



Analysis of the Scientific Productivity of Mexican Researchers on the Topic of Gifted Students

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Authors' contributions

This work was carried out in collaboration between all authors. Authors MIDVS and AAVC designed the study, wrote the protocol and supervised the work. Authors MGL and GLA managed the literature searches and classified the information. Authors TRWA and ACRR carried out all analyses of the study, including the statistical analysis. All authors participated in writing and reviewing the research article, as well as approved and read the final manuscript.

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ABSTRACT

The purpose of the study was to conduct a critical analysis of the scientific literature by Mexican researchers about the topic of the gifted students for the period 2003-2013. Within the analysis were included research articles, book chapters and/or books in which a Mexican researcher participated. A bibliometric, thematic and methodological analysis of the literature was conducted.

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The results indicated the existence of Mexican researchers with sustained productivity in the thematic analyses. However, the results also showed limitations on a high geographic, institutional and authorship concentration of the publications, few empirical studies, few publications in journals with high-quality indexing a narrow range of methodological approaches and the predominance of descriptive scope research.

Keywords: Gifted; student; research; Mexico; scientific productivity.

1. INTRODUCTION

The scientific study of the gifted is associated with the development of the measurement of intelligence at the beginning of the 20th century [1]. Nowadays the studies focusing on the gifted address aspects such as: (a) The identification of cognitive, motivational, and psychosocial characteristics [2,3] (b) The development of cognitive and non-cognitive instruments for the identification of those characteristics [4,5]; (c) The factors that affect the cognitive development and the social adaptation of the gifted students [6,7] and (d) the effects of intervention programs [8,9].

The results of the research carried out so far are consistent in noting that the gifted require an enabling context that allows them to develop their personal abilities and to meet their needs and interests for their own benefit and that of society [10]. Proper attention to this group of students, in addition to being an element of social equity, is a resource that can be used to encourage the development of countries and regions [11]. An increased awareness of the importance of the intellectually gifted individuals as part of the human capital necessary for the development within knowledge societies led to an international increased interest (particularly in developed countries) regarding the research and the programs of intervention targeting this segment of the population.

In Mexico the beginnings of the attention to the gifted date back to 1986, where there commenced the programs of educational attention directed to the gifted. Most of these programs focused on primary education. Based on the model of Gagné [12], the Secretaría de Educación Pública –Department of Public Education- (SEP, [10]) defined gifted as "those able of standout significantly from the social and educational group to which they belong in one or more fields of human endeavor" (p. 59). Gifted are characterized by possessing an intelligence well above the average, rapid learning processes, efficient cognitive self-regulation,

elevated motivation for learning and high creativity [13,14].

In recent years, attention to gifted students has been boosted by the educational authorities in Mexico and has manifested itself in proposals for intervention and educational policies intended to improve the care for them. These new policies were initiated by the National Educational Program 2001-2006, and in particular the National Program for the Strengthening of Special Education and Educational Integration, which noted one of the key lines of action was to establish the guidelines for the attention to gifted and talented students and as a target in 2002, designing a model of assistance directed at gifted children and young people [15].

In 2003, the development of the research and innovation project called "A model of educational intervention for students with outstanding aptitudes" was implemented in 13 states of Mexico during the academic year 2006-2007, and subsequently established throughout the country. This program aimed to (a) Increase awareness in society and in particular in the educational community with regard to the characteristics and educational needs of gifted students, (b) Promote the professional development of teachers in special education in order to provide students with an educational response in accordance to their needs; and (c) to reinforce a research program on gifted students.

The topic of the gifted students was taken up again in the policies of the National Development Plan 2007-2012 and the Alliance for Quality in Education signed in 2008 by the federal government and the national syndicate of educational workers. Among the actions proposed were the following: (a) The elaboration of a plan of educational assistance for students with outstanding skills and/or specific talents, (b) the professional development and training of teachers of regular and special education concerning educational attention to gifted students, (c) The elaboration of a program of information and awareness-raising to the

community about issues related to the outstanding capabilities, (d) The design of strategies to promote family involvement in developing the potentialities of their children and (e) A project of intra and inter-institutional linkage to support the process of educational assistance for gifted students [16].

The analysis of the educational attention to the gifted in Mexico reflects that weaknesses remain. Specifically, the weaknesses include: (a) Low coverage of the services provided, (b) Limited research on the processes and methods of identification, (c) Tendency to focus research and attention almost exclusively on the level of primary education, (d) Lack of systematization and continuity in the assistance and care programs, (e) Scarce monitoring and evaluation of the interventions implemented, (f) Limited research on the topic within the country, especially in the middle and higher grade, and (g) Poor integration of the research findings with the educational practices and the assistance programs [17,18].

Due to the importance of research as a tool to form a basis for the design, orientation and evaluation of policies and actions aimed to assist educationally gifted students, and taking into account the scarcity of systematic studies focused on the analysis of the Mexican scientific productivity on this topic in the present study performed a critical analysis of the publications by Mexican researchers on the subject of gifted students for the period from 2003 to 2013. The selection of this period of time is because before 2003 the research on the gifted in the country was scarce, which is reflected in the fact that during the period of 1990-2002 only two research articles on the subject published by Mexican authors in indexed journals were reported [19].

To achieve the abovementioned purpose, the following specific objectives were established: (a) perform a bibliometric analysis of the research on the topic for the period 2003-2013, (b) Develop a thematic and methodological analysis of the empirical research with regard to the themes under study and (c) Conduct a critical analysis of the empirical research in Mexico about gifted students for the corresponding period of 2003-2013.

By bringing out the strengths and limitations of the research on gifted students in Mexico the study aims to provide information about the

advances, gaps and areas of opportunity of the investigation on this topic.

2. METHODOLOGY

2.1 Criteria for the Inclusion of Publications in the Analysis

The publications considered for inclusion in the analysis were those that reported studies or analyses on the theme of gifted students in Mexico whose authorship included at least one Mexican researcher and had been published as research articles, book chapters and/or books.

Theses and papers at conferences or congresses are not included in the analysis. The majority of the theses -especially those at the doctoral level- were published in one or more research articles. In terms of the conference papers, the research team considered the evaluation criteria of many of the academic events that present this type of work do not guarantee a scientific level of the manuscripts.

2.2 Procedure

For the identification and selection of the publications for inclusion in the analyses, the following strategies were adopted: (a) Identification of articles in databases, (b) Review of publications of books about the theme from selected publishers, and (c) Direct contact via e-mail with the give number of identified authors. Identified authors were sent a database with its entries and were asked for authors contacted to incorporate any publications that had not been identified.

3. RESULTS

3.1 Bibliometric Analysis

There were identified 113 manuscripts that dealt with the topic of the gifted students, of which 76 (67.3 %) were published between 2010 and 2013, which showed an increase with regard to the previous years (see Fig. 1).

In terms of the types of publications, the study showed a predominance (55.8%) of publications of secondary sources (books and book chapters) rather than primary sources (journal publications).

According to the concentration of researchers in the Federal District and the State of Mexico, an analysis of the locality of origin of the researchers was performed, in which the state of Jalisco was ranked as the political entity with greater academic production, surpassing even the Distrito Federal which usually provides most of the scientific productivity and the heaviest documentation of researchers in Mexico. It is important to note that only 11 (34.4%) of the 32 political entities in the country have authors ascribed to institutions located in the State, with publications on the topic (see Table 1).

Table 1. Distribution of publications by federal entity

States	<i>n</i>	%
Jalisco	43	38.1
Distrito Federal	16	14.2
Sonora	13	11.5
Morelos	13	11.5
Guanajuato	10	8.8
Yucatán	6	5.3
Chihuahua	5	4.4
Hidalgo	4	3.5
Aguascalientes	1	.9
Tamaulipas	1	.9
Michoacán	1	.9
Total	113	100

In regard to the nature of the publications - empirical studies or works of scientific dissemination- it was found that in the period under study 79 (69.9%) publications were of scientific dissemination, which implies a predominance of these with regard to the empirical studies.

3.2 Analysis of the Empirical Research Published by Mexican Authors during the Period from 2003 to 2013

The reports of empirical research constituted approximately one-third (30.1%) of the publications produced by Mexican academics on the theme of the gifted student. According to the emphasis of the programs of attention on Mexico, more than half of these studies focus on the primary grade levels (see Table 2).

Concentration of the publications in a limited number of researchers was evidenced, since four authors with high productivity appear in 26 (76.5%) of the total number of publications from the analysis period. These researchers are from public universities located in various states of the country (see Table 3).

In relation to the topics covered by Mexican researchers in the publications analyzed for this study, it was observed that the topics addressed with greater frequency were those relating to socio-affective and cognitive aspects, and intervention strategies (see Table 4).

3.3 Analysis of the Journals of Publication of Research Reports

An analysis was made of the scientific journals in which the research articles on the topic were published, with regard to the country of origin of the journal and its indexing quality. Three levels of quality in the indexing were established: (a) "High", indexed in at least one database of scope at the international level such as Scopus, Wiley, Ebsco, Web of Science, Sage or Elsevier; (b) "Medium", indexed in databases in scope across Ibero and Latin American level, for example Redalyc, Scielo, Latindex, IRESIE or CSIC; and (c) "Low", those journals that do are not indexed (see Table 5).

Table 2. Distribution of publications by grade level

Grade level	<i>n</i>	%
Preschool	1	2.9
Primary school	20	58.8
Middle school	5	14.7
High school	6	17.7
Higher education	2	5.9
Total	34	100

Table 3. Authors appearing in greater numbers of publications from 2003 to 2013

Author	<i>n</i>	Institution of origin / affiliation
Valadez, M.	8	Universidad de Guadalajara
Acle, G	5	Universidad Nacional Autónoma de México
López, G.	5	Universidad Autónoma del Estado de Morelos
Valdés, A.	5	Instituto Tecnológico de Sonora

As it is noted in the table above, all the research articles on giftedness produced by Mexican authors during the period under review were published in Spanish-language journals, mainly in Mexico (57.1%) and Spain (42.9%). The largest number of manuscripts (75.8) were published in journals with medium quality in its indexing, few publications -only 15.6%- were those with high quality.

3.4 Methodological Analysis of the Publications of Research Reports

In the analysis of the research reports, 29 (76.5%) studies employed a quantitative methodology and five (23.5%) were qualitative [49-53]. The cross-sectional research design predominated only one investigation of longitudinal design was located.

The 79.4% of the quantitative studies were non-experimental, being majority those of descriptive (38.7 %) and comparative (28.6 %) scope. The use of univariate inferential statistical models prevailed (73.6%), this with regard to the descriptive (17.6%) and the multivariate inferential ones (8.8%). In experimental studies -

which were minority (29.6%)- most designs were pre-experimental (66.7%) and all used univariate inferential analyses (see Table 6).

Table 4. Distribution of the topics covered in the studies

Themes/topics	n	%
Socio-affective aspects	10	29.4
Intervention strategies	5	14.7
Cognitive aspects	5	14.7
Identification	4	11.8
Design of instruments	4	11.8
Family	3	8.8
Teachers	2	5.9
Educational needs	1	2.9
Total	34	100

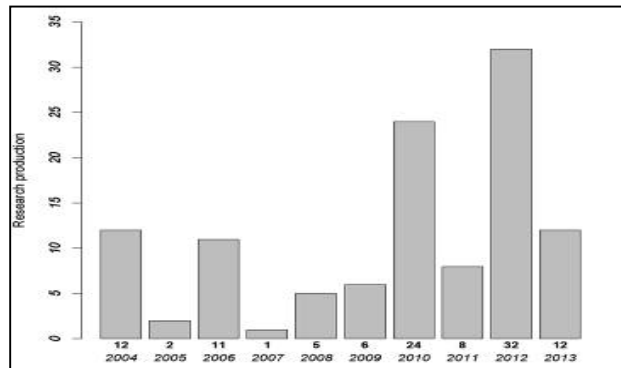


Fig. 1. Distribution of publications per year (n = 113)

Table 5. Country and level of impact of the journals where research articles were published

Name of the journal	Research articles		Country	Level of indexing
	n	%		
Revista Ideación	11	33.3	Spain	Medium
Revista de Educación y Desarrollo	3	9.2	Mexico	Medium
Faísca. Revista de Altas Capacidades	3	9.2	Spain	Medium
EJREP*	3	9.2	Spain	High
RIDPL*	2	6.1	Spain	Medium
RIE-REDIECH*	1	3	Mexico	Low
RIMTM*	1	3	Mexico	Low
Revista Panamericana de Pedagogía	1	3	Mexico	Medium
Investigación y Ciencia	1	3	Spain	Medium
Revista Educación y Ciencia	1	3	Mexico	Medium
Revista Educar	1	3	Mexico	Low
Revista Iberoamericana de Educación	1	3	Spain	Medium
Pensamiento Psicológico	1	3	Colombia	Medium
Acta Colombiana de Psicología	1	3	Colombia	High
REIE*	1	3	Mexico	High
RMIP*	1	3	Mexico	Medium

*Abbreviations. EJREP = Electronic Journal of Research in Educational Psychology; RIDPL = Revista de Investigación y Divulgación en Psicología y Logopedia; RIE-REDIECH = Revista de Investigación Educativa de la REDIECH; RIMTM = Revista Investigación Multidisciplinaria del Tecnológico de Monterrey; REIE = Revista Electrónica de Investigación Educativa; RMIP = Revista Mexicana de Investigación en Psicología.

The qualitative studies, which are a minority, were all descriptive and mostly used a phenomenological approach, since they focused on the study of beliefs and/or meanings of diverse actors towards aspects related to the outstanding students (see Table 7).

4. FINDINGS

This section was developed taking into account the purpose of the study, which consisted of developing a critical analysis of research in Mexico with respect to the gifted students during the period 2003-2013. Conclusions are organized on the basis of the strengths and limitations of the scientific productivity of the country on the topic of giftedness.

4.1 Strengths

Strengths were defined as those characteristics that indicate a quantitative or qualitative

advancement of research and knowledge generated by Mexican researchers regarding the gifted intellectual aptitudes. Among these are: (a) An increase in the number of publications during the last years of the period evaluated, which may suggest a greater interest in the subject within the Mexican researchers; (b) The existence of a group of researchers with sustained production on this topic during the period of time considered and (c) The use and development of a wide variety of issues related to the gifted students.

The above can be explained due to the fact that in the last 10 years the topic of the gifted has always been included in the educational policy [54], leading to the development of programs of attention directed to this group of students and the increase in support for studies in the thematic from funding agencies of the research in Mexico, such as the SEP and the National Council of Science and Technology.

Table 6. Methodological analysis of the publications with quantitative approach

Author(s)	Type of study	Design
Acle and Ordaz (2010) [20] Chávez, Zacatelco and Acle (2009) [21] López-Aymes and Acuña (2012) [22] Muñoz and López (2010) [23] Valadez et al. (2013) [24]	Pre-experimental	Cross-Sectional
Chávez and Zacatelco (2010) [25] Acuña and López-Aymes (2010) [26]	Quasi-experimental	Longitudinal Cross-Sectional
Cervantes et al. (2011) [27] De la Torre (2005) [28] Covarrubias (2012) [29] Gómez and Valadez (2010) [30] López-Aymes, and Acuña (2010) [31] Márquez and Martínez (2011) [32] Valadez, Meda, and Zambrano (2006) [33] Valdés et al. (2012) [34]	Descriptive	Cross-Sectional
González (2010) [35] Valadez, Borges, Ruvalcaba, Villegas, and Lorenzo (2013) [36]	Correlational	Cross-Sectional
Martín, Medrano, and Sánchez (2005) [37] Ordaz & Acle (2012) [38] Valadez, Meda, and Matsui (2004) [39] Valadez, Pérez, and Beltrán (2010) [40] Valdés, Vera, and Carlos (2013) [41] Zambrano and Valadez (2011) [42]	Comparative	Cross-Sectional
Valdés, Sánchez, and Yáñez (2013) [43] Ordaz, Reyes, and Acle (2010) [44] Sánchez, García, and Valdés (2009) [45] Sánchez and Medrano (2010) [46] Valdés, Carlos, Vera, and Montoya (2012) [47] Zacatelco and Acle (2009) [48]	Classificatory Validation of instruments	Cross-Sectional Cross-Sectional

Table 7. Analysis of the qualitative research in the thematic analysis

Author(s)	Scope	Approach
Calatayud, Forero, and Ramírez (2007) [49]	Descriptive	Investigation-action
Mercado and López-Aymes (2010) [50]	Descriptive	Phenomenological
García and López-Aymes (2010) [51]	Descriptive	Phenomenological
Covarrubias (2012) [52]	Descriptive	Phenomenological
Covarrubias, Garibay, Armendáriz, and Marín (2013) [53]	Descriptive	Phenomenological

4.2 Limitations

The limitations were considered as those particularities of the research involving design deficiencies in the knowledge produced on the topic. In the bibliometric analysis were identified deficiencies such as: (a) A limited number of empirical studies, and (b) A high concentration (geographical, institutional and by authorship) in the scientific productivity about this topic within the country.

In addition, the thematic analysis showed that the studies focused almost exclusively on the level of primary education, which entailed a neglect of the investigation with respect to other levels of education with the consequent limitation that this causes in the knowledge necessary for decision-making and the development of suitable programs of intervention to students coursing other levels of study.

The methodological analysis revealed that publications focused on dissemination prevailed over those that include reports of empirical studies, which represented only 32.7% of the total. Another aspect to be noted is that less than 20% of the studies (17.6%) were published in journals with high-quality of indexing. Although this may be an indirect indicator of the quality of the knowledge generated in the studies, it suggests that most of the works realized on the topic by Mexican researchers lacks the theoretical and methodological soundness for publication in journals of this level.

Regarding quantitative studies there are evidences suggesting methodological deficiencies and lack of statistical recourses for the analysis of the data, therefore, the need for more robust methodological designs and the use of more powerful statistical tools. Within these indicators are: (a) Low presence of longitudinal studies; (b) Predominance of pre-experimental designs, which are well known by having important weaknesses in regard to the internal validity; (c) Absence of studies of explanatory scope in the topic and (d) Use of univariate

statistical models, which do not allow the simultaneous analysis of multiple variables.

Also worth noting is the limited amount of work done with qualitative methodologies, which implies that there is few knowledge contributed to the understanding of the object of study from this perspective of research. On the other hand, the sprinkling qualitative studies that exist are descriptive in nature, so that their contribution is restricted to the elaboration of comprehensive models in this group of students.

These limitations are associated with a more general problem of science in Mexico, which is the limited number of researchers in the country. In 2014 there were in the country 21,358 researchers registered at the National Council of Science and Technology, of which 14.71% belonged to the area of Humanities and Education, which implies that in a country of more than 100 million inhabitants there were only 3,141 researchers devoted to these topics [55]. In addition, it is important to note that the theme of the gifted is one that brings the lower number of researchers in that area (see Tables 6 and 7), with only 22 investigators with publications on the topic as first authors during the time period studied. This particular lack of researchers in the topic can be attributed to the fact that it does not constitute a priority when compared with the serious problems that the education faces in the country.

Moreover, the existing educational programs for the gifted are reduced to primary education and have little rigor and consistency in the implementation of their actions. This hinders the work of the researchers, since it prevents students from being identified, causing difficulties for access to this population. On the other hand, it is difficult to assess intervention programs that do not apply or are improperly conducted.

In particular, we consider that the work done in Mexico with regard to the gifted is limited by the beliefs of teachers and researchers who consider

that the existence of differentiated programs for this group of students contributes to increase the inequality in education and would result in the creation of an academic elite.

5. CONCLUSIONS AND RECOMMENDATIONS

In summary, it is argued that despite some signs that denote a growth of research in the subject-matter of the gifted students in the country, in a general way this suffers from significant limitations that need to be addressed to be able to generate the necessary knowledge that will serve as a basis for the projects of intervention and support to this group of students in Mexico.

Based on the findings of this study, some recommendations are suggested to consolidate the investigation about the "gifted" in the country, such as: (a) Broaden the base of researchers of the subject-matter in the country, (b) Ensure that there are studies aimed at all educational levels, (c) Strengthen the empirical research, (d) Use various methodological perspectives, and (e) improve the quality and scope of the investigations carried out.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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