

Contributions of research groups from CNPq to the research in historical-cultural theory

Contribuições dos Grupos de Pesquisa do CNPq para a pesquisa na teoria histórico-cultural

Daniel Trugillo Martins Fontes¹

Ediane Maria Gheno²

André Machado Rodrigues³

ABSTRACT

This article presents a quantitative overview of research in cultural-historical theory in Brazil from the 96 Research Groups in the areas of education and psychology registered in the CNPq directory surveyed by Asbahr and Oliveira (2021). Bibliometric and scientometric indicators of production and training of human resources of 1,963 researchers were applied. Data collection took place in the *Lattes* Curriculum, using the *ScriptLattes* software for extraction. The researchers of the Research Groups presented a multidisciplinary formation, with degrees in several areas of knowledge. In addition, the results allowed us to affirm that there is no significant difference in the number of articles published between the research groups in the area of Education and in the area of Psychology. This article contributes to the understanding of the state of the art in the area of cultural-historical theory research based on diversified indicators on the profile and scientific production of researchers who are members of CNPq Research Groups.

Keywords: cultural-historical theory. Research Groups. CNPq. Bibliometrics.

RESUMO

O presente artigo apresenta um panorama quantitativo da pesquisa em teoria histórico-cultural no Brasil a partir dos 96 Grupos de Pesquisa das áreas educação e psicologia cadastrados no diretório do CNPq levantados por Asbahr e Oliveira (2021). Aplicaram-se indicadores bibliométricos e científicos de produção e de formação de recursos humanos de 1.963 pesquisadores. A coleta de dados deu-se no Currículo *Lattes*, utilizando o software *ScriptLattes* para extração. Os pesquisadores dos Grupos de Pesquisa apresentaram uma formação multidisciplinar, com titulação em diversas áreas do conhecimento. Além disso, os resultados permitiram afirmar que não há diferença significativa no número de artigos publicados entre os Grupos de Pesquisa da área de Educação e da área de Psicologia. O artigo contribui para o entendimento do estado da arte da área de pesquisa histórico-cultural a partir de indicadores diversificados sobre o perfil e o desempenho de pesquisadores membros de Grupos de Pesquisa do CNPq.

Palavras-chave: Teoria histórico-cultural. Grupos de Pesquisa. CNPq. Bibliometria.

¹Degree in Physics and Philosophy. Master's and PhD student in the Interunits Postgraduate Program in Science Teaching at the Universidade de São Paulo, Brazil. Orcid: <http://orcid.org/0000-0002-4741-2067>. E-mail: daniel.fontes@usp.br.

² Bachelor's degree in Library Science. Master's and PhD in Science Education from the Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil. Orcid: <https://orcid.org/0000-0003-2743-4557>. E-mail: ghenoediane@gmail.com.

³ Degree in Physics, Master's and Doctorate in Science Teaching. Professor at the Physics Institute of the Universidade de São Paulo, Brazil. Orcid: <http://orcid.org/0000-0001-7109-5295>. E-mail: rodrigues.am@usp.br.

1 Introduction

In the last decade, cultural-historical theory—with its various denominations—has gained traction in Brazil, particularly in the domain of Science Education (GEHLEN and MATTOS, 2009; TOASSA, 2016; CAMILLO and MATTOS, 2019). From another perspective, Roth, Lee, and Hsu (2009) also noted that, from 1989 to 2009, academic papers indexed in Clarivate Analytics' Web of Science (ISI) database that cite Vygotsky, Leontiev, and Engeström grew exponentially. Recently, Asbahr and Oliveira (2021) conducted a comprehensive survey of Research Groups (RGs) registered with the National Council for Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq) in the area of cultural-historical theory. The present study is situated within this broader context. The raw data provided by Asbahr and Oliveira (2021) was utilized to expand and enhance the characterization of the domain of cultural-historical theory research in Brazil, with particular attention to its scientific production and the training of human resources.

Asbahr and Oliveira (2021, p. 567) conducted a survey of RGs with the objective of "identifying research groups registered in the Directory of Research Groups of the National Council for Scientific and Technological Development (DGP-CNPq) that point to Psychology or Historical-Cultural Theory as their assumed theoretical framework." Utilizing a search strategy encompassing 15 distinct keywords, including the group's name, description, and/or primary research area, the authors identified 115 groups within the domain of cultural-historical theory. Of these, 103 groups were classified under the categories of Education and Psychology. The remaining 12 RGs were classified into eight distinct areas, namely: administration, anthropology, nursing, literature, linguistics, physics, mathematics, and public health. Asbahr and Oliveira (2021, p. 573) conclude their article with the expectation that the scientific community will continue the study: "We hope that the raw data presented below in alphabetical order can serve as material for further research into the extension of cultural-historical theory in Brazil." The information concerning the

researchers associated with the RGs in Education and Psychology was utilized to ascertain their salient characteristics. This was accomplished through an analysis of the areas in which they hold degrees, their scientific production, and the training of human resources. From this perspective, the present work proposes to engage in a dialogue with and expand upon the contributions of Asbahr and Oliveira (2021), while also encouraging further studies that are aimed at producing a reflection on the characteristics, organization, and trends of research in the domain of cultural-historical theory.

To achieve the proposed objective, bibliometric and scientometrics indicators were applied. These disciplines constitute the Metric Studies of Information (MSI), which, based on quantitative indicators of scientific activities, provide important information on the growth and development of science and make it possible to assess the performance of researchers, institutions, and countries (GLÄNZEL, 2003).

Bibliometric, in its turn, is defined as the study of the quantitative aspects of the production, dispersion, and use of recorded information, constituting a segment of Information Science (TAGUE-SUTCLIFFE, 1992). Conversely, scientometrics is defined as the study of the quantitative aspects of science as a discipline or economic activity (PRICE, 1963; TAGUE-SUTCLIFFE, 1992; GLÄNZEL, 2003). It is a segment of the sociology of science, applied to the definition of public policies in science and technology.

In these terms, both disciplines, along with the others that have emerged over the years (Informetrics, Webmetrics, Patentometrics and Altmetrics), are present in the different areas of the Human Sciences. As Hayashi (2013) explains, they are constituted as

As stated by Hayashi (2013, p. 66), this interdisciplinary field is dedicated to the quantitative study of science and technology. Its objective is to evaluate the scientific and technological output produced by the scientific community within areas of knowledge. The aforementioned output includes articles, books, book chapters, papers published in proceedings of events, and patents.

The utilization of these metrics in this study will facilitate an understanding of the contributions of researchers from CNPq's Education and Psychology RGs to the production of scientific knowledge and the training of human resources.

2 Materials and methods

This descriptive study employs a quantitative approach, utilizing bibliometric and scientometrics indicators of scientific production (number of papers published), human resources (number of researchers by area and profile), and human resources training (number of master's and doctoral degrees awarded and in progress) of the members of the 96 CNPq Research Groups engaged in research within the domain of cultural-historical theory. As previously delineated, the list of these RGs was obtained from the study conducted by Asbahr and Oliveira (2021). The aggregation level of this study is regarded as micro (GLÄNZEL, 2003), as it assesses researchers affiliated with Brazilian higher education institutions. The data were collected from the Lattes CVs of the 1,963 researchers who are members of the RGs between August 18 and September 24, 2021. However, at the time of the survey, seven links were deactivated, which rendered it impossible to access the RGs in the DGP-CNPq. Consequently, the total number considered was 96 RGs, 64 from the education area and 32 from the psychology area. The ScriptLattes software (MENA-CHALCO and CESAR JUNIOR, 2009) was used to extract data from researchers on the Lattes Curriculum platform. As data extraction through ScriptLattes is contingent upon the researchers' Lattes ID, the Lattes Curriculum ID was obtained manually from the link to the RG mirror provided by Asbahr and Oliveira (2021). In these terms, the following fields were retrieved, considering the period 2000-2020:

- i) Researcher degrees: Bachelor's, Master's, and Doctoral degrees (in progress or completed);
- ii) Scientific production: full papers published in journals, books (published, organized, or edited), book chapters, and full papers published in proceedings;
- iii) human resources training (supervision completed): master's degrees,

doctoral degrees, and postdoctoral supervision. In this case, only researchers who were supervised during the period were included in the analysis, representing 16.0% of the total.

2.1 Data processing and analysis

The processing and normalization of the data, as well as the execution of the analyses, were carried out using Excel software and the R programming language. The following actions were taken regarding processing and normalization:

a) The degrees reported in the Lattes CV were grouped. Initially, the terms "degree," "graduate," "baccalaureate" and "bachelor" were eliminated from the degree descriptions, as their relevance was deemed negligible.

b) A subsequent investigation revealed that 0.3% (six cases) of the total number of researchers possess two master's degrees, while 0.2% (five cases) hold two doctorates. It was decided to maintain the area and period of the last master's and doctorate. The areas of the degrees (undergraduate, master's, and doctorate) were grouped based on the radicals or common terminations of the words, and the set of letters "engi" was always linked to engineering courses. Consequently, all terms containing "engi" in the engineering field were consolidated into a single group. This process was repeated multiple times for each degree level, with the CAPES⁴ areas and sub-areas serving as a reference. For instance, master's and doctoral degrees belonging to the fields of "mathematics education," "science education," "science and mathematics education," "science teaching," "science and mathematics teaching," and "science education," among other combinations, were classified under sub-area 90201000 Science and Mathematics Teaching. During this process, numerous typing errors were identified, as some CVs listed the degrees in the following spellings: "pedgogia," "pegagogia," "bilogia," among others. In such cases, the data has been standardized.

⁴ CAPES areas and sub-areas are available at: https://www.gov.br/capes/pt-br/centrais-de-conteudo/TabelaAreasConhecimento_072012_atualizada_2017_v2.pdf.

It was determined that 28 researchers (representing 1.4% of the total sample) did not report their graduate coursework in their CVs, despite having reported their master's and doctoral degrees. In these cases, the degrees were not considered; only the other degrees were reported.

e) The multivariate linear regression method (AGRESTI and FINLAY, 2012) was used to assess the relationship between the number of articles in journals by RGs and the proportion of researchers with doctoral degrees controlled by the areas of interest of education and psychology (see Graph 6).

3 Results and discussion

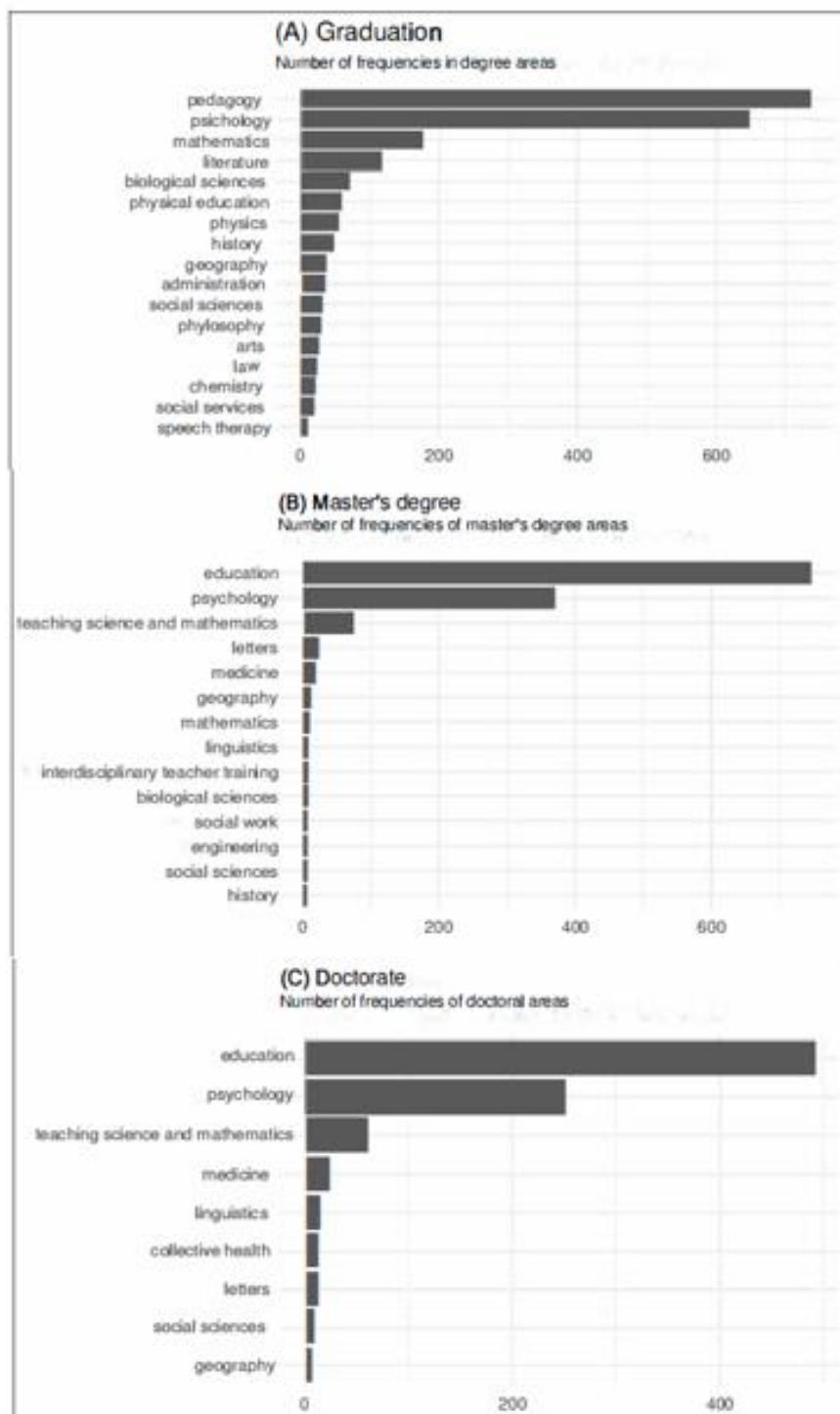
The ensuing results were methodically arranged into three distinct sections: 3.1) Profile of Research Groups (number of RGs per area, number of researchers per RG, areas in which the researchers per RG hold degrees); 3.2) Scientific Production per RG; and 3.3) Training of Human Resources.

3.1 Profile of the researchers who constitute the Research Groups

A total of 96 RGs were analyzed, 64 of whom were registered in the field of Education and 32 in the field of psychology. This yielded a total of 1,963 member researchers, of whom 1,263 were members of the Education area and 674 of the Psychology area. The analysis revealed that 26 researchers are affiliated with RGs from both domains, with an average of 20.4 researchers per RG.

Graphs 1 (A-C) illustrate the academic backgrounds of the researchers affiliated with Education and Psychology RGs, categorized by degree level (undergraduate, master's, and doctoral). The analysis identified a total of 145 distinct graduate courses, which suggests that the RGs possess a multidisciplinary background (see Graph 1A). The three graduate courses that were most frequently identified were Pedagogy ($n = 735$), representing 31.2% of the total, followed by Psychology ($n = 648$), accounting for 27.5%, and Mathematics ($n = 176$), constituting 7.5%.

Graph 1 - Degree areas of the researchers who are members of the CNPq Research Groups in the areas of Education and Psychology: (A) Bachelor's, (B) Master's and (C) Doctorate with the highest frequency



Source: Prepared by the authors, based on survey data

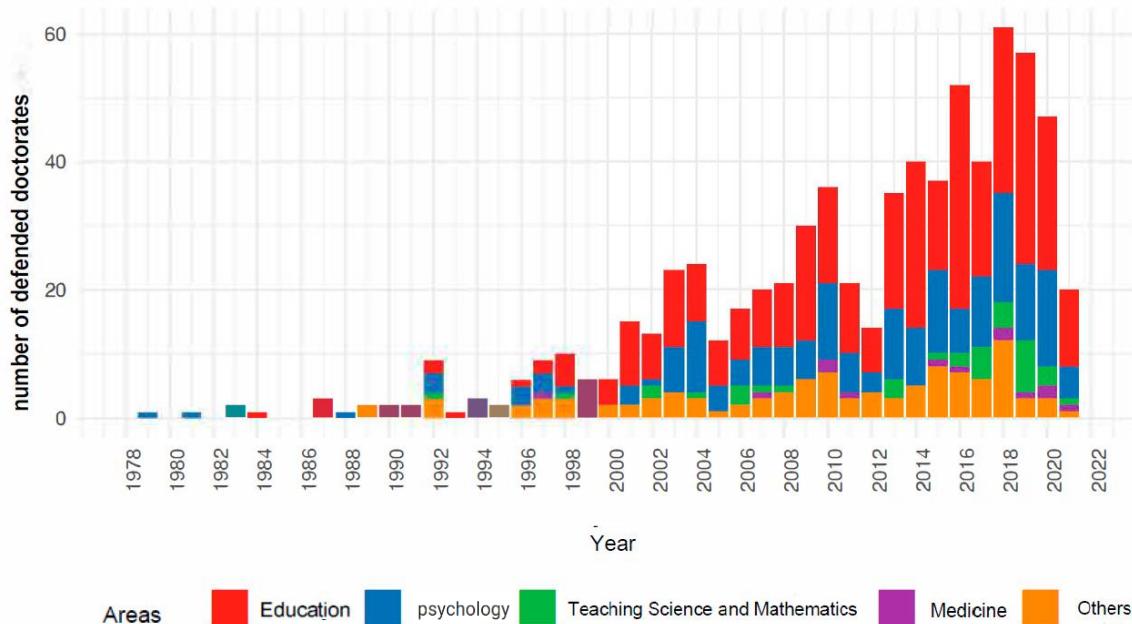
A comparison of the data (Graph 1A) reveals a discrepancy between the number of RGs in the Education area and the number of RGs in the Psychology area. While the former has twice the number of members as the latter, this ratio is not proportionally reflected in the areas of graduation. Consequently, RGs in Education are more diverse in their graduate course areas and exhibit greater heterogeneity.

In the context of postgraduate studies (see Graphs 1B-C), a discernible gap emerges between the Education and Psychology domains. This disparity persists across both masters and doctoral programs, suggesting that researchers specializing in RGs may predominantly employ a cultural-historical theoretical framework within the educational domain, with challenges arising predominantly from the Education sector rather than the Psychology domain.

This observation is further substantiated by the predominance of researchers holding postgraduate degrees in Science and Mathematics Teaching across both master's and doctoral programs. The substantial presence of researchers with postgraduate qualifications in this field aligns with the findings reported by Camillo and Mattos (2019). The findings of this study corroborate the results obtained by Bonfim, Solino, and Gehlen (2019) on the use of Vygotsky as a theoretical reference in dissertations and theses in the area of Science Education in Brazil. According to these authors, there has been a significant increase in theses and dissertations defended between 1991 and 2016 that use Vygotskian concepts. In this study, the majority of researchers obtained their doctoral degrees in Science and Mathematics Teaching from 2016 onwards.

Graph 2 illustrates the temporal progression of the primary domains in which doctoral dissertations were submitted for consideration. Among the 1,963 researchers from the RGs who were examined, 683 (34.8%) have successfully completed their doctorates, which were conferred between 1979 and 2020.

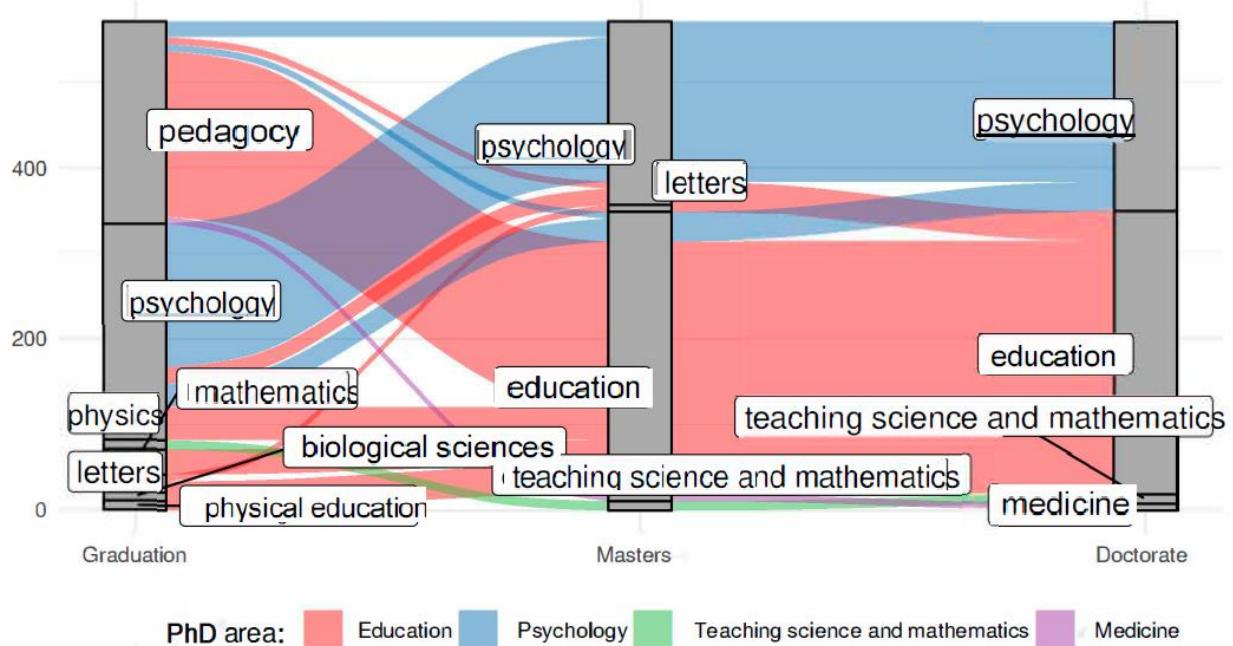
Graph 2 - Number of researchers who are members of CNPq Research Groups in the areas of Education and Psychology with a doctorate by area and year of graduation



Source: Prepared by the authors, based on survey data

Accordingly, the first doctorate was conferred in 1979 in the field of psychology, followed by the conferral of the first doctorate in education in 1984. Although a PhD defense in mathematics science teaching was conducted in 1983, this was an exception. In the area of science and mathematics teaching, the majority of doctorates were awarded after 2013. It is noteworthy that the first doctoral defense in a field apart from psychology, education, science and mathematics teaching, and medicine occurred in 1989. However, it was not until 1995 that other fields began to emerge more frequently. Given the diversity of doctoral programs within the RGs, it is essential to examine the trajectory of those who have completed or are currently completing a doctorate. Graph 3 illustrates the movement of the areas in which all researchers with a doctorate have completed or are in progress, with $n = 893$ researchers constituting 45.5% of the total.

Graph 3 - Movements in the areas of the 893 researchers who are members of the CNPq Research Groups in the areas of Education and Psychology with completed or ongoing doctorates



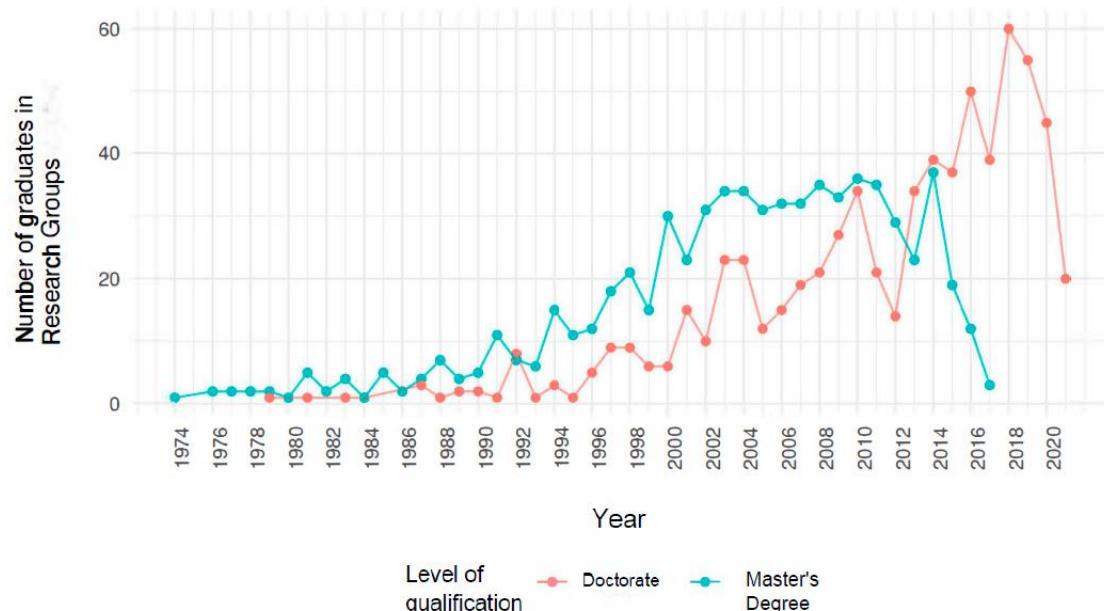
Caption: The colors used refer to the area of the doctorate. Red indicates a doctorate in education, while blue indicates a doctorate in psychology.

Source: Prepared by the authors, based on survey data.

As illustrated in Graph 3, two distinct pathways were identified: 1) the attainment of a master's degree in education and a doctorate in education was indicative of graduation in pedagogy, which corresponded to 193 researchers (21.6%), and 2) the possession of a master's degree in psychology and a doctorate in psychology was indicative of a degree in psychology, which corresponded to 168 researchers (18.8%). Notably, the transition between these two areas corresponded to more than half of the researchers with a completed doctorate or a doctorate in progress (59.0%), indicating a significant shift in academic trajectories. For instance, some researchers initially pursued a degree in psychology at the undergraduate level but subsequently obtained a doctorate or are currently enrolled in a doctorate program in Postgraduate Programs in Education. It is also noteworthy to examine the academic background of individuals who hold masters and doctoral degrees in Science and Mathematics Teaching. A significant proportion of these individuals (11

researchers) possess a degree in physics, with most concentrating in a single RG. This observation underscores the prevalence of diverse pathways leading to doctoral degrees. Graph 4 provides a visual representation of the graduation dates of the researchers comprising the 96 RGs.

Graph 4 - Year of master's and doctoral degrees awarded to researchers in the 96 CNPq Research Groups in the areas of Education and Psychology



Source: Prepared by the authors, based on survey data.

One interpretation of the decline in master's degrees from 2014 and doctorates from 2017 may be associated with the delay in updating the CVs of its members on the RG portal, as well as the restriction of funds from primary scientific research funding agencies, as Silva Júnior and Fargoni (2021) have noted.

3.2 Scientific production

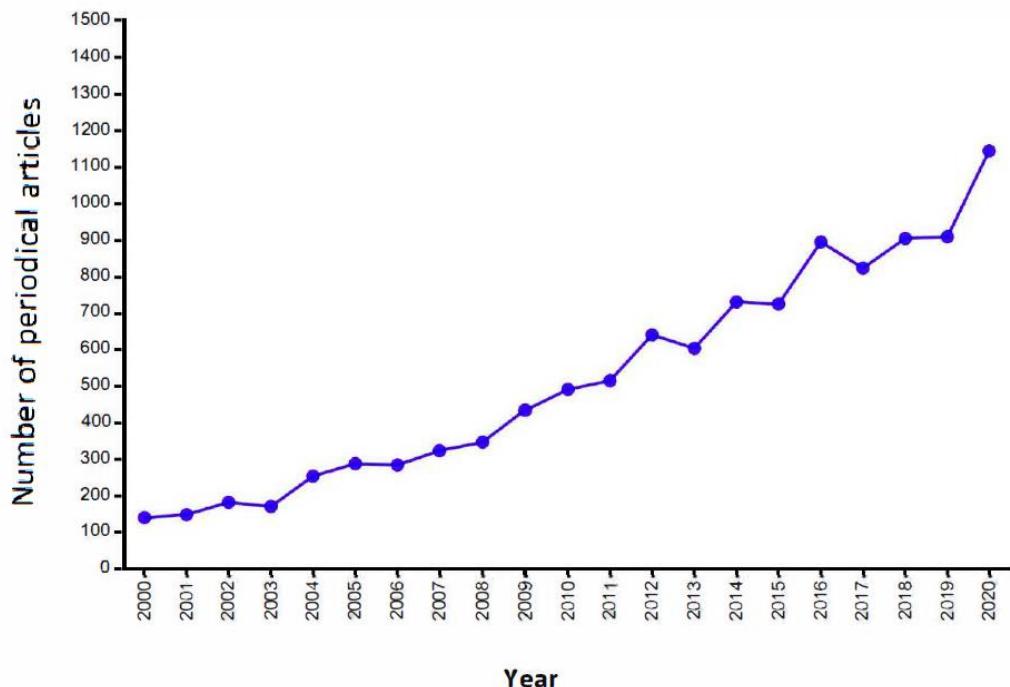
A comprehensive analysis of the scientific output of the 1,963 researchers affiliated with the RGs from 2000 to 2020 revealed a total of 43,876 presentations at scientific events, 2,851 books, 9,410 book chapters, 13,956 full

papers in conference proceedings, and 10,974 full articles in journals. On average, researchers present 2,000 papers at national and international scientific events per year. It is important to note that these figures represent the total scientific output per researcher. However, some publications have multiple authors, and both authors are members of the RGs analyzed. Therefore, if each author included the publication in question in their respective Lattes CV, then it was counted more than once when surveying with Script Lattes. Consequently, a comprehensive analysis of individual scientific production is being developed for future studies.

A close examination of the distribution of the number of articles published in journals over the years reveals a substantial increase, with two periods of particular note: i) from 2008 to 2012, there was a continuous growth. The number of published articles doubled during this period compared to previous years. The second significant increase in publications occurred from 2019 to 2020, with a 25.9% growth rate, the highest percentage growth observed during the entire study period.

However, the findings do not allow for the establishment of a causal relationship with the points made in the literature, as previously noted by Salém (2012), Silva and Hai (2016), and Bonfim, Solino, and Gehlen (2019). The authors of the study attribute this increase to the growing use of a Vygotskian theoretical framework in recent decades. While the results of this study demonstrate an increase in the number of dissertations and theses defended, it cannot be inferred that this is correlated with the number of articles published in journals by the same researchers. In other words, it cannot be guaranteed that the continuous growth over the years in the number of articles published in journals is the result of an increase in the number of dissertations and theses defended.

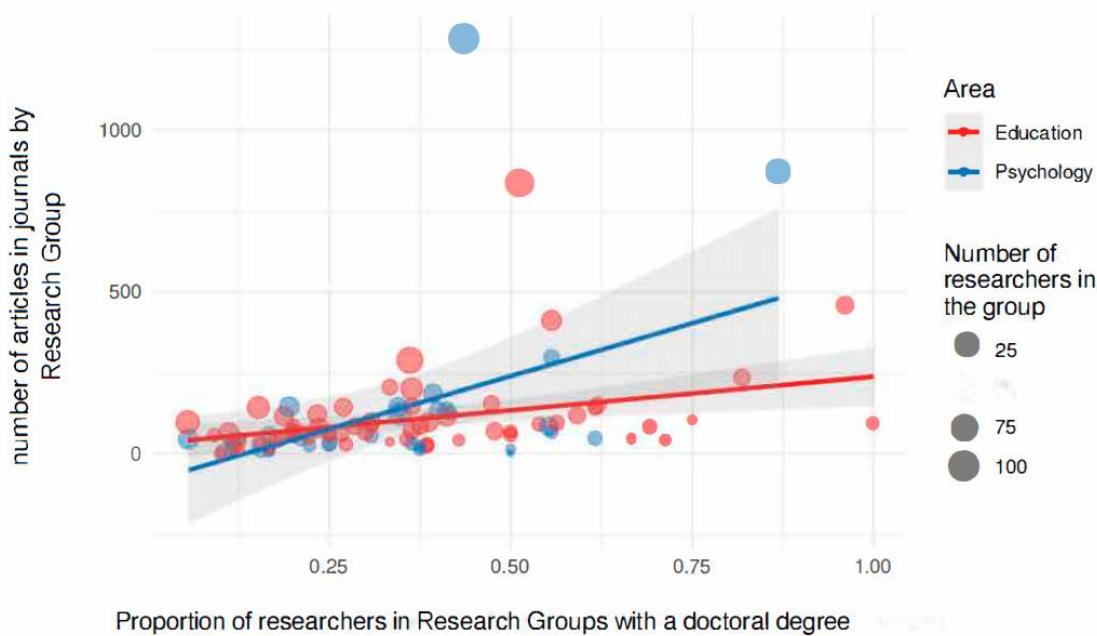
Graph 5 - Distribution of the number of articles in journals by researchers who are members of CNPq Research Groups in the areas of Education and Psychology by year (2000-2020)



Source: Prepared by the authors, based on survey data.

Finally, about academic production, Graph 6 presents three variables: 1) the number of articles in journals per RG, distinguishing between Education and Psychology; 2) the proportion of researchers with completed doctorates in RG; and 3) the number of researchers per RG.

Graph 6 - Distribution of the number of articles in journals by CNPq Research Group in the areas of Education and Psychology, 2000-2020



Caption: Education Research Groups: 64; Psychology Research Groups: 32. The count of articles for each RG is per researcher, with 26 researchers belonging to two or more RGs classified in both areas, Education and Psychology; 53 researchers belonging to two or more RGs classified in the area of Education and 33 researchers belonging to two or more RGs classified in the area of Psychology. The filled line indicates the linear regression, and the gray shading indicates the standard deviation of the sample.

Source: Prepared by the authors, based on survey data.

Graph 6 shows two line segments representing the average number of journal articles per RG. Both segments have a positive slope, indicating that, on average, as the proportion of Ph.D. researchers per RG increases, so does the number of articles published by RGs. The size of the circle indicates the number of researchers per RG. The smallest group has two members and the largest 110.

The statistical treatment of the data presented in Figure 6 allows us to conclude that

- i) There are no significant differences in the production of articles between

the different fields of education or psychology. Both fields contribute equally to research based on cultural-historical theory.

- ii) There are no significant differences in the production of articles by the different RGs. Only three of the 96 RGs produced significantly more than the average.
- iii) The number of articles in journals is statistically significant in relation to the proportion of Ph.D. researchers in the RGs and in relation to the number of researchers per RGs⁵.

Therefore, in general, research in cultural-historical theory, represented by the RGs of education and psychology found by Asbahr and Oliveira (2021), and has developed symmetrically between the fields.

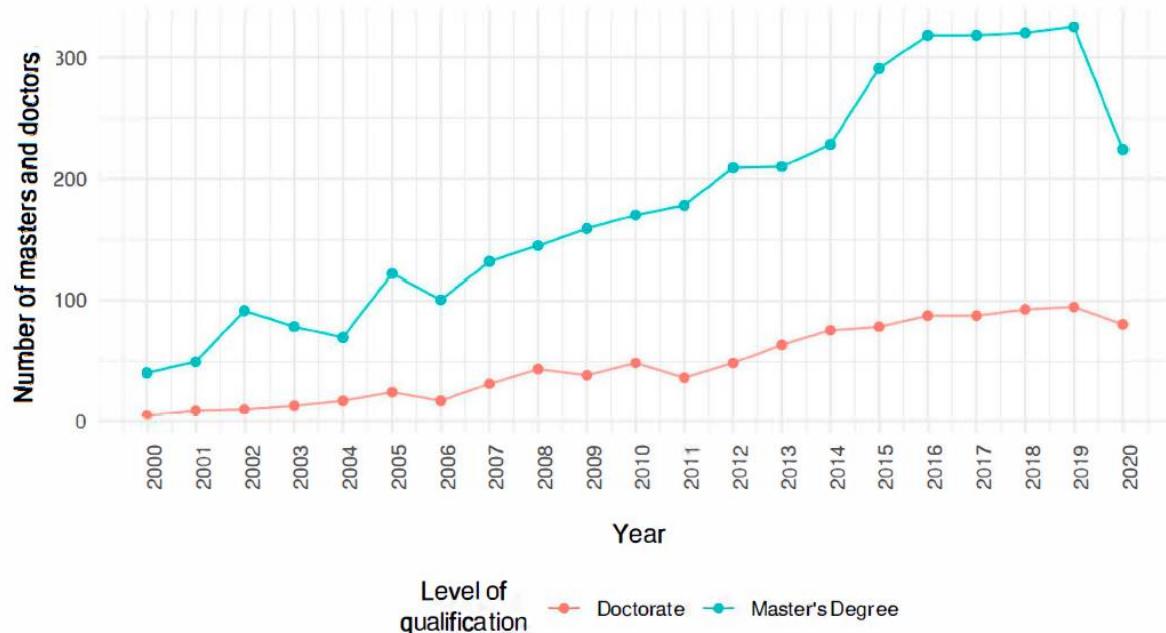
3.3 Training human resources

Given the significant contribution of the members of the RGs to the production of scientific knowledge, it is necessary to determine the number of supervisions completed or in progress by the researcher-supervisors.

Of the 1,963 researchers who form the 96 RGs, 315 (16.0%), researchers were responsible for 3,782 master's degrees, and 147 (7.5%) researchers were responsible for 1,016 doctoral degrees between 2000 and 2020, for a total of 4,798 masters and doctoral degrees. A smaller group of researchers, 60 (3.1%), were responsible for supervising 178 postdoctoral students. The growth in the number of M.Sc. and Ph.D. graduates per year was linear, as shown in Graph 7.

⁵ Multiple linear regression was used to predict the *distribution of the number of journal articles per CNPq Research Group in the areas of Education and Psychology, from 2000-2020*, based on the *proportion of researchers with a doctorate, the number of researchers per group, and the area of activity* ($F(3.91) = 87.79$, $p < 0.001$, with $R^2 = 0.74$).

Graph 7 - Number of master's and doctoral degrees awarded by researcher-supervisors who are members of CNPq Research Groups in the areas of Education and Psychology between 2000 and 2020



Source: Prepared by the authors, based on survey data.

The decrease in the number of master's and doctoral degrees awarded by researcher-supervisors who are members of RGs in 2020 may be related to the coronavirus pandemic, which has changed the dynamics of teaching and research institutions. In this scenario, some postgraduate programs, such as the Inter-University Postgraduate Program in Science Teaching (USP), exceptionally allowed an extension of the defense deadlines.

4 Final considerations

The results of this research allowed us to identify some characteristics of the research field of cultural-historical theory, based on an analysis of the researchers that constitute the 96 educational and psychological research groups registered in the CNPq, initially surveyed by Asbahr and Oliveira (2021). From this perspective, this work is an additional step towards building an overview of this research area.

Although these groups are identified mainly in the human sciences (education or psychology), it is worth remembering that the researchers' degrees are multidisciplinary. For example, at the undergraduate level alone, there are more than 140 different courses, representing a broad spectrum that includes courses in the social sciences and the exact sciences. It is likely that this is a factor that helps to explain why postgraduate degrees are not exclusively in education and psychology, with a focus on science and mathematics education, medicine, and literature.

In terms of scholarly production, it can be said that the two fields studied, education and psychology, contribute equally to research in the area of cultural-historical theory through their RGs. In addition, the data indicate that factors such as the size of the group and the proportion of researchers with doctoral degrees have a significant impact on scientific production. From a training human resources' perspective, the researcher-supervisors who comprise the 96 RGs have been supervising and graduating an increasing number of master's and doctoral students over the last 20 years.

This article is a first attempt to present a broad overview of the profile of cultural-historical theory researchers in terms of scientific production and the training of human resources. As pointed out by Asbahr and Oliveira (2021), there are limitations to this survey, which does not cover all researchers dedicated to the study of cultural-historical theory in Brazil, either because they do not participate in research groups registered with the CNPq, or because they belong to research groups in which the predominant areas are not education or psychology (such as the 245 researchers in RGs in 9 other areas), or because they belong to RGs created after 2019.

The results presented in this paper may help other researchers in the field of cultural-historical theory or, more broadly, educational psychology, to understand a profile of this area of research.

Contribuciones de los grupos de investigación del CNPq para la investigación en la teoría histórico-cultural

RESUMO:

El presente artículo muestra un panorama cuantitativo de la investigación en la teoría histórico-cultural en Brasil a partir de los 96 Grupos de Investigación de las áreas de educación y psicología inscritos en el directorio del CNPq recogidos por Asbahr y Oliveira (2021). Se aplicaron indicadores bibliométricos y cienciométricos de producción y de formación de recursos humanos de 1963 investigadores. Los datos se recogieron a través del Currículo Lattes, utilizando el software ScriptLattes para su extracción. Los investigadores de los Grupos de Investigación presentaron una formación multidisciplinar, con titulación en diversas áreas del conocimiento. Además de eso, los resultados permitieron afirmar que no hay diferencia significativa en el número de artículos publicados entre los Grupos de Investigación del área de Educación y del área de Psicología. Este artículo contribuye al entendimiento del estado del arte del área de investigación histórico-cultural a partir de indicadores diversificados sobre el perfil y el desempeño de investigadores miembros de Grupos de Investigación del CNPq.

Palavras-chave: Teoría histórico-cultural. Grupos de Investigación. CNPq, bibliometria.

References

AGRESTI, A; FINLAY, B. *Métodos estatísticos para as ciências sociais*. 4. ed. Porto Alegre: Penso, 2012.

ASBAHR, F. S. F; OLIVEIRA, M. L. S. A. M. Inventário dos grupos brasileiros de pesquisa na teoria histórico-cultural a partir do Diretório de Grupos do CNPq. *Obutchénie: R. de Didat. e Psic. Pedag.* Uberlândia, v. 5, n. 2, p. 566-587, mai./ago. 2021. Disponível em: <http://www.seer.ufu.br/index.php/Obutchenie/article/view/61477>. Acesso em: 14 out. 2021. DOI: <http://doi.org/10.14393/OBv5n2.a2021-61477>.

BONFIM, V; SOLINO, A. P; GEHLEN, S. T. Vygotsky na pesquisa em educação em ciências no Brasil: um panorama histórico. *Revista Electrónica de Enseñanza de las Ciencias*, v. 18, n. 1, p. 224-250, 2019. Disponível em: <http://revistas.educacioneditora.net/index.php/REEC/article/view/370/39>. Acesso em: 21 out. 2021.

CAMILLO, J; MATTOS, C. Notas sobre a expansão da teoria da atividade na educação em ciências no Brasil. *Revista Brasileira da Pesquisa Sócio-Histórico-Cultural e da Atividade*, v. 1, n. 2, p. 1-26, 2019. Disponível em: <https://revistashc.org/index.php/shc/article/view/48/20>. Acesso em: 14 out. 2021.

GEHLEN, S; MATTOS, C. Freire e leontiev: contribuições para o ensino de ciências. *Enseñanza de las Ciencias*, n. extra, VIII Congreso Internacional sobre Investigación en Didáctica de las Ciencias, Barcelona, p. 438-441, 2009. Disponível em: <http://ensciencias.uab.es/congreso09/numeroextra/art-438-441.pdf>. Acesso em: 10 dez. 2021.

GLÄNZEL, W. *Bibliometrics as a research field: a course on theory and application of bibliometric indicators*. [Research Gate do autor]. 2003.

HAYASHI, M. C. P. I. Afinidades eletivas entre a cientometria e os estudos sociais da ciência. *Filosofia e Educação*, v. 5, n. 2, p. 57-88, 2013.

MENA-CHALCO, J; CESAR JUNIOR, R. M. ScriptLattes: an open-source knowledge extraction system from the Lattes platform. *Journal of the Brazilian Computer Society*, v. 15, n. 4, p. 31-39, 2009. Disponível em: <https://link.springer.com/article/10.1007/BF03194511>. Acesso em: 15 out. 2021.

PRICE, D. S. *Little science, big science*. New York: Columbia University Press, 1963.

ROTH, W-M; LEE, Y-J; HSU, P-L. A tool for changing the world: possibilities of cultural-historical activity theory to reinvigorate science education, *Studies in Science Education*, v. 45, n. 2, 131-167, 2009. DOI: <https://doi.org/10.1080/03057260903142269>.

SALEM, S. *Perfil, evolução e perspectivas da pesquisa em ensino de física no Brasil*. 2012. 385 f. Tese (Doutorado em Ensino de Ciências). Universidade de São Paulo. Faculdade de Educação, Instituto de Física, Instituto de Química e Instituto de Biociências. 2012. Disponível em: https://www.teses.usp.br/teses/disponiveis/81/81131/tde-13082012-110821/publico/Sonia_Salem.pdf. Acesso em: 21 nov. 2021.

SILVA, J. C; HAI, A. A. O conceito de zona de desenvolvimento proximal na educação infantil: apropriações nas produções acadêmicas e documentos oficiais brasileiros. *PERSPECTIVA*, v. 34, n. 2, p. 602-628, 2016. Disponível em: <https://periodicos.ufsc.br/index.php/perspectiva/article/view/2175-795X.2016v34n2p602/32792>. Acesso em: 21 nov. 2021. DOI: <http://dx.doi.org/10.5007/2175-795X.2016v34n2p602>.

SILVA JÚNIOR, J. R; FARGONI, E. H. E. Notas sobre o colapso da ciência no Brasil. *EccoS - Revista Científica*, n. 58, p. 1-18, e20850, 2021. Disponível em: <https://periodicos.uninove.br/eccos/article/view/20850/9253>. Acesso em: 8 dez. 2021. DOI: <https://doi.org/10.5585/eccos.n58.20850>.

TAGUE-SUTCLIFFE, J. An introduction to informetrics. *Information Processing and Management*, v. 28, n. 1, p. 1-3, 1992.

TOASSA, G. Nem tudo que reluz é Marx: críticas stalinistas a Vigotski no âmbito da ciência soviética. *Psicologia USP*, v. 27, n. 3, p. 553-563, 2016. Disponível em: <https://www.scielo.br/j/pusp/a/xqtj97v4yTqvGHDw7m5MVBv/abstract/?lang=pt>. Acesso em: 14 nov. 2021. DOI: <https://doi.org/10.1590/0103-656420140138>.

Received in February 2022.

Approved in May 2022.