the most relevant and essential information for the constitution of a congruent theoretical support in a study. It is necessary to highlight, based on the large amount of information gathered, that nonverbal intelligence and IQ are two complementary aspects of human intelligence. While IQ focuses on academic and cognitive skills, nonverbal intelligence encompasses emotional, social and practical aspects. Both aspects are valuable and must be recognized to gain a complete understanding of human intelligence. By recognizing the diversity of intelligences, the diverse skills and talents that each individual possesses can be appreciated and fostered.

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