C O P E
Member since 2019
JM14482

Sławomir Pasikowski*

Meta-analysis for Supporting Empirical Theories in Educational Sciences

Abstract

This article explores the role of meta-analysis and systematic review in developing and refining empirical theories in educational sciences. It highlights the method's value in synthesizing research findings, identifying patterns, and improving the explanatory power and coherence of theories. It also underscores the skepticism present in academic circles, especially concerning meta-analysis. While meta-analysis is widely used in evidence-based approaches, its adoption in educational research sometimes remains locally limited due to concerns about data quality, methodological heterogeneity, publication bias, and perceived epistemic incompatibility with constructivist or interpretive paradigms. The author argues that these challenges can be addressed through methodological rigor, data transparency, proper contextualization, and interdisciplinary training in statistics, epistemology, and logic. Meta-analysis is presented not only as a statistical tool, but as a means of supporting intellectual inquiry and collaborative theory-building. The article calls for greater integration of meta-analytic methods into education research, emphasizing their potential to enhance the quality, comparability, and transparency of scientific knowledge.

Keywords: evidence-based approach, meta-analysis, theory, systematic literature review.

Article received: 28.05.2025; accepted: 18.06.2025.

* University of Lodz.

https://doi.org/10.18778/2450-4491.20.05

Metaanaliza dla wsparcia teorii empirycznych w naukach o edukacji

Abstrakt

Artykuł analizuje rolę metaanalizy i systematycznego przeglądu literatury w rozwijaniu i doskonaleniu teorii empirycznych w naukach o edukacji. Podkreśla wartość tych metod w syntezowaniu wyników badań, identyfikowaniu wzorców oraz zwiększaniu spójności i mocy eksplanacyjnej teorii. Zwraca też uwagę na środowiskowy sceptycyzm, zwłaszcza wobec metaanalizy. Choć metaanaliza jest szeroko stosowana w podejściach opartych na dowodach, jej wykorzystanie w badaniach edukacyjnych bywa lokalnie ograniczone – głównie z powodu obaw dotyczących jakości danych, heterogeniczności metod, stronniczości publikacyjnej oraz spostrzeganej niekompatybilności epistemicznej z podejściami konstruktywistycznymi lub interpretatywnymi. Autor przekonuje, że wyzwania te można przezwyciężyć dzięki rygorowi metodologicznemu, transparentności danych, właściwemu kontekstualizowaniu oraz interdyscyplinarnemu przygotowaniu z zakresu statystyki, epistemologii i logiki. Metaanaliza przedstawiana jest nie jako narzędzie wyłącznie statystyczne, lecz jako wsparcie dla intelektualnych dociekań i współpracy teoretycznej. Artykuł apeluje o silniejsze włączenie metaanalizy w badania edukacyjne, podkreślając jej potencjał dla poprawy jakości, porównywalności i przejrzystości wiedzy naukowej.

Słowa kluczowe: podejście oparte na dowodach, metaanaliza, teoria, systematyczny przegląd literatury.

Introduction

One of the key objectives of scientific disciplines is to build theories of the phenomena that are the subject of those disciplines' research. Such theories, in addition to describing phenomena, also allow for understanding, explanation, and prediction. However, it is widely acknowledged that for theories to be effective in these respects, they must be coherent, non-contradictory, and possess explanatory power. Moreover, in empirical sciences, theories concerning phenomena under investigation must meet the requirement of non-verbal interpretation of terms and the requirement of the decidability of referring names to the objects they designate by means of observations (Przełęcki 1988; Hempel 1964). In other words, these theories must be empirically verifiable and confirmable. Consequently, the commonly used framework for theory testing or theory building involves the collection and analysis of data. However, to paraphrase Ludwig Wittgenstein's note (Wittgenstein 1958: 47), problems are not solved only by providing new information, but also by organizing what is already known. This means that the collection of new observations is not always necessary or reasonable in the process of determining a theory's validity. And this is not about analyzing the consistency and non-contradiction of the system of sentences that constitute a theory. Rather, what is meant here is an analytical solution that

does not evaluate the sentences forming a theory, but instead the values of metrics and results reported in already completed research studies. What is more, this solution creates the conditions for theory development, for example in the educational sciences, that can demonstrate the three characteristics mentioned earlier – at least to an acceptable degree. This solution is meta-analysis.

The aim of this article is to highlight the potential of meta-analysis in the context of building and developing empirical theories in educational sciences, as well as to examine the circumstances surrounding the reception of this method in the research community. This means that the characteristics of the method will be presented in general terms, with some discussion of its advantages and potential drawbacks, but without an in-depth presentation of the technical aspects of the method. A systematic overview of the topic of empirical theories will also be omitted. First, there already exists a rich and classical literature on this subject (e.g., Hempel 1965; Lakatos 1989; Merton 2017; Popper 2002; Reichenbach 1963; van Fraassen 2004), and second, the intention of this article is to focus specifically on the methodological issue.

Method description

Meta-analysis is a method whose origins date back to the early 20th century, although its development is closely tied to the advancement of statistics and the computerization of the data analysis process (Pigott, Polanin 2019). Its value has been widely recognized, and its dissemination gained extraordinary momentum once attention was drawn to the limitations of making claims about observed reality based on individual primary studies and the shortcomings of the statistical hypothesis verification theory – both due to issues related to sample representativeness and the evaluation of statistical test power (Schmidt 1992). Although it is often treated as an independent method, meta-analysis should, in fact, be considered in conjunction with the method known as the *systematic literature review* (Harrer, Cuijpers, Furukawa, Ebert 2022). A systematic literature review involves synthesizing published knowledge using so-called review protocols. The review may include research results regardless of the topic and methodical solutions used, although it is important that they concern the same issue, e.g., a specific relationship between specific variables (Gough, Oliver, Thomas 2017). Systematic searching means that the search and selection are conducted according to specific criteria, such as defined keywords, character strings, and other symbols that allow the identification of all publications or studies considered key to the subject of the analysis. The results of a properly conducted systematic review provide the research material that can be used in meta-analysis. Meta-analysis, in turn, based on the statistical aggregation of separate research findings, enables the assessment of the current state of empirical knowledge and the validity of theories concerning a given phenomenon. As a result, meta-analysis initiates the process of formulating new hypotheses and guides the search for new sets of sentences regarding observed phenomena.

Meta-analysis can focus on studies examining population differences, relationships between variables, or the psychometric properties of measurement tools. The key objective of meta-analysis is to highlight what is replicable across sets of primary studies. This approach stems from the observation that relying on a single study or project carries a high risk of generating artifacts. Any individual empirical study is subject to limitations due to various forms of bias. The well-known statistical principle – stating that deviations from expected values tend to cancel each other out – illustrates the foundational principle behind meta-analysis. If an observed effect in a single study is confirmed by other previously or simultaneously conducted studies, its credibility increases. However, it must also be remembered that similar results may be subject to various distortions, such as those related to the sample and its size, so the issue of data quality is a critical concern in meta-analysis as well.

In addition to the benefits gained from observations made within individual projects and compiled into a set of research findings, meta-analysis offers further advantages stemming from the accumulation of knowledge that accounts for the limitations related to sample sizes. One such benefit is the potential to discontinue certain lines of exploration. The meta-analytical approach allows to determine whether the effects reported in individual studies attain the status of confirmed findings or whether they are artifacts. In either case, continuing research aimed at answering the same research questions may no longer be justified.

Meta-analysis provides information about the distribution of effect sizes, including key parameters such as the expected value and variance of effect size. This makes it possible to highlight what, and to what extent, recurs across different studies. It is important to note that meta-analysis relies on aggregated data, not on raw data collected in primary studies. These aggregated data are statistical metrics derived from the original studies. The type of metrics depends on the statistical methods used in the primary research, although they usually include descriptive statistics, correlation coefficients, odds ratios, test statistics, and effect size coefficients. The core strength of meta-analysis lies in its synthetic approach to primary research findings, which allows researchers to determine how much of what was predicted by assumptions and theories has actually received empirical confirmation. This is extremely valuable knowledge that cannot be provided by any single study, as primary studies are burdened with errors, often unavoidable, that distort the image of the phenomenon being investigated. By relying on the well-known statistical mechanism of offsetting deviations from expected values, meta-analysis provides a less biased picture of the studied phenomenon. However, the quality of meta-analytical results is still contingent on the quality of the primary studies, including the empirical material underlying the primary observations. For this reason, conducting a meta-analysis is subject to rigorous methodological recommendations, such as presenting: justification of the review, review plan, research questions, data search strategy plan (for literature and studies), including selection criteria (e.g., keywords used to search databases), screening strategy, design of coding protocol, strategy

and analysis plan, including statistical model (e.g., fixed-effects or random-effects models), methods for data cleaning and transformation, methods of handling with missing data. It is recommended that all these elements be documented in a protocol, including also the synthesis of study effects, explanation of variability in effect sizes, interpretation of results, testing for publication bias in the systematic review, and data sharing from the review process (Pigott, Polanin 2019). Furthermore, it is expected that researchers provide the scripts used in automating the data search, analysis, and visualization processes. Pre-registration of the meta-analysis is also recommended to clearly distinguish a priori assumptions and hypotheses from those formed after the data have been collected, i.e., exploratory in nature. This helps eliminate HARKing (Hypothesizing After the Results Are Known), a practice that not only reduces the transparency of the study but also misleads readers regarding the theoretical framework, diminishes the replicability of the research, and increases the risk of false-positive findings.

The aforementioned recommendations and expectations ensure the transparency and detail of the meta-analytical procedure and the materials used, thereby providing a foundation for the rational assessment of the quality of both the procedure and the research findings, as well as enabling replication of the study. Moreover, they can serve as a basis for conducting a meta-analysis of meta-analyses, known as "Umbrella Meta-analysis" (Ioannidis 2009; Slim, Marquillier 2022). This is feasible both from the perspective of the theoretical foundations of the method and due to the technical solutions available through the R platform and the Jamovi application, for example (Gosling et al. 2023).

Skepticism toward meta-analysis in the educational sciences

Despite the widely emphasized potential of meta-analysis in literature, it still elicits a degree of skepticism. One of the main reasons is the high and difficult-to-control dependence of its outcomes on the quality and availability of data. Studies are conducted within various frameworks and employ different methods, which complicates the process of integration. To address this, special protocols have been introduced, such as PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Moheret al. 2009) and AMSTAR (A MeaSurement Tool to Assess Systematic Reviews; Shea et al. 2017). However, a persistent issue remains: the unjustified lack of standardization in how studies are conducted, specifically in terms of measurement procedures, data analysis, reporting, and interpretation frameworks.

Significant concerns also revolve around the persistent and often unavoidable problem of missing data. This issue stems not only from limited access to relevant publications but also from inconsistencies in scientific communication standards. Some data and statistical metrics are simply not reported by the original study authors. Nevertheless, meta-analysts are not powerless. There are recommended methods for data supplementation, including various more or less advanced techniques

for statistical data imputation (Audigier et al. 2018; Grund, Ludtke, Robitzsch 2018). Furthermore, the aforementioned recommendation to report the quality of material used in a meta-analysis also supports this effort.

Another major challenge is publication bias, which poses a serious threat to the accuracy of meta-analytical findings. Publication bias involves not only the tendency to avoid publishing studies with unexpected or non-significant results, but also the exclusion of such studies from meta-analyses (e.g., Cumming, Calin-Jageman 2017). This usually concerns statistical significance tests where $p > \alpha$. To address this challenge, it is recommended to search public repositories to uncover all relevant studies, including not just journal articles, but also online reports, conference presentations, and student theses. Additionally, direct contact with researchers working in the field is encouraged, asking them for information about unpublished or overlooked studies (Pigott, Polanin 2019). Although there are also analytical methods to support the assessment of publication bias, such as visual inspection of a funnel plot and Egger's test of funnel plot symmetry (Page, Higgins, Sterne 2019), and others, including the advanced approach of robust Bayesian meta-analysis using the concept of posterior probability and heterogeneity among effect sizes in the evaluation, comparison and selection of models (Bartoš et al. 2023, Vevea, Hedges 1995).

Doubts and reservations about meta-analysis also arise from the heterogeneity of definitions (i.e., identical search terms referring to different concepts), differences in the operationalization of variables, and divergent research methods used in primary studies. Understandably, making comparisons without aligning this conceptual and methodological layer becomes problematic, since differences in operationalization and research methodics often mean that results pertain to entirely different issues or different aspects of the same issue. This resulting variability may involve the type of research intervention, the target population, the data collection or analysis methods used, or even the overall quality of the studies. Each of these multilevel factors can be controlled by treating them as moderators of effect size and examining covariances between specific effect sizes, each of which is nested within a particular study. A common solution to address such variability is the use of meta-regression (Harrer et al. 2022). It is also worth noting that for the frequently occurring differences in effect size metrics, data transformation techniques can be applied.

A separate issue concerns the application of meta-analysis to qualitative data and to findings from studies conducted using qualitative or mixed methods strategies, as well as challenges related to meta-synthesis – a historically later variant of meta-analysis proposed specifically for studies using qualitative approaches. There are established solutions in this area, but these too require careful standardization of both primary and meta-analytic procedures (Heyvaert, Maes, Onghena 2011; Hong et al. 2017; Sandelowski, Barroso 2006). Moreover, when facing difficulties with qualitative data, it is possible to apply the data transformation procedures mentioned earlier, although such transformations are not without limitations (Hong et al. 2017).

I would argue that a fundamental difficulty in recognizing meta-analysis and systematic review as legitimate research methods may stem from concerns about epistemic incompatibility between the statistical approach and constructivist or critical-interpretive paradigms. Meta-analysis is grounded on the assumption that the observable world can be known through the accumulation of data and the isolation of effects that demonstrate a higher degree of objectifiability and generalizability. Meanwhile, several currents within the social sciences view knowledge as situated, relational, and culturally embedded. The concern mentioned above is justified, if objectifiability and generalization are understood in terms of extrapolation beyond the specific context of the group, place, time, and the knowing agent. However, if inference is limited to sets of behaviors or phenomena within very precisely defined populations, for instance, a specifically and locally situated group of people, or even a single individual, then the replication framework and the observation of distribution patterns remain fully applicable. This is because they refer strictly to a population of phenomena or behaviors identified with that particular group, place, context, or observational agent. That said, context cannot be treated vaguely, generally, or as merely residual (i.e., everything else that is unspecified but important). A deliberate effort must be made to specify the context. If that is done, then it becomes fully legitimate to invoke the *ceteris paribus* principle and to assert that the knowledge produced is a representation, an idealization of the observed phenomenon – which should be subject to essential correction based on subsequent observations, in order to improve the representation of what is observed. Such an approach to reducing the risk of epistemic incompatibility can support a greater willingness to use meta-analysis justified by the need to improve the quality of reasoning and, ultimately, the quality of theoretical models of the phenomena being studied. But this effort alone may not be enough.

Conclusion

Meta-analysis has gained a wide base of users and supporters, although – as previously mentioned – it is neither a universal nor infallible solution. However, when applied consciously, it brings invaluable benefits, many of which have already been discussed. Numerous applications of this method in research on education, learning, and schooling can be found within the evidence-based approach (Hattie 2008). Yet, compelling examples of its effective use, especially relevant to the educational research community, also include studies on creativity and its development (Gajda, Karwowski, Beghetto 2017; Wiśniewska, Karwowski 2007), the accuracy of student self-assessment scoring (León, Panadero, García-Martínez 2023), the effectiveness of the Montessori method (León, Lipnevich, Garrido 2025), and Technological Pedagogical Content Knowledge (TPACK) (León et al. 2025). The latter perfectly illustrates the value of meta-analysis in the process of evaluating the model of an educational phenomenon and the enormous importance of the methodological awareness of the meta-analyst, which ensures the procedural and result quality of this method.

Notwithstanding, in some academic circles this method is still not widely adopted – a situation that may seem surprising, especially in the field of education, where the demand for evidence-based education and for theories that support the design, prediction, and explanation of educational phenomena is driven not only by scientific interest, but also by practical needs.

It is possible to improve the readiness of the educational research community to both passively and actively use meta-analysis and systematic reviews in the process of building and developing scientific theories. Strengthening this readiness is especially important due to the fundamental characteristics of scientific theories highlighted in the introduction (at least coherence and non-contradiction) as well as the fact that these criteria are not always reflected in current practices in the social sciences, including education. Too often, theories in these fields are treated as collections of free statements freely assembled. To enhance this readiness, it is essential to reshape course programs and training by introducing courses that equip researchers with statistical literacy and competence in digital tools such as R and Python, particularly their use in data analysis and visualization. Equally important is philosophical preparation, especially in epistemology, which can provide a broader understanding of the possibilities and limitations associated with different epistemic approaches. Additionally, logical training is key, since conducting a systematic review or meta-analysis requires precise reasoning, both in using the methods themselves and in interpreting the results they produce. In other words, meta-analysis and systematic literature review are technological solutions meant to support the intellectual efforts of the knowing subject. But the conditions under which this intellectual work takes place are equally important. Without fostering an academic culture of collaboration, characterized by task delegation, mutual review, data sharing, and a commitment to transparency, the effectiveness of such intellectual activity may remain unsatisfactory. Relying on meta-analysis as a tool does not imply the dominance of the statistical approach in the development of empirical theories concerning complex phenomena such as education. This is clearly demonstrated by the experiences and achievements associated with meta-synthesis. Meta-analysis can serve as a foundation for transparency, comparability, and epistemic collaboration in the development of theories in educational sciences, but only if it is recognized within the pluralistic methodological landscape of these disciplines (which, unfortunately, are often "locally governed") as a relevant, non-accidental, and indispensable method.

Bibliography

Audigier V., White I. R., Jolani S., Debray T. P. A., Quartagno M., Carpenter J., Resche-Rigon M. (2018) *Multiple Imputation for Multilevel Data with Continuous and Binary Variables*, "Statistical Science", no. 33, pp. 160–183, https://doi.org/10.1214/18-STS646.

Bartoš F., Maier M., Wagenmakers E., Doucouliagos H., Stanley T. D. (2023) *Robust Bayesian Meta-Analysis: Model-Averaging Across Complementary Publication Bias Adjustment Methods*, "Research Synthesis Methods", no. 14(1), pp. 99–116, https://doi.org/10.1002/jrsm.1594.

Cumming G., Calin-Jageman R. (2017) *Introduction to the New Statistics. Estimation, Open Science, and Beyond*, New York, NY – London, Routledge, https://doi.org/10.4324/9781315708607.

Gajda A., Karwowski M., Beghetto R.A. (2017) *Creativity and Academic Achievement: A Meta-Analysis*, "Journal of Educational Psychology", no. 109, pp. 269–299, https://doi.org/10.1037/edu0000133.

Gosling C.J., Solanes A., Fusar-Poli P., Radua J. (2023). *Metaumbrella: the First Comprehensive Suite to Perform Data Analysis in Umbrella Reviews with Stratification of the Evidence*, "BMJ Mental Health", no. 26, pp. 1–8, https://doi.org/10.1136/bmjment-2022-300534.

Gough D., OliverS., Thomas J. (2017) *An Introduction to Systematic Reviews*, London, Sage.

Grund S., Ludtke O., Robitzsch A. (2018) *Multiple Imputation of Missing Data for Multilevel Models: Simulations and Recommendations*, "Organizational Research Methods", no. 21, pp. 111–149, https://doi.org/10.1177/1094428117703686.

Harrer M., Cuijpers P., Furukawa T. A., Ebert D. D. (2022) *Doing Meta-Analysis with R. A Hands-On Guide*, London – New York, NY, Taylor & Francis Group, https://doi.org/10.1201/9781003107347.

Hattie J. (2008) *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*, London – New York, NY, Routledge.

Hempel C. G. (1964) *Fundamentals of Concept Formation in Empirical Science*, Chicago, IL – London, University of Chicago Press.

Hempel C. G. (1965) *Aspects of Scientific Explanation and Other Essays in the Philosophy of Science*, New York, NY, Free Press.

Heyvaert M., Maes B., Onghena P. (2011) *Applying Mixed Methods Research at the Synthesis Level: An Overview*, "Research in the Schools", no. 18(1), pp. 12–24.

Hong Q. N., Pluye P., Bujold M., Wassef M. (2017) *Convergent And Sequential Synthesis Designs: Implications for Conducting and Reporting Systematic Reviews of Qualitative and Quantitative Evidence*, "Systematic Reviews", no. 6(1):61, https://doi.org/10.1186/s13643-017-0454-2.

Ioannidis J. P. A. (2009) *Integration of Evidence from Multiple Meta-Analyses: A Primer on Umbrella Reviews, Treatment Networks and Multiple Treatments Meta-Analyses*, "Canadian Medical Association Journal", no. 181(8), pp. 488–493, https://doi.org/10.1503/cmaj.081086.

Lakatos I. (1989) *The Methodology of Scientific Research Programmes*, Cambridge, Cambridge University Press.

León S. P., Garrido M. G., Martínez I. G., Lipnevich A. (2025) *Passing TPACK through the Meta-science Circle: A Meta-analytic Systematic Review of the application of the Model*, May 14, preprint, https://doi.org/10.35542/osf.io/c5qsr_v1.

León S. P., Lipnevich A., Garrido M. G. (2025) *Is All That Glitters Gold? Meta-analytical Systematic Review of the Effect of the Montessori*, April 7, preprint, https://doi.org/10.35542/osf.io/mf9ec_v1.

León S. P., Panadero E., García-Martínez I. (2023) *How Accurate Are Our Students? A Meta-Analytic Systematic Review on Self-assessment Scoring Accuracy*, "Educational Psychology Review", no. 35:106, https://doi.org/10.1007/s10648-023-09819-0.

Merton R. K. (2017) *Social Theory and Social Structure*, New York, NY, Free Press.

Moher D., Liberati A., Tetzlaff J., Altman D. G., Prisma Group (2009) *Preferred Reporting Items for Systematic Reviews and Meta-Analyses: the PRISMA Statement*, "PLoS medicine", no. 6(7), e1000097, https://doi.org/10.1371/journal.pmed.1000097.

Page M. J., Higgins J. P. T., Sterne J. A. C. (2019) *Assessing risk of Bias Due To Missing Results in a Synthesis* in: *Cochrane Handbook for Systematic Reviews of Interventions*, J. P. T. Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, M. J. Page, V. A. Welch (eds.), Oxford, The Cochrane Collaboration and John Wiley & Sons, https://doi.org/10.1002/9781119536604.ch13.

Przełęcki M. (1988) *Logika teorii empirycznych*, Warszawa, Wydawnictwo Naukowe PWN.

Pigott T. D., Polanin J. R. (2019) *Methodological Guidance Paper: High-Quality Meta-Analysis in a Systematic Review*, "Review of Educational Research", no. 90(1), pp. 24–46, https://doi.org/10.3102/0034654319877153.

Popper K. R. (2002) *The Logic of Scientific Discovery*, London – New York, NY, Routledge.

Reichenbach H. (1963) *The Rise of Scientific Philosophy*, Berkeley & Los Angeles, University of California Press.

Sandelowski M., Barroso J. (2007) *Handbook for Synthesizing Qualitative Research*, New York, NY, Springer.

Schmidt F. L. (1992) *What Do Data Really Mean? Research Findings, Meta-Analysis, and Cumulative Knowledge in Psychology*, "American Psychologist", no. 47(10), pp. 1173–1181, https://doi.org/10.1037//0003-066X.47.10.1173.

Shea B. J., Reeves B. C., Wells G., Thuku M., Hamel C., Moran J., Moher D., Tugwell P., Welch V., Kristjansson E., Henry D. A. (2017) *AMSTAR 2: a critical appraisal tool for Systematic Reviews That Include Randomised or Non-Randomised Studies of Healthcare Interventions, or Both*, "BMJ", 358:j4008, https://doi.org/10.1136/bmj.j4008.

Slim K., Marquillier T. (2022) *Umbrella Reviews: A New Tool to Synthesize Scientific Evidence in Surgery*, "Journal of Visceral Surgery", no. 159(2), pp. 144–149, https://doi.org/10.1016/j.jviscsurg.2021.10.001.

van Fraassen B. C. (2004) *The Scientific Image*, Oxford, Oxford University Press.

Vevea J. L., Hedges, L. V. (1995) *A General Linear Model for Estimating Effect Size in the Presence of Publication Bias*, "Psychometrika", 60, 419–435, https://doi.org/10.1007/BF02294384.

Wiśniewska E., Karwowski M. (2007) *Efektywność treningów twórczości – podejście metaanalityczne*, „Ruch Pedagogiczny", no. 3–4, pp. 31–50.

Wittgenstein L. (1958) *Philosophical Investigations*, New York, NY, Macmillian Publishing Co.

Acknowledgements

The author would like to thank Samuel Parra León of the University of Jaén for providing numerous inspirations that led him to turn toward meta-analysis. Without them, this article would not have been written.

About the Author

Sławomir Pasikowski – Ph.D. in Education Sciences, specializations: the methodology of scientific research in education. Author of publications on the methodology of educational research and the use of statistics in social research. Vice-chair of the Section for Methodology of Research on Education at the Committee on Pedagogical Sciences of the Polish Academy of Sciences (PAN). Member of the Laboratory of Research Tools at the Committee on Pedagogical Sciences of the PAN. Contact: slawomir.pasikowski@now.uni.lodz.pl

Sławomir Pasikowski – doktor habilitowany nauk społecznych w dyscyplinie pedagogika, specjalizacja: metodologia badań w edukacji. Autor publikacji na temat metodologii badań edukacyjnych i wykorzystania statystyki w badaniach społecznych. Wiceprzewodniczący Sekcji Metodologii Badań nad Edukacją Komitetu Nauk Pedagogicznych PAN. Członek Pracowni Narzędzi Badawczych Komitetu Nauk Pedagogicznych PAN. Kontakt: slawomir.pasikowski@now.uni.lodz.pl

creative commons © by the author, licensee University of Lodz – Lodz University Press, Lodz, Poland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license CC BY 4.0