Neuromyths in Greek primary teachers and their sources

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Abstract

This study examines the prevalence and sources of neuromyths among primary school teachers in Greece, focusing on misconceptions related to neuroscience and their implications for educational practices. Through a questionnaire, we collected data from teachers to identify common neuromyths and explored their sources, including educational materials, professional development programs, and media representations. The findings reveal significant gaps in understanding of basic neuroscience, echoing trends observed in research conducted in other contexts and countries. This article contributes to the ongoing discourse on the impact of neuromyths in education and highlights the importance of enhancing awareness and understanding among educators.

Keywords

Neuromyth, primary teacher, teacher training, sources of neuromyths, questionnaire

Résumé

Cette recherche s'intéresse à la prévalence et aux sources des neuromythes chez les enseignants du primaire en Grèce, en se concentrant sur les idées fausses liées aux neurosciences et leurs implications pour les pratiques éducatives. À l'aide d'un questionnaire, nous avons recueilli des données auprès d'enseignants afin d'identifier les neuromythes les plus courants et d'étudier leurs sources, notamment le matériel pédagogique, les programmes de développement professionnel et les médias. Les

résultats révèlent d'importantes lacunes dans la compréhension des neurosciences, ce qui fait écho aux tendances observées dans les recherches menées dans d'autres contextes. Cet article contribue au débat en cours sur les conséquences des neuromythes dans le monde de l'éducation et souligne l'importance de sensibiliser les éducateurs, et d'améliorer leur formation.

Mots-clés

Neuromythe, enseignant du primaire, formation des enseignants, sources des neuromythes, questionnaire

Cite this article

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Introduction

In an ideal world, learning would be effortless. Students could easily absorb new information while sleeping or listening to classical music. When academic challenges arose, they could simply take supplements such as omega-3 or drink more water to boost their cognitive abilities. Classroom learning would become seamless by 'activating' brains through simple exercises such as coordination tasks before tackling complex subjects such as maths. The world would seem simpler, divided into categories of more or less "gifted" individuals. In this fantasy, being born with a bigger brain or superior genes would guarantee intelligence and happiness. Reading the previous sentences, we realize that things may not be as simple. Statements like the above are sometimes called "neuromyths". According to the *Organization for Economic Co-operation and Development* (OECD) the term "neuromyth" refers to a "misconception generated by a misunderstanding, a misreading or a misquoting of facts scientifically established (by brain research) to make a case for use of brain research, in education and other contexts" (OECD, 2002, p. III). Neuromyths are widespread and come from both formal and informal sources (Blanchette-Sarrasin, 2019). These misconceptions often arise from the misinterpretation of neuroscientific studies, the exploitation of such findings by individuals who lack adequate knowledge and expertise in the field, and the public's attraction to sensationalised narratives. (Van Dijk & Lane, 2018). The limited understanding of the complexity of the human brain further fuels curiosity and interest in neuroscience research. Unfortunately, incomplete or misinterpretation of scientific findings facilitates the spread of neuromyths (Pasquinelli, 2012). Several studies have reported that teachers are also unable to distinguish between myths and truths (Ching et al., 2020;

Deibl & Zumbach, 2023; Papadatou-Pastou et al., 2017; Rato et al., 2013; Tardif, 2015), and more than 35% incorporate such scientifically unsupported beliefs into their classroom practice (Bissessar & Youssef, 2021).

The spread of neuromyths can be traced to both formal and informal learning sources. The most important formal sources include seminars, formal training programmes and scientific books and articles. It is possible to suggest that informal sources may include social media platforms, podcasts, certain self-help publications and prejudices spread by word of mouth. In addition, professional experience and preconceived notions may contribute to the informal spread of neuromyths. Research highlights the rapid spread of neuromyths through these channels. For example, a study conducted in Australia found that 48% of pre-service teachers were exposed to neuromyths during their university education, 11% through books and journals, 7% from peers, and 5% through television programmes (Kim & Sankey, 2018). Similar findings emerged from a descriptive study conducted in France, Canada and Luxembourg, where scientific articles were identified as the most common source of neuromyths, accounting for 29% (Schmitt et al., 2023).

Research shows that belief in neuromyths is pervasive among teachers (Bissessar & Youssef, 2021). Among the multiple neuromyths identified in studies, the most prominent are those related to learning styles and multiple intelligences (Gleichgerrcht et al., 2015; Krammer et al., 2021; Lethaby & Harries, 2016). Despite the lack of empirical evidence to support the effectiveness of adapting teaching methods to students' learning styles, as highlighted by Grospietch and Lins (2021), these beliefs persist in educational practice. Research consistently shows that the concept of learning styles is widely accepted as truth. For example, a comparative study by Howard-Jones (2014) found that a significant majority of teachers believed in learning styles as determinants of learning processes and outcomes: 93% in England (N=137), 96% in the Netherlands (N=105), 97% in Turkey (N=278), 96% in Greece (N=174) and 97% in China (N=238).

Among other persistent neuromyths is the concept of hemispheric dominance, which suggests that "left or right brain dominance can help explain [some] individual differences among students" (De Bruyckere, 2015). This myth posits that brain dominance determines personality, thinking style and cognitive ability. Typically, the left hemisphere is associated with logic, analysis, and intellect, supposedly making individuals more adept at science, reading, and writing (Ibid.). In contrast, the right hemisphere would be linked to emotion and creativity. Proponents argue that understanding dominance helps teachers tailor instruction to meet the unique cognitive needs of students. However, this myth is deeply ingrained and often goes unchallenged. Another longest running neuromyths is that "we use only 10% of our brains". This claim is widely accepted, perhaps due to the complexity of debunking it, which requires substantial knowledge. Neuromyths can be prevalent in the public domain without necessarily having crucial consequences. However, the potential consequences may be more severe in

education, as teachers' decisions directly impact young learners. If teachers base pedagogical choices on neuromyths, their practice may be suboptimal or even detrimental to students' learning outcomes.

Despite the potential impact of neuromyths on classroom practices, there is a significant knowledge gap regarding their prevalence among teachers, particularly in Greece. To address this, our study aims to establish a baseline understanding of neuromyth adherence among Greek educators. This is why we have included the present study in a larger one that is led by Adiguzel et al. (2025). As part of a larger international initiative, the Neuromyth Diagnosis Project, spanning 11 countries, we utilized the validated *Multilingual Neuromyth Identification Questionnaire* (MNIQ). This tool assesses not only the prevalence of neuromyths but also their potential origins. Our study aims to provide a snapshot of the current state of neuromyth belief among Greek primary school teachers, in a specific cultural context.

We hope that a more precise diagnosis of Greek teachers' adherence to widespread neuromyths will lay the foundations for targeted pre- and in-service specific training interventions. These interventions can ultimately improve the education of young children, who are most malleable and sensitive to pedagogical interventions. To support and inform these interventions, our analysis will also examine the possible sources (origins) of neuromyths.

- Research question No 1: What is the prevalence of popular neuromyths in the Greek population of elementary teachers?
- Research question No 2: What are the sources of these neuromyths?

Method

This study used a descriptive design with a survey model to explore teachers' beliefs and the sources they use for information about the learning process.

Materials

The "*Multilingual Neuromyth Identification Questionnaire*" (MNIQ) comprises a total of 30 statements and tests for 12 possible learning sources was initially written in English developed and validated (through a process described in an article to be published: Cronbach's α=.85 and Guttman Split-Half Coefficient of .71) with the leadership of author 2 and author 3 and subsequently adapted into Greek language by our team. Three native speakers with high English proficiency performed the translation. The questionnaire consists of 30 statements, which participants respond to with one of three options: "correct", "incorrect" or "I can't answer". Of these, 21 statements specifically assess well-documented neuromyths, while the remaining nine do not. They merely ask usual but unproblematic questions about brain function and serve as control questions to prevent excessive

skepticism among participants. In the last option ("I can't answer", participants had to specify the reason why they could not answer, choosing between "I don't have enough information to answer", "I've never heard of it", and "There are important uncertainties about this issue". These options allow uncertain participants to avoid these options aim to alleviate participants' uncertainty, reducing false positives by allowing them to opt out without forced guessing. Then, for each statement that they answered "correct" or "incorrect", they had to indicate one or more of the 12 possible sources of information that motivated their initial response (formal education; professional development programs; professional experience; social media; websites; colleagues or friends; academic publications; books or journals, movies, television programs; advertisements; intuition). There was a 30-second time limit for each question to prevent participants from cheating and having time to look up the answer on the web, as the test was conducted online, using the *Interceptum*™ platform. After this delay, participants were constrained to move on to the next question. The total time length of the online survey was around 13 minutes. During the entire questionnaire completion period, the concept of *neuromyth* was never mentioned, to prevent participants from becoming too suspicious.

Here are a few examples of popular neuromyths that the MNIQ tested:

- Individuals learn better when they receive information in alignment with their dominant learning styles (examples: visual, auditory, kinesthetic etc.) (Dekker et al., 2012);
- The dominant intelligence profile of learners (examples: mathematical, verbal, spatial) must be considered in teaching;
- Individuals can learn new information while asleep (Schmitt et al., 2023);
- The idea that people are predominantly "right-brained" or "left-brained", explain individual differences in learning (De Bruyckere et al., 2015);
- Humans use only 10% of their brain capacity (Dekker et al., 2012);
- Supplements such as Omega-3 and Omega-6 positively impact academic achievement. (Dekker et al., 2012)

Participants and recruitment

The questionnaire was distributed to in-service primary school teachers throughout Greece. We targeted primary school teachers due to their significant influence on young and their relatively homogeneous profile, which could facilitate more convergent results. We had no particular agenda for the sampling, since we accepted the participation of all volunteer teachers who received the invitation and responded to the call. The total number of participants was 82. The group consisted of 56 female and 26 male teachers from large, medium and small cities and villages. There was a wide range of ages among them, ranging from less than 25 years old to more than 51 years old. Almost 49% of the teachers had more than 21 years of experience in the field, while only 15% had less than 5

years of experience. Teachers were recruited through personal connections with school principals and groups on social media. Participants received the questionnaire hyperlink via email. As an incentive, we offered a random draw for one of 40 "smiley" ink stamps, popular among primary teachers. The questionnaire also asked a few demographic questions to allow us to provide a better description of the final sample.

Analysis

Since this study corresponds to a simple (1-time) questionnaire without comparative hypothesis, we will confine ourselves to a descriptive analysis of the results, with frequency percentages, as is usually done for small samples such as ours. Furthermore, since each of the questionnaire items does not present any logical coherence with the others (they are all distinct and test different neuromyths), we will not conduct a principal component analysis, nor will we calculate Cronbach's alphas.

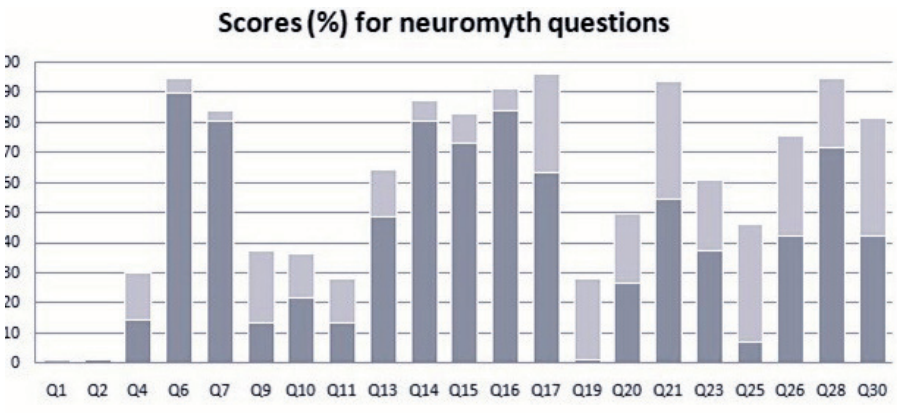
Results

Adherence to neuromyths

Figure 1 provides percentages of accuracy for all 21 neuromyth questions. It also provides, in light grey, the proportions of "I can't answer" option. One can see that there is a great variability in adherence, while some accuracies are very high and others very low. Uncertainty level also vary substantially (see Appendix 1 for the complete list of statements).

For discussion purposes, we define strong neuromyths as those with accuracy rates below 15%. We will focus on the five most prevalent neuromyths.

Figure 1



Accuracies (%) for neuromyth questions. Dark grey represents the accuracy (having adequately identified the statement as "Incorrect"), while lighter grey areas represent the "I can't answer" option

On the total of 21 of the tested "*neuromythical*" statements, the most popular were about learning styles (0% accuracy [N=0/82]); the dominant intelligence profile (ex: Q2 with 1.2% accuracy [N=1/82]); that information can be learned during the state of sleep (ex: Q9 with13.4% [N=11/82]); the short periods of coordination exercises (ex: Q19 with 1.2% accuracy [N=1/82]); and the neuromyth that supplements, such as Omega-3 and Omega-6, have a positive impact on academic achievement (ex: Q25 with 7.3% accuracy [N=6/82]). Full statements can be found in Table 1. All these statements are incorrect according to the brain sciences literature.

TABLE 1

Complete statements of the strong neuromyths in our sample (all statements are false)

Question number	Statement	Accuracy
Q1	Individuals learn better when they receive information in alignment within their dominant learning styles (examples: visual, auditory, kinesthetic etc.)	0.0%
Q2	The dominant intelligence profile of learners (examples: mathematical, verbal, spatial) must be considered in teaching	1.2%
Q9	Individuals can learn new information even while in a state of sleep	13.4%
Q19	Short periods of coordination exercises can improve brain function (for example, touching your right ankle with your left hand and vice versa)	1.2%
Q25	Supplements such as Omega-3 and Omega-6 have a positive effect on academic achievement	7.3%

We also identified a notable group of neuromyths with accuracy rates ranging from 15-50%. This category includes questions such as: whether people are good multitaskers (Q10), whether we can learn new things at different stages of childhood (Q13), and other questions about "*perceptions of brain and intelligence characteristics*" (Q20, Q23, Q26, Q30). Table 2 presents the statements and accuracy percentages.

TABLE 2

Complete statements of other important neuromyths in our sample (all statements are false)

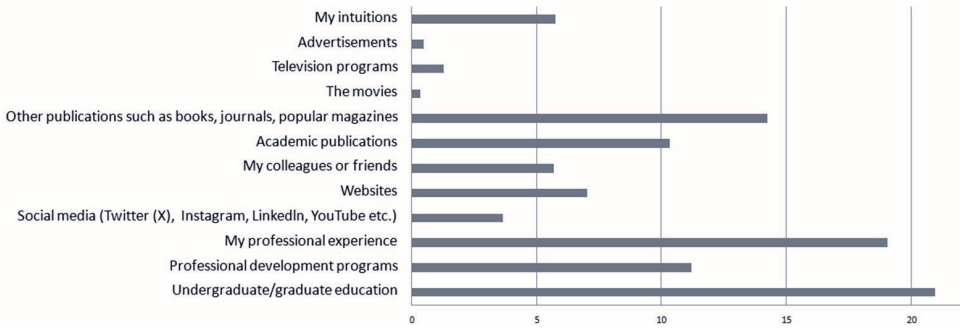
Question number	Statement	Accuracy
Q10	Humans are good multitaskers	22,0%
Q13	There are specific periods in childhood after which certain things can no longer be learned	48.8%
Q20	We use only 10% of our brain	26.8%
Q23	Male and female brains are designed for different types of skills	37.8%
Q26	Brain development is complete by the time children reach the end of puberty	42.7%
Q30	Humans are born with all the neurons they will have in their lifetime	42.7%

Sources of neuromyths

To eventually address these myths, it may be useful to identify the factors that created them. For each question that participants answered "correct" or "incorrect", they had to indicate the sources of their choices.

Figure 2 shows the percentages of sources contributing to all neuromyths (only inaccurate answers) among participants. Notably, both formal (undergraduate/graduate education, publications) and informal sources contribute significantly (>10%). In contrast, advertisements, TV, movies, and social media have relatively negligible influence. Interestingly, personal intuition emerges as a substantial source (or reinforcement) of neuromyths, cited by 6% of participants.

Figure 2



Sources of all neuromyths (%)

Discussion

The survey results reveal a striking diversity in answer accuracies. Notably, some questions yielded 0% accuracy (*e.g.* Q1), while others achieved relatively high accuracy rates (*e.g.* Q6, Q16). furthermore, several questions had higher "I can't answer" rates than correct answers (*e.g.* Q19, Q25).

One can notice that in Q1, Q2 and Q19, the percentages of people who adhere to the neuromyths are surprisingly high.

Neuromyths Q1 and Q2, related to student learning styles, primarily stem from professional experience and secondarily from education. Although scientifically unfounded, this misconception can have positive implications, as teachers may focus on student-centered learning and cater to individual needs. The concept of learning styles originated from Frederic Vester's 1975 book "Denken, Lernen, Vergessen" (*Thinking, Learning, Forgetting*). This idea gained popularity in pedagogy and didactics texts, pro-

posing four primary learning types: the *auditory*, the *visual*, the *haptic* and the last type which is "*learning by intellect*".

Torrijos-Muelas et al. (2021) conducted a review of 24 studies on neuromyths in education, revealing that 91.3% of the articles identified the learning styles myth (neuromyth Q1) as the most prevalent. This myth, often linked to the theory of multiple intelligences (neuromyth Q2), leads to the classification and labeling of students as specific types of learners. Q9 is also of particular interest. The myth implicitly refers to the concept of "hypnopaedia", which is a Greek word *(υπνοπαιδεία)* composed of two terms: "hypnos" meaning sleep and "paedia" meaning education. *Hypnopeadia* involves auditory stimulation of a person, such as listening to recorded lessons while asleep, with the goal of absorbing the information and retaining it in the subconscious part of the brain. However, this concept lacks scientific substantiation Sawant (2024). It may stem from the fact that brain activity persists during sleep, but research has not supported the effectiveness of hypnopedia as a learning method.

Q11 addresses the issue of the dominance of only one hemisphere of the brain. The remarkably low accuracy rate and minimal "I can't answer" responses indicate strong conviction in this notion among Greek primary teachers. The origin behind this myth may be an extension of the knowledge that some specific actions, such as processing numerical information requires the activation of very specific parts of the brain. However, research shows that most tasks require inter-hemispheric collaboration (OECD, 2002). The persistence of this myth may reflect a desire to oversimplify personality and talent differences, adhering to brain essentialism or personality fatalism. This simplification bypasses a more nuanced understanding of individual variations.

Consider question Q19: "Short periods of coordination exercises can improve brain function (for example, touching your right ankle with your left hand and vice versa)". In this question, only 1 out of 82 participants answered correctly (that is, the statement is false), while 22 opted for "I can't answer". Strikingly, 59 participants (72%) endorsed this myth. Although regular physical exercise does benefit cognitive skills over extended periods (Chaddock-Heyman et al., 2013), there is no evidence that brief coordination exercises temporarily improve brain efficiency during class time.

Moving on, we have one of the most well-known myths of all, Q20: "We use only 10% of our brain". The myth probably started with a misinterpretation of a 1920s radio interview by physicist Albert Einstein, in which the scientist suggested that we may not use all our abilities and wanted to encourage us to think more (Geake, 2008). The media may have perpetuated this myth, which was later exploited by *New Age culture*. "New Age culture" is a broad, loosely defined movement or cultural phenomenon that emerged in the 1970s and gained popularity in the 1980s. It blended spirituality, self-improvement, and alternative practices, often borrowing elements from various religious, philosophical, and metaphysical traditions. it sometimes falsely claimed the unused

90% of the brain held psychic powers, promising that adopting a specific lifestyle could unlock superhuman consciousness.

Lastly neuromyth Q25, "Supplements such as Omega-3 and Omega-6 have a positive effect on academic achievement", had only 7.3% of respondents answered correctly. This remarkably low accuracy rate raises concerns, suggesting widespread misconceptions about the relationship between dietary supplements and academic performance.

Comparison with other studies conducted elsewhere

Table 3 shows the results of similar surveys conducted in the past in countries (or groups of-) such as United Kingdom (Dekker et al., 2012), the Netherlands (Dekker et al., 2012), Canada (Québec) (Blanchette-Sarrasin et al., 2019), Spain (Ferrero et al., 2016) and Latin America (Gleichgerrcht et al., 2015). With a few differences, the similarities nevertheless appear to be rather striking, confirming that the situation in Greece might not be so different from elsewhere. However, the different questionnaires used to establish these proportions proposed questions that are sometimes differently formulated such that further comparison should be made with caution. Indeed, for example, see below the formulations used to test the same myths. Some of these formulations are indeed a bit distinct from the ones used in the MNIQ:

- Q1: Individuals learn better when they receive information in alignment with their dominant learning styles (examples: visual, auditory, kinesthetic etc.) (similar in all articles, including MNIQ);
- Q11: The fact that some people are more "right-brained" and others are more "left-brained", helps explain the differences in how we learn; Left-brain or right-brain dominance can help explain individual differences among students (Blanchette-Sarrasin et al.,2019);
- Q15: Environments that are rich in stimulus improve the brains of pre-school children (Gleichgerrcht et al., 2015);
- Q20: We use only 10% of our brain (similar in all articles, including MNIQ);
- Q25: Supplements such as omega-3 and omega-6 have a positive effect on academic achievement; Omega 3 supplements do not enhance the mental capacity of children in the general population (Deligiannidi & Howard-Jones, 2015).

The survey results, conducted between 2012-2016, share a similar scientific and knowledge context. Notably, the myth of learning styles persists across all surveyed populations. Given its widespread prevalence, the issues stemming from this myth can be considered a global concern.

TABLE 3

Neuromyths among teachers

Neuromyth	United Kingdom	The Netherlands	Greece	Canada (Québec)	Spain	Latin America
Learning styles	93%	96%	97%	74%	91%	91%
Hemispheric dominance	91%	86%	71%	57%	67%	73%
Environmental stimulation	95%	56%	*NA*	*NA*	94%	92%
Use of 10% of the Brain	48%	46%	45%	44%	44%	61%
Omega supplements	69%	54%	50%	*NA*	45%	71%

NA=Data not available. Data for United Kingdom and the Netherlands are taken from Dekker et al. (2012); Greece, Deligiannidi and Howard-Jones (2015); Québec, Blanchette-Sarrasin et al. (2019); Spain, Ferrero et al. (2016); and Latin America from Gleichgerrcht et al. (2015).

Comparison with previous results in Greece

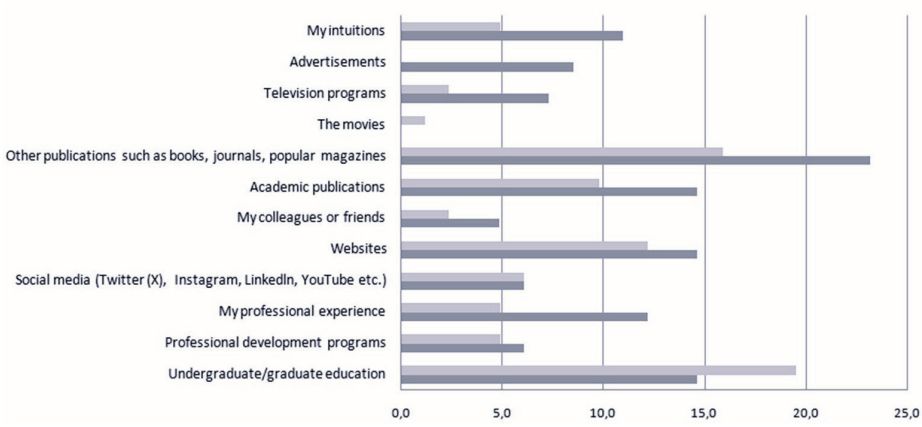
It may be interesting to compare our results of Greece with those of Deligiannidi and Howard-Jones (2015) survey conducted in 2015 in the same country. Table 4 presents Deligiannidi and Howard-Jones' results (2015) and ours (2024), which are, to our knowledge, the ones that are currently available for Greece. Although a comparison may be hazardous (in addition to formulating slightly different questions, Deligiannidi and Howard-Jones' study tested with teachers of the secondary levels also) we can nevertheless suggest that both studies reveal widespread adherence to neuromyths among Greek teachers, particularly the misconceptions about learning styles and hemispheric dominance, which remain pervasive. While the 2015 study by Deligiannidi and Howard-Jones highlighted a 97% adherence to learning styles and 71% to hemispheric dominance, the 2024 findings echo similar trends, with no significant reduction in these beliefs. Notably, both studies identify formal education as a primary source of neuromyths, raising concerns about teacher training quality. However, the 2024 study provides a nuanced analysis of additional sources, such as professional experience and publications, emphasizing the multi-faceted origins of neuromyths in educational contexts. This observation may be a bit unsettling since as convincing results from neuroscience are being produced and disseminated, the misinterpretations do not appear to be reduced. This suggests that efforts in terms of, or quality of, scientific communication have not been commensurate with those associated with scientific progress.

TABLE 4

Results of Greece in the gap of almost 10 years (2015-2024)

Neuromyth	2015	2024	Difference
Learning styles	97%	99%	+2%
Hemispheric dominance	71%	72%	+1%
Environmental stimulation	-	17%	-
Use of 10% of the Brain	45%	50%	+5%
Omega supplements	50%	54%	+4%

FIGURE 3



Sources (%) for neuromyths "10% brain usage" (Q20-light grey) and "Omega food supplements" (Q25-dark grey)

A comparison between the 2015 and 2024 (Table 4) surveys reveals an increase in results for all questions. Notably, two myths exhibited significant growth: the 10% brain usage myth (Q20) and the Omega food supplements myth (Q25), with increases of 4% and 5%, respectively. To further investigate these trends, we created a separate graph illustrating the sources for these two myths (Figure 3). The presented percentages correspond to the proportion of participants who "checked" each option. Analyzing separately the sources of these myths, we can suggest that they could mostly originate from "publications such as books, journals, popular magazines" and other sources as formal education.

General comment on sources

Surprisingly, our data suggests that the most common source of tested neuromyths appears to be the university (21% graduate and undergraduate and 18% PD programs) (see Figure2). This finding makes us wonder about the scientific quality of initial and in-service training in Greece and in other countries. Similarly, Blanchette-Sarrasin et al. (2019) found that university education was also the most common source of neuromyths among teachers in Quebec, Canada. If teachers learn false information in academic institutions, it is only logical that they confidently reproduce it in their teaching. This is a problem that is not easy to solve, given the high level of institutionalization of formal education. Additionally, professional experience appears to confirm many neuromyths (18%), while publications of all sorts are also an important source, while not as important.

After generating graphs like Figure 2 for each neuromyth, we highlight the sources of specific neuromyths. Notably, educational institutions are the primary source of knowledge for most neuromyths. For example, in Q2, 65.9% of the participants attributed their knowledge to "undergraduate/graduate education" for Q2, and 41.4% for Q11.

Strikingly, many teachers report that the source of their neuromyth is their personal experience and intuition; for example, neuromyth Q1 has a percentage of 85.4% in the source "My professional experience", as well as in Q2, Q2 with 70.7%. This raises concerns about the reliability of scientific evidence and the potential for teachers to be biased by prior learning in educational institutions or seminars, which may influence their observations and application of theories.

Conclusion

This study examined the prevalence and sources of neuromyths among Greek teachers, utilizing a diverse sample of 82 participants. Our results show that neuromyths surrounding learning styles, intelligence profiles, and coordination exercises' impact on brain function are particularly pervasive. Furthermore, we identified academic training and personal experience as the main sources of information. reveals a concerning trend: a slight increase in teachers' endorsement of neuromyths.

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References

Adiguzel, O. C., Potvin, P., Sarrasin, J. B., Vanhoolandt, C., Corfdir, A., Japashov, N., Mansurova, A., Tsai, C.-C., Wu, C.-L., Elmas, R., Atik-Kara, D., Kucukkayhan, S., Zaid, A.-K., Kouchou, I., Voulgari, A., Sy, O., Sakho, I., Ng, S. B., Charland, P., & Létourneau, A. (2025). Belief in Neuromyths among primary school teachers: A cross-national study of II countries. *Trends in Neuroscience and Education*, *40*, 100264. https://doi.org/10.1016/j.tine.2025.100264.

Bissessar, S., & Youssef, F. F. (2021). A cross-sectional study of neuromyths among teachers in a Caribbean nation. *Trends in Neuroscience and Education*, *23*, 1-5. https://doi.org/10.1016/j.tine.2021.100155.

Blanchette-Sarrasin, J., Riopel, M., & Masson, S. (2019). Neuromyths and their origin among teachers in Quebec. *Mind, Brain, and Education*, *13*, 100-109. https://doi.org/10.1111/mbe.12193.

Chaddock-Heyman, L., Erickson, K. I., Voss, M. W., Knecht, A. M., Pontifex, M. B., Castelli, D. M., Hillman, C. H., & Kramer, A. F. (2013). The effects of physical activity on functional MRI activation associated with cognitive control in children: A randomized controlled intervention. *Frontiers in Human Neuroscience*, *7*. https://doi.org/10.3389/fnhum.2013.00072.

Ching, F. N., So, W. W., Lo, S. K., & Wong, S. W. (2020). Preservice teachers' neuroscience literacy and perceptions of neuroscience in education: Implications for teacher education. *Trends in Neuroscience and Education*, *21*, 100144. https://doi.org/10.1016/j.tine.2020.100144.

De Bruyckere, P., Kirschner, P. A., & Hulshof, C. D. (2015). *Urban myths about learning and education*. Academic Press.

Deibl, I., & Zumbach, J. (2023). Pre-service teachers' beliefs about Neuroscience and Education. Do freshmen and advanced students differ in their ability to identify myths? *Psychology, Learning & Teaching*, *22*(1), 74-93. https://doi.org/10.1177/14757257221146649.

Dekker, S., Lee, N. C., Howard-Jones, P., & Jolles, J. (2012). Neuromyths in education: Prevalence and predictors of misconceptions among teachers. *Frontiers in Psychology*, *3*, 33784. https://doi.org/10.3389/fpsyg.2012.00429.

Deligiannidi, K., & Howard-Jones, P. A. (2015). The Neuroscience literacy of teachers in Greece. *Procedia - Social and Behavioral Sciences*, *174* (2015), 3909-3915. https://doi.org/10.1016/j.sbspro.2015.01.1133.

Ferrero, M., Garaizar, P., & Vadillo, M. A. (2016). Neuromyths in Education: Prevalence among Spanish teachers and an exploration of cross-cultural variation. *Frontiers in Human Neuroscience*, *10*. https://doi.org/10.3389/fnhum.2016.00496.

Geake, J. (2008). Neuromythologies in education. *Educational Research*, *50*(2), 123-133. https://doi.org/10.1080/00131880802082518.

Gleichgerrcht, E., Luttges, B. L., Salvarezza, F., & Campos, A. L. (2015). Educational neuromyths among teachers in Latin America. *Mind, Brain, and Education*, *9*(3), 170-178. https://doi.org/10.1111/mbe.12086.

Grospietsch, F., & Lins, I. (2021). Review on the prevalence and persistence of neuromyths in education. Where we stand and what is still needed. *Frontiers in Education*, *6*, 1-13. https://doi.org/10.3389/feduc.2021.665752.

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

Kim, M., & Sankey, D. (2018). Philosophy, Neuroscience and pre-service teachers' beliefs in neu-

romyths: A call for remedial action. *Educational Philosophy and Theory*, *50*(13), 1214-1227. https://doi.org/10.1080/00131857.2017.1395736.

Krammer, G., Vogel, S. E., & Grabner, R. H. (2021). Believing in neuromyths makes neither a bad nor good student-teacher: The relationship between neuromyths and academic achievement in teacher education. *Mind, Brain, and Education*, *15*(1), 54-60. https://doi.org/10.1111/mbe.12266.

Lethaby, C., & Harries, P. (2016). Learning styles and teacher training: Are we perpetuating neuromyths? *Elt Journal*, *70*(1), 16-27. https://doi.org/10.1093/elt/ccv051.

OECD. (2002). Neuromythologies. In *Understanding the brain: Towards a new learning science* (Chapt. 4.6, pp. 69-77). OECD.

Papadatou-Pastou, M., Haliou, E., & Vlachos, F. (2017). Brain knowledge and the prevalence of neuromyths among prospective teachers in Greece. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.00804.

Pasquinelli, E. (2012), Neuromyths: Why do they exist and persist? *Mind, Brain, and Education*, *6*, 89-96. https://doi.org/10.1111/j.1751-228X.2012.01141.x.

Rato, J. R., Abreu, A. M., & Castro-Caldas, A. (2013). Neuromyths in education: What is fact and what is fiction for Portuguese teachers? *Educational Research*, *55*(4), 441-453. https://doi.org/10.1080/00131881.2013.844947.

Sawant, R. R. (2024). Hypnopedia: Underdog in hypnotic world. *Journal of the Indian Society of Pedodontics & Preventive Dentistry*, *42*(Supplement 1). https://doi.org/10.4103/jisppd.jisppd_59_24.

Schmitt, A., Wollschläger, R., Sarrasin, J. B., Masson, S., Fischbach, A., & Schiltz, C. (2023). Neuromyths and knowledge about intellectual giftedness in a highly educated multilingual country. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1252239.

Tardif, E., Doudin, P., & Meylan, N. (2015). Neuromyths among teachers and student teachers. *Mind, Brain, and Education*, *9*(1), 50-59. https://doi.org/10.1111/mbe.12070.

Torrijos-Muelas, M., González-Víllora, S., & Bodoque-Osma, A. R. (2021b). The persistence of Neuromyths in the educational settings: A systematic review. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.591923.

Van Dijk, W., & Lane, H. B. (2018). The brain and the US education system: Perpetuation of neuromyths. *Exceptionality*, *28*(1), 16-29. https://doi.org/10.1080/09362835.2018.1480954.

Appendix I

List of all the questions of the questionnaire (neuromyths in bold)

Q1	**Individuals learn better when they receive information in alignment within their dominant learning styles (examples: visual, auditory, kinesthetic etc.)**
Q2	**The dominant intelligence profile of learners (examples: mathematical, verbal, spatial) must be considered in teaching**
Q3	In the learning process, the mind associates new information with previous knowledge
Q4	**Different parts of the brain operate independently during the learning process**
Q5	Learning occurs through changes in synaptic connections between neurons in the brain
Q6	**Learning is a purely cognitive skill, not emotional**
Q7	**Learning takes place independent from individuals' learning backgrounds**
Q8	Some mental processes (experience, learning) repeated over a long period of time can change the structure and function of some areas of the brain
Q9	**Individuals can learn new information even while in a state of sleep**
Q10	**Humans are good multitaskers**
Q11	**The fact that some people are more "right-brained" and others are more "left-brained", helps explain the differences in how we learn**
Q12	Individuals learn better when course content is presented in short sessions or modules
Q13	**There are specific periods in childhood after which certain things can no longer be learned**
Q14	**Memorization has no impact on the learning process**
Q15	**Environments that provide a larger amount of stimuli improve the brains of pre-school children**
Q16	**Mental capacity is hereditary and cannot be changed by the environment or experience**

Q17	**Listening to classical music improves mental capacity**
Q18	When a part of the brain is damaged, other parts can take over its function
Q19	**Short periods of coordination exercises can improve brain function (for example, touching your right ankle with your left hand and vice versa)**
Q20	**We use only 10% of our brain**
Q21	**Individuals with larger brains are smarter**
Q22	The brain continues to generate new connections throughout an individual's life
Q23	**Male and female brains are designed for different types of skills**
Q24	The brain remains active 24 hours a day
Q25	**Supplements such as Omega-3 and Omega-6 have a positive effect on academic achievement**
Q26	**Brain development is complete by the time children reach the end of puberty**
Q27	The normal development of the human brain involves the birth and death of brain cells
Q28	**The brain shuts down during sleep**
Q29	On average, males have bigger brains than females
Q30	**Humans are born with all the neurons they will have in their lifetime**