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Research methodology in physical education and sport teacher education: systematic review
Metodología de la investigación en la formación del profesorado de educación física y deporte: revisión sistemática

*Alfonzo-Marín Arnoldo, **Cachón Javier, ***Enríquez Lázaro, ****Del castillo-Andrés Óscar
*Technical University of Manabi, (Ecuador), **University of Jaén, (Spain), ***Technical University of Manabi, (Ecuador), ****University of Seville, (Spain)

Abstract. The training of Physical Education and Sport teachers faces a constant challenge to carry out effective learning. The study of research methodology emerges as an essential cornerstone. This field of study allows future teachers to address problems, make decisions under reflective criteria and promote evidence-based practices. Objective: to review the scientific literature published in the Web of Science and Scopus databases on teaching scientific research in Physical Education and Sport teacher education in a date range of 2019-2023. Method: It was structured using the PRISMA flowchart. The basic search terminology was: "Teaching of Sport Science Research"; keywords: "Investigation"; "Research; "Physical Education" and Sport. Inclusion criteria were: Open Access articles from journals with a date range of 2019-2023; area: Education Research and Sport Sciences; Social Science and Health Professions. Proceedings of congresses, conferences and documents that do not correspond to the object of study were excluded. Results: a total of n=13 publications of interest were obtained that address some aspects, such as: perceptions, experiences, critical analysis, and research teaching methods. Conclusions: The acquisition of research skills is a long process, if we want to optimize the teaching of scientific research in the training of Physical Education and Sport teachers, practical action methodologies should be applied. There are very few studies published in relation to the study variables.
Keywords: Science; Research; Methodology; Teaching.

Resumen. La formación del profesorado de Educación Física y Deporte se enfrenta a un desafío constante para llevar a cabo un aprendizaje efectivo. El estudio de la metodología de la investigación se perfila como un pilar fundamental. Este campo de estudio permite a los futuros docentes abordar problemas, tomar decisiones bajo criterios reflexivos y promover prácticas basadas en evidencia. Objetivo: revisar la literatura científica publicada en las bases de datos Web of Science y Scopus sobre la enseñanza de la investigación científica en la formación del profesorado de Educación Física y Deporte en un rango de fechas 2019-2023. Método: Se estructuró utilizando el diagrama de flujo PRISMA. La terminología básica de búsqueda fue: "Teaching of Sport Science Research"; palabras clave: "Investigación"; "Investigación; "Educación Física" y Deporte. Los criterios de inclusión fueron: Artículos en Acceso Abierto de revistas con rango de fechas 2019-2023; área: Investigación en Educación y Ciencias del Deporte; Ciencias Sociales y Profesiones de la Salud. Actas de congresos, jornadas y documentos que no corresponden al objeto de estudio. Resultados: se obtuvieron un total de n=13 publicaciones de interés que abordan algunos aspectos, tales como: percepciones, experiencias, análisis crítico y métodos de enseñanza de la investigación. Conclusiones: La adquisición de la investigación. habilidades es un proceso largo, si queremos optimizar la enseñanza de la investigación científica en la formación del profesorado de Educación Física y Deporte se deben aplicar metodologías de actuación práctica. Existen muy pocos estudios publicados en relación con las variables de estudio.
Palabras clave: Ciencia; Investigación; Metodología; Enseñanza.

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Arnoldo Alfonzo Marín
aeam0002@red.ujaen.es

Introduction

During life, different problems arise, to which an effective solution is sought. In these cases, empirical research methods are used, which are sometimes applied naturally or spontaneously. In the educational field, research scientifically supports the application of methodological strategies that guarantee meaningful learning. Research training not only fosters critical thinking, but also inculcates an investigative mentality that promotes the constant search for excellence in teaching practice.

In the field of education, particularly in the training of Physical Education and Sport (PE and S) teachers, the study of research methodology is a fundamental pillar for the development and evolution of the academic and professional environment. Research in this discipline not only allows a deeper understanding of pedagogical and sports processes, but also contributes to the generation of new knowledge and the improvement of educational and sports practices.

Research methodology provides prospective PE and S teachers with the conceptual and practical tools that are necessary to address complex problems and challenges in their respective fields. Through the study of research methods, designs and approaches, data collection and analysis, pre-service teachers acquire crucial skills for the critical evaluation of information for fundamental decision making and the implementation of effective teaching strategies. This discipline not only offers tools for the search for truth and the generation of knowledge, but also provides the necessary foundations for informed and effective teaching (Chandia-Poblete, Martino-Fuentealba, & Aguilar-Farias, 2019).

It was interesting to review the results obtained by Aguilar-Valdés et al., (2024), who concluded that teachers of EF and D in Latin America use active methodologies in teacher training. also, they show in their review that the thematic trends published between 2009 and 2023, are in relation to didactics in relation to physical performance. However, there are some subcategories worth highlighting, such as the epistemology of PE, digital competencies, and active methodologies.

It is worth considering that teacher training should include pedagogical strategies to develop specific research competence in future teachers. Authors such as Hernández-Sánchez, et al., (2021), and Buendia-Arias et al., (2018), support this proposal in their research but in general context as teacher training. Other authors, such as Páez and Almonacid, (2019), list some specific competencies for PE teachers and highlight some such as "Mastery of technical and tactical fundamentals of sports (...), Mastery of basic

principles of sports training (...), Design and development of educational processes and communication of ideas effectively" (p. 63), with which they strongly agree, however, they do not highlight as a competence the domain of research, which is considered fundamental for the scientific shielding of the contents to be taught in the classes, together with the need to have a specific mastery of digital competences (Gámez & Peña, 2020).

Other researchers in the area, such as Pazo & Mora, (2012); Adnan & Ibraheem, (2017), who studied the perception of teachers, students, and graduates on the specific and general competencies of the PE professional, also did not consider scientific research. We understand that the EF and D require professional specialists in the transmission of specific knowledge of physical activity, movement, and the functioning of the human body, seeking alternatives to guide the training of our students or athletes. Therefore, it is necessary a training oriented to the teaching of the promotion of physical activity, movement, and the functioning of the human body, looking for alternatives to guide the training of our students or athletes. Therefore, it is necessary a training oriented to the teaching of the promotion of physical activity, movement, and the functioning of the human body, looking for alternatives to guide the training of our students or athletes with objective foundations, based on science and reflection that is born in the research-action in practical scenarios (Dieste et al., 2019). Without forgetting, methodologies such as the Flipped Classroom, a model that according to Ruano et al., (2021), raises the levels of motivation and the state of Flow in students compared to students who receive classes with traditional methodology.

The application of rigorous methodological approaches in EF and D allows teachers to investigate and understand the effectiveness of different pedagogical strategies and training programs. By collecting and analyzing data, educators can assess the influence of certain methodologies on students' learning, athletic performance, and overall development. This information supports educational decision-making to optimize and adapt practices, which in turn leads to sustainable improvement in educational quality and competitive performance.

Scientific research is included as a subject in the study programs for obtaining the degree in Physical Education and Sports in many universities in different countries. Expert teachers and researchers worldwide, give a high value to the subject and recognize it as the backbone to ensure individuality in the continuous learning of the career. Such is the case of Fidias Árias, professor and researcher at the Central University of Venezuela, (2011), who states that:

Research Methodology is a basic tool of the sciences applied to sport, indispensable for the generation of new knowledge, as well as for the solution of problems related to physical training and the achievement of optimal results at the competitive level (p.1).

In this sense, it is understood that research as a specific professional competence in the training of teachers of EF and D is essential to ensure that teachers are well prepared and equipped to provide quality education in this field. The acquisition of research skills enables them to strengthen their self-confidence to make informed decisions, continuously improve their practice, and promote the well-being and integral development of their students (Criollo et al., 2017). The integration of research in teacher education presents challenges, but also offers opportunities to strengthen training and create a stronger educational community committed to excellence in physical education and sport.

Currently, undergraduate, and graduate studies at the Technical University of Manabi, Ecuador, require within their curricula the application of scientific research and presentation of reports or high impact reports, which are also under peer review by experts in the field. For this, the scientific method must be followed, which structurally consists of formulating the problem, stating the objectives, establishing a hypothesis, delimiting the study variables, consulting the bibliographic references, selecting the instruments for the application of measurement tests, collecting data, analyzing and interpreting the data, contrasting the results obtained with other research and issuing conclusions (Gonzalez et al., 2006).

It is a challenge for professors at the Technical University of Manabi, Ecuador, that future PE and S teachers possess a solid understanding of research methodology. Sometimes the quality of research projects and their ability to address problems in the field of physical education and sport is not shown effectively. It is presumed that research methodology training for prospective FE and S teachers is insufficient, and this is negatively affecting their ability to conduct high quality research and contribute to the advancement of their field.

It is from here that some questions arose, such as: Are there any scientific publications on methodologies for teaching scientific research in the training of teachers of PE and S between 2019-2023?; What are the scientific publications in Scopus and Web of Science databases between 2019 and 2023 that support research as a specific professional competence in PE and S?, and, What are the scientific publications in Scopus and Web of Science databases between 2019 and 2023 that support research as a specific professional competence in PE and S? Therefore, we set out to systematically review the scientific literature published in Web of Science and Scopus databases on the teaching of scientific research in the training of teachers of PE and S in a range of dates from 2019-2023.

Material & methods

A systematic literature search was carried out in scientific databases Web of Science and Scopus, according to the PRISMA flow chart (PRISMA, 2021), (Prato & Torregrossa, 2020), see fig. 1. PRISMA flow chart, "teaching of Sport Science Research" review. The variables were operationalized starting from the statement of terms, keywords and wilcards that guided the search. As shown in Table 1, the variables were operationalized to simplify the

search. The terms were: "teaching of Sport Science Research"; keywords: "Investigation"; "Research; "Physical Education and Sport".

Table 1.
Operationalization of the study variables.

Variable	Terminus	Palabras clave/Keyword	Use of wildcard's
Research Methodology	"Teaching of Sport-Research".	Science	"Investigation". "Research"
EF and D	"Physical Education"; "Sport"		"Physical education". "Sport"

Starting point for the search was: "teaching of Sport Science Research".

The inclusion criteria were publications in scientific databases Web Of Science Core Collection and Scopus; in Open Access, with a date range of 2019-2023; area: Education and Sport Science, Education Educational Research, Social Science other Topics and Sports Science. Publications that are not in scientific databases Web Of Science Core Collection and Scopus; in Open Access, outside the date range 2019-2023; in other areas outside the area: Education and Sport Science, Education Educational Research, Social Science other Topics and Sports Science; proceedings of congresses, conferences and documents that do not have inherence to the object of study were excluded. To determine the exclusion, an exhaustive and deep reading of the summary or abstract of the publication was carried out, to obtain n=13 publications to study. The search patterns were: WoS search link= https://www.webofscience.com/wos/alldb/summary/d561ff00-a5a8-4545-90e1-868ccbc4bcf6c096a17f/relevance/1; Scopus search formula= title-abs-key (teaching and of and sport and science and research) and pubyear > 2018 and pubyear < 2024 and (limit-to (oa, "all")) and (limit-to (subjarea, "soci") or limit to (subjarea, "heal"))). A summary was made in table 2 format. Where the authors, title, method, results, and conclusions are detailed. Then a discussion of the main findings and conclusions of the authors studied was made. A descriptive research level analysis was performed (Hernández-Sampieri et al., 2020). The MAXQDA Analytics Pro Software (24.1.0) was used to identify the words most frequently used by the authors and thus determine their relationship with the object of study, see Table 3 and Fig. 2.

PRISMA flow diagram, "teaching of Sport Science Research" review, shows the results obtained using the search formulas in the WoS and Scopus databases. The diagram shows the data obtained. It also shows the inclusion and exclusion criteria and the identification, eligibility, and suitability of the results.

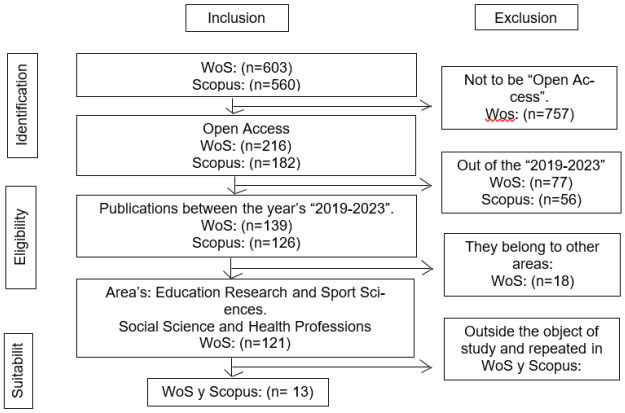

Figure 1. PRISMA flow chart, WoS and Scopus review "teaching of Sport Science Research".

Results

After reviewing the scientific literature, the initial search with the terminology "teaching of Sport Science Research" was obtained in WoS: (n=603) and Scopus: (n=560). Excluding publications that are not Open Access: WoS: (n=757) and Scopus: (n=378); Outside "2019-2023": WoS: (n=77) and Scopus: (n=56); publications in other areas: WoS: (n=18) and Scopus: (n=44); outside the object of study and repeated in WoS and Scopus: (n=190). Including results in Open Access: WoS: (n=216) and Scopus: (n=182); publications between the years "2019-2023": WoS: (n=139) and Scopus: (n=126); areas: Education Research and Sport Sciences; Social Science and Health Professions: WoS: (n=121) and Scopus: (n=:82). Final review: (n=13) is shown in Table 2 below.

Table 2.
Results of the review.

Authors	Title	Method	Results
Engelsrud et al., (2023)	Taking time for new ideas: learning qualitative research methods in higher sports education.	Collection of opinions through qualitative interviews conducted with six students.	Analysis of the interviews reveals the challenges of learning to think from a phenomenological perspective in an institutional context that emphasizes quantitative methods. Students' previously established methods of learning involved receiving unambiguous instructions and definitions from their professors, but they had not been taught to include themselves in the meaning-making process. Because phenomenological language has not yet become an embedded part of the students' academic language, their course experiences are marked by preconceived ideas about teaching and research.
Arora et al., (2023)	Sport and the exercise sciences: a comprehensive brief practical assessment for sports research.	Literature review.	Sports researchers should comply with available guidelines to improve the planning and conduct of future research, thereby reducing the risk of harm to research participants

Sevillano-Monje et al., (2022)	The inverted classroom and the development of competencies: a teaching innovation experience in higher education.	The study methodology combines qualitative and quantitative approaches (mixed methods) through a pre-experimental design.	The results show that there were significant differences in the acquisition of knowledge after the application of the methodology, which had a significant impact on the students' levels of competence. In addition, students presented high levels of satisfaction in different areas.
Del Valle et al., (2022)	Competencies of teachers in physical activity and sport sciences.	A descriptive, quantitative, correlational, and cross-sectional method was used, involving 104 students (74 males and 30 females).	Achievement expectations were found, regardless of gender, in the following teaching competencies: creative potential with institutional support, mastery of teaching techniques, and active personality with metacognitive teaching skills.
Potov et al., (2022)	Knowledge of the fundamentals necessary for scientific research activity in the field of Physical Education and Sport Sciences.	The experimental study monitored both the teaching activity and the evaluation of the subjects. The seminar activity involved the elaboration of 4 papers on the bibliographic study method, the historical method, the survey (questionnaire) method and the test method.	The results of the differences between the groups investigated in the field of Methods and Methodology of Research in Physical Education and Sport Sciences highlight the comparative analysis of the medians of the groups during the elective and compulsory activity and the final evaluation (colloquium and exam). It is also observed that at least two means differ significantly at $p < 0.05$ in the seminar, elective and compulsory activity; insignificant differences are observed at $p>0.05$.
Ali et al., (2021)	A STEM model for engaging students in sustainable science education through sport: a case study in Qatar.	Statistical tools to assess students' attitudes toward the importance of STEM. Observation of and schoolteachers who mentored students during the program. Qualitative data were retrieved from field notes, media (photos and videos). The annual program operated within a tentative three-month period.	The sports-based program has conferred productive insight into students' cognitive skill development and their attitudes toward STEM domains and aspirations. The SIS program has positively influenced the cognitive development of the participating students because they successfully designed their sport products. This section explored the program outcomes, improvement in students' learning, sense of efficacy, and problem-solving skills.
Stoszkowski et al., (2021)	Using Flipgrid to enhance reflection: an online collaborative approach to coach development.	It was applied to a group of studentcoaches (n=21), enrolled in a university sports coaching program at a higher education institution in the United Kingdom. The Teaching and Training reflective framework. Quantitative and qualitative data were collected reflecting the number and reflexive level of interactions over a fifteen-week period.	The results showed good support showing t for the approach, with responses participants more frequent and interaction critical compared to previous studies that had used a blog-based written and response format.
Chen & Chen, (2020)	Online cooperative teaching mode based on the theory of self-.direction in sport science research using the method. Online cooperative method	Experimental Descriptive. Details the experience and methodology applied for the study of the research methodology	The students' learning was systematically analyzed through interaction analysis.
Backman & Barker, (2020)	Rethinking pedagogical content knowledge for physical education teachers: implications for physical education teacher education.	Literature review proposed by Thomas, (2007); Shoemaker, Tankard, and Lasorsa (2004); and Sage and Whetten (1989), for the conceptual task of broadening our understanding of PCK.	1.Physical education teachers must know how to perform activities with correct technique, know tactics, and have knowledge of rules and etiquette; 2. Physical education teachers must know how to detect errors and design task progressions. 3. Physical education teachers must know how to select and modify appropriate tasks, as well as give feedback. 4. The level of CK and PCK of physical education teachers can be measured quantitatively.
Bezeau et al., (2020)	Health education assessment practices used by physical education and health teachers in a collaborative action-research study	Collaborative action research (CAR). Individual interviews; group interviews; participant observation; and logbooks. Data were collected over a 12month period and then analyzed using content analysis.	The results suggest that, despite the planning and implementation of strategies considered effective by the participants, their evaluation practices in the gym progressed very little, while their practices outside the gym evolved considerably.
Espalda et al., (2020)	Development of learning to learn competence in the university context: inverted classroom or traditional method?	Quasi-experimental. The design involved two groups following different types of teaching (traditional versus inverted classroom) × two moments in time (before and after).	the perception of the development of the 'learning to learn' competence.
Wrigley & McCusker, (2019)	Evidence-based teaching: a simple view of "science".	It examines the insistent claims by pr ponents of evidence-based teaching that it is a rigorous scientific approach.	It suggests that these claims are often based on a rhetorical appeal that relies on an overly simplistic notion of "science." In exploring the tacit assumptions behind "evidence-based teaching," the article identifies an empiricist and reductionist philosophy of science, and a lack of recognition of the complexity of education and pedagogy.
D' Isanto, (2019)	Structure of physical sports education and the Italian academic system and the European Research Council.	Review. Keyword search in the ERC 2018 Panel Structure.	The effect is that the Italian system has a dichotomy between research and training that affects sport.

A low index of publications that provide information on the methodology to be used to make effective the study of research methodology in the training of teachers of PE and S was detected (n=13). The search results are mostly in field research, related to the improvement of physical and

competitive performance. However, Table 3 shows the frequency of words related to scientific research most used by the authors.

Table 3.
Relationship between authors and number of words used within the object of study.

Word	Research	Method	Science
f.	20	17	14
Wrigley y McCusker, (2019)	1	1	3
Stoszkowski et al., (2021)	1	0	0
Sevillano-Monje et al., (2022)	0	1	1
Potov et al., (2022)	4	5	4
Espalda et al., (2020)	2	3	1
Engelsrud et al., (2023)	2	4	0
Del Valle et al., (2022)	1	1	1
D' Isanto, (2019)	3	0	0
Chen y Chen, (2020)	3	2	1
Bezeau et al., (2020)	0	0	0
Backman y Barker, (2020)	0	0	0
Arora et al., (2023)	3	0	1
Ali et al., (2021)	0	0	2

A high frequency (f) is shown in the use of the word's education (f: 28), being mostly named by Backman and Barker, (2020), with 10 occasions and Potov et al., (2022), with four times. Followed by the word research (f: 20); method (f: 17); science and sport (f: 14) and scientist (f: 13). The authors who used these terms the most were Potov et al., (2022), (f: 29); Backman & Barker, (2020), (f: 21); Bengelrud et al., (2023), (f:16); Sevillano- Ali et al., (2021), (f:15); Monje et al., (2022), (f:12); Chen & Chen, (2020), (f:11); D' Isanto, (2019), (f:10); Espalda et al., (2020), (f: 9); Wrigley and McCusker, (2019); and Del Valle et al., (2022), (f:8); Arora et al., (2023), (f:5); Stoszkowski et al., (2021), and Bezeau et al., (2020), (f:3). This is also reflected in Figure 2.

Figure 2. Word cloud in Spanish.

Fig. 2, word cloud, shows graphically the trend or patterns that were useful to highlight the use of language in relation to the topic. It shows a difference in the size of the letters as a function of the frequency of use of the words. This is in relation to the analysis in Table 3.

Dicussion

The analysis of the studies by their characteristics and main contributions to the area of study, then we have: 1.- Experience in the study of research in FE and D in higher education: cooperative teaching: (Chen & Chen, 2020). Action research: (Bezeau et al., 2020); (Ali et al., 2021); (Wrigley & McCusker, 2019). Inverted classroom: (Sevillano-Monje et al., 2022); (Espalda et al., 2020). Information and communication technologies (ICT 's) as a means of study: (Stoszkowski et al., 2021). Diagnostics based on students' perception of research: (Engelsrud et al., 2023). 2.- Competences of teachers of FE and D: (Backman & Barker, 2020); (Espalda et al., 2020); (Del Valle et al., 2022). 3.- Ethics in physical activity and sport research: (Arora et al., 2023). 4.- training of researchers in PE and S: (D' Isanto, 2019); (Potop et al., 2022).

Therefore, the methodologies for teaching scientific research are shown to be the backbone of the training process for teachers of PE and S. The research selected for the study ratifies this statement. Authors such as Ali et al., (2021), who propose an active, field methodology focused on practical experience, state that the results are significant when "science, technology, engineering and mathematics" are combined in the learning of research in sport, giving rise to the proposal of the STEM method, (2020), who, through a comparison between the "inverted classroom", which proposes the review and study of the content prior to the meeting with the teacher and the "traditional teaching", which includes a methodology directed to the lecture and teacher leadership, express that no significant differences were obtained in contrast to the two methodologies, however, they recommend conducting more research where the active method of the inverted classroom is applied to demonstrate the influence of this method in the development of research skills in university students.

Researchers such as Chen & Chen, (2020), demonstrated that online collaborative work in research teaching fosters students' enthusiasm, stimulates learning initiative and improves their effectiveness. Another study was that of Sevillano-Monje et al., (2022), who used the Flipped Classroom method to study the contents of the subject Theory and History of Physical Education, Physical Activity and Sport, highlighting a high degree of achievement with this method and suggesting that this methodology be applied in different subjects. Espalda et al., (2020), made a comparison between the inverted classroom method and the traditional method and found no significant differences. They suggest further research on the subject.

On the other hand, Engelsrud et al., (2023), who by interviewing six students of the course "qualitative methods inspired by a phenomenological approach to higher education in sport", managed to evidence that "teachers are not sufficiently aware of how unfamiliar students are with the ideas and perspectives they are teaching", in turn, students expressed the need for more time to consolidate knowledge.

The research by Del Valle et al., (2022), cites Baena-Extremera et al., (2015), who propose that within the analysis of teaching competences there is "problem solving", with which we agree emphatically, considering that this competence leads to a shielding of previous evidence provided by the research, however, the research is not declared as a specific competence, not even transversal, which is essential to

ensure the solution of academic problems. The same occurs with the results obtained by Bezeau et al., (2020), who state that the application of the evaluation by their students was not satisfactory in practice. Therefore, they suggest that there should be a greater investment of time in practical tests in their training. The use of ICT 's also shows benefits for the study of research in PE and S, concluded Stoszkowski et al., (2021), that the use of the platform "flipgrid" was impacting the student-coaches. Study participants. In turn, they suggest further research to examine the broader use of this approach.

One of the types of research of note was that proposed by Wrigley and McCusker, (2019), who suggest that some claims related to "evidence-based teaching" are often supported by appealing rhetorical arguments that may oversimplify the concept of "science." These authors point out that behind the idea of "evidence-based teaching" is an underlying conception of science that tends to be "empiricist and reductionist." Furthermore, the author argues that this perspective does not adequately recognize the inherent complexity of education and pedagogy.

Now, the brief suggests that claims about "evidence-based teaching" are often presented in a persuasive manner, which can lead people to accept these ideas without critical questioning. However, the question is whether this prioritization of method excludes key aspects such as creativity. It highlights the idea that scientific research should not be uniform, as different disciplines may require different methods. Ultimately, the critical summary points to a balance between methodological structure and flexibility to address the diversity of methods in the scientific community.

This statement does not detract from the importance of methods in scientific research; on the contrary, it emphasizes the need for a systematic approach to ensure the validity of the results, but without losing scientific rigor (Backman and Barker, 2020); (Stoszkowski et al., 2021).

On the other hand, Cereda, (2023), suggests that "the practical-reflective perspective fosters in the coach a professional, genuine and authentic mentality". This approach guarantees a training that starts from practical learning and reflection (mixed methodology) to the new practice and thus, generate new learning or breaking of paradoxes (Ghiara, 2020).

Conclusions

The effective insertion of scientific research competencies in teacher training in Physical Education and Sport optimizes the application of learning activities. The ability to implement evidence-based teaching methods with scientific support, not only allows a better, but also facilitates the integration of new and advanced strategies in the field of action. Research as a fundamental competence is in continuous evolution, theories, and scientific discoveries in the field of physical education and sport have allowed to reduce the empiricism that threatens the harmonious development, not only of professional and amateur athletes, but also of students, young people, adults and human beings.

There are few scientific productions in relation to the methodologies applied by teachers to teach research methodology in the training of Physical Education and Sport teachers. However, the researchers studied show the need to apply practical methodologies based on scientific evidence.

Several analyzes emerged from this review: The study of research methodology and Information and Communication Technologies (ICTs) have a close relationship. The methods: STEM, fligrip, cooperative teaching, action research and the inverted classroom, are taken as the main methodological strategies to support future proposals. Learning is meaningful if its practical component surpasses the theoretical one. The words most frequently used in scientific language determine our line of research. Controlling this frequency is very useful in research oriented to literature review.

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Datos de los/as autores/as y traductor/a:

Arnoldo Alfonzo Marín	aeam0002@red.ujaen.es	Autor/a
Mayra Monserrate Palma Villavicencio	mayra.palma@utm.edu.ec	Traductor/a