This is the new myth

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**Introduction**

According to the Oxford dictionary myths can be defined as ‘misrepresentations of the truth’. In that light, it’s good that education is talking about evidence and preventing myths to take hold. This article aims to give an overview of some aspects that come into play when talking about the creation of myths. I will start by sketching an image of the prevalence of myths, with particular emphasis on neuro-myths in education. I will then try to describe some of the mechanisms behind the formation of myths. One particular example of the role of iron in spinach will serve to demonstrate how challenging it can be to address myths. I briefly look at the role of social media and discuss some popular themes in the education blogosphere. I will finish by giving some pointers that might help prevent myths taking hold in education.

## The nature of myths

In the last five years numerous studies have looked at the prevalence of myths in education, especially neuro-myths. For example, Howard-Jones (2014) looked at the level of agreement of several ‘neuro-mythical’ statements in different countries, and concluded that even with very different cultures, there are similarly high levels of belief in several neuro-myths like that we mostly only use 10% of our brain, that individuals learn better when they receive information in their preferred learning style, and that differences in left/right brain dominance can help explain individual differences amongst learners. Howard-Jones (2014) usefully reflects on possible ‘seeds of confusion’ that might spark myths. The most likely scenario seems to be that myths originate from “uninformed interpretations of genuine scientific facts”. They are promoted by victims of their own wishful thinking who hold a “sincere but deluded fixation on some eccentric theory that the holder is absolutely sure will revolutionize science and society” (Howard-Jones, 2014, p. 817). Howard-Jones (2014) makes some attempts to formulate barriers to understanding and the perpetuation of neuro-myths. Firstly, he flags up there are cultural conditions, for example with regard to differences in terminology in language. A second reason Howard-Jones mentions, is that counter-evidence might be difficult to access. Relevant evidence might appear in specialist journals, and together with the complexity of the topic, this might mask any critical signals. A third element might be that claims simply are untestable, for example because they assume knowledge about cognitive processes, or even the brain, that are unknown to us (yet). Finally, an important factor we can’t rule out is bias. When we evaluate and scrutinise evidence, a range of emotional, developmental and cultural biases interact with emerging myths. The good news, though, is that there are signs that training in education can decrease, but not eliminate, beliefs in neuro-myths.

In a recent study, Macdonald et al. (2017) compared the prevalence of neuro-myths in the USA between three groups of participants: educators, participants exposed to neuroscientific knowledge, and the general public. The general public endorsed the greatest number of myths, with educators endorsing fewer, and the high neuroscience exposure group even fewer. Unfortunately, it was still around 50 percent. More accurate conclusions regarding myths were informed by variables like being younger, having a graduate degree, exposure to training and exposure to peer-reviewed science. In other words, training can help but given the effort, time and costs involved we should remain realistic about how much it can help. It was suggested, however, that in order to not invoke new myths, care must be taken in how myths are dispelled. The article, for example, describes the learning styles neuro-myth as a particular challenge to the field as it “it seems to be supporting effective instructional practice, but for the wrong reasons.” (MacDonald et al., 2017, p. 12). It is suggested that dispelling that particular myth might inadvertently discourage diversity in instructional approaches. In some cases simply saying something is a myth is fine, in other cases it is best to combine with more information, to prevent new myths taking hold. A meta-analysis by Chan et al. (2017) investigated the factors underlying effective messages to counter attitudes and beliefs based on misinformation, concluding that it seems helpful to not spend too much time talking about the misconception, but focusing on presenting counterarguments, or even asking the audience to generate counterarguments. Perhaps a simple question like “what is the best argument to *not* believe the following statement or study?” could be rather revealing.

## The case of iron in spinach

An interesting case example regarding the creation of myths is described by Rekdal (2014)[[1]](#footnote-1). He explores the formation and reaction to the urban legend spinach and iron. I remember that factoid from my own youth, partly incentivised by cartoon like Popeye: spinach is good because of its iron content. However, spinach does not really contain significantly more iron than other food products, and most probably should not be the first food to get if one is iron deficient, as it also contains substances that inhibit the intestinal absorption of iron. Rekdal describes how he came across an article by a Larsson that on its terms cited work by Hamblin from 1981 who first ‘debunked’ the factoid. According to Larsson, Hamblin reported that the myth came about because of a mal-positioned decimal point in the 1930s. Rekdal subsequently embarks on a quest to track down the origins of this statement. He calls this a ‘treasure hunt’ in which he traces down the original manuscript by Hamblin and notices that Hamblin had worded it differently: the decimal point error was from the 1890s but only disclosed in the 1930s, he ascribes the discovery to other scientists, and does not provide further references. Rekdal notes the situation is quite ironic as bot Larsson and Hamblin place themselves at the frontline of the fight against bad science and academic carelessness. It was not until 2010 that Sutton argued convincingly that there were entirely other reasons, such as contamination during the analysis or the confusion between fresh and dried spinach that caused the inflated figures in the 19th century. Upon tracing back all the sources to work by someone called Bender, Hamblin posted on Sutton’s website that perhaps the source originally was a Reader’s Digest article. However, between 1981 and the years after the urban legend about the ‘decimal point’ had found its way into wider society through books like *Facts and Fallacies* and *Follies and Fallacies in Medicine* which Larsson might have used. Even until 2008 the latter book is described as a ‘medical classic’ to ‘encourage an appropriate scepticism about medical dogma’. According to Rekdal, the moral of this tale is not that myths have been created, but the way in which we approach our facts. He describes the ‘invisible heroes’ that go out of their way to trace back scientific facts: “individuals with such attitudes are among the most important propellers of scientific development and accumulative knowledge.” (p. 650). Rekdal finishes with the appreciation that the “digital revolution has made it easier to expose and debunk myths, but it has also created opportunities for new and remarkably efficient academic shortcuts, highly attractive and tempting not just in milieus characterized by increasing publication pressure and more concerned with quantity than quality, but also for groups and individuals strongly involved in rhetorics of demarcation of science, but less concerned with following the scientific principles they claim to defend.” (p. 649). I think the article provides a cautious tale for how we ‘build’ up our tower of evidence.

## What about social media?

The double face of the digital revolution is demonstrated in the recent work by Robin-Garcia et al. (2017) in which the authors sought, the field of dentistry, to assess the extent to which tweeting about scientific papers signified engagement with, attention to, or consumption of scientific literature. They argue that “tweeting about scholarly articles represents curating and informing about state-of-the-art appears not to be realized in practice.” (p. 1) and that “simplistic and naïve use of social media data risks damaging the scientific enterprise, misleading both authors and consumers of scientific literature.” (p. 16). Being active on social media myself, I think this critical stance could sometimes be better.

In the remainder of this article I want to flag up some questions that years of social media have sparked in me. Some are rhetorical, others will cause great irritation with those that see their favourite theory criticised. But keep in mind: it is all from a good, critical heart[[2]](#footnote-2). Let’s, for example, scrutinise the advent of economic papers with advanced statistical methods being cited in the education blogosphere. These papers often appear as pre-prints via the National Bureau of Economic Research and deal with a range of important issues. However, like any piece of research, there are many features that –if not studied more deeply- can lead to myths. Issues that come to mind are: has the paper already appeared in a peer-reviewed journal? If not, this means that no ‘peers’ have yet studied the article in detail; in general one could say that peer-reviewed articles tend to be more rigorous and robust[[3]](#footnote-3). Another thing to look at might be whether it is clear how the authors operationalised complex variables in their statistical models. There are examples where ‘domestic violence’ suddenly seems to be equated with ‘peer disruption’, or ‘traditional teaching’ is seen as ‘only lecturing’. Sometimes these things boil down to the way in which they are measured. When we talk about measurement many people envisage some sort of ‘thermometer’ that can easily gauge the concept. This often is not the case for highly complex constructs. Take the currently popular concept of Growth Mindset. In many cases this is measured with three Likert scales, all questions to what extent respondent agree with statements about whether intelligence can be changed. Research in another currently popular field, Cognitive Load Theory, which looks at the relation of ‘cognitive load’ (the amount of mental effort being used in working memory) and formulates recommendations for instructional design, also primarily uses self-report. The most popular measurement instrument is a 9 point Likert scale, and therefore asks more about the *perception* of load, rather than real physical load of the working memory. Of course this need not be a problem, both concepts can still be very useful, but I would argue that a critically engaged teacher should be aware of these things. Another challenge often lies in the summaries of underlying data. One can almost have a day job in unpicking research articles, the prior literature involved, the methodology, the data analysis and subsequent conclusions. We often have to rely on summaries and accounts from others, and as I’ve already shown this can sometimes be subject to ‘Chinese Whispers’. When you dive in deeper you see all sorts of surprising things, ranging from atypical definitions of concepts to selectively using data. Analyses of, for example, large-scale datasets like PISA and TIMSS certainly need to go further than the key tables reported in the media. Also keep in mind that science is constantly revised and updated, and this means that one ideally looks at a whole body of literature. One article that contradicts previous literature does not nullify it, nor should it be disregarded. This, in my view, also means we should not easily dismiss some older research, purportedly because ‘cognitive science’ has shown that they were ‘wrong’. I would assert that for many ideas over the decades ‘cognitive science’ has provided empirical backing for some ideas and no empirical backing for other ideas. Blanket dismissal would be inappropriate: approach the ideas as they are and evaluate them as such, and not through broad sweeping generalisations. Rather, we look at science accumulatively and then make an informed judgement. Underneath all of this, it is useful to be aware of a very human tendency to appreciate novel and original findings, in the research literature sometimes leading to ‘publication bias’. Remember that what ends up in publication often is the remarkable, not the unremarkable.

**Conclusion**

In this article I have tried to give an overview of the complexities involved in (studying) myths and misconceptions. I would like to finish with what I feel are some take-away points. Firstly, I would recommend to try and follow-up sources as much as possible. Of course, this is a very time-consuming affair. Sometimes other people summarise research for you, but even then –as the iron in spinach example shows- it is wise to remain critical. Perhaps refraining from too firm a position, until you feel you have reviewed a fair amount of material, from different actors, might be a good strategy. Sorry, this is just hard work, and I understand that practitioners do not always have this time. Secondly, in line with the first point, I would recommend that we are mindful of over-simplifications. I completely understand that providing a multitude of pages to describe the complexities of an educational phenomenon is not helpful for practitioners. However, the fact some over-complicate things, does not mean that ‘simple is best’ either. Follow the facts, and if one simplifies, be aware of the limitations or what it leaves out. A third take-away point might be that we can actually educate teachers. As some examples in this article have shown, it is best, when talking about myths, to not just say something is wrong but provide more memorable facts to replace them. There is a tension here with potential new myths, as a simple concrete message that grabs attention can more easily replace a previous misconception. But this simplicity, of course, might risk new myths. Finally, when it comes to policies, some people have suggested that we wait at least 15 years before an initial (scientific) idea should ever end up as policy, allowing to fully study the pros and cons. Although I think this time period is too lengthy, it would not hurt if research findings at a minimum are accompanied by a clear scope and disclaimer with regard to claims. As active researcher I do notice such humility sometimes contradicts how research agendas in Higher Education more and more need to evidence their impact. Perhaps the key message for all is that we accept that no research finding will provide a ‘silver bullet’. Now go forth and fact-check my article!

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1. I do not reproduce all the references in this article, and refer to the actual article for those. [↑](#footnote-ref-1)
2. For more on these specific points I refer to my blog. [↑](#footnote-ref-2)
3. Note, however, that peer review is no guarantee! [↑](#footnote-ref-3)