10.24193/ed21.2025.31.04

The Influence of Learning Styles on the Academic Performance of Second Graders in Mathematics and Environmental Exploration

Denisa Pop, Mușata-Dacia Bocoș

Educatia 21 Journal 31 (2025) – Special issue
Special Issue: Proceedings of 13th International Conference "Education, Reflection, Development" (ERD 2025)
Educatia 21 Journal, (31) 2025, Art. 04
doi: 10.24193/ed21.2025.31.04
Research article

The Influence of Learning Styles on the Academic Performance of Second Graders in Mathematics and Environmental Exploration

Denisa Pop [a*], Mușata-Dacia Bocoș [b]

[a] *"Avram Iancu" Theoretical College, Cluj-Napoca, Romania*
[b] *Faculty of Psychology and Educational Sciences, "Babeș-Bolyai" University, Cluj-Napoca, Romania*

*Corresponding author: *denisa.pop18@avramiancucluj.ro*

Abstract

This study investigates the implications of learning styles on the academic performance of second graders in the subject Mathematics and Environmental Exploration. The research was conducted on a sample of 97 students from four classes (2nd grades A, C, D and F) at the "Avram Iancu" Theoretical High School in Cluj-Napoca, aged 8-9 years old. The classes were randomly selected according to the availability of the students and teachers to participate in the study. We aimed to determine the dominant learning style of students, by class, by completing a free online questionnaire, available on www.twinkl.ro; to measure students' performance in Mathematics and Environmental Exploration, at the beginning of the study (through an initial written test) and at the end (through a final written test); to adapt the teaching activities carried out in the mentioned classes, in order to respond to the dominant learning styles in each class, namely the visual style (classes II A and II F) and the kinesthetic style (classes II C and II D); to plan and support lessons that promote visual learning (with the help of images, educational videos) - in classes II A and II F and motor learning (through movement and practical activities, puzzles) - in classes II C and II D. The results of the research, analyzed with the Chi-square test, showed that the visual and kinesthetic styles have positive effects on the performance of students in the subject of Mathematics and Environmental Exploration, through the activities carried out in the lessons, this test indicating a significant difference between the final and initial test ($p < 0.05$). In conclusion, learning styles influence the academic performance of second grade students in the subject of Mathematics and Environmental Exploration.

Keywords:
mathematics and environmental exploration, school performance, teaching styles

1. Introduction

Mathematics is one of the fundamental components of the primary school curriculum, recognized as an essential subject for the development of basic cognitive skills and for the overall development of the child. In the context of a knowledge-based society characterized by digitization, globalization, and accelerating technological change, early mathematics education takes on strategic importance. Contemporary studies highlight the fact that mathematical skills acquired in the early years of school are predictive of later academic success, but also of success in personal and professional life (Clements & Sarama, 2011, Duncan et al., 2007).

The concrete operational stage described by Piaget (1970). At this stage, logical thinking is based on the manipulation of objects and practical situations, which means that students understand mathematical concepts better when they are presented through visual materials and interactive activities. Similarly, Bruner (1966) showed that students progress more quickly when teaching integrates enactive, iconic, and symbolic representations, the gradual transition from manipulating objects to images and, finally, to the abstract language of mathematics. An important dimension of current research is the link between learning styles and performance in mathematics. Ford and Chen (2001) showed that students with a visual learning style learn more effectively when provided with diagrams and graphic representations, while students with an auditory learning style respond better to verbal explanations, and kinesthetic learners develop through the manipulation of materials and practical activities. In this regard, a study conducted by Khoirunnisa and Iba (2022) on primary school students highlighted a strong correlation between VAK styles and math performance ($r = 0.71$).

Duncan and colleagues (2007) conducted an extensive longitudinal study that showed that mathematics performance at the beginning of schooling correlates strongly with later academic achievement, more so than reading skills or socio-emotional competencies.

This perspective is supported by other international studies (Jordan et al., 2009, OECD, 2015), which emphasize that the development of fundamental mathematical skills (counting, numerical relationships, understanding basic operations) has a long-term impact on the student's ability to access and understand advanced mathematical concepts, but also to transfer these skills to other areas of knowledge.

The literature draws attention to the fact that attitudes toward mathematics are formed in the early years of schooling and can significantly influence subsequent educational progress. Math anxiety is a phenomenon that is increasingly analyzed in current research, as it is negatively correlated with school performance (Ashcraft & Krause, 2007).

Studies show that pedagogical approaches that emphasize exploration, play, collaboration, and connecting mathematics to real-life situations can contribute to building positive attitudes toward the subject. In this sense, the role of the teacher becomes crucial in shaping a healthy relationship between the child and mathematics, encouraging curiosity, perseverance, and confidence in one's own abilities.

Educational research in recent decades has thoroughly analyzed the correlation between learning styles and performance in mathematics, providing solid arguments in favor of a differentiated and personalized approach to the teaching and learning process.

2. Theoretical foundation

Numerous studies show that adapting the educational process to students learning styles contributes to improving performance in mathematics. Pashler et al. (2008) emphasize that, although there is debate about the absolute validity of the "matching hypothesis" (the hypothesis that teaching styles should match learning styles), students tend to learn more effectively when exposed to methods that capitalize on their cognitive preferences.

Ford and Chen (2001) demonstrated that students with visual styles achieve better results when learning mathematics involves graphical representations, diagrams, images, or concrete materials.

Studies by Felder & Spurlin (2005) in STEM contexts indicate that students with a sensory style prefer concrete examples and applications, while intuitive students respond better to abstract concepts and theories, both approaches being essential in the formation of comprehensive mathematical thinking.

A study of a sample of 80 middle school students in the Philippines showed that the kinesthetic style correlates significantly with math performance ($r = .349$, $p = .001$), while visual, auditory, and reading/writing styles did not have a statistically significant association (Autida, 2024). The authors emphasize the importance of hands-on activities and the manipulation of concrete materials for learning mathematics, suggesting that physical engagement can support the understanding of abstract concepts. Other studies, focusing on geometry teaching, reported that kinesthetic learners achieved the best results in topics such as “Ratio and Proportion,” and visual learners benefited from graphic and spatial representations (Zales, 2022). More generally, a recent systematic review of 27 studies shows that most research indicates positive effects of integrating learning styles into lesson design, particularly in mathematics. The most effective strategies were visual-spatial ones, where abstract concepts were supported by diagrams and concept maps (Hariri et al., 2025). However, the authors note that the results are heterogeneous and that not all studies confirm the hypothesis of a strict match between style and method.

According to Vermunt & Vermetten (2004) learning style represents a personalized combination of specific ways of processing learning content, the learner's personality, learning goals and beliefs about how learning works. Some brain research states that when the ways of presenting information are adapted to learning styles, students will retain with less effort and their academic performance will increase in less than two weeks. The concept of learning style is first found in history as cognitive style. It was first used by Allport (Riding & Cheema, 1991) to express the "typical or habitual way of solving, thinking, perceiving and remembering". The learning style is a combination of factors such as: preference for a specific way of perceiving information, systematic choice for a type of learning methods, strategies and techniques, the conduct of optimal use of personal, environmental and social resources for learning (Neacşu, 2006, p. 24).

Regarding the method of evaluating school performance, some authors (Hunter & Hunter, 1984, Kuncel, Hezlett, & Ones, 2001) believe that school performance can be most objectively evaluated through students' grades.

If we are talking about learning styles, we will mention Walter Barbe`s model.

2.1. VAK is an acronym for Visual, Audithory and Kinesthetic.

Visual learners prefer to learn via the visual channel. Therefore, they like to read a lot, which requires concentration and time spent alone. Visual learners need the visual stimulation of bulletin boards, video and movies (Oxford, 1995, p. 35). Auditory learners want to engage in discussions, conversations, and group work. These students typically require only oral directions" (Oxford, 1995, p. 36). Kinesthetes are suited to activities involving movement, types of movement, varied games, experiments. When teaching students with kinesthetic learning styles it is advisable to keep in mind that they are always on the move. Just hearing the lesson will not keep them interested for long. However, not all studies have confirmed a direct link between VAK and performance. For example, research conducted in Indonesia showed that there were no significant differences between the math scores of students with visual, auditory, or kinesthetic styles (Barokah et. al., 2019). In addition, interventions that integrated physical activity into math lessons showed that the benefits were more evident in terms of attitudes and school engagement, and that performance gains were often contextual and moderate (Mavilidi et al., 2018).

The application of the VAK model in education is reflected in the diversification of teaching strategies. Teachers can include visual, auditory, and kinesthetic elements in the same lesson to respond to the diversity in the classroom. For example, a math lesson can combine diagrams and graphs for visual learners, explanations and discussions for auditory learners, and object manipulation and hands-on activities for kinesthetic learners.

We have chosen to describe a few learning styles to critically evaluate the effectiveness of certain approaches.

2.2. Fleming`s model (VARK)

The VARK (Visual–Auditory–Read/Write–Kinesthetic) learning style is an extension of the VAK model and is now one of the best-known tools used to identify students' learning preferences. The original VAK model was developed in the 1970s by Walter Barbe and his colleagues, and later, Neil Fleming (1992) added the "Read/Write" dimension, observing that many students prefer to learn through written materials, reading, and writing. This led to the creation of the VARK questionnaire, which is widely used around the world to provide insight into how individuals prefer to receive and process information. The visual component refers to a preference for information presented through images, diagrams, graphs, symbols, and colors. Students with this style tend to retain information more easily when they can visualize concepts, and in mathematics they benefit from graphical representations, number lines, geometric figures, or concept maps. These students tend to organize their materials using diagrams and colors and learn effectively through visual aids such as presentations or videos. The auditory style involves a preference for learning through listening and discussion. Students with a strong auditory style retain information better when it is conveyed verbally, prefer oral explanations, and consolidate their knowledge through conversation, debate, or reading aloud. In mathematics, these students can be supported by explaining algorithms in groups, through oral presentations of the steps to solve problems, and through peer teaching activities. The Read/Write (R) dimension added by Fleming refers to a preference for written materials and reading. Students who learn in this way prefer to read textbooks and articles and take notes, committing information to memory by rewriting or editing. In mathematics, they achieve good results when solving problems from textbooks, writing definitions and rules, or noting down the steps to solving problems in a systematic manner. The kinesthetic style involves learning based on movement, experimentation, and practical involvement. Kinesthetic learners understand concepts when they are asked to manipulate objects or perform concrete activities. In mathematics, they benefit from using cubes for counting, practical measurements, mathematical games involving movement, and experimental activities. These students feel more motivated when learning becomes a direct experience.

2.3. The 7 learning profiles model of Jean-Francois Michel

Jean-François Michel, a French researcher in pedagogy, developed a model known as the Seven Learning Profiles (*les 7 profils d'apprentissage*). This framework offers an alternative to traditional models such as VAK or Gardner's Multiple Intelligences, by focusing on the cognitive, affective, and behavioral attitudes that shape the way learners approach knowledge. Instead of concentrating solely on sensory channels, Michel's profiles highlight the strategies, emotions, and dispositions that influence learning processes. According to Michel, the first profile is the Intellectual, a learner who favors reasoning, abstraction, and logical analysis. Such students are

attracted to theories, conceptual frameworks, and deductive reasoning. They thrive when presented with structured arguments and opportunities to engage in reflective thinking. In contrast, the Emotional learner depends on affective engagement to succeed. Motivation, encouragement, and the presence of a positive interpersonal environment are essential for their progress. These learners are more receptive when they feel a personal or emotional connection to the subject matter. The third profile, the Instinctive, is characterized by spontaneity and reliance on intuition. These learners often prefer to experiment, take risks, and learn through trial and error. Their energy and readiness to act can make them highly engaged, although they may require guidance to structure their experiences. The Conformist profile, on the other hand, represents students who feel secure within a framework of rules and established standards. They are most comfortable when expectations are clear and when learning is guided by well-defined instructions. The Rebel constitutes the fifth profile. Such learners tend to challenge authority, question rules, and search for alternative ways of thinking. For them, debate, confrontation of ideas, and opportunities to express independence are crucial. Closely related, but distinct, is the Thematic learner, who seeks coherence and meaning in knowledge. This profile is marked by a preference for organizing information into overarching systems and themes, connecting details to a larger picture. Finally, the Dynamic learner is oriented towards action and practice. They learn best by doing, experimenting, and applying knowledge in concrete situations. This pragmatic orientation often leads them to value immediate usefulness and real-world application. The purpose of Michel's model is to encourage teachers to personalize instruction. By identifying the dominant learning profile of a student, educators can adjust their methods—providing more structure for conformists, more debate for rebels, or more hands-on activities for dynamic learners. At the same time, the model helps learners themselves to become aware of their preferences, which fosters metacognition and greater autonomy in the learning process. When compared with other frameworks, the seven profiles stand out as a synthesis of cognitive, emotional, and social dimensions. While Gardner's theory of multiple intelligences emphasizes different kinds of abilities, and VAK focuses on sensory modalities, Michel's model addresses the *attitudes and strategies* with which learners engage in education. For this reason, it offers a rich perspective for understanding the diversity of learning in the classroom and for designing more inclusive and responsive pedagogical practices.

2.4. Kolb`s model

In Kolb's view, learning style represents the personal choice for perceiving and processing information. Students' preferences for certain ways of approaching tasks and using certain problem-solving strategies are represented in 4 personal learning types: divergent, convergent, assimilative, accommodative).

The value of Kolb's model derives mainly from its potential for practical use. Within education, it guides teachers to plan learning experiences that incorporate every stage of the cycle: engaging learners in direct experiences, supporting them in reflective observation, assisting in the construction of conceptual understanding, and creating contexts for testing ideas through experimentation. In the sphere of professional development and lifelong learning, the model stresses the need to adapt teaching methods to different learner preferences, while also encouraging flexibility so that individuals are not confined to a single approach. Kolb's experiential learning framework has found application in a wide range of fields, including management training, medical and engineering education, and teacher preparation. Although it has been criticized—for instance, for simplifying complex cognitive processes or for classifying learning styles too rigidly—it remains influential because it portrays learning as a holistic, cyclical, and interactive process. At its core, the theory highlights that genuine learning emerges from the constant interplay of experience, reflection, conceptualization, and application.

2.5. Lussier`s model

Lussier`s model is based on Kolb`s theory but reorganizes the 4 learning styles into a system of 2 coordinates: emotional-rational and practical-observational. The strength of this model is that it opens the way for a more personalized educational process, one that can respond to the variety of learners present in any classroom. At the same time, it encourages the growth of metacognitive abilities, since students gain a clearer awareness of their learning preferences and can begin to use alternative strategies when needed. Some scholars have cautioned that a rigid classification of learners into fixed categories risks creating stereotypes, highlighting instead the importance of maintaining flexibility. Even with such critiques, Lussier's framework continues to be a significant point of reference in both pedagogical practice and research, as it underscores the principle that genuine learning develops through the interplay of

experience, reflection, conceptualization, and practical action.

From a theoretical perspective, examining learning styles deepens our understanding of how children perceive, process, and use information. When these preferences are recognized and applied in the classroom, the result is a more inclusive, efficient, and engaging learning environment. Teachers become increasingly attentive to the diverse needs of their students, and it becomes essential to design teaching strategies that make use of each child's strengths and potential.

3. Research methodology

3.1. Research Aim

We aimed to determine the dominant learning style of students, by class, by completing a free online questionnaire, available on www.twinkl.ro; to measure students' performance in Mathematics and Environmental Exploration, at the beginning of the study (through an initial written test) and at the end (through a final written test); to adapt the teaching activities carried out in the mentioned classes, in order to respond to the dominant learning styles in each class, namely the visual style (classes II A and II F) and the kinesthetic style (classes II C and II D); to plan and support lessons that promote visual learning (with the help of images, educational videos) - in classes II A and II F and motor learning (through movement and practical activities, puzzles) - in classes II C and II D.

3.2. Research Questions

Is there any statistically significant relation between learning styles and academic performance of second grade students in Mathematics and Environmental Exploration?

Does the adaptation of activities by teachers, according to the predominant learning style, influence the academic performance of second graders in Mathematics and Environmental Exploration?

3.3. The purpose of the study

The purpose of the study is to verify the effectiveness of adapting teaching strategies according to the learning styles of students in grades 2A, 2C, 2D, and 2F in Mathematics and environmental exploration on academic performance by comparing the results obtained in the initial and final tests.

3.4. Objectives of the study

- Identifying and analyzing the learning styles for students in grades 2 A, C, D, and F in Mathematics an environmental studies
- Developing and applying differentiated activity sequences, adapted to the specific characteristics of each learning style, for students in grades 2 A, C, D, and F in mathematics and environmental exploration
- Assessing the relationship between initial and final assessment results to determine whether significant changes in school performance occur

3.5. Tools

In the study we used a descriptive and inferential statistical approach to analyze the relationships between academic performance and learning styles among students.

Data collection included data on demographics, initial assessment scores, final assessment scores and preferred learning styles. Chi-square test was used to assess the relationship between the categorical variables investigated.

This included testing the relationships between initial and final assessment scores and learning styles. The significance level was set at p lower than 0.05 for all statistical tests. Contingency tables were made to examine the distribution of variables and their interactions, with analysis performed using SPSS statistical software.

3.6. Participants

The research was conducted on a sample of 97 students from four classes (2nd grades A, C, D and F) from "Avram Iancu" Theoretical High School in Cluj-Napoca, aged 8-9 years old. The classes were randomly selected according to the availability of the students and teachers to participate in the study.

4. Results

In class 2D, following the initial assessment, 13% obtained an S grade, 44% a B grade, and 43% an FB grade. In the final assessment, 4% obtained an S grade, 35% a B grade, and 61% an FB grade. In class 2C, after the initial assessment, 13% obtained an S grade, 52% a B grade, and 35% an FB grade. Following the final assessment, 4.3% obtained an S grade, 39.1% a B grade, and 56.5% an FB grade. In class 2A, following the initial assessment, 42% obtained an S grade, 35% a B grade, and 25% an FB grade. After the final assessment, we again observe progress, this time with 12% obtaining an S grade, 46% a B grade, and

42% an FB grade. In the fourth grade, class 2F, the results of the initial assessment were 5.2% S, 9.4% B, and 7.3% FB, while in the final assessment, 8.3% obtained B and 13.6% FB.

Table 1

Present the results of Chi-square tests examining the relationships between key variables

Variable 1 School performance	Variable 2 Learning styles	Chi-Square	p
Initial assessment	Final assessment	53.84049799	0.000005
Initial assessment	Learning style	16.82699883	0.265514
Final assessment	Learning style	11.75712035	0.625801

School performance progress: A significant improvement was observed between the initial and final evaluation ($\chi^2 = 53.84$, $p < 0.05$), indicating progress in school performance.

Impact of learning style: There is no significant relationship between learning styles and initial assessment ($\chi^2 = 16.82$, $p > 0.05$) and final assessment ($\chi^2 = 11.75$, $p > 0.05$).

5. Conclusions

There was a statistically significant association between the initial and final assessments ($p < 0.05$), demonstrating a clear progression in student performance over time.

Even if there is no relationship between the assessment results and the learning style, the fact that the results are better is due to the adaptation of teaching activities, based on the preferred learning style of second graders in the subject Mathematics and Environmental Exploration.

Authors note:

Denisa Pop is a primary school teacher at the Avram Iancu Theoretical High School (Cluj-Napoca, Romania). Throughout her career, she has constantly sought to create a balanced, empathetic, and effective learning environment focused on the real needs of each child.

Mușata-Dacia Bocoș is a Professor at the Department of Educational Sciences, Faculty of Psychology and Educational Sciences, Babeș-Bolyai University of Cluj-Napoca and PhD supervisor in the field of "Educational Sciences" since 2009. Her main scientific fields are: theory, methodology and management of instruction; curriculum theory, methodology and management; mentoring in education and training; interactive pedagogy; general didactics; didactics of pedagogical disciplines. In 2023 she was awarded the Romanian Academy Prize - "Constantin Rădulescu Motru" Prize, for the coordinated work entitled "Dicționar de pedagogie", published by the "Presa Universitară Clujeană" Publishing House of the Babeș-Bolyai University of Cluj-Napoca.

References

Ashcraft, M.-H., & Krause, J.-A. (2007). Working memory, math performance, and math anxiety. *Psychonomic Bulletin & Review, 14*(2), 243-248. https://doi.org./10.3758/BF03194059

Autida, N. (2024). The influence of learning styles on mathematical performance among junior high school students. *Journal of Educational Issues, 10*(2). https://doi.org/10.5296/jei.v10i2.22029

Barokah, S.-M., Suseno, L.-C., Deze Say, Y.-K., Mustadi, A. (2019). Learning styles, Does it cause the differences of students achievement? *Journal Ilmu Pendidikan*. http://dx.doi.org/10.17977/um048v25i1p82-97

Bocoș, M.-D. (2013). *Instruirea interactivă. Repere axiologice și metodologice*. Polirom.

Bruner, J.-S. (1966). *Toward a theory of instruction*. Harvard University Press.

Cazan, A.-M. (2013). *Strategii de autoreglare a învățării*. Editura Universității Transilvania.

Clements, D.-H., Sarama, J., Spitler, M.-E., Lange, A.-A., Wolfe, C.-B. (2011). *Mathematics learned by young children in an intervention based on learning trajectories: a large-scale cluster randomized trial. Journal for research in mathematics education.* https://doi.org/10.5951/jresematheduc.42.2.0127

Dewey, J. (1992). *Fundamente pentru o știință a educației*. (N. Viorel, traducător). Editura Didactică și Pedagogică.

Drago, W.-A., & Wagner, R.-J. (2004). *Vark preferred learning styles and online education. Management Research News, 27*(7), 1–13.

Duncan, G.-J., Claessens, Dowsett, C.-J., Claessens, A., Magnuson, K., Huston, A.-C., Klebanov, P., Pagani, L.-S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., Duckworth, K., & Japel, C. (2007). *School readiness and later achievement*. *Developmental Psychology, 43*(6), 1428-1446. https://doi.org./10.1037/0012-1649.43.6.1428

Felder, R.-M., & Spurlin, J., (2005). *Applications, reliability and validity of the Index of Learning Styles. International Journal of Engineering Education, 21*(1), 103-112.

Ford, N., Chen, S.-Y. (2001). Matching/mismatching revisited: An empirical study of learning and teaching styles. *British Journal of Educational Technology, 32*(1), 5-22. https://doi.org/10.1111/1467-8535.00173

Hariri, D.-D., Mahmudah, H., Wibawa, F.-S., & Kania, N. (2025). Unraveling the connection: A systematic review of learning styles and mathematics achievement. *Pedagogical Researc*h, *10*(1), em0232. https://doi.org/10.29333/pr/15681

Howard-Jones, P.-A. (2014). Neuroscience and education: Myths and messages. *Nature Reviews Neuroscience*, *15*(12), 817–824. https://doi.org/10.1038/nrn3817.

Hunter, J.-E., & Hunter, R.-F. (1984). Validity and utility of alternative predictors of job performance. *Psychological Bulletin*, *96*(1), 72-98. https://doi.org.10.1037/0033-2909.96.1.72

Jordan, N.-C., Glutting, J., & Ramineni, C. (2009). The importance of number sense to mathematics achievement in first and third grades. *Learning and Individual Differences,20*(2), 82-88

Khoirunnisa, S., & Iba, K. (2022). Correlation Study Of Visual, Auditorial and Kinesthetic Learning Styles (VAK) With Mathematics Learning Outcomes For Elementary School Students. *Jurnal Paedagogy, 9*(4),790–798. https://doi.org/10.33394/jp.v9i4.5495

Klitmoller, J. (2015*).* Review of the methods and findings in the Dunn and Dunn learning styles model research on perceptual preferences. *Nordic Psychology, 67*(1):2-26. https://doi.org./10.1080/19012276.2014.997783.

Kolb, A.-Y., & Kolb, D.-A. (2005). Learning styles and Learning Spaces: Enhancing Experiential Learning in Higher Education. *Academy of Management Learning & Education*, *4*(2), 193–212.

Kuncel, N.-R., Hezlett, S.-A., & Ones, D.-S. (2001*).* A comprehensive meta-analysis of the predictive validity of the Graduate Record Examinations: Implications for graduate student selection and performance. *Psychological Bulletin*, *127*(1), 162-181. https://doi.org/10.1037/0033-2909.127.1.162

Mavilidi, M.-F., Okely, A.-D., Chandler, P., & Paas, F. (2018*).* Immediate and delayed effects of integrating physical activity into preschool children`s learning of numeracy skills. *Journal of Experimental Child Psychology, 166*, 502-519. https://doi.org/10.1016/j.jecp.2017.09.009

Mîndru, E., Niculae, A., Borbeli, L. (2010). *Strategii didactice interactive [Interactive didactic strategy]*. Didactica Publishing House.

Neacşu, I. (2006). *Metode şi tehnici de învăţare eficientă: Fundamente şi practici.* Editura Universităţii din Bucureşti.

OECD. (2015). *Universal basic skills: What Countries stand to gain.* OECD Publishing. http://dx.doi.org/10.1787/97892644234833-em

Oxford, R.-L. (1995*). Language learning strategies around the world: Cross-cultural perspectives*. Manoa: University of Hawaii, Second language teaching and Curriculum Center

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. *Psychological Sci Public Interest. Dec;9(*3):105-19. Doi: 10.1111/j.1539-6053.2009.01038.x. Epub 2008 Dec 1. PMID: 26162104

Riding, R., & Cheema, I. (1991). *Cognitive styles: An overview and integration. Educational Psychology*

Vermunt, J.-D., & Vermetten, Y.-J. (2004). Patterns in student learning: Relationships between learning strategies, conceptions of learning, and learning orientations. *Educational Psychology Review, 16*(4), 359-384.

Zales, J.-P., & Vasquez, R.-S. (2022) Learning styles and achievement in geometry. *South Florida Journal of Development, 3*(4), 5542-5548. http//doi.org/10.46932/sjdv3n4-117