
NEUROMYTH: BETWEEN MYTH AND REALITY IN PHILOSOPHICAL PERSPECTIVE

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Abstract: *Neuromyths are erroneous beliefs about the brain and how it works. Neuromyths often appear in mass media, popular literature, and even in formal education. Neuromyths can have negative impacts, such as causing diagnostic and therapeutic errors, as well as hindering research and development in the field of neuroscience. In this paper, the author will discuss neuromyths from a philosophical perspective. The author will review how neuromyths emerge and develop, as well as how neuromyths can be criticized from a philosophical perspective. The author will also discuss the implications of neuromyths for society and education.*

INTRODUCTION

Neuromyths, or myths about the brain and how it works, have become a rapidly spreading global phenomenon. Through mass media, popular literature, and even in the realm of education, neuromyth has become a source of information that is easily accessible to the general public. Unfortunately, the information conveyed is often wrong and misleading, creating an inaccurate picture of the brain and its potential (Maisarah et al., 2023).

Neuroscience in education, has been merged into "Neuroeducation". A growing interest in brain-education among the general public especially educators have caused an increase in the myth of the brain because they do not have solid knowledge in neuroscience and it's hard for them to distinguish myth from fact. In 2002, Organization for Economic Cooperation and Development (OECD) warns of misunderstandings about the brain among teachers, labeling them as brain myths. The main objective here is to observe prevalence of brain myths in education and relationships between neuroscience literacy and teacher teaching practice (Maisarah et al., 2023).

The results of the analysis show the three most common myths in between teachers is a rich environment with stimulation increases the brain of preschool students, individuals learn better when they receive information in their preferred learning style (for example, auditory, visual, kinesthetic) and differences in dominance hemispheres (left brain, right brain) can help explain individual differences among students (Deligiannidi & Howard-Jones, 2015; Gleichgerrcht et al., 2015; Howard-Jones, 2017; Kalbfleisch, 2015; Karakus et al., 2015; Lethaby & Harries, 2017; Pei et al., 2015; Tardif et al., 2015; Turner, 2016). The results of the analysis reflect the prevalence of brain myths in teachers who have an interest in

neuroscience in education. It is difficult for teachers to distinguish between correct information and incorrect information. When the teacher can't wait to implement the discovery neuroscientific, lack of expertise in neuroscience and find a quick and easy solution, they may fail to distinguish fact and myth and cause misunderstanding (Deligiannidi & Howard-Jones, 2015; Düvel et al., 2017; Gleichgerricht et al., 2015; Howard-Jones, 2017; Kalbfleisch, 2015; Karakus et al., 2015; Lethaby & Harries, 2017; Papadatou-Pastou et al., 2017; Papatzikis, 2017; Pei et al., 2015; Tardif et al., 2015; Turner, 2016; Weale, 2017).

Differing views between educators and scientists regarding the contributions of neuroscience in education there are three reasons. The first is collaboration between scientists and educators still rarely apply. The second is the difference in language and terms use by investigators and teachers is large (Gurdis, 2020; Knowland & Thomas, 2020). Teacher maybe Misinterpretation of what scientists mean and this causes myths to occur neuroscience or myths in neuroscience. The last one is that teachers lack knowledge and scientific skills in the fields of neuroscience and cognitive psychology to assess critically and differentiate accusations based on evidence from practices that are not based on evidence (Grospietsch & Mayer, 2020; Lawrence et al., 2020; Tovazzi et al., 2020; Tyler & Rüegg, 2020). The gap in understanding between educators and scientists has led to misinterpretations, educators making interpretations too easy in scientific investigations and leading to errors opinions about the mind and brain, known as neuroscientific myths ("From Neuromyth to Reality," 2010; Geake, 2008; Neuromyths & Mind, 2011; Stephenson, 2008; Teske, 2006). Neuroscientific myths involve popularizing erroneous information, psychological beliefs among the people, and wrong responses are not the only ones about the brain in general (for example, "we only use 10% of the brain"), but also related to education (for example, "This lesson is designed for visual learners") (Bailey, 2018; Gleichgerricht et al., 2015; Horvath, 2018; Ruhaak, 2018; Warnke et al., 2015).

As interest in brain science and neuroscience has grown significantly, Mistakes and misuse of brain research also develop in parallel with interest the. Especially in the field of educational neuroscience or better known as mind, brain and education. There is a hypothesis that teachers use practice teaching based on their belief in neuroscientific myths, especially those related to learning. This brain myth has spread widely among teachers. trust teachers against brain myths and it influences their teaching styles. If this In effect, it leads to wrong teaching practices and has no impact on these students and there is an interest in dispelling brain myths and integrating proven neuroscience into education (Arslan et al., 2022; García, 2022; Jeyavel et al., 2022; Shin, 2022).

In Indonesia, neuromyths are also starting to develop and have the potential to cause quite significant negative impacts. This can result in Misdiagnosis and inappropriate therapy: Belief in neuromyths can lead to misdiagnosis and inappropriate therapy for certain neurological disorders. Unrealistic expectations: Neuromyth can promise instant increases in cognitive abilities and intelligence, fueling unrealistic expectations. Inhibition of research and development: Neuromyths can hinder research and development in the field of neuroscience, as the focus is diverted from valid, evidence-based research. Distorted views of self and brain: Neuromyths can distort people's views of themselves and their brains, and have implications for educational policy and practice.

Therefore, critical efforts are needed to review and identify neuromyths circulating in

Indonesia. A philosophical approach can be a powerful tool in this regard. Philosophy, with its principles of logic, empiricism, and rationalism, can help us to evaluate and criticize claims related to neuromyths. Distinguishing fact from myth in widely circulated information about the brain. Understand the social, cultural, and ethical implications of neuromyths. Develop a framework that can be used to test the validity of information about the brain.

This paper aims to examine neuromyths circulating in Indonesia from a philosophical perspective. Through critical analysis and philosophical considerations, this paper intends to identify the most common neuromyths in Indonesia. Reveals logical errors and inconsistencies in the neuromyth. Assessing the impact of neuromyths on society and education in Indonesia. Propose recommendations to overcome neuromyth problems and increase neuroscience literacy in Indonesia.

By studying neuromyths from a philosophical perspective, it is hoped that we can make a significant contribution in eradicating erroneous myths about the brain, and ultimately, advancing Indonesian society's understanding of the brain and its potential.

RESEARCH METHOD

This research is qualitative research using a literature study or literature review method. The data collection technique was collected by collecting literature from books, the internet, and journal articles related to a review of philosophy in neuroscience learning related to the discussion of neuromyths. This research describes a review of neuromyths that are believed to be true by teachers who have studied the study of brain development in children

RESULTS AND DISCUSSION

Neuroscience Myths

The term "neuromyth" was coined in the 1980s by neurosurgeon Alan Crockard to refer to the unscientific understanding of the inner brain medical culture (Howard-Jones, 2010). Organization for Economic Cooperation and Development (OECD) (2002) defines the brain myth as "a misconception that produced by a misunderstanding, a misleading reading, or a misunderstanding of the passage scientific facts produced by brain research for use in education and other context". This means that the brain myth is a discovery of neuroscientific research which is false or an oversimplified interpretation that is transferred to other contexts such as teaching, learning and instruction. Ritchie et. al. (2018) said findings research about the brain is often published in challenging reading levels and it difficult for non-neurobiologists to understand and they often make simple formula for self-understanding. Most brain myths are used in a low-cost and simple classroom approach that claims to improve learning (Howard-Jones, 2014).

This process is reinforced with help media that give an overview and easily interpret research to public (Beck, 2010) and also companies that offer programs brain-based learning (Pasquinelli, 2012). In the field of education, the persistent belief in the myth of the brain is dangerous because it can reduce the effectiveness of education and can leading to a waste of limited resources such as time and money. As for example, schools that create and enforce a curriculum based brain myths that are directly adapted from commercial programs without foundation scientific to improve their school performance. On a smaller scale, each teachers spend their own resources and time to develop and perform activities that the students

would probably receive positively but did not have real benefits to achieve desired goals (Howard-Jones, 2014).

In the past 10 years, many researchers from different countries have studied the prevalence of the brain myth in the education system and its results shows that there is a similar pattern of brain myth beliefs across countries.

Among the countries that investigate about the myth of the brain among teachers is in the United States Kingdom and the Netherlands (Dekker et al., 2012), Portugal (Rato, Abreu, & Castro-Caldas, 2013), Latin America (Gleichgerricht et al., 2015), Argentina, Peru, and Chile (Gleichgerricht et al., 2015), Turkey (Karakus, Howard-Jones, & Jay, 2015; Dündar & Gündüz, 2016), Greece (Deligiannidi & Howard-Jones, 2015; Papadatou-Pastou, Haliou, & Vlachos, 2017), China (Pei, Howard-Jones, Zhang, Liu, & Jin, 2015), Spain (Ferrero, Garaizar, & Vadillo, 2016), the United States (van Dijk & Lane, 2018) and Germany (Grospietsch & Mayer, 2019). All these studies found that teachers believe that a large number of brain myths and cultural differences between countries have an influence about which brain myth is spreading. One of the common myths found in among educators based on studies across the country are individuals will learn better when they receive information in a learning style their preferences (eg, auditory, visual, kinesthetic).

Neuroscientific literacy

Neuroscience is a broad domain that encompasses everything from processes discrete biochemistry of neurons to the study of nervous system quality and behavior (Haynes & Jacobi, 2021). As old mysteries are solved, new encounters are discovered and knowledge of how the nervous system works is advanced and how the implications for individuals and society (Altimus et al., 2020). By domain width neuroscience, explanation in terms of education remains the key to linking characteristic qualities with physical structure. Therefore, the need arises for scientists to improve the public's understanding of neuroscience, especially teachers because it can increase the effectiveness of the use of neuroscientific findings to various domains of education.

Public science literacy, and specifically related to neuroscience (literacy neuroscience) is low (Sperduti et al., 2012). Many neuroscientific principles well established and taught in higher education i.e. in universities. They are rarely discussed in public places and when they enter the neuroscience public news is often diluted, context irrelevant and outdated (Pasquinelli, 2012). Although some so-called "myths "neuroscience" doesn't pose a big problem, but it does harm when they are internalized and promoted on a community scale (Haynes & Jakobi, 2021). Lack of understanding of basic neuroscience concepts among the general public may prevent the appropriate application of scientific advances to the issues faced by society today (Haynes & Jakobi, 2021).

Neuroscience literacy among the general public is necessary to leverage neuroscientific discoveries to be fully utilized. With increasing literacy neuroscience, scientists can dispel myths established by early research which harms the community and ensures that public conversations on neuroscience centered on facts, and empowering individuals to make better decisions (Haynes & Jakobi, 2021).

Neuroscience Myths and Teaching Practice

Kuzborska (2011) shows that trust teachers not only affect their teaching methods, but Early research also suggests that neuroscience can be used to change student learning and

teacher teaching methods. however, The relationship between teachers' beliefs and practices shows the findings of the study mixed, largely due to the difficulty of determining what teacher beliefs and how they can be adequately measured. Kuzborska (2011) conducted a study on eight teachers who teach English the first year of an undergraduate course at a Lithuanian university to determine the relationship between teachers' beliefs about neuroscience myths and teaching practices and their learning. The findings show that there is a relationship between teacher's belief with teacher's teaching practice in class (Kuzborska, 2011).

Alekno (2012) was the first researcher to look at the relationship between beliefs neuroscience myths and teaching practice. Research questions generated by Alekno's (2012) focused on the extent to which teachers believe in neuroscience myths, the relationship between belief in neuroscience myths and teaching practice, as well as how external factors influence teachers' practices and beliefs in myths aligned neuroscience. Based on his findings, 50% of teachers believe in five myths neuroscience ie (1) use of right brain / left brain, (2) use only ten brain percentage, (3) learning style, (4) multiple intelligence (Multiple Intelligence), and (5) differences in the female and male brain. Alekno (2012) states that myth predicted neuroscience has a relationship with practice differences in classroom with the neuroscience myths most believed by the participants and suggests a complex relationship between the myth of neuroscience and the practice of the room degree.

However, a major limitation in Alekno's (2012) study is that practice teacher teaching is not identified or defined. Alekno (2012) measured whether a teacher uses neuroscience myths to guide her teaching by asking them whether belief in neuroscience myths is affected with their classroom practice. Although self-report in practice teaching is often used in educational research, teaching practice methods identified and measured in Alekno's study (2012) provides a lot of information on the nature of the relationship between teachers' beliefs in neuroscience myths and practice the teaching of certain teachers that can be attributed to the myth of neuroscience.

Although there is little research on the relationship between teacher beliefs against neuroscience myths and teachers' teaching practices, many articles warn danger when using neuroscience myths in pedagogy. Most goals researchers in the field of neuro education is to reduce the potential dispelling neuroscience myths, while increasing the potential uses of neuroscience in education. Among the many neuroscience myths that are applied in teaching practice are myths Mozart. Pasquinelli (2012) states Florida requires day care centers to played classical music and the governor of Georgia allocated \$105,000 so that classical music can be given to parents who have just given birth.

"Brain-based learning" packages offered by several companies education is not based on research and is implemented randomly (Goswami, 2006).

CONCLUSIONS

Neuromyth is a complex phenomenon and important to understand. This paper has provided an overview of neuromyths from a philosophical perspective. The author hopes that this paper can provide readers with insight into the importance of criticizing neuromyths and understanding their implications for society and education. educators can start from understanding how the brain works to understanding cognitive processes, and then developing educational practices. Schools should not be run with a curriculum that is only

based on brain biology. However, ignoring what we know about the brain is also not justified. Brain-based learning offers Some directions for educators who want to be more focused, at least neuroscience research helps educators to understand how effective learning strategies are.

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