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THE UTILITY OF COMPARATIVE ANALYSES IN RESEARCH ON THE IMPLEMENTATION OF META-LEARNING STRATEGIES AT THE EDUCATIONAL LEVEL

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Abstract
The utility of comparative analyses in research related to the implementation of meta-learning strategies at the educational level involves a methodical approach aimed at justifying the partial or total validity, or the non-validity, of specific hypotheses. Thus, starting from the idea that comparative analysis represents a specific investigative strategy in educational research, our goal is to identify the extent to which similarities and differences can generate assumptions that can be scientifically validated in such an endeavor. In this regard, we consider the evaluation of educational practices to identify possible solutions for scientific validation in the field of educational epistemology.

Keywords: ***comparative analysis; educational epistemology; meta-learning.***

Introduction

Within research focusing on the utility of comparative analyses in studies related to the implementation of meta-learning strategies at the educational level, we can develop a series of research strategies aimed at capturing a deep understanding of the concept of scientific knowledge. Such comparisons serve to highlight the conceptual foundations of meta-learning. In this regard, we consider it essential to identify the elements to be compared in the research, such as methods, strategies, concepts, and theories. Moreover, such comparative analyses can be effectively conducted if clear comparison criteria are established beforehand, as these criteria serve to define the aspects that guide and structure such comparative approaches.

We consider that such a methodological initiative should take into account a systemic comparison aimed at identifying how meta-learning strategies are integrated into different

educational systems. In this regard, the implementation of these strategies will be analyzed in various academic contexts, such as traditional higher education, online programs, and hybrid learning. At the same time, the methodological comparison will serve to explore the advantages and limitations of different methods used to evaluate the impact of meta-learning on students (Vanschoren, 2019, 35-61). For research accuracy, the analysis should focus on distinguishing between quantitative, qualitative, and mixed approaches, highlighting their advantages and disadvantages in the context of educational research itself.

Cultural, economic, and political factors play a significant role in shaping meta-learning strategies, and comparative analysis helps in understanding these influences. (Bliuc, Costea, Mihai & Stratulat, 2018, 51-64) Identifying the most effective educational practices through comparison supports the adaptation of meta-learning strategies to the specific needs of different education systems. At the same time, comparative analysis provides decision-making support for the development of evidence-based educational policies. Thus, it contributes to the optimization of educational processes and the improvement of learning outcomes.

Theoretical Approaches

First and foremost, a theoretical comparison requires an investigative approach that considers analyses and explanations regarding the fundamental concepts of the research study (e.g., "academic experiences," "(meta)learning strategies," "optimization"). In this way, comparisons can be made between learning theories relevant to the educational process (e.g., cognitive theory, constructivist theory, experiential learning, social learning, etc.). On the other hand, such a research endeavor can also focus on the similarities and differences between the theoretical contributions of various authors, while also highlighting their scientific and practical contributions within meta-learning theories (Pasha & Fatima, 2017, pp. 923-933). The purpose of theoretical comparisons is to identify the conceptual foundation of the meta-learning concept to later formulate research hypotheses and optimize a practical/methodological investigative design (Brazdil, Giraud-Carrier, Soares, & Vilalta, 2009).

Additionally, within a theoretical comparison, such research can integrate specific analyses related to the concept of meta-learning, including the theory of efficient learning, the theory of self-regulated learning, and, not least, the theory of meta-learning itself. This approach can be justified by the fact that, for example, the theory of efficient learning "operates" on methods that maximize retention and on how knowledge is utilized. By comparing it to meta-learning theory, one can observe a common ground—both theories consider scientific analyses and

explanations aimed at the conscious development of cognitive skills (Kalousis & Hilario, 2001).

However, the key difference between the two theories lies in the fact that meta-learning theory also incorporates the idea of self-regulation—that is, the learner's ability to reflect on their own learning process. Furthermore, in comparison with the other two theories, meta-learning is distinguished by its high degree of adaptability and reflection. Through this comparative approach, the complexity of developing metacognitive skills can be better understood. In this context, best practice models (as seen in efficient learning theory), methods of proactive engagement (within self-regulated learning theory), and strategies for fostering and enhancing reflective thinking (specific to meta-learning theory) can be highlighted.

Of course, within such an investigative context, specific meta-learning strategies—such as planning, monitoring, and self-evaluation—can also be discussed and compared. This allows for an analysis of traditional learning methods in contrast with those specific to the meta-learning dimension. In this way, the impact of applying and leveraging meta-learning strategies on students can be examined. Therefore, a theoretical comparison requires a proper understanding of the learning process, based on an explicit analysis of each of the theories addressed within the proposed research.

Systemic Approaches

Secondly, a systemic comparison involves analyzing concepts related to the idea of meta-learning and, implicitly, meta-learning strategies (a comparison made from a descriptive perspective). In this sense, scientific interest can particularly focus on academic contexts where such meta-learning strategies can be applied and leveraged. On the other hand, by considering contexts from different universities that focus on a series of innovative methods based on the idea of self-regulated learning, advantages and limitations of this process can be identified in relation to student performance/results. This represents the opportunity for a systemic paradigm through which teaching strategies are discussed, analyzed, and compared, along with correlations between them, in various academic contexts (a comparison made from a functional perspective). Moreover, the immediate objective of such a comparative process is to analyze how such meta-learning strategies can influence the academic context and identify a series of effective educational policies grounded in pragmatic (inter)national experiences (Vettoruzzo, Bouguelia, Vanschoren, Rognvaldsson, Santosh, 2024). On the other hand, a systemic comparison requires an analysis of the interdependence between the various components of the

educational process. These components include both internal factors, such as the university curriculum and pedagogical methods, and external factors, such as educational policies and the integration of technology into learning. Students who benefit from well-structured meta-learning strategies can develop superior cognitive skills and a higher degree of autonomy in the process of acquiring knowledge. In this context, a systemic comparison can highlight the differences between educational systems that support self-reflection and those that place greater emphasis on traditional methods of information delivery. Therefore, it is essential to analyze to what extent meta-learning strategies influence students' academic success and personal development.

Desigur că, la nivelul unei comparații care vizează abordarea sistemică trebuie avute în vedere, pe lângă elementele ce vizează aspecte de natură academică, și o serie de diferențe sociale, dar și culturale existente între sisteme educaționale diferite. (Pan & Yang, 2009). În acest mod, trebuie vizate acele medii educaționale care promovează ideea de învățare fundamentată pe gândire critică și autonomie. (Weng, 2018) Acestea pot fi comparate cu sistemele care (încă mai) susțin reproducerea mecanică/memorarea excesivă. (Doya, 2002, 495-506). Astfel de comparații pot fi valorificate tocmai prin faptul că pot evidenția modalitățile prin care studenții percep, își asumă și aplică o serie de strategii de metaînvățare în formarea propriei lor experiențe academice și personale.

De asemenea, nu pot fi neglijați factorii de natură economică și socială care pot contribui la identificarea și corelarea unor resurse educaționale cu astfel de strategii de metaînvățare. O astfel de asumpție poate justifica necesitatea unei analize comparative exhaustive (desigur, cu limitele sale academice și metodologice) care să aducă o contribuție epistemică în cadrul metaînvățării. De aceea, acest tip de comparație devine eficient la nivelul cercetării tocmai prin faptul că performanțele academice ale studenților pot fi influențate de înseși competențele formate/dobândite, ca urmare a corelațiilor dintre strategiile de metaînvățare și procesul de adaptabilitate inițiat și valorificat la nivelul sistemelor universitare care țin cont de noile cerințe de pe piața muncii. Desigur, aceste demersuri sunt posibile prin raportare la o serie de aspecte ce țin de estimarea, examinarea unor concepte și teorii (Thrun & Pratt, 1998), cercetări inițiate și concretizate, rezultate obținute, reflectare asupra acestora, eventuale reconceptualizări și redimensionări teoretice, idei științifice personale și validate sub aspect al cercetării comparative. De altfel, integrarea absolvenților în viața profesională s-ar realiza mult mai ușor, pornindu-se tocmai de la ideea însăși de optimizare a propriilor experiențe academice. (Alexandros & Melanie, 2001, 525-554)

Of course, at the level of a comparison aimed at a systemic approach, not only academic aspects should be considered, but also a series of social and cultural differences existing between different educational systems (Pan & Yang, 2009). In this way, educational environments that promote learning based on critical thinking and autonomy should be targeted (Weng, 2018). These can be compared with systems that still support mechanical reproduction/excessive memorization (Doya, 2002, pp. 495-506). Such comparisons can be valuable as they highlight how students perceive, embrace, and apply various meta-learning strategies in shaping their academic and personal experiences.

Furthermore, economic and social factors that may contribute to identifying and correlating educational resources with meta-learning strategies cannot be overlooked. Such an assumption can justify the need for a comprehensive comparative analysis (with its academic and methodological limits) that would contribute epistemically to the field of meta-learning. Therefore, this type of comparison becomes effective at the research level precisely because students' academic performance can be influenced by the skills formed/acquired as a result of the correlations between meta-learning strategies and the adaptability process initiated and leveraged within university systems that take into account the new demands of the labor market.

Of course, these efforts are possible through the consideration of aspects related to the estimation and examination of concepts and theories (Thrun & Pratt, 1998), initiated and concretized research, results obtained, reflection on these, possible reconceptualizations and theoretical resizing, personal scientific ideas validated within the context of comparative research. Moreover, the integration of graduates into professional life would be much easier by starting from the very idea of optimizing their own academic experiences (Alexandros & Melanie, 2001, pp. 525-554).

Methodological Approaches

Thirdly, in such research, we can also use a methodological comparison. The goal of the methodological comparison is to identify a valid/relevant research method. This involves creating a methodological framework regarding the assessment of the impact of the meta-learning process on students' academic experiences. Such an approach targets comparative analyses that refer to methods of data analysis and collection specific to the research process, as well as the analysis of the sample and studies found in the literature.

Thus, a comparison can be made between quantitative research (where studies and statistical analyses can be highlighted) and qualitative research (where interviews, analyses, and case studies prevail). While quantitative research focuses on obtaining and interpreting measurable/quantifiable data regarding the impact of learning, qualitative research can explore students' perceptions and academic experiences related to (meta)learning.

Conclusions and proposals

Comparative analysis is an essential tool in research concerning the implementation of meta-learning strategies in education, as it facilitates the clarification of relevant concepts and theories. By comparing different approaches to meta-learning, the influences of various epistemological currents on the learning process can be identified. It also allows for the evaluation of the validity and applicability of the strategies used in various educational contexts, highlighting the limitations and advantages of each.

In this regard, we propose that such research include a comparison between an experimental design (educational intervention) and a descriptive one (analysis of students' perceptions of meta-learning strategies). Thus, at the experimental level, the effects of an educational intervention can be tested by applying specific meta-learning strategies and evaluating the results before and after the intervention. In contrast, at the descriptive level, the analysis can focus on how students perceive and concretize their experiences related to the meta-learning process, without introducing changes in the educational process.

Additionally, in the experimental research, comparisons can be made by analyzing data from the experimental group (which undergoes educational interventions) and the control group (which follows the regular educational path). Such an approach proves useful as initial and final tests can be applied to measure the students' progress in utilizing meta-learning strategies. Comparatively, the analysis of experimental data relies on inferential statistical tests (e.g., ANOVA, t-test), while the analysis of descriptive data involves thematic coding and content analysis.

Thus, the comparison between the experimental and descriptive designs highlights the essential differences between testing educational interventions and analyzing students' experiences. Choosing the appropriate method influences the validity, applicability, and relevance of the conclusions, contributing to the development of more well-founded educational strategies. Therefore, a comparison between the two approaches can reveal a comprehensive paradigm in which subjective analyses are integrated with a range of objective perspectives.

Furthermore, in such research, a comparison of results can be made to determine the effectiveness of the meta-learning strategies implemented in the study. This involves an entire process of evaluating the effectiveness of the results by comparing them with the strategies used in the research groups (students). The level of self-regulation in learning, academic progress, and students' satisfaction with the strategies used can be compared. Additionally, the alignment of these results with the existing literature and educational models will be analyzed. Therefore, such a final comparison can lead to the formulation of relevant conclusions and provide recommendations for improving students' academic experiences through meta-learning.

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