NEUROMYTHS IN EDUCATION: A SURVEY IN ITALIAN TEACHERS IN THE INTERNATIONAL CONTEXT

I NEUROMITI IN EDUCAZIONE: UN'INDAGINE SUGLI INSEGNANTI ITALIANI NEL CONTESTO INTERNAZIONALE

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Double Blind Peer Review

Citazione

Nart A., Biancalana V., Scarpa S., (2023) Neuromyths in education: a survey in italian teachers in the international context, Giornale Italiano di Educazione alla Salute, Sport e Didattica Inclusiva - Italian Journal of Health Education, Sports and Inclusive Didactics. Anno 7, V 2. Edizioni Universitarie Romane

Doi:
https://doi.org/10.32043/gsd.v7i2.882

gsdjournal.it
ISSN: 2532-3296
ISBN: 978-88-6022-470-5

ABSTRACT

Here we present an empirical replication and comparative study, conducted in Italy, in comparison with studies from other countries (United Kingdom, The Netherlands, Turkey, Greece and China) on neuromyths in personal epistemologies in school teachers with degrees in various disciplines. The selected sample consists of 140 teachers in initial training (83 females and 57 males with an average age of 31.5 years) for access to a teaching post in secondary school. Participants filled out a questionnaire consisting of seven neuromyths indicator questions present in didactic (e.g., We mostly only use 10% of our brain). Teachers were asked to indicate their levels of agreement with such statements reflecting several popular myths in neuroscience: "I agree", "I don't know" or "I disagree".

Presentiamo qui uno studio empirico replicativo e comparativo, condotto in Italia, a confronto con studi di altri paesi (Regno Unito, Paesi Bassi, Turchia, Grecia e Cina) sui neuromiti nelle epistemologie personali in docenti scolastici laureati in varie discipline. Il campione selezionato è composto da 140 insegnanti in formazione iniziale (83 femmine e 57 maschi con un'età media di 31,5 anni) per l'accesso a una cattedra nella scuola secondaria. I partecipanti hanno compilato un questionario composto da sette domande sugli indicatori di neuromiti presenti nella didattica (ad esempio, Per lo più usiamo solo il 10% del nostro cervello). Agli insegnanti è stato chiesto di indicare i loro livelli di accordo con tali affermazioni che riflettono diversi miti popolari nelle neuroscienze: "Sono d'accordo", "Non lo so" o "Non sono d'accordo".

KEYWORDS
neuromyths in education; personal epistemologies of teachers; teacher training
neuromiti in educazione; epistemologie personali degli insegnanti; formazione degli insegnanti.
Received 2/05/2023
Accepted 11/05/2023
Publishe 20/0572023

Introduction

Neuromyths are misconceptions that can be generated by misunderstanding, misreading, or misquoting scientifically established facts to justify the use of brain research in education and other educational settings. In particular, neuromyths are wrong beliefs about the brain that flourish when cultural conditions shield them from scrutiny, generated by misunderstanding, misreading or misquoting scientifically established facts to justify the use of brain research in education and other contexts. Their form is influenced by a number of biases in the way we think about the brain. Some long-standing neuromyths are found in products for educators, and this has contributed to their spread in classrooms around the world (Purdy & Morrison, 2009).

According to some authors, the prevalence of many neuromyths in teachers' personal epistemologies attests to the conceptual confusion that often surrounds the application of neuroscience to education. Neuromyths have persisted in schools and universities, often used to justify ineffective approaches to teaching (Goswami, 2004). Thus, curricular reform on the application of cognitive neuroscience research to educational settings seems necessary (Ramirez, 2020).

Here we present an empirical replication and comparison study, conducted in Italy, compared with studies from other countries (United Kingdom, The Netherlands, Turkey, Greece and China) on neuromyths in the personal epistemologies of graduate school teachers in various disciplines (Howard-Jones, 2014).

2. Method

The selected sample consisted of 140 teachers undergoing initial training (83 females and 57 males with an average age of 31.5 years) for entry into teaching in secondary school. Participants completed a questionnaire consisting of seven questions indicative of neuromyths present in teaching (e.g., Mostly we use only 10 percent of our brain). Teachers were asked to indicate their level of agreement

with such statements reflecting several popular myths in neuroscience: “I agree”, “I don't know”, or “I disagree”.

3. **Results**

The results of the Italian sample inserted in the context of the data already collected previously at an international level are presented in Table 1.

Table 1
Prevalence of neuromyths amongst practising teachers in five plus one (Italy) different international contexts

	United Kingdom (n = 137)	The Netherlands (n = 105)	Turkey (n = 278)	Greece (n = 174)	China (n = 238)	**Italy (n=140)**
We mostly only use 10% of our brain	48	46	50	43	59	***49***
Individuals learn better when they receive information in their preferred learning style (for example, visual, auditory or kinaesthetic)	93	96	97	96	97	***95***
Short bouts of co-ordination exercises can improve integration of left and right hemispheric brain function	88	82	72	60	84	***73***
Differences in hemispheric	91	86	79	74	71	***75***

dominance (left brain or right brain) can help to explain individual differences amongst learners						
Children are less attentive after sugary drinks and snacks	57	55	44	46	62	***54***
Drinking less than 6 to 8 glasses of water a day can cause the brain to shrink	29	16	25	11	5	***21***
Learning problems associated with developmental differences in brain function cannot be remediated by education	16	19	22	33	50	***23***

The Table 1 shows some of the most popular myths reported in four different studies from the United Kingdom, The Netherlands, Turkey, Greece and China (Howard-Jones, 2014). The original data of this study which concern the Italian context are shown in boldface in the last column. They do not differ significantly from those of other countries.

In all studies, teachers were asked to indicate their levels of agreement with statements reflecting several popular myths in neurosciences. The results in Table

1 show how the sample of Italian teachers does not differ from that of other countries. The misconception on the role of neurosciences in education therefore seems to be widespread both in the international and national context. Results also show that a large number of Italian teachers believe in neuromyths, perhaps

due to improper training or communication. This is in line with studies conducted in other countries.

4. **Discussion and conclusions**

In light of the limitations of current neuroscientific knowledge and the urgent need to dispel popular neuromyths which have become accepted in many classrooms, we believe there is a need to establish a training curriculum on neuroscience in teaching (cfr. Goswami, 2006).

We agree with what was highlighted in the Faculty for Undergraduate Neuroscience (FUN) 2020 workshop in the USA on the need to provide a starting outline for a curriculum for teacher education that would see among its goals: (a) to promote critical and integrative thinking; (b) to develop communication skills; (c) to develop the ability to articulate the interdisciplinary and interdependent nature of the neuroscience enterprise; (d) to promote competence in quantitative reasoning skills and develop the facility to create quantitative representations of the phenomena under investigation; and (e) to acquire the ability to apply neuroscientific processes in teaching.

Following the guidelines of the American Association for the Advancement of Science it is possible to identify, summarizing, the following objectives for continuous training of a neuroscience education (cfr. Ching, 2020):

1.First, an undergraduate education in neuroscience should promote critical and integrative thinking.

2.A second key feature essential for a sound undergraduate education in neuroscience is the development of communication skills wherein students can clearly convey their thoughts in writing, orally, and visually.

3.A third outcome of a sound undergraduate neuroscience education should be the ability to articulate the interdisciplinary and interdependent nature of the neuroscientific enterprise.

4. A fourth objective for a sound education in neuroscience is to promote competency in quantitative reasoning skills. Just as in other arenas of the life sciences, in order to explore neuroscientific phenomena in sophisticated and informative ways, undergraduate students need to develop facility with creating quantitative representations of the phenomena under investigation, statistical methodologies to assess the meaningfulness of discoveries arrived at through experimentation, and data analytics involving computational and programming skills.

5.“The ability to apply the process of science.” This would ensure that scientific discovery would be untainted and that the next generation of neuroscientists is well positioned to avoid the pitfalls that have undermined the public’s confidence in biomedical scientific research (Ramirez, 2020).

To conclude, we agree with the most optimistic scientists who claim that although the bridge’s cement is still fresh, we argued why it is prime time to march over it (Sigman, Peña, Goldin and Ribeiro, 2014).

References

Ching FNY, So WWM, Lo SK, Wong SWH (2020). Preservice teachers’ neuroscience literacy and perceptions of neuroscience in education: Implications for teacher education. Trends Neurosci Educ, 21:100144.

Goswami U (2004). Neuroscience and education. Br J Educ Psychol, 74:1-14.

Goswami U (2006). Neuroscience and education: from research to practice? Nat Rev Neurosci, 7(5):406-11.

Howard-Jones, P (2014). Neuroscience and education: myths and messages. Nat Rev Neurosci, 15: 817–824.

Purdy N & Morrison H (2009). Cognitive neuroscience and education: unravelling the confusion. Oxford Review of Education, 35:1, 99-109.

Ramirez JJ (2020). Undergraduate neurosciences education: Meeting the challenges of the 21st century. Neurosciences Letters 739:1-9.

Sigman M, Peña M, Goldin AP & Ribeiro S (2014). Neuroscience and education: prime time to build the bridge. Nat Neurosci,17(4):497-502.