

New aspects of the methodology of performing a scientific literature review in pedagogical research taking into account digitalization processes

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Abstract

The article is devoted to the study of new approaches to solving the urgent problem of increasing the efficiency of processing the source base of scientific research results in the field of social sciences, in particular Pedagogy, in modern conditions of expansion of the research opportunities spectrum due to digitalization. The authors give a comprehensive description and present a holistic juxtaposition comparison of the five most common types of scientific literature review in pedagogical science: narrative, systematic, semi-systematic, integrative, and meta-analysis based. Having analyzed the Ukrainian and foreign scientists' works on the problem under investigation, the authors found out the peculiarities of the new methodology of searching and analyzing the results of existing pedagogical research. The purpose of the study was to develop methodological recommendations for the implementation of various strategies and approaches to the scientific literature review as an effective and fruitful research method in the study of educational problems. Researchers have proven that under the influence of digitalization processes, not only the paradigm of scientific research is gradually changing, but also significant changes are being made in the methodology of carrying out a scientific literature review. These positive changes have made the process much faster, more convenient and more accurate. Modern search tools allow a researcher to focus on analyzing the content of information, significantly reducing the technical burden associated with searching and organizing data.

Keywords: source base, methodology, scientific literature, review of sources, pedagogical research, digitization

УДК 001.814:37]:004

[https://doi.org/10.31652/3041-1203-2024\(1\)-14-22](https://doi.org/10.31652/3041-1203-2024(1)-14-22)

Нові аспекти методології здійснення огляду наукової літератури в педагогічних дослідженнях з урахуванням процесів цифровізації

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Анотація

Стаття присвячена вивченню нових підходів до вирішення нагальної проблеми підвищення ефективності роботи із джерельною базою результатів наукових досліджень у галузі суспільних, зокрема педагогічних, наук в сучасних умовах повсюдного розширення спектру дослідницьких можливостей завдяки цифровізації. Автори дають вичерпну характеристику та проводять зіставне порівняння п'яти найбільш поширених у педагогічній науці типів огляду наукової літератури: нарративного, систематичного, напівсистематичного, інтегративного та на основі мета-аналізу. Проаналізувавши роботи вітчизняних і закордонних вчених щодо заявленої проблематики, автори з'ясували особливості нової методології пошуку й аналізу результатів наявних педагогічних досліджень з метою розробки рекомендації щодо застосування різних стратегій і підходів до огляду наукової літератури як дослідницького методу у вивченні проблем освіти. Дослідниками доведено, що під впливом процесів цифровізації поступово змінюється не лише парадигма наукового пошуку, а й вносяться істотні зміни в методологію здійснення огляду наукової літератури. Ці позитивні зміни зробили процес виконання значно швидшим, зручнішим і точнішим, а сучасні інструменти пошуку дозволяють зосередити увагу на аналізі змісту інформації, суттєво зменшуючи технічне навантаження, пов'язане з пошуком та організацією даних.

Ключові слова: джерельна база, методологія, наукова література, огляд джерел, педагогічне дослідження, цифровізація

Problem setting. Every pedagogical research is a continuation of previous scientific investigations. Therefore, the abilities to search, retrieve, analyze, compare, and generalize scientific information are important for a teacher-researcher, as well as for any scientist in any field. No less valuable is the skill to carry out a critical review of previously performed investigations by other scientists.

Processing large arrays of scientific information is traditional when writing articles, monographs, dissertations, course and diploma papers, other qualifying works, where it can comprise about 20% of the paper's main body. A literature review is generally a systematic way of analyzing and summarizing previous scientific research (Tranfield, et al., 2003). A detailed and correctly systematized analysis of the previously completed research contributes to the

further theory development and can create a solid basis for solving different practical tasks and problems (Webster, & Watson, 2002).

By comparing various standpoints and combining the conclusions from many empirical studies of the past, it is possible to obtain highly effective tools for solving new issues arising in society in general and in the field of education in particular.

The Analysis of Sources and Recent Research. The results of the scientific information reviews on a particular problem may vary depending on whether an author is working at a usual review article, or at an article representing own research results, or at a dissertation section. Recommendations for each of these cases can be found on the websites of universities and R&D institutions. In Ukraine the general methodology for carrying out previously conducted

researches reviews and analyses is presented mainly in textbooks and manuals on the methodology of scientific research. However, they offer only trivial recommendations for the organization and implementation of this type of scientific activity and do not take into account the subtleties of different types of reviews as well as ICT and digital tools capabilities (Kolomiets, & Gromov, 2017).

Unfortunately, in Ukraine there are not plenty of published studies on the modern methodology of reviewing available research on Pedagogy. The authors found only a few publications by the Ukrainian scholars, in which the specificity of the pedagogical research methodology is indicated, in particular: the philosophical foundations of scientific research in the field of education (Ogneviuk, 2009); sociological determinants of theoretical and methodological problems of education (Chepak, 2011); feasibility of applying systemic and synergistic approaches to educational problems (Sysoieva, 2012); analyzing of the scientific problem research state in the field of Comparative Education (Hrykov, 2015). There are also several textbooks and manuals on the methodology of scientific-pedagogical research for pedagogical students (Goncharenko, 2008; Sysoieva, & Krystopchuk, 2013).

Nevertheless, the society is developing, scientific information access technologies are being improved, and data volumes are constantly growing. Therefore, the methodology of scientific research in the field of Pedagogy is also undergoing changes.

In our opinion, the most detailed and up-to-date is the textbook by Zavgorodnia and Strazhnikova. However, insufficient attention is paid to the matter of research analysis methodology (Zavgorodnia, & Strazhnikova, 2021).

We consider the textbook by Dr. Alan Gow from the University of Edinburgh to be the most detailed in terms of the literature review methodology, but it does not reflect the specifics of pedagogical research (Gaw, 2021).

We believe that young researchers might get use of the works on the typology of different types of literature reviews, which helps to choose the appropriate methods depending on the research questions (Grant, & Booth, 2009), the methodology of systematic reviews in the social sciences with an emphasis on the practical aspects of their implementation (Petticrew, & Roberts, 2006), and detailed instructions for carrying out and structuring a systematic literature review (Moher, et al, 2009a).

Among the works by foreign researchers, we found several publications that specifically take into account the peculiarities of carrying out literature reviews in the field of pedagogical research. In particular, Kennedy's article discusses the principles of conducting literature reviews in educational research, especially regarding the variety of sources and approaches that can be applied in the educational context (Kennedy, 2007). Biesta emphasizes the fact that educational research cannot be based only on quantitative data, and stands on the importance of taking into account value aspects in pedagogical research and their reviews (Biesta, 2010). Suri's article examines ethical aspects of carrying out systematic reviews in education, which is particularly important in educational research because of the sensitivity of data and the impact on the learning process participants (Suri, 2020). These publications emphasize the importance of adapting common methodological approaches to conducting literature reviews in the context of modern pedagogical realities.

The Purpose of the article is to find out the features of the new methodology for the pedagogical research analysis and provide recommendations for various techniques of literature reviews as an effective research method in the study of current educational issues.

The Results of the Research. The review of pedagogical research has certain specificity in comparison with other fields due to the educational field's peculiarities. Context is especially important in pedagogical research. This includes taking into account the social, cultural and institutional factors that might influence learning and teaching. In other fields (natural sciences, exact sciences), context has less influence because the research is often based on the controlled experiments or objective data. Pedagogical research often needs taking into account such unstable and unpredictable variables as education policy, social inequality, individual characteristics of students and teachers.

Pedagogical research is often based on qualitative methods (interviews, observations, case studies, students' works analyses), which distinguish it from other disciplines that rely more on quantitative methods. This is explained by the need to investigate such deep and subjective aspects of learning as motivation, emotional state, and personal beliefs of students and teachers.

In pedagogical research, the connection between theory and practice plays a crucial role. Educational

innovations as well as new approaches to teaching and learning should not only be theoretically grounded, but also tested in real classroom conditions. In other sciences, particularly exact ones, theory can often exist independently of practical application for a long time.

Pedagogical research often involves work with children and adolescents, which requires particular attention to ethics. Researchers must ensure the protection of participants' confidentiality and care for their psychological well-being. This sets an additional level of complexity that may be less decisive in other fields. The results of pedagogical research should have practical value for the educational system. A literature review in pedagogical sciences is often aimed at analyzing of how research findings can be implemented into both curricula (in particular) and educational policy (in general).

So, the specificity of literature reviews in pedagogical research is their contextual approach, use of qualitative methods, and emphasis on practical application. Therefore, we need a new methodology for carrying out a review of studies on those issues, emergence of which may be often determined by new factors that never existed before (globalization, digitalization, pandemic, martial law, artificial intelligence, etc.).

The following five types of scientific literature reviews are most common in Pedagogy: narrative, systematic, semi-systematic, integrative, and meta-analysis based.

Narrative type is used when the goal is to provide general information about a certain research question or problem. Usually, this type is used to assess the state of problem research and update knowledge on a certain topic. It is used to create an agenda for further research, identify gaps in research, or simply to discuss a specific issue.

Systematic type has clear requirements for the search strategy and selection of scientific publications, which are called inclusion criteria (time period, country, research objects, social conditions, etc.). It can be effective in summarizing the results of research on a specific problem. On its basis, it is possible to obtain evidence of the effectiveness of previously developed pedagogical recommendations, which may become the basis for their further use in practice. Adherence to clear inclusion criteria ensures objective and reliable findings (Moher et al., 2009b). Systematic type is often a method for identifying and critically evaluating the results of previous research on a particular problem, and for collecting and analyzing data for its solution

(Liberati, et al., 2009). Its goal is to identify all empirical evidence that meets predetermined inclusion criteria to answer a specific research question or hypothesis.

Systematic type has several advantages. It can be used to determine whether an effect is consistent across peer-reviewed studies and to determine what further studies are needed to demonstrate this effect. This type is also useful for identifying characteristics (historical, cultural, economic, political, etc.) that influence the phenomenon under study (Davis et al., 2014).

Semi-systematic type is appropriate if the problem is too broad in historical, geographical, cultural, and conceptual terms. It is used where both a significant number of factors that caused the problem and theoretical and methodological approaches to its solution are possible. This type is used for aspects that have been conceptualized differently; studied by different groups of researchers in different disciplines; and as a result, hinder the process of a full systematic review (Wong et al., 2013).

Since it is impossible to review every single article that is relevant to the topic, a different strategy is required. Therefore, one evaluates how research in the chosen field has progressed over time or how the topic has developed in research traditions. In general, a semi-systematic review aims to identify and understand all potentially relevant research traditions appropriate to the topic under study and to synthesize them through meta-narratives instead of effect size measurements (Wong et al., 2013).

This type provides a better understanding of complex areas. However, covering broad topics and different types of research, this approach implies that the research process should be transparent and have a developed research strategy. A clear strategy should enable other researchers to judge whether the ideas are sufficiently reasoned, and whether they are justified from a methodological point of view. Semi-systematic (also known as semi-structured) type is often combined with such research methods as content analysis, generalization, comparison, classification, etc. This type can be useful for identifying themes, theoretical perspectives, or general issues within a particular problem or for identifying the components of a theoretical concept (Ward, et al., 2009).

Using such an approach can result in: chronology of a specific problem development; diagrams, maps, and graphs; assessment of the problem solving state at a specific stage; plan or strategy for further research (Snyder, 2019).

Integrative type is closely related to the semi-systematic type and can be useful when scientists analyze research on a specific problem in different but related fields (philosophy, psychology, pedagogy, cultural studies, sociology) in order to create new theoretical models and develop prospects for further research. This type provides a basis for building a new conceptual model or theory. It can be valuable when it is necessary to reflect the development of a particular research field over time or to demonstrate the interdisciplinary nature of a specific problem. Integrative review usually has the purpose of evaluating, critiquing, and synthesizing the literature on a research topic in such a way as to enable the emergence of new theoretical frameworks and perspectives (Torraco, 2005).

Most integrative reviews are designed to address traditional topics or emerging topics. In the case of traditional topics, the purpose is to review the knowledge base, critical analysis and rethinking, extrapolation to new conditions of social development in order to expand the theoretical basis of a specific topic. For new topics, the goal is to create initial or preliminary conceptualizations and theoretical models. This type requires a more critical data analysis, as the goal is not to cover all articles on the topic, but to combine perspectives and ideas from different fields or research traditions.

Integrative review's general purpose is to critically analyze and explore the main ideas and relationships between previously proposed ways of solving a problem. This requires conceptual and predictive thinking skills, as well as transparency and clarity in documenting the process and results of the analysis (MacInnis, 2011). Any integrative review should lead to an expansion of general knowledge and theoretical foundations, rather than a simple description of existing research. That is, it should not be descriptive or historical, as in a narrative review, but should create a new conceptual framework or theory. Using this type, researchers clearly report how the research was conducted, what criteria were used to select the articles, how the integration was done (Torraco, 2005).

Meta-analysis based review is a relatively new type to Pedagogy. In other fields (medicine, economics) meta-analysis is a statistical method of combining the different studies results to compare and identify patterns, discrepancies or connections that arise in the context of several studies on the same topic (Davis et al., 2014). In meta-analysis, each primary study is

coded and the results are subsequently transformed into a common matrix to calculate the overall effect size. Meta-analysis is sometimes used to integrate the results of included studies. However, for conducting any meta-analysis, the included studies must have a common statistical measure (effect size) to compare the results. Therefore, in Pedagogy, where different methodological approaches to carrying out research are possible, meta-analysis is difficult to perform.

In general, the quality of any of the described types depends on proper planning, breadth of material coverage, depth of analysis, and logic and clarity of presentation (Moher et al., 2009a). When properly performed, a review of any type can become an effective method of achieving the scientific research goals. Sometimes the review itself can be the purpose of the research. This happens when a researcher needs to evaluate theory or evidence in a particular field, or to test the validity or accuracy of a particular theory, or to compare several theories (Tranfield et al., 2003).

The review type choice depends on the scientific research topic, the research problem and the set tasks. Sometimes it is impossible to use only one type, and sometimes a combination of all types may be the only appropriate variant. Practice witnesses that systematic type is the most accurate one, but its accuracy is the greater the narrower a research question is.

Therefore, a semi-systematic review is used more often, but it requires the development and description of clear steps for its implementation (Wong та ін., 2013). The researchers need to develop own standards and detailed plans to ensure accurate coverage of relevant sources and to be able to answer the research questions. When a clear algorithm is developed and followed, a semi-systematic review can be no less effective a research tool for complex and broad topics than a systematic review.

In the case of an integrative review, even more responsibility and skill is required of researchers, as there are no clear standards and guidelines to follow when conducting such a review (Torraco, 2005). However, a successful integrative review may contribute to emergence of a new conceptual model or theory.

Regardless of which approach is used to carry out a review, it is necessary to take five main steps: development of inclusion/exclusion criteria; defining the review's volumes and topic; processing and analysis of covered sources; comparison and generalization of the results; writing a review text.

The analysis of various standards and recommendations for carrying out literature reviews (Liberati et al., 2009; Tranfield, et al., 2003; Wong, et al., 2013) showed that at the stage of review developing the researcher should set the following questions:

- Is this review really necessary?
- What contribution to science will be made with its help?
- What potential audience will it be addressed to?
- What specific purpose will be achieved?
- What research question(s) will be answered?
- What type of review should be chosen to achieve the goal best?
- What is the search strategy for this particular type of review?
- What are the search terms, databases, and inclusion and exclusion criteria?

At the stages of processing and analysis of sources, the researcher documents basic information, provisions, conclusions; evaluates the quality of the search and analysis process; adjusts the previously developed search plan, expands the scope of sources. At the stage of structuring and writing, the main issues are the review's form and content.

In order to avoid unnecessary work and mistakes, it is worth taking into account the existing reviews on the given problem, to evaluate the number of these studies, to identify possible gaps, to formulate the purpose of own research and the specific research question that will be addressed in the review. All this will help to choose the most appropriate type of review.

After defining the research question and choosing an approach to the general review, a search strategy must be developed to identify relevant sources. This includes selecting search keywords and relevant databases, as well as defining inclusion and exclusion criteria. The keywords selection is especially important, since thousands of scientific works can be found for a certain phrase, and therefore it is worth narrowing down the search spectrum. To do this, we recommend choosing phrases from a larger number of words, but imposing restrictions on publication dates, specifying the type of publications, etc. All these elements of the search strategy and the inclusion and exclusion criteria should be specified in the research methods. In addition, the choice of a specific strategy should also be reasoned and logically motivated.

At the current stage of society, science and technology development, the review of literature acquires new directions and characteristic features.

The modern society issues are often interdisciplinary. Their solution is impossible without taking up a comprehensive approach and the involvement of interdisciplinary research teams (Kolomiets, et al., 2021). Therefore, in modern conditions, a review of literature from only one field of knowledge loses its effectiveness. That is, meta-level reviews are necessary. This will help to see old problems in new realities; to discover new problems that humanity has not faced before; to build new conceptual models for solving pedagogical problems, taking into account as many factors as possible (social, economic, political) that caused to their emergence.

The ICT development has significantly expanded access to various sources of scientific information (international libraries, institutional repositories, scientometric databases). Therefore, the process of searching sources is accelerated, but its strategy is complicated. By keywords, you can find not only the needed scientific information on the Internet, but also advertising, information from commercial sites, as well as low-quality scientific works. Therefore, the first task for the researcher is the selection of databases that contain confirmed reliable information. Such databases are, for example, Scopus, Web of Science, EBSCOhost, Research4life, Science Direct, and Google Scholar (Kolomiets, & Gromov, 2017).

Such digital tools as Rayyan, Covidence, or EndNote allow automating part of the review process, including managing bibliographic data, selecting articles meeting the set criteria, and organizing them. Text analysis and data processing tools also facilitate meta-analyses and faster synthesis of results.

Such tools for bibliometric analysis as VOSviewer and CiteSpace can help with analyzing large arrays of scientific data, identifying key research directions and tracking collaborations between authors. They allow building citation networks, identifying trends, and visualizing the structure of scientific knowledge. This makes the review more in-depth and systematic.

Other tools, as Zotero, Mendeley, and RefWorks can help with automating the processes of searching, storing, organizing, and citing. This significantly simplifies the management of large numbers of scholarly sources and helps ensure that bibliography lists meet the different citation styles requirements (APA, MLA, Chicago etc.).

The Open Access movement is also an important aspect of digitization. Thanks to this, many scientific articles are available for free, which significantly

lowers the barriers for researchers, especially from regions with limited research funding.

Conclusions. Digitization has significantly changed the procedure for carrying out scientific literature reviews, making the process more efficient, accessible and automated. Thanks to digitization, researchers have gained access to a huge number of scientific publications through specialized databases. Such resources provide an opportunity to quickly find relevant articles, books and other scientific publications on any topic. This significantly speeds up the literature selection process compared to traditional methods that required physical access to libraries.

Thanks to machine learning algorithms and artificial intelligence tools, the search for relevant scientific publications has become more accurate and faster. Search systems can select articles based on keywords, citations, or even research context. This greatly facilitates the literature search and increases the relevant sources selection accuracy.

Consequently, digitization has brought significant changes to the methodology of carrying out reviews of scientific pedagogical literature, and the automated tools allow researchers to focus more on content analysis, reducing the technical tasks associated with searching and organizing data.

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