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Review Article

KNOWLEDGE PRODUCTION ON CONTINUOUS PROFESSIONAL LEARNING OF PHYSICAL EDUCATION TEACHERS: AN ANALYSIS BETWEEN BRAZILIAN AND INTERNATIONAL STUDIES

A PRODUÇÃO DO CONHECIMENTO SOBRE A FORMAÇÃO CONTINUADA DE PROFESSORES DE EDUCAÇÃO FÍSICA: UMA ANÁLISE ENTRE ESTUDOS NACIONAIS E INTERNACIONAIS

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RESUMO
O artigo analisa a produção do conhecimento sobre a formação continuada de professores de Educação Física na base de dados *Education Resources Information Center* (ERIC) e numa coletânea de 14 periódicos nacionais. O objetivo é fornecer uma visão geral das produções e discutir as opções de pesquisa adotadas pelos pesquisadores, identificando evoluções e tendências. Foi possível constatar uma transitoriedade nos 15 anos de produção analisada (2000-2014) e uma prevalência de estudos que privilegiam a historicidade dos informantes. Quanto à natureza epistemológica, predominaram estudos fenomenológico-hermenêuticos e quanto aos métodos de pesquisa, os de natureza qualitativa. Os dados sugerem que há espaço para se investigar a formação continuada que compreenda o professor como um pesquisador de sua prática e transformador de sua realidade.
Palavras-chave: Educação Física. Desenvolvimento de pessoal. Conhecimento.

ABSTRACT
This article analyzes knowledge production on continued training of physical education teachers in the Education Resources Information Center (ERIC) database and a collection of 14 Brazilian journals. The goal is to provide an overview on scientific production and discuss the search options adopted by researchers, identifying developments and trends. There has been a transition in the 15-year period analyzed (2000-2014) and a prevalence of studies emphasizing the participants history. There was a predominance of phenomenological-hermeneutical studies regarding the epistemology and of qualitative studies regarding the research methods. Our data suggest that there is room to investigate the continued professional training, perceiving teachers as researchers of their practice and transforming agents of their reality.
Keywords: Physical Education. Personal development. Knowledge.

Introduction

There is consensus among the scientific community that scientific journals play a leading role in the dissemination of research results. This is no different in relation to knowledge production on Physical Education (PE). Therefore, the submitted studies undergo an analysis by independent researchers and publications can be accessed by everyone interested in them anywhere in the world.

Issues about the understanding of the human being and its relations with society emerge from research involving topics related to the PE area, such as the continuing education of teachers working in schools. A plurality of viewpoints stands out in these researches, involving aspects of educational administration, the PE identity in the school, the reflexive process for a contextualized practice, the implementation and reinterpretation of methodological approaches in PE, among other issues that arise in complexity of everyday school life[1].

Analysis of knowledge production related to Physical Education Pedagogy, such as Antunes et al.[2], found evidences of the predominance of observational research. Within the school context, they only describe situations found by teachers, without bringing the researcher closer to the teachers who work in these schools.

When evaluating the type of knowledge produced, studies reveal that the gap between the knowledge produced by the educational institutions researchers and their application in school contexts[3-5] is still present, thus, suggesting that continuing education programs may have a positive impact on the solution of this demand[4, 6-8].

The proposals for continuing teacher-training programs should be built from the interaction between educational institutions and the education managers[9]. Loureiro and Caparroz[10], in turn, argue that such programs should give voice to teachers when formulating proposals.

With these theoretical bases, according to which the PE teacher should have voice and time to formulate proposals on professional development programs, a question arises: what is the scientific production on the continuing education of PE teachers and what is the epistemological position of those participating in this process?

In order to contribute to this issue, we looked at the knowledge production made by and with PE teachers. To do so, we selected studies in which schools were the place of research and articles in which teachers took part in professional development programs, whether or not involving educational institutions.

The research objectives were: 1) Search for studies on the continuing education of PE teachers; 2) Identify their ontological and epistemological matrices; 3) Examine the research methods used in the studies.

Research procedures for the studies analysis

Beginning with the definition of the topic and following Olsen's guidelines[11] for the Relevance Test (RT), we adopted the following inclusion criteria: a) research with PE teachers taking part in continuing education programs; b) studies in which schools were the loci of action. The exclusion criteria were: review articles; books and norms from different associations and/or government guidelines; theses and dissertations; and research with PE interns.

The *Education Resources Information Center* (ERIC) database was the one that best met the inclusion criteria, since it offers unlimited access to more than 1.4 million bibliographic records in Education and areas related to it.

We searched the ERIC thesaurus, a dictionary of specific terms, from which we selected the following descriptors: "In-service teacher education"; "Teacher Researchers"; "Professional development schools".

One of the researchers/authors performed the search at the ERIC database in three periods: 09.26.2011, 03.28.2013 and 11.22.2014. In this search for studies published between 2000 and 2014, we realized there were no Brazilian studies on the subject at ERIC database. Thus, we selected Brazilian Physical Education journals that could have published works under the theme "teachers' continuing education", setting up the potential for comparison, their convergences and divergences.

Previous analysis on knowledge production in PE adopted a similar procedure for selecting Brazilian journals[2,12-14]. The three researchers/authors reached consensus and the 14 selected journals were:

1. Revista Brasileira de Educação Física e Esportes (RBEFE); 2. Revista Motriz (RMz); 3. Revista Movimento (RMo); 4. Revista Brasileira de Ciências do Esporte (RBCE);

5. Revista Pensar a Prática (RPP); 6. Revista Motrivivência (RMa); 7. Revista Brasileira de Ciência e Movimento (RBCM); 8. Revista de Educação Física (REF-UEM); 9. Revista Mackenzie de Educação Física e Esporte (RMe); 10. Cadernos de Formação da Revista Brasileira de Ciências do Esporte (CF-RBCE); 11. Revista Especial de Educação Física (REEF); 12. Revista Licere (RL); 13. Revista Mineira de Educação Física (RMEF) e 14. Revista Corpoconsciência (RC).

The majority of the selected magazines is edited by post-graduate programs in Physical Education (RBEFE, RMz, RMo, RPP, RMa, RBCM, REF-UEM, RMe, RL) and two of them by professional associations, belonging to the Brazilian Sports Science College (RBCE, CF-CBCE).

We noticed the lack of consensus on the words adopted by researchers to characterize studies on continuing education of PE teachers. Therefore, we listed some keywords that we used in the search engines on each journal (item "Full Text"), which are: "Continuing Formation", "Life-long Formation", "ongoing education", "Life-long Education", Continuing Education ", as well as the descriptors in Health Sciences (DECS), "Physical Education and Training", "Human Resource Training".

One of the researchers/authors carried out the search in Brazilian journals between 07 and 10.15.2014. Studies published between 2000 and 2014 were selected in this analysis.

We used the Paradigmatic Matrix proposed by Sánchez Gamboa[15] to better organize our results. This matrix seeks to recover the essential logic of scientific research, assuming the closeness of relationships between the ontological, epistemological and methodological-technical levels in knowledge production.

According to Sánchez Gamboa, the *ontological level* refers to the concepts of man, history and reality (relating time, space and movement) and they are the researchers' foundation at the time they formulate their questions and seek answers to the studied problems or phenomena. These ontological concepts have an integrating function, which helps elucidate the other levels of research. The *epistemological level* refers to the concepts of causality, science and the validation criteria of scientific proof requirements. The *technical-methodological level* relates to the procedures adopted for knowledge production, such as data collection techniques, treatment and approach to phenomena.

When we could not clearly identify the ontological or epistemological foundation, we looked for information that would enable us to categorize them, as agreed by the three researchers/authors.

Results and discussion

Based on the descriptors and the given period, we searched the ERIC database, which resulted in 144 publications. After the first Relevance Test (1RT), through reading the abstracts, we excluded eight books, seven regulations, two theses, a dissertation and a collection of publications on the subject, leaving 125 publications. The second Relevance Test (2RT), based on the reading of articles from the exclusion criteria, resulted in 47 publications, corresponding to 33% of the initial search.

We had initially selected 567 articles from the Brazilian journal collection (BC). After the 1RT (reading the title and abstract), we excluded 342 publications, leaving 225 works. Based on these works, we were able to determine which keywords could better explain studies of this kind, starting from a categorization process of the terms used by the authors of 178 studies 47 had no keywords (REEF, 43; RMa 2; RBCE, 1; RMo, 1)).

Each article contained, at least, three keywords and, as agreed by the researchers/authors, one keyword of each study should relate to *continued teacher training*.

Thus, we found 34 different terms in 155 appearances, making the framework of the analysis as shown in Table 1 below.

Table 1. Categorizing keywords in 178 studies.

Keywords	F
Training (academic; continued; teacher continuaed; life-long; Physical Education teachers ongoing; human resources; teacher; permanent; professional; Paradigms)	94
Competences (perceived; professional; pedagogical)	17
Teachers knowledge	10
Learning (knowledge appropriation and production; empowerment; teacher empowerment)	9
Education (continued; permanent)	8
Development (human; professional)	7
Preparation/Qualification (teacher; professional)	5
Pedagogical Assistance	3
Egresses	1
Training	1
Total	155

Sources: Colection of Brazilian journals.

By placing the term "training" in evidence, it amounted to more than 60% of the appearances and it is possible to see the ramifications linked to it. The terms initially selected and entered in the magazines search engines, when combined, accounted for only 22% of the appearances. It is likely that this infusion of 34 different terms may have hampered the initial selection of studies, generating 567 articles.

Some authors differ on the terms "Continuing Formation" and "Life-long formation", an epistemological discussion that should not affect the use or not of a descriptor or keyword. A consensus on a common term is necessary, one representing studies investigating teachers in service.

We read 225 articles from the BC at 2RT. Using the exclusion criteria, 44 publications remained, corresponding to 7.8% of the initial search, a lower rate than those selected from the ERIC database (33%). We can infer that the search engines in ERIC database are more efficient than those in the Brazilian journals. ERIC has, besides the keywords search, descriptors that favor the refinement of selection.

1. Mapping the studies:

As for the nationality of the 47 studies from the ERIC database, we identified 15 countries. The 15 North American publications, together with the 17 British, accounted for 68% of the studies. The other 13 countries were Greece (3), Australia (2), followed by Germany, Belgium, Botswana, China, South Korea, Slovenia, France, Israel, Malta, New Zealand and Russia, with one study each. Greek researchers associated with their British counterparts and carried out one of the studies, a research on the effectiveness of continuing education in both countries.

Pamela H. Kulinna, with six publications[16,21], is the most prolific American author. As for British studies, Kathleen M. Armour, with eight publications[22,29], is the most productive.

As for the Brazilian studies, the 44 studies were carried out in nine states: Minas Gerais (9), São Paulo (9), Espírito Santo (8), Rio Grande do Sul (5), Santa Catarina (4), Goiás (3), Paraná (3) – one of Paraná's studies was in cooperation with the states of Santa Catarina and Rio Grande do Sul –, Pernambuco (2) and Roraima (1).

Unlike studies from ERIC, there are several authors in the BC. There are 101 researchers/authors in the 44 articles selected. Zenólia Chistina Figueiredo Campos, with three publications[30-32], stands out.

There are 664 research groups registered in Area 21 in Brazil, according to the Research Groups Directory in Brazil (DGP-CNPq); only ten of them carry on research on "continuing education", "continuing training" and/or "life-long education", with 98 researchers.

After selecting the articles in Brazilian journals, we verified the authorship against the research groups' members. Thus, we found that only nine (8.9%) of the 101 authors belonged to one of the research groups, a low ratio, as we selected field researches with PE teachers who participated in continuing education programs.

The 47 articles from Eric were found in 21 journals and 8 of them (38.1%) are in the Qualis on Physical Education (Area 21). This shows that there are publications on continued education of PE teachers in journals still little explored by the Brazilian academic community. One example is the "European Physical Education Review" with nine articles found in the studied period, rated "B1" in the Qualis on Engineering. Table 2 shows the journals in which we found the articles and their respective classifications in the Qualis system, if any.

Table 2. Distribution of studies, at ERIC, by journal and classification at *Qualis* system.

Journal	**F**	***Qualis* (classification)**	
		Área 21	**Other areas**
Journal of Teaching in Physical Education	9	A2	-
European Physical Education Review	9	-	B1 Engineering III
Physical Education and Sport Pedagogy	5	B1	-
Sport, Education and Society	4	A1	-
Educational Action Research	2	-	A1 Education
Teaching and Teacher Education	2	-	A1 Education
Journal of In-service Education	2	-	-
Research Quarterly for Exercise and Sport	1	A2	-
Biomedical Human Kinetics	1	B4	-
International Journal of Applied Sports Sciences	1	B4	-
Journal of Physical Education, Recreation & Dance	1	B4	-
Physical Educator	1	B4	-
Canadian Journal of Education	1	-	B1 Interdisciplinary
Teacher Development	1	-	B3 Letter/Linguistics
Asia-Pacific Journal of Health, Sport and Physical Education	1	-	-
Australian Journal of Teacher Education	1	-	-
British Journal of Visual Impairment	1	-	-
European Journal of Teacher Education	1	-	-
Irish Educational Studies	1	-	-
Rural Educator	1	-	-
Technology, Pedagogy and Education	1	-	-

Source: ERIC database.

The 44 publications were from 12 Brazilian journals. At the end of 2RT, REF-UEM and RMe showed no studies that matched the criteria listed. Unlike the selection in the ERIC database, only one of the journals has no classification in the *Qualis* system at Area 21. Table 3 shows the data.

Table 3. Distribuition of studies, Brazilian collection, by journal and classification *Qualis* in Area 21.

Journal	F	*Qualis* (Area 21)
RMa	8	B4
RPP	7	B2
RBCE	7	B1
RMo	6	A2
RBEFE	4	B1
REEF	4	-
RMz	3	A2
RBCM	1	B2
RL	1	B2
CF-RBCE	1	B4
RMEF	1	B4
RC	1	B4

Source: Collection of Brazilian journals.

When comparing the publications and the respective *Qualis* criteria, we can say that the studies from ERIC were published in better-ranked journals than the BC: we found 29.7% of the publications in journals with *Qualis* A1 and A2 in area 21 against only 20.5% from BC. After analyzing the overall production, we saw that 47.2% of the studies were published in journals with low rating (B4) or without any ranking for Area 21.

2. Ontological Level

Four distinct moments can be observed in the studies selected in the ERIC database and BC after the 2RT, reflecting a transition in 15 years of study. We called the first stage of studies in this area "Initiation" – the period between 2000 and 2004. The second period, between 2005 and 2009, is a time in which there is a significant increase of studies, mainly of qualitative design, which we called "qualitative expansion". The third stage occurs within the ERIC database, between 2010 and 2012, with an epistemological transition, with mixed studies (qualitative-quantitative), which we called "Paradigmatic transition." The fourth stage starts is 2013, with a decrease in publications, which we called "Disinterest". Figure 1 shows these data.

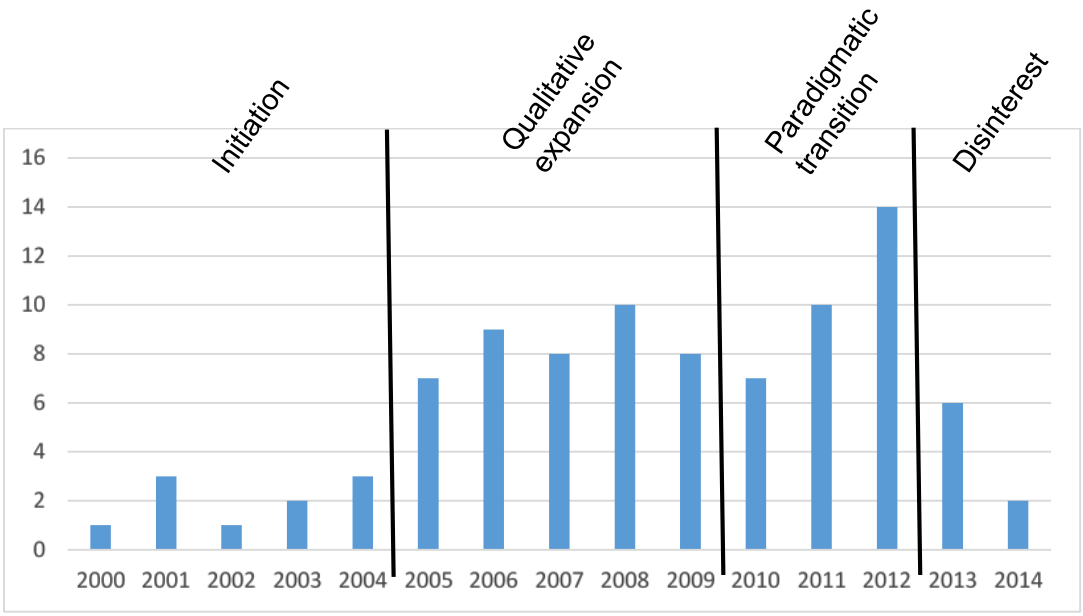

Figure 1. Distribution of articles after 2RT.
Source: The authors.

3. Epistemological level

Sánchez Gamboa[15], based on Habermas, classifies knowledge production in three epistemological trends: the empirical-analytic approach, the phenomenological-hermeneutic approach and the critical-dialectical approach.

In the analyzed production, we found eleven studies (12.1%) with empirical-analytic approach; forty-eight (52.7%), with phenomenological hermeneutic approach; and thirty-two (35.2%), with critical-dialectical approach.

The *empirical-analytic* approach defines the object of study, isolating it from its context. It is guided by the division/analysis of the parts that make up the whole, looking for a relationship between antecedents and consequences. In this approach, the observer seeks to distance itself as much as possible from the phenomenon observed[15].

Eleven studies (seven from ERIC and four from BC) identified in this approach focused on biological aspects, assessing the impact of physical activity programs on health and psychological aspects related to a software to evaluate the students' motor performance. There were studies that verified the teaching skills of Slovenian teachers, after a continuing education program, and an American study that diagnosed the impact of professional development intervention with the participation of tutors. In the BC, studies investigated the impact of continuing teacher-training programs in Pernambuco and Minas Gerais; in São Paulo, studies investigated the teachers' profile, the same being studied with educators working in Special Education in Parana.

According to Sánchez Gamboa[15], the phenomenological-hermeneutic approach is the search for knowledge started by the study of the parts of the phenomenon in order to understand the whole. The same is true in the examples of cases looking for possible generalizations, a process that we identified with the use of inductive reasoning in knowledge construction. In this approach, knowledge is constructed when the meaning of phenomena is understood and its meaning is revealed, taking in account the contexts in which they occur. That was the most commonly used approach in the studies (52.7%), which allowed us to identify the awakening of the researchers' interest in continued education in Physical Education throughout the period analyzed.

The twenty-nine studies on continuing education programs from ERIC aimed at understanding the obstacles and conveniences related to the implemented curricular changes; the use of alternative material resources in the classroom; the difficulties faced by beginning teachers; the influence of experienced teachers as tutors; the community participation in curriculum development, as well as the perception of teachers' engagement in continued education programs.

As for the nineteen Brazilian studies, they addressed the pedagogical principles in continued education; the role of PE in schools; the analysis of teachers' pedagogical practices; the disconnection between the proposed training and the needs of PE teachers; teachers' perceptions after the training program; alternative models of in-service training; the enhancement of students' participation in the classes planning; the relationship between attending training programs in service and professional development; leisure and in-service training in cultural exchanges; the possibility of overcoming the training programs paradigm; and, the use of professional experience as a basis for teaching practice in a meaningful learning.

The *critical-dialectical* approach presupposes an inter-relationship between the whole and the parts and vice versa, similar to the phenomenological-hermeneutic. However, there is concern when performing analysis and interpretations taking into account the conditions present in the economic, social, political, legal and intellectual structures, as well as overcoming the opposition between the quantity and quality paradigm[15].

We found the use of this paradigmatic trend from 2002 on, in 32 of the selected studies (eleven from ERIC and 21 from BC). International studies (performed during continued education programs) reported researchers/teachers in rural schools in China, the exercise of reflection as a strategy on professional development in Malta, the evaluation of the curriculum based on health in Australia, cultural diversity as a challenge in Germany, English studies on evaluating a program of physical activity and discovery of school talents, the convergences of reflection in curriculum planning, research/action as a way to implement cooperative learning, teachers' perceptions on their professional development, teachers' limitations in the engagement and orientation of physical activities related to health.

Brazilian studies reported on the experiences of in-service teachers in training programs and the participation of university researchers, the results of programs based on research-action principles, capoeira as a teaching content, the contribution of in-service training in the proposals for inclusion of students with special needs, the structure of in-service training from the topics listed by the participants, systematic planning as a guide for pedagogical practices, the reflections on the leisure facilities in the community and social and political issues involved, the exchange of experiences as a training strategy, the disconnection between the in-service training and the teachers' needs, and the difficulty in the implementation of the proposals engendered by school systems when not articulated with the teachers.

Developed by Sánchez Gamboa, Chaves and Taffarel[33], the study analyzed the production of researchers working in northeastern Brazil, from 1982-2004. It is possible to identify similarities with our findings. According to the authors, there is a growing movement of this approach over time. The study by Chaves-Gamboa and Sánchez Gamboa[34] – with the same group of researchers and the same timeline as Sánchez Gamboa, Chaves and Taffarel[33] – reports that three-quarters (77%) of 145 studies used this approach. In Table 4, we identified the number of researches in the studied period, according to its epistemological foundation.

Table 4. Frequency of articles according to epistemological approach.

Epistemological level	Base ERIC		Brazilian Collection		Total	
	F	(%)	f	(%)	f	(%)
Empirical-analythical	7	14,9%	4	9,1%	**11**	**12,1%**
Phenomenological-hermeneutic	29	61,7%	19	43,2%	**48**	**52,7%**
Critical-dialetical	11	23,4%	21	47,7%	**32**	**35,2%**
Total	47		44		91	

Fonte: The authors.

When we compared both bases, we identified a preference towards the phenomenological-hermeneutical approach by international researchers. Most Brazilian researchers opted for the critical-dialectical approach. We also observed a lower percentage on empirical-analytic approach in both bases. It is plausible to suggest that studies on continued education of PE teachers are closer to paradigms that take into account the history and the social constraints involved.

Another important finding is when we analyze the production from ERIC database and we relate the epistemological level to Qualis for Area 21. 28.6% of the studies with empirical-analytic approach were published in unrated journals, whereas this number rose to 44.8% with the phenomenological-hermeneutic approach, and to 81.8% in the critical-dialectical approach. These figures lead us to infer that when a publication is related to the empirical-analytic approach, it is more likely to have a Qualis rating in area 21 than when using other approaches. Of the 21 studies that used the critical-dialectical approach in BC, 19% were published in the REEF journal, without Qualis in Area 21.

Of the 11 articles using the critical-dialectical approach in the ERIC database, only two were published in journals with Qualis to Area 21 - *Sport, Education and Society* (A1) and *Physical Education and Sport Pedagogy* (B1). Other six articles were published in journals with Qualis in other areas of knowledge – the *European Physical Education Review* (B1 Engineering III), the *Educational Action Research* (A1 Education) and the *Teaching and Teacher Education* (A1 Education). The other three articles were published in journals without Qualis - the *Asia-Pacific Journal of Health*, the *Sport and Physical Education*, the *European Journal of Teacher Education* and the *Rural Educator*.

Different criteria make up the final classification of *Qualis*. Among them, the epistemological framework, the journal indexing base, and the search for local researchers in each journal. We can assume that studies published in international journals, using the critical-dialectical approach, will not be well-ranked by the Qualis system in Area 21.

4. Technical and methodological level

In this analysis, we classified the studies according to the method researchers used to solve their research problems, always based on ontological assumptions. Thus, we classified them in quantitative studies, qualitative studies and qualitative-quantitative studies. We found 9.9% of quantitative studies, 82.4% of qualitative and 7.7% mixed in the evaluated production.

4.1. The quantitative design

Quantitative research designs are based on the positivist thought, which use deductive reasoning and generalization to test or evaluate a theory, while still examining the different relations of cause and effect. We found nine publications under this paradigm, in both bases.

There was a prevalence of "Almost experimental" over the "Experimental" design, according to Thomas, Nelson and Silverman[35] classification.

4.2. The quantitative research tools and the number of participants involved.

Questionnaires corresponded to almost all of the research tools used by both, those undergoing scientific validation process, and those that did not. Seven of the reviewed studies used a questionnaire; the other two used pedometers and a software to assess motor performance.

The number of Physical Education teachers (PET) involved varies greatly, ranging from 7 to 2,700 professionals. Thus, we adopted the rule of the median equation as a way to identify the distribution main number, corresponding to 85 PET. Only two studies, both from ERIC, also used the students and the school teachers as participants, which can increase the quality of the information collected, as shown in Table 1.

Quantitative Design	**Study**	**Instrument**	**Number of participants**
Quase experimental	Stewart S, Mitchell M, 2003.	Questionnaire	150 PET; 270 school classes*
	Williams L, Rink J, 2003.	*Software* of motor performance	152 PET
	Kovac M, Sloan S, Starc G, 2008.	Questionnaire	85 PET
	Tokuyochi J, Bigotti S, Antunes F, Cerencio M, Dantas L, Leão H, et al., 2008.	Questionnaire	2.700 PET
	Crawford S, 2011.	Questionnaire postal	171 PET
	Frank R, Stocco J, Borella D, Storch J, Schone A, 2013.	Questionnaire	10 PET
	Lima R, Oliveira R, Melo M, Souza Junior M, Silva P, 2013.	Questionnaire	43 PET
Experimental	Kulinna PH, McCaughtry N, Martin JJ, Cothran D, Faust R, 2008.	Questionnaire	47 PET
	Kulinna PH, 2012.	Pedometer	7 PET; 31 Te; 320 students

Figure 1. Research of quantitative design.
Caption: PET: Physical Education Teacher; Te: Teacher
* Number os sudents not specified.
Source: The authors.

4.3. The qualitative design

Qualitative research designs are those based on the post-positivist paradigm, in which reality is subjective, for there are multiple perceptions and interpretations of it and knowledge is relevant when considering the specific context in which it originated from. Of the 91 selected studies, 75 (35 from ERIC and 40 from BC) focused on this paradigm, with the following designs: Ethnography, Participative Research (Action Research and Participative Research), Phenomenology, Case Study, Grounded Theory, and History of Life. Table 5 shows the frequency of qualitative research designs.

Table 5. Distribution of qualitative design researches.

Qualitative design	ERIC		Brazilian Collection		Total	
	f	(%)	f	(%)	f	(%)
Etnography	10	28,6%	11	27,5%	21	28,0%
Participative Researches	6	17,1%	15	37,5%	21	28,0%
Phenomenology	2	5,7%	10	25,0%	12	16,0%
Case study	7	20,0%	2	5,0%	9	12,0%
Grounded Theory	9	25,7%	-	0,0%	9	12,0%
History of life	1	2,9%	2	5,0%	3	4,0%
Total	35		40		75	

Source: The authors.

It is possible to identify differences between ERIC and BC regarding the designs chosen in qualitative research. We did not find Grounded Theory (GT) in the Brazilian collection. Researchers use GT when they believe there is no previous theory to explain or understand a specific situation, so that they create a theory based on the data collected in the research itself[36]. This research design is commonly categorized as one of the chains of Ethnography in the Brazilian studies. We also found differences in the Participative Research, Phenomenology and Case Study.

When the subject is continued education of PE teachers, we believe that ethnographic studies and those with the researcher's active participation in the field were used more frequently due to the good chance they offer to understand the circumstances. Thus, the researcher considers the context and makes use of tools to better match and approach the local reality, allowing the social actors to have a voice and time in the knowledge construction process.

4.4. Qualitative research tools and the number of participants involved

Of the 75 articles classified in qualitative paradigm (35 from ERIC and 40 from the BC), 53 (71%) used "observations" recorded in field diaries, class diaries, footage and photographs as data collection instruments, followed by "interviews" in different forms (structured, semi-structured and unstructured) with 52 appearances. "Document analysis", "questionnaire", "seminar", "focus group" and "memorial" were the other tools used, but less frequently. Table 6 below summarizes all the instruments and their frequencies.

Table 6. Instruments of research used in the design of qualitative researches

Instruments	Base ERIC		Brazilian Collection		Total	
	f	(%)	F	(%)	F	(%)
Observations	26	32,9%	27	30,3%	53	31,5%
Interviews	32	40,5%	20	22,5%	52	31,0%
Document analysis	4	5,1%	17	19,1%	21	12,5%
Questionnaire	7	8,9%	7	7,9%	14	8,3%
Seminar	4	5,1%	10	11,2%	14	8,3%
Focus group	5	6,3%	4	4,5%	9	5,4%
Memorial	1	1,3%	4	4,5%	5	3,0%
Total	79		89		168	

Source: The authors.

When comparing the number of instruments used in quantitative and qualitative research, we observed that positivist studies used only one instrument, while the use of a single collection instrument in the post-positivist studies accounted for 30.7%. This suggests that, in qualitative studies, more than one instrument is usually necessary to establish, register, describe, and then understand the situation found during the investigation. Table 7 shows the number of instruments used.

Brandl Neto, Silva and Miranda[13:701] also found the same results when they analyzed knowledge production on the teaching methods used in school Physicl Education in three databases: ERIC, SIBRADID and NUTESES, from 2005 to 2010. According to them: "[...] the combination and/or triangulation of sources/results have been used in pursuit of credibility, validity, quality and, therefore, in knowledge production with scientific rigor." They showed in their study that the researchers of the school area of PE preferred interviews and field observations, similar to our findings. To them, this preference demonstrates their belief that researchers should not intervene either in the researched context or in the behavior and opinions of the surveyed people, or if they have to, to do so minimally, so that they can understand them properly.

Table 7. Number of instruments used per article in qualitative researches

Number of instruments/Article	Base ERIC		Brazilian collection		Total	
	f	(%)	F	(%)	F	(%)
One	12	34,3%	11	27,5%	23	30,7%
2 or 3	19	54,3%	22	55%	41	54,6%
4 or more	4	11,4%	7	17,5%	11	14,7%
Total	35		40		75	

Source: The authors.

Of the 75 qualitative studies, we excluded six (two from ERIC and four from BC) for not mentioning the number of participants. The number of PET involved varied greatly, from 01 to 85 teachers, similar to the quantitative studies. Therefore, we also adopted the median as a way to identify the distribution main number, corresponding to eight PET. Eleven of the selected studies (seven from ERIC and four from BC) also used managers, teacher trainers, tutors, teachers and students as participants, which can increase the quality of information collected.

There was a difference regarding the number of PET involved in each study from ERIC and BC. 51.5% of studies from ERIC have up to four PET while BC has 36.1%. Even taking the distribution median as a reference (eight PET), the data demonstrated a prevalence in foreign studies of works with up to four PET while in the BC there are studies with more than ten PET. Table 8 shows the number of PET participants in the international and Brazilian studies.

Table 8. Number of PET participants.

Number of PET/Article	ERIC		Brazilian collection		Total	
	f	(%)	F	(%)	F	(%)
1 to 4	17	51,5%	13	36,1%	30	43,5%
5 to 10	4	12,1%	8	22,2%	12	17,4%
11 or more	12	36,4%	15	41,7%	27	39,1%
Total*	33		36		69	

* Six studies were excluded for not mentioning the number of participants

Source: The authors.

There is no direct or inverse correlation between the number of instruments and the number of participants, that is, a larger or smaller number of instruments is not related to a smaller or larger number of participants. This allows us to suggest that the number of instruments in qualitative studies may increase the possibility of understanding the phenomenon, and that the number of participants is the one determined in each field situation.

4.5. Qualitative- quantitative design and the number of participants involved.

Of all articles, seven (six from ERIC and one from BC) called themselves qualitative-quantitative. The BC article did not mention such a classification; it was a consensus among the three researchers/authors. These studies were published from 2007 on and they use instruments of quantitative and qualitative nature, in a complementary way. Six of these studies applied questionnaires to a group of people and, afterwards or at the same time, they developed field diaries and conducted interviews or focus groups with some selected group members, based on criteria set by the researchers.

However, it necessary to draw attention to the necessary caution in adopting such procedures, taking in consideration what Popper[37:14] says when referring to the concept of science: "[...] knowledge does not start from perceptions or observations of facts collection or numbers, but, it begins, rather, from problems" and he ends, stating: "there is no knowledge without problems".

That is, inexperienced investigators may make use of numerous instruments to collect data and information, driven more by fads or by the command they have on these different tools than by the research problem, which may lead them to epistemological errors.

By reading the data, we can say that Brazilian studies still do not use such a strategy when carrying out their research. On the other hand, invariably, international researchers remain on the field for a long period and may deepen the questions initially raised by the questionnaire, understanding in different ways the observed phenomenon (Figure 2).

Base	**Study**	**Instrument**		**Number of participants**
		1st phase	**2nd phase**	
ERIC	Collins D, Martindale R, Button A, Sowerby K, 2010.	Questionnaire	Interview, focus group.	2 PET; 19 Coaches; 13 Teachers; 3 managers; 112 students.
	Blair R, Capel S, 2011.	Questionnaire	Semi-structured interview, Focus Group, Classes Footage, Document analysis, participative observation, Field diary.	21 PET
	Grimminger E, 2011.	Questionnaire	Interview	18 PET
	Alfrey L, Webb L, Cale L, 2012.	Questionnaire	Interview, participative observation	124 PET
	Alterman N, Vansteenkiste M, Van Keer H, De Meyer J, Van Den Berghe L, Haerens L, 2013.	Questionnaire	Focus group	35 PET
	Kloeppel T, Kulinna P, Stylianou M, Van der Mars H, 2013.	Instrument of observation of professional development	Interview, Field notes, Systematic observation.	20 PET
Coletânea nacional	Pandolfi F, Medeiros F, Guerra P, Silva S, 2007.	Questionnaire	Interview	6 PET

Figure 2. Qualitative-quantitative researches.
Source: The authors.

Conclusions

The analysis of production as a strategy for literature review shows us the paths taken by researchers in the construction of knowledge on continued education of PE teachers in these 15 years of analysis.

However, we should take in account some limitations. We selected only publications from journals, disregarding other types of publications such as books, theses and dissertations. By using these criteria, we sought to show the production published in journals and that this production is still incipient.

Another important aspect concerns the vagueness in some classifications established by the researchers/authors, in which the articles did not clearly state their ontological and epistemological base. Despite the authors' consensus and experience, errors may have occurred in the clarification of the paths taken by researchers in their research on continued education for Physical Education teachers, although this does not hinder this study.

The selection of studies, via database, greatly facilitates the search for articles, especially by adopting standardized keywords and descriptors that refine searches. We suggest a standardization of keywords in Brazilian studies with regard to the continued education of teachers: the adoption of the term "in-service training".

Different from the studies at ERIC, there is an evident multitude of authors in the analyzed Brazilian production, and invariably they are not associated with registered research groups at the DGP-CNPq site investigating this phenomenon.

There is a prevalence of studies published in low rating (B4) journals or in journals not classified in the Qualis system to Area 21 in both bases. This was more often present in ERIC, in articles using the critical-dialectical approach.

There was a prevalence of phenomenological-hermeneutic approach, qualitative studies, with Ethnography and Participative Research designs, using observations as a tool to collect information in the field. We also observed differences at the ontological level between ERIC and BC, which reflected on the epistemological and technical-methodological levels.

We also found differences between the bases when we analyzed the research participants. There were more studies from the ERIC that considered managers, tutors and students as participants than those from BC. The number of PET involved also differed, especially in journals with qualitative design.

Based on the data and on the discussion presented, we faced new challenges when we researched the continued education of Physical Education teachers. We observed the consolidation of qualitative-quantitative design in international research studies, as well as exchange between different research institutions. We did not find the same in Brazilian studies, but this may serve as a north for new incursions into the area.

This systematic review indicates that there is still "fertile ground" to investigate continued training. Studies should involve schoolteachers as researchers of their own practice, with approaches focusing on school settings, with the participation of researchers from educational institutions, so that teachers can become actors in knowledge production and conscious transformers of their reality.

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