RESEARCH ARTICLE

LOGICAL THINKING IN THE EDUCATIONAL CONTEXT

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Abstract

At present, having skills to solve the various difficulties of everyday existence using logical reason, is very significant; also, towards the progress of science and technology; the result of research on the logical judgment of students is shown. The objective is to analyze the present phase of scientific discernment on logical thinking in the formative reality in the period 2016 to 2021. The methodology was based on the systematic review, using a quantitative, retrospective approach; non-experimental design, cross-sectional and retrospective type; the inquiry of information has been executed in prestigious databases; the descriptive results show that the definition of logical thinking has been evolving according to the development of technology which is a very influential factor; finally it was concluded that logical thinking is the solvency to solve difficulties, the logical and scientific do not exist if they are not related. *ASEAN Journal of Psychiatry, Vol. 22(10), December 2021: 1-11.*

Introduction

The current inquiry is born of the lack of knowing the current phase of scientific and digital knowledge of the logical thinking of the students; to develop it, various retrospective techniques have been put into practice. In this reality it is necessary to conceive of thought as united of skills, two key elements are considered from a formative vision: it is learned and taught by improving with the appropriate practice; and it is not a unitary entity containing varied skills; study and explain the judicious courses the magnitudes are estimated both the content that alludes to what is reflected and the process that are the thinking skills that are activated while reflecting [1,2].

So it is necessary to investigate what are the main causes that hinder logical reasoning and the lack of logical procedures in the development of problems; argumentation is an important competence, it is achieved when the teacher promotes argumentation in the classroom with the intention that this work serves as a consultation document for teachers [3]. It is necessary to ask the following question: What is

the present state of scientific knowledge about logical thinking in the formative environment during the period 2016 to 2021? The word "thought" is formed with Latin roots and represents "thinking effect". Its lexical elements are: pensare (estimate, compare), plus the suffix -miento (result). It is a word that is specified as the act or consequence of thinking, meditating, reflecting, studying, pondering or concentrating.

Thought is paramount to the cognitive progress of human beings; the word is often handled in a generic way that specifies all the results that the mind manages to forge by containing the reasoned actions of the intelligence or the meditations of idealism; it is the action and creation of the mind [4-6].

As for the term "logical" comes from the Greek logikê-logikós and in turn from logos whose meaning is reason. Logic is the science and art of finding the truth, it teaches to reason exactly. It is a discipline, which through norms and

techniques, establish if a foundation is legitimate; it is conceived as the thought that is correct, where it is guaranteed that the close knowledge it provides adapts to the existing. The word "education" is found in literary works from the seventeenth century. The terms used were those of "raising" and "nurturing", meaning "sustraer forward", "train" as a resembling of "doctrino", anf "disciple" towards showing "discipline" or "disciple" [7,8] .

The word education derives from the Latin educates that represents to handle, to govern, to locate; it can also be related to the word educate: to remove outward, arriving at the etymological definition of "guider out" [9]. The term education comes from educate: to take from within, to relieve and to give birth. In this reality it is understood as the directionality that is given to life [10].

"The verb "to educate" seems to have made its first documentary appearance in the first half of the sixteenth century". The word "education" is used on a day-to-day basis since it involves us all in some way, where they would try to give a definition of education [11].

 It is always common to use etymology to know the meaning of the term, before elaborating a conceptualization related to the explanation of the reality to which the term corresponds term addresses the integral development of the person and must be integrated into his experience as a user; also the instruction is part of the complicated human and cultural evolution and finally education is dynamic and is perpetuated in the human being as an inert force that goes from the individual plane to the supraindividual and organic [12-14].

It is necessary to know the current state of logical thinking, it constitutes a main aspect of mastering, in the period of the concrete operations of the progress of the infant, since through them, these, progressively deploy notions of causal relationships; it is understood that social equity is similar to equal opportunities for all, in a society influenced by technological advances; the origin of mental operations should not be sought in expression but in the act as a

seat of the ordering of practice [15-17]. The objective is to identify the real phase of scientific knowledge about logical thinking in reality in the 2016 to 2021 stage; to respond the following criteria are considered: authors, definition, type, research design, by journals according to quartiles, statisticians. In recent times the use of technology in pedagogical establishments has allowed to develop and fortify logical thinking, it is generating interest in the training community at the national and global level.

Methodology

The research had a quantitative approach, because the collection of quantities was used for numerary measurement and statistical study, in order to establish rules of conduct and experiment with theories complex variables [18]; is retrospective, because the collection of evidence was carried out after the occurrence of the facts [19]; it takes as a resource the data that constituted the foundations of information and proven inquiry [20]; it is non-experimental, because they do not have random is position, management of variables or collation sets. What happens is perceived in an original way, without getting in the way in any way [21].

It is transversal, because information is collected at a certain and retrospective moment, it studies the reconstruction of what happened, based on the data collected at present [22]. The search for information for this research work has been carried out in the databases Scopus, EBSCOhost, Academic OneFile, and Educator's Reference Complete (ERIC), because they are the set of information constituted referring to a series of documents in digital format [23]; in institutions of higher education the bases of internal management are important to be able to evaluate the publications [24]; initially a basic or general search was carried out using the variable under study, in thesaurus UNESCO the search is made for the synonyms of the words descriptors of "logical thinking".

With their synonym "reasoning"; in the advanced search the Boolean operators "AND" and "OR" are used, because they allow searches of information of greater complexity, in relation to

the layers of spatial data, they are essential in superposition operations [25]. "The Bolean executors "∧","∨"and "¬" in several examiners are replaced, correspondingly, by "AND", "OR" and "NOT" [26].

The PRISMA flow scheme is a small unit of components, based on evidence, to support to show scope of systematic reviews, manages to be productive for the critical estimation of methodical or informed studies [27] "the PRISMA diagram is a north of transmission of the inquiry delineated to optimize the integrity of the scope of systematic reviews and meta-analyses" [28], making use of selection criteria such as: Inclusion criteria, was limited by each database between the years 2016 to 2021; considering the words "logical thinking" in the general search and "logical thinking", "reasoning" in the advanced search, in the latter the Boolean operators "AND" and "OR" were used; in Scopus, it was delimited by open access, year, thematic area, type of document, article, country, language.

In EBSCO host, it was defined to search for all search terms, full text of articles, date of publication and language. In Academic OneFile, it was restricted to relevance, full-text documents, by publication dates, by type of document. Finally, in Educator's Reference Complete (ERIC), it was limited by relevance, full-text documents, by publication dates, topics, by document type. Databases are considered as the set of information or documents in digital support. Elimination criteria, those that are not verified or systematic review articles, books, essays, web pages, publications in another language other than Spanish, full texts not available for download were excluded; finally, the researchers verify that the scientific articles consider the descriptive words within the title, in addition to being in the abstract and in the conclusions (Table 1).

In the general search in Scopus we found 238 articles; at EBSCO host, 70385; Academic OneFile, 416; and Educator's Reference Complete (ERIC), 158. Then the advanced search was carried out considering the Bolognan operators and using inclusion and exclusion criteria, where 25 articles representing 41.7% were obtained in Scopus; EBSCO host, 23 articles representing 38.3%; Academic OneFile, 8 articles representing 13.3% and Educator's Reference Complete (ERIC), 4 articles representing 6.7%; making a total of 60 items representing 100%.

Table 1: Searching for articles in databases.

Databases	Basic search	quantity	Search variables with logical operators	Outpost	%
Scopus	TITLE-ABS-KEY ("logicalthinking" O "reasoning")	238	TITLE-ABS-KEY ("logical thinking" O "reasoning") Y (LIMIT-TO (FREETOREAD,"all")) Y (LIMIT TO (PUBYEAR, 2020) O LIMIT-TO (PUBYEAR, 2019) O LIMIT- A (PUBYEAR, 2018) O LIMITADO A (PUBYEAR , 2017) O LIMITADO A (PUBYEAR, 2016)) Y (LIMITTO (DOCTYPE, "ar"))Y (LIMIT-TO (SUBJAREA, "SOCI")) Y (LIMIT-TO (LANGUAG , "Spanish"))	25	41.7
EBSCO Host	logical thinking	70385	TX ((mind games) AND (FM P)) AND TX ((logical thinking) AND (FM P))	23	38.3

Academic OneFile	Basic Search: Basic Search: Logical ThinkingLIMITS :Full text	416	Advanced search: Keyword: logical thinking OR Keyword: reasoning LIMITS: Full text AND Fecha: Dec 31, 2014-Dec 31, 2019 AND Document type: "Article"AND Tema: "Educational research"8 Revisar	8	13.3
Educator's Reference Complete	Basic Search: Basic Search: Logical thinkingLIMITS: Full text	158	Advanced Search: Keyword: L ogical Thinking OR Keyword: Reasoning LIMITS: Fulltext AND Date: Dec 31, 2014 - Dec 31, 2019 AND Tipo de documento: "Article" AND Publication title: "Educación"	4	6.7
TOTAL				60	100

In the PRISMA diagram, the search for information was evidenced in four information sheets where a total of 60 research papers were achieved, where 8 articles were excluded because there were duplicates, 7 articles by evaluation of title and abstract, 6 articles by full text, 11 articles by different language, 4 were not articles; leaving for the sample 24 articles for the study (Figure 1).
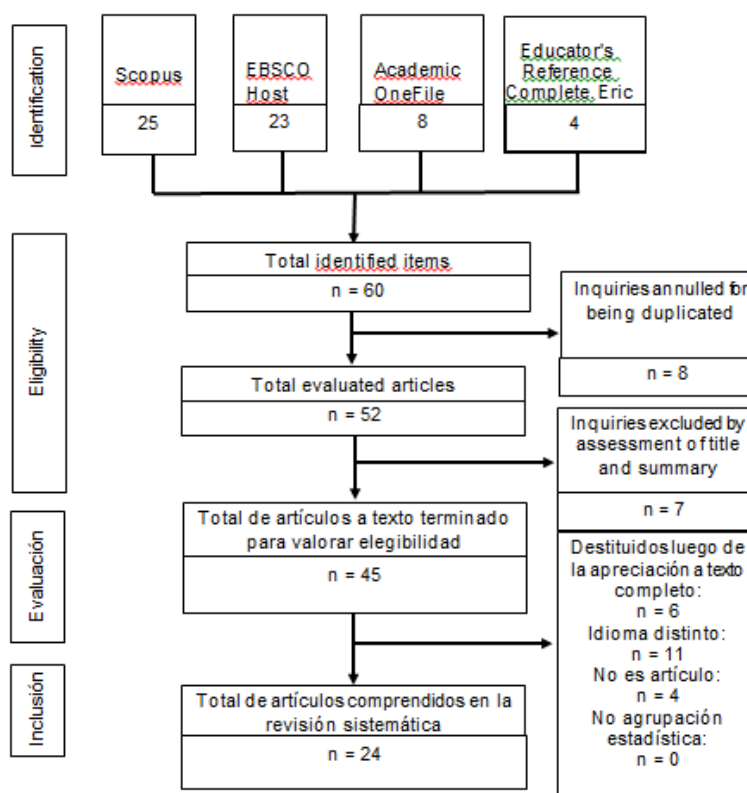
Figure 1: Prism diagram of inclusion and exclusion.

Results

The results consider the analysis of the original articles between the years 2016 to 2021, based on established criteria. In the sample of 24 articles, it is distinguished that all titles have, at least, two keywords of the variable; and the evolution of the concepts and contributions of logical thinking between 2016 and 2021 is evident.

In 2016 it is defined that reasoning is what admits the individual to establish the consistency of events, which involves revealing the various elements that make it up and in 2021 it is defined that the judgment of logic as the solvency of solving difficulties, understanding schemes and operating logic links (Table 2).

Table 2. Conceptual analysis of logical thinking.

Item code	Concept
1	Reasoning is essential to solve the daily difficulties and for the advancement of science, therefore it symbolizes to gain determinations of the propositions, included in them, orcults in a simple way (Saldarriaga, Bravo, & Loor).
2	Logical thinking based on what is called formal logic, because the processes that were discussed are part of the order of thought and the construction of knowledge (Galicia & Vázquez).
3	The improvement of reasoning occupies a significant part in the growing course of infants, therefore it copes with phases of inspection, understanding, study, stimulation and understanding of the interrelationships, also shows several metacognitive axioms (A. P. León, Casas, & Restrepo).
4	The reasoning is the one that allows the individual to implement the connection of some events, also involves revealing several elements that form it, it looks at its organization, the same that must be limited to the context (Pachón, Parada, & Chaparro) .
5	Logical thinking is the way in which individuals with particular affectation, schoolchildren, learn to think from premature ages or beginning collegial existence, which when properly worked from the classroom allow a meaningful reflection (Jaramillo & Puga).
6	The progress of logical thinking in schoolchildren is a course where dialectical links mediate between elements of different existence, where components are involved from the educational to the social and psychic representations that enunciate effective characters (Bermúdez & Villena)
7	Logical thinking is the one that is formed from the interaction of objects and is formed in people and having the ability to understand everything that surrounds us (Suarez, Carlín, Sánchez, & Ruano).
8	Reasoning works the generic ways and norms that govern the discernment and discernment of person, recognized merely in one's own, without mentioning the object; the primordial difficulties of reasoning is the foundation of the concept. (Castro, Jeffers, Figueredo, & González) .
9	Logical-mathematical intelligence usually connects with scientific thinking, and allows us to deduce, ponder, reflect on different choices, form hypotheses, as well as execute complicated mathematical exercises (Medina).
10	Reasoning is the course of extensive diligence with the various areas of action of the individual through their daily existence, so much, takes real significance in the educational space (Travieso & Hernández).

11	The development of logical thinking is a succession linked to the essence of the individual and his ability to reason; the objective of illustration and the right-handedness of mathematics is to be exact and rigorous in reasoning (Naranjo, Sánchez, & Pérez).
12	Logical thinking and magical thinking are currents of a thought that observes the universe allowing a judgment that observes itself in the dark, in the disturbance that reveals, returns to quote and gives to know (Yepes).
13	The Ministry of Education of Colombia, mentions that reasoning is not part of mathematical reasoning, despite the logical judgment endorses and refines mathematical thinking, where logical reasoning can and should also be developed (Ramirez, Hernández, & Prada).
14	Logical thinking is taught and developed by action. The action has as components the objective, dependent on an intrinsic motivation, acts and operations, among others, there are very complicated dynamic relationships (Guerra, Caballero, Hernández, Ochoa, & Domínguez).
15	Children's logical thinking unfolds especially through perception. The diverse experiences of an infant consistent with his appreciation, the comparison with the rest and the things of the world, transport to his imagination events that are beliefs (Molina, Jalón, & Albasarrín).
16	An important component is that the infant from his early years is fundamental to assimilate is to be rational. Therefore, simply that individual who assesses the logical norms that understand and perform it conveniently in mathematical works (Pinos, Ayala, & Bonilla).
17	Logical thinking has the purpose of exposing anomalous of daily existence, thinking logically supports the individual to ask about the functioning of everything that surrounds him (Mazenett et al.,).
18	The infant from early childhood should be logical. From this point of view, it is thought that simply individuals who value logical norms manage to conceive and transfer knowledge (Mapp, Gumercindo, & Cooper).
19	During the course of the study, the logical notions form a primordial and fruitful tool, because through them the infants enunciate their teachings every day in each of the lessons of formative constitution (Lugo, Vilchez, & Romero).
20	Thought can be classified as consistent with the understanding of the element that fertilizes it, therefore it gives reason to thought: figurative, practical, logical and scientific; the last two, is to mention that they do not exist without being related (Nieves, Caraballo, & Fernández).
21	ICT is the initiation of the path to evolution and manages to be estimated as active instruments related to the range of judgment of existing adolescence, originating a revealing and important instruction in habitual existence (Gualdrón et al.,) .
22	Mathematical Logical Thinking, are those formal norms that constitute part of the mathematical language, which primarily consists of all those sets of signs that can symbolize amounts or variables and all the logical relationships that occur between them (Godoy, Abad, & Torres).
23	The progress of reasoning in school age is strengthened when an appropriate understanding and agile exit from the problem is strengthened, both related to learning (Ocampo, García, Macas, Carrasco, & Centeno).
24	Reasoning is the solvency of solving difficulties, understanding schemes and managing logic links (López & González).

Table 3 show of the 24 articles, the majority (11) are qualitative, to a lesser extent (10) quantitative and much less (3) are mixed. According to the categorization of the journals considered by Simago, there is 1 in quartile Q1, 3 in Q3; in MIAR there are 16 journals that have a Composite Index of Secondary Diffusion, ICDS between 3.3 and 10.0; we can also observe that 4 journals do not have ranking categorization.

Table 3: Focus and location of journals according to their categorization.

Item Code	Approach	Magazine	Scimago/Miar
1	Qualitative	Scientific journal: Mastery of Science	ICDS=3.3
2	Quantitative	National and international journal of Inclusive Education	ICDS=7.6
3	Qualitative and quantitative	Panorama	ICDS=9.6
4	Qualitative	Research journal Praxis and knowledge	ICDS=9.5
5	Qualitative	Sophia, philosophy of education collection	ICDS=9.7
6	Qualitative	Electronic Journal Training and Educational Quality (REFCalE)	ICDS=3.9
7	Quantitative	Scientific journal: Mastery of Science	ICDS=3.3
8	Qualitative	Technological Innovation	ICDS=3.4
9	Qualitative	Didasc@lia: Didactics and Education.	ICDS=6.0
10	Quantitative and qualitative	Cuban Journal of Higher Education	Q3
11	Qualitative	Teacher and Society. Electronic magazine for teachers and professors	ICDS=4.2
12	Qualitative	Journal of Education and Humanism	Q3
13	Quantitative	Espacios Magazine	Q3
14	Qualitative	University Pedagogy	ICDS=7.3
15	Quantitative	Contemporary Dilemmas Magazine: Education, Politics and Values.	ICDS=5.9
16	Qualitative	Science & Technology Magazine	Q1
17	Quantitative and qualitative	International meeting of engineering education ACOFI	No data
18	Quantitative	ESPILA Journal Latin American Research Spectrum	No data
19	Qualitative	Logos Magazine, Science & Technology.	ICDS=9.6
20	Quantitative	MENDIVE Education Magazine	ICDS=4.3
21	Quantitative	AVFT Venezuelan archives of pharmacology and therapeutics	No data

22	Quantitative	3C ICT. Development notebooks applied to ICT	No data
23	Quantitative	RISTI Iberian Journal of Information Technology Systems	ICDS=7.6
24	Quantitative	ITL. Ibero-American Journal of Distance Education	ICDS=10.0

Table 4 shows that 2018 is where the largest number (6) articles related to the investigated variable equivalent to 25.0% were published; followed by the years 2016 and 2017 with the same number of articles (5) and in the year 2021, it is where the lowest number of articles (1) representing 4.2% has been published.

Table 4: Journal publications by years according to variable.

Year	No of articles	%
2016	5	20.8
2017	5	20.8
2018	6	25
2019	4	16.7
2020	3	12.5
2021	1	4.2
Total	24	100

Discussion

Taking into account the results in Table 1, on the databases where the systematic review of the information was carried out, collecting and analyzing information on the keywords of the study variable, the articles of four main databases have been selected: Scopus, EBSCO host, Academic Onefile and Educator's Reference Complete (Eric); constituting the set of information or documents in digital support; where it was possible to identify that the database that contains the most information related to the variable of logical thinking in the advanced search is Escopus, which contains the majority of articles; and Educator's Reference Complete (Eric) with fewer articles. Quantitative and qualitative studies have been considered. The notions form the first steps to the real situation, to the unreal situation or to the inter subjective situation, which will have to be as cercerned [29].

In Figure 1, prism diagram has allowed the selection of articles according to the study variable the quantities of the advanced searches of the 4 databases have been taken, where at the end 24 articles have been selected that are directly related to the study variable. In Table 2, the 24 articles are ordered by year in ascending form from 2016 to 2021, where the evolution of the concepts and/or contributions of logical thinking is evidenced; in 2016 it is defined that the reasoning is attributed to the individual to establish the consistency of certain events, where it involves revealing the varied elements that compose it and in 2021 reasoning is defined as the faculty of solving inconveniences,

understanding schemes and operating logic links [30].

In Table 3, it is evident that, of the 24 articles, most are of qualitative approach; according to the categorization of journals for Scimago, there are four journals that have quartile, the identification of the quartiles is with the letter Q and are 4 levels: the green color to indicate the Q1, the yellow Q2, the orange Q3 and the red Q4. Q1 is the one with the greatest impact [31]. Most (sixteen) are in Miar and there is also an amount that has not been located. The MIAR Ranking according to the ICDS, are four groups of journals, ICDS: A), between 10.8 and 11.0; B), between 9.8 and 10.0; C), between 9.5 and 9.7 and, finally, D), journals with an ICDS lower than 9.5 and four have not identified the ranking [32].

In Table 4, it can be seen that in 2018 the largest number of articles related to the variable were published and then it has decreased in the following year and so far in 2021 the least number of articles is being published [33-56].

Conclusion

Of the four most important databases, the ones with the highest number of published articles related to the study variable are Scopus and EBSCO host. The original articles have been selected according to various selection processes of inclusion and exclusion, leaving only those that contain the study variable that are 24 articles. The concept of logical thinking has evolved over time and thanks to the advancement of science and technology that has contributed to developing and fortifying the logical reasoning of school children through the resolution of difficulties and not only by learning concepts. Logical thinking is the solvency of solving difficulties, they value the logical norms are achieved to conceive and transfer knowledge, the logical and scientific do not exist without being related, the logical judgment endorses and refines the mathematical thought, it is strengthened with an appropriate understanding and agile exit from the problem.

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