MENDIVE
REVISTA DE EDUCACIÓN

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Some more spread myths about ICT in education. How to avoid the m?

Algunos mitos más difundidos sobre las TIC en la educación. ¿Cómo evitarlos?

Alguns dos mitos mais difundidos sobre as TIC na educação. ¿Como evitálos?

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ABSTRACT
The invasion of electronic devices in all spheres of society, with screens of all sizes and with multiple features, is increasing. The rapid automation of most processes, including educational ones, has generated or re-emerged different myths, in the form of fabulous stories and epistemological assumptions lacking empirical evidence and contrast with reality. In the literature, the existence of recurring myths around technology that contain promises that cannot be achieved is proposed precisely because they originate in myths. These myths cease to be so when technology, after a new stage, enters the realm of the common and then its full use is possible. This work aims to analyze and comment on evidence that supports or rejects some of the myths generated by ICT in education. In particular those related to the existence of multitasking, digital natives, learning styles, video games, and connectivity as a supposed new theory.

Keywords: myths; ICT; education.

RESUMEN
La irrupción de dispositivos electrónicos en todas las esferas de la sociedad, con pantallas de todos los tamaños y con múltiples prestaciones, es cada vez mayor. La rápida automatización de la mayoría de los procesos, incluidos los educacionales, ha generado o hecho resurgir diferentes mitos, en forma de relatos fabulosos y supuestos epistemológicos, muchos de ellos carentes de evidencia empírica y contraste con la realidad. En la literatura se plantea la existencia de mitos recurrentes alrededor de la tecnología, que encierran promesas que no podrán ser alcanzadas debido, precisamente, a que se originan en mitos. Estos mitos dejan de serlo cuando la tecnología, luego de una etapa novedosa, entra al ámbito de lo común y entonces es posible su utilización plena. Este trabajo pretende analizar y comentar evidencias que soportan o rechazan algunos de los mitos generados por las TIC en la

educación, en particular los relacionados a la existencia de la multitarea, los nativos digitales, los estilos de aprendizaje, los videojuegos y el conectivismo como supuesta nueva teoría.

Palabras clave: mitos; TIC; educación.

RESUMO
É cada vez maior a irrupção de aparelhos eletrônicos em todas as esferas da sociedade, com telas de todos os tamanhos e multifuncionais. A rápida automação da maioria dos processos, incluindo os educacionais, gerou ou ressurgiu diferentes mitos, na forma de histórias fabulosas e suposições epistemológicas, muitas delas sem evidências empíricas e contrastadas com a realidade. Na literatura, é proposta a existência de mitos recorrentes em torno da tecnologia, que contêm promessas que não podem ser cumpridas justamente por se originarem de mitos. Esses mitos deixam de existir quando a tecnologia, após um novo estágio, entra no reino do comum e então seu uso pleno é possível. Este trabalho tem como objetivo analisar e comentar evidências que sustentam ou rejeitam alguns dos mitos gerados pelas TIC na educação, em particular aqueles relacionados à existência de multitarefa, nativos digitais, estilos de aprendizagem, videogames e conectivismo como suposta nova teoria.

Palavras-chave: mitos; TIC; Educação.

INTRODUCTION

The use of digital technologies, such as devices with screens of all sizes and multiple features, is increasing. The automation of most social processes, including educational ones, has created great expectations, many times over- exaggerated by the press, which has led society to feed myths about this phenomenon, in the form of fabulous stories that are lacking of empirical evidence (George-Reyes & Avello-Martínez, 2021).

In general, myths are built through supposedly historical, common sense accounts, not based on justifications or evidence, which reveal the expectations, in this case about the supposed potentialities of technologies, of those who create or feed them (Sancho *et al.,* 2015). There is no doubt that many myths can help to explain a natural or social practice, belief or phenomenon and are based on popular beliefs or traditions that have developed around something or someone, and can also be permeated with the ideals and institutions of a society or a segment of it.

In this sense, Mosco (2011) raises the existence of recurring myths around technology, which contain promises that cannot be achieved precisely because they originate in myths and are difficult to eradicate. These myths, says Mosco, cease to be when technology after a new stage, in which over expectations are created (like Garnert states regarding technologies), enter to the range of the ordinary and then it is possible its full use. For example, television, like the telegraph, telephone, radio and electricity, in spite of been of a common use, have strengthened their influence and consolidated their true importance in the field of communications and other social activities such as the education.

There are several ways that cause the generation of myths. First, we find the mass media, both print and digital. In these media, many journalists base their news, on occasions, on research published in magazines or academic books that, although frequently scientifically rigorous, on many occasions are not enough to affirm, for example, improvements in learning; However, they gain great popularity and roots in teachers due to the

influence that these media have on their beliefs, and they assume them as irrefutable truths.

Among the main problems are the lack of critical evaluation of the studies, we found a very small and local samples, little control outside variables that do not ensure that the treatment with technologies were the cause of improvement, research based solely on self - reports (self- report studies), irregularities in the control groups, etc. (Avello et al., 2019). In this sense, Weinstein et al. (2018), argue that once the message is transmitted through various channels (from researchers to journalists, from professional workshops, to teachers), the science behind the"fact" is often lost and the conclusion is distorted. Over time, what started out as an oversimplification or overgeneralization may turn into a catchphrase, and an inaccurate one.

In investigations related to the eradication of myths it has been shown that this process is very problematic; unless great care is taken, any effort to dismantle a myth can reinforce it. In other words, contradicting any misunderstanding without solid evidence (or even with it) can increase the resilience of the defenders of the myth in question in terms of their point of view, as it is important to highlight that myths about learning generally begin with a grain really, big or small, but that makes its eradication more complex.

Finally, you can also discuss the myths that are generated locally and spread from teacher training institutions in particular where there may be a teacher who has a lot of prestige, but has rooted a myth and , due to its influence on students , it is assumed by them in an uncritical way. This is complemented by the methodological (workshops, seminars) and departmental learning activities of the institutions.

In the case of education, there are many myths that emerged from the emergence of school education and remain in the ideology of teachers until today (examples : only use 10 % of our brain, the pyramid of learning, education affects creativity, among others (De Bruyckere *et al.* , 2015), which shows the solidity of the inherited culture, which makes it difficult to eradicate those myths that introduce false claims, and which have even been widely proven in scientific research (De Bruyckere *et al.*, 2019).

At present, we are in the presence of a new wave of myths generated by the strong irruption of ICT in education and the great appeal that it awakens for the press. In this regard, Mosco (2011) comments that the convergence of communications and computers, that is, the widespread use of computers, services such as Internet, telephony, television, radio and tools such as email, digital games, among others, have fostered a new push towards mythological visions. In the case of the role of digital technologies in education, the most widespread myth fed by a good number of authors consists in assuming, despite the repeated lack of evidence, that they have the power to improve education only with their introduction and use.

As it has happened historically with other technologies, there is a group of teachers and enthusiasts at the forefront of its application who, often exaggeratedly, predict great changes in education and that are sometimes taken up uncritically by other researchers. One of the problems underlying these positions is that both try to explain the social, cultural and educational changes in terms exclusively technological, which often brings the makers of educational institutions try to buy more powerful computers with new features, excited about an educational improvement corresponding to the investment.

In this sense, it is necessary more and more the permanent digital literacy of teachers and

attend not only to the equipment, but also to the contents, the didactic strategies, among other factors that are those that ensure efficient learning.

The objective of this work is to comment on some of the most widespread myths related to the emergence of ICTs in education and to provide some evidence, both of its veracity and of its falsehood or lack of evidence of its effectiveness. In addition, some criteria are provided to evaluate the results of published research that can be included in the training and updating of teachers to avoid spreading these myths.

DEVELOPMENT

Some more widespread myths

Myth 1. Is multitasking possible?

Although multitasking goes beyond the use or not of technology and is more related to neurosciences (Kirschner, 2017), technology has undoubtedly enriched this myth, simply because it is increasingly common to find young people (and adults) doing various tasks at the same time using technologies (cognitive and / or information processing), such as playing a video game, listening to music and talking to another person (by chat, video call or other communication tool), all at the same time, which has led researchers to state that young people are capable of multitasking, and even that education should take this into account, which could have many negative effects.

It would be ideal if we could multitask at the same time, which is possible; however, its true value would be that the results of each of these tasks remain successful and, not for the contrary, at the time we include tasks, in parallel, the results are declining.

To achieve multitasking, individuals must consciously switch their attention among tasks, as Quinn (2018) suggests, making an analogy with the operation of a computer. To change the task we must stop the running task, save the current state, recover the state of the other stopped task and process the recovered task until we change again. All these extra steps to save and restore states of the tasks make us much slower (figure 1, Kirschner, 2017) .

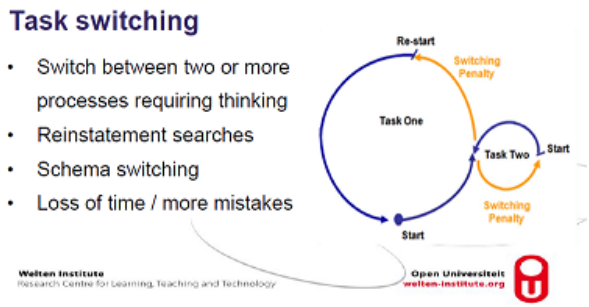

Fig. 1 - Penalties for changing tasks (Kirschner, 2017)

In this sense, the research suggests that there is a cost for changing tasks that deteriorates performance. Although this cost sharing is relatively small, the sum of all may be large, so that multitasking can lead to low efficiency of learning.

The task-sharing phenomenon may seem like a continuous process; However, what really happens is that some tasks are automated, for example, if we are playing a family game, talking with a friend and listening to one of our favorite songs, it seems that we do everything at the same time, but we are really changing tasks, what happens is that when we are talking, we do the game automatically (without requiring cognitive processing) as well as listening to the song, where our main attention is towards the conversation, but if the song we had never heard before, or the game becomes more complex, we will surely lose details and performance would drop dramatically due to

increased cognitive load (Gladstones *et al.*, 1989; Sana *et al.*, 2013).

Myth 2. Are today's youth "digital natives"?

The idea of "digital natives", understood as a generation of young people skilled with technology, which current educational systems cannot serve, has gained great popularity on the basis of numerous messages that are disseminated in the media, rather than scientific evidence. Recent research (Kirschner, 2017) has shown flaws in the argument that there is an identifiable generation or even a single type of highly skilled technology user.

In this so-called "digital age", young people have been able to find their own vehicle on the Internet and social networks to communicate and establish relationships with their environment, creating what is known as "network society". Since the late nineties, experts have coined different names to refer to those users who surf the Internet, quickly process information and acquire knowledge actively, and even, as discussed earlier, "are layer" to perform multiple tasks at the same time.

The first definitions of this new generation spoke of a "Net Generation", "App Generation" (Gardner & Davis, 2013), "Millennials", or of "digital natives" (Prensky, 2001). And, in this new scenario, we are faced with interconnected young people, content, social and mobile consumers who have naturally adopted the tools and resources offered by the network in their daily lives (Prensky, 2001).

This is evident in the debates on educational research, in particular, on the integration of ICT in schools, where it is common to find discussions on the topic of "digital natives". In this sense, it is claimed that there is a divorce between the skills that are developed in education and the skills of the 21st century, stating that the supposed digital natives presumably have sophisticated digital skills and learning preferences , for which education is not prepared to face.

In this regard, scientific evidence questions whether digital natives truly exist and whether education should really be adapted for this reason (Margaryan *et al.,* 2011; Bullen *et al.,* 2008). The results of these investigations have suggested that young people do not have deep digital skills, that these are mainly limited to the use of social networks such as Facebook, surfing the internet, basic use of office automation tools, passive consumption of information and the use of video games; however, there is a great deficit in the use of tools for learning, content creation, management and evaluation of the information retrieved. Many of these deficiencies are found by Kennedy & Fox (2013), who showed that students mostly use technologies such as content consumers rather than as creators of contents with academic purposes.

Another recent study (Romero *et al*., 2013) reveals that older students (over 30 years old) exhibited more digital skills than their younger peers; not, however, these students over 30 who showed proper powers of the "Net Generation " are classified in much literature as "digital immigrants".

Because of this and other evidence, Kennedy & Fox (2013) warn that we must be careful to propose deep changes in education due to the "greater" development of digital competences that young people have. This does not mean that education, like all social processes, does not need to introduce changes ; Indeed, new forms of learning and online learning, requires adjustments and new pedagogical approaches to achieve better efficiency in learning and or optimal use of digital resources.

Myth 3. Are video games useful for learning?

The use of games in education is as old as it is, from traditional games without the use of technology to the most current video games with the use of virtual reality tools. Many researchers highlight the use of electronic devices for entertainment as an alternative for learning, taking advantage of its advantages and trying to avoid its drawbacks. These affirm that video games improve different cognitive capacities and contribute to optimizing planning, resource management, problem solving, decision making and executive functions (López *et al.,* 2018). Even several multinationals look for their leaders among the best video game players.

In recent years, there have emerged the so - called Serious Games (SG) that are flooding the market for educational games, that is, Video Games (VG) intended to serve an educational purpose. A review study of experimental results designed to examine the effectiveness of VG and SG in the learning and participation of the players (Girard *et al.,* 2013), showed that with the results obtained it was still impossible to reach a reliable conclusion with regarding the effectiveness of GV and SG in learning; Furthermore, they highlight the limitations of the existing literature and propose a series of suggestions for future studies.

Along these lines, a meta- analysis carried out by Tokac *et al.* (2019), Investigated the effects of video games learning performance in mathematics of undergraduate college (K-12), compared to traditional methods of classroom instruction. The results of the 24 collected studies showed heterogeneity between effect sizes, both in magnitude and direction. Using a random effects model, a small but marginally significant overall effect suggested that math video games contributed to better learning compared to traditional instructional methods. In addition, the analysis combined variables such as grade, type of instrument, duration of the intervention based on the game, country, type of publication, and characteristics of the year of study. The overall results indicated that video games are a slightly effective instructional strategy for teaching math at the pre- University levels.

Another large-scale study in four cities in the Netherlands showed - contrary to what was assumed to be the initial hypothesis - that children who had a computer in their own room were significantly more likely to play outside than were similar children who did not have such easy access to the computer in their room (Wack & Trantleff-Dunn , 2009). Another study, carried out by the Pew Research Center, concluded that video games, far from being a social isolation, serve to connect young people with their peers and with society in general (Aartset *et al.* , 2010).

The literature on the use, efficacy, and design of educational games and game-based approaches to learning has accumulated gradually and in phases, across different disciplines and on an *ad hoc ways.* This has been problematic in a number of ways. According to Freitas (2018), in a recent literature review, he found fragmented literature and reference patterns inconsistent among different subfields and countries. This is mainly due to the fact that a single disciplinary perspective has not emerged due to: the interdisciplinary nature of educational games, the reliance on unique disciplinary contexts for studies, the change of terminologies in different contexts, and the use of multi-methodological approaches. Similarly, these authors have found different perspectives from educational science, neuroscience, and information science that have deepened the understanding of games.

In summary, studies seem to indicate that video games improve tasks, especially in

jobs that require hand-eye coordination, attention, working memory, and quick decision-making. However, there is still insufficient evidence to ensure that video games are more (or at least equal) efficient than other traditional teaching methods; Furthermore, if this were the case, it would be one more tool to be included among the teaching strategies that the teacher can use, but it should not be believed that it will solve all learning problems.

Myth 4. Do learning styles exist?

The growth of research on learning styles is undeniable, even in virtual learning environments. The followers of this theory suggest that people are divided according to their learning style; for example, in: visual, auditory or kinesthetic, depending on the learning medium. People learn better visually with charts and diagrams, auditions learn best by hearing and kinesthetic learn best through movement and experience (Avello & Requeiro, 2018).

In the same way, other researchers relate learning styles to the aptitudes of the human being, their talent, means, personal instruments with which they have to interact with reality effectively according to their own characteristics; This is of great value to educators and psycho pedagogues in the important objective of improving and personalizing the learning of their students, including the development of digital resources adapted to these styles in online training environments.

As a result of these investigations, it seems appropriate to many students, parents, teachers, and researchers to state that since people prefer to learn visually, auditory, kinesthetically, or otherwise, we should adapt teaching, situations, and educational resources to these preferences. However, the theory of learning styles has received much criticism. The main one is that there is no real scientific basis that supports, first, that students really have a certain optimal learning style, and second, that they are aware of their personal learning style and/or if there is a reliable and valid way to determine this style.

One of the main critics are Kirschner & van Merriënboer (2013), who argue that learning styles misclassify (actually pigeonhole) students. Recently, Kirschner (2017) posits that the first problem is that people cannot simply group themselves into specific and distinct groups as shown by various studies (Druckman & Porter, cited by Kirschner, 2017). Most of the differences between people in whatever dimension one can imagine are gradual and not nominal. Supporters of the use of learning styles tend to be unaware of this and use arbitrary criteria, such as a median or mean on a certain scale to associate a person with a specific style.

The second problem has to do with the validity, reliability and predictive power of the learning style tests that are being used. For example, Stahl (1999) reported inconsistencies and low reliability in measuring learning styles when individuals perform a specific test at two different times. In other words, the reliability between tests is quite low.

Similarly, Coffield *et al.* (2004) and colleagues selected 13 of the 71 evaluation models of learning styles and assessed its psychometric properties: six did not meet psychometric criteria, three "approached to comply" with the psychometric criteria other three met half ... Only one of the models met the minimum psychometric requirements (and the one that met the requirements is not aimed so much at students but rather at teachers and managers...). Likewise, Massa & Mayer (2006), in a series of three experiments evaluated whether to follow the student's preferred modality

(visual or verbal), which generated differences in learning. What they found is that the mode of presentation has no impact in terms of results. Let's say, if a "visual" student receives content visually or verbally, there is no difference.

Another problem that is criticized with respect to the measurement of learning styles is the inadequacy of the self-report questionnaires for their evaluation. The reason is that students are unable or unwilling to report what they actually do, or what they think they do. To illustrate the unreliability of the self-report, Rawson *et al.* (2017) asked a group of students when they did their homework and how long they worked on it. While there was a significant positive correlation between the amount of time students spent working on their homework (measured by a "smart pen") and the grade achieved by students in the course, there was no significant correlation between grade and time that students said they devoted to homework. In other words, there was no real correlation between subjective self-assessment and objective measurement. Furthermore, Massa & Mayer (2006) found that when students reported their preference for verbal information rather than visual information, this preference was only weakly related to their actual, objectively measured abilities (i.e., their spatial ability).

In short, the question is whether students really know what the best is for them. Many of these studies show that students who expressed preferring a particular way of learning, in most cases did not have better results using that form, or even showed worse results. Certainly, the learning styles hypothesis does not look promising, considering that it has been around for 40 years, and there is not enough evidence to justify the tremendous expenditure of resources that it means to test all students and have multiple versions of the same content according to the style of the students.

Myth 5. The new theory of learning: the connectivity

Connectivity emerges in 2005 when Siemens published the manuscript " Connectivity: A learning theory for the digi tal age " (Siemens, 2005), where it proposes a theoretical alternative for behaviorism, cognitivism and constructivism (as a variant of cognitivism). According to Zapata (2015), it is an interpretation of some of the processes that occur within the Information and Knowledge Society (SIC), related to education, in which a meaning and projection of these is attributed changes in the field of educational practice and its organization.

This theoretical proposal has received numerous criticisms and questions by various authors (Kop & Hill, 2008; Clarà & Barberà, 2014; Zapata, 2015), although they recognize the importance of the aspects raised in this proposal as a first theoretical attempt to radically reexamine the implications for online learning and the increase of new communication technologies, in this way it has constituted the theoretical basis of Massive Open Online Courses (MOOC).

In connectivity, it is the collective connections between all the"nodes" in a network that result in new forms of knowledge. According to Siemens (2005), knowledge is created beyond the level of individual human participants, and it is constantly changing. Networked knowledge is not controlled or created by any formal organization, although organizations can and should "connect" to this world of constant information flow and extract meaning from it. Knowledge in connectivity is a chaotic and changing phenomenon as nodes come and go and information flows through networks that are interconnected with a myriad of other networks.

For Siemens (2005), it is the connections and the way in which information flows as a result in a knowledge that exists beyond the individual. Learning becomes the ability to tap into meaningful information flows and to follow those flows that are significant. In other words, connectivity is presented as a learning model that recognizes changes in society, where learning is no longer an internal and individualistic activity, but can reside outside of ourselves (within an organization or a database).

Among the main criticisms it is stated that the authors of connectivity tend to minimize the role of teachers, since the approach of connectivity focuses more on individual participants, networks and the flow of information and new forms of knowledge than " it is assumed "result from these relationships. In their opinion, the main aim of a teacher is to provide the environment and the context of initial learning that brings together students and help them build their own personal learning environments that allow to connect them to " successful " networks, with the assumption of that they will learn automatically as a result of exposure to the flow of information and the individual's autonomous reflection on its meaning. In other words, it is not necessary for formal institutions to support this type of learning, especially since such learning often relies heavily on the social networks available to all participants. In this regard, in a recent work, Al Dahdouh *et al.* (2015) try to clarify what it means to define knowledge as a network and how it can affect teaching and learning. Undoubtedly, these concepts, relationships and forms of learning are not formally defined and there is evidence of a lack of theoretical and methodological support. These approaches have been, in part, accepted by the authors themselves, which dissociates initial conceptions of Siemens on " the attribution of meaning " as a necessary component of learning.

In this sense, Zapata (2015), states:

> Connectivity is presented to us as a theory that overcomes the deficits of the, according to the author, three great existing theories about learning based on three great currents of thought and science of today's society: the theory of chaos, that of complexity and self-organized networks, and it does so based on confusing statements about whether learning occurs inside or outside the individual, mixing levels of significance, and also based on principles in which the conceptualization of the learning as linked to the configuration of the networks and as something related to the ability to configure the information and the capacities to obtain more cognitive performance from the information that is in the networks.

Similarly, Verhagen (2006) has argued that connectivity does not constitute a new learning theory, since it does not present anything that is not present in other theories. He argues that it is only a"pedagogical perspective" and also states that learning theories must deal with the instructional level (how people learn) and connectivity reaches the curricular level (what is learned and why it is learned). Along the same lines, Zapata (2015), another critic of connectivity, considers that, although technology affects learning environments, existing learning theories are sufficient.

These authors, moreover, argue that this proposal lacks the structure of a theory, and is presented as a set of statements that are not syntactically and semantically integrated into a system held together by rules of logic, so that they can relate some with others and with observable data, allowing evaluating, attribute meaning, predict and explain

observable phenomena. It is also argued that it lacks essential components in a theory such as values and application conditions.

On the other hand, although connectivity is presented as a theory that overcomes the deficiencies of the existing theories about learning , according to three great currents of thought and science of today's society: the theory of chaos, that of complexity and the networks, it does it according to some confusing statements about whether learning occurs inside or outside the individual mixing levels of significance, and principles in highlighting conceptualizing learning as linked not accurately to the configuration of the networks and the devices, and as something related to the ability to configure the information and the capabilities to obtain more cognitive performance from the information that is in the networks. Ignoring with this previous works such as those related to the theory of elaboration.

In summary, the main criticisms of connectivity that do not support it as a theory are:

- It does not have and it is not structured according to the elements that the classics attribute to a theory: objectives, values, application conditions, methods, elements of the theory, validation and open problems and future lines of development. In other words, it is a set of points of view with a structured development of ideas, which adapts to current times and the type of skills that students must acquire in new digital environments.
- The principles are not sufficiently linked to the arguments, or to the examples, to develop a system of ideas about how the theory can work in practice.
- It does not consider learning as an exclusive and especially human activity, linked to human thought, to its capacities to analyze, abstract, deduce-induce, debate, etc. ethereal and to the faculties of knowing, representing, relating, transmitting and executing.
- Its implications are more related to the organization of education than to the development of learning.
- Inconsistencies in the treatment and references to previous theoretical approaches to learning (behaviorism and cognitivism with their different approaches).
- Little empirical validation of the proposal, in terms of experimentation. The research published in its majority, has descriptions of experiences that demonstrate their superiority over previous theories.

Myth 6. *Wikipedia* is wrong, false and should not be consulted.

Wikipedia defines itself as the free encyclopedia that everyone can edit, and at the age of 19, it contains more than six million articles in English, as of November 2020, and has been presented in 314 different languages (Wikipedia, November 1, 2020).

In 2005, with *Wikipedia* only three years old, the journal *Nature* published a study that described *Wikipedia* as "face to face" with the British Encyclopedia. Of course, *British* refuted that statement, but since *Wikipedia* has multiplied by six the number of items being eighty-five times larger than *British,* of 120 volumes (Jemielniak, 2019).

In addition to the *British* rebuttal, *Wikipedia* has not enjoyed credibility in academic circles, due to the lack of centralized control of the creation and editing of articles, the anonymity of the authors / article creators and the very objective of its mission, ease of access. *Wikipedia* became the most

maligned disseminator of knowledge in the world, and educators in particular have condemned it to the point of banning students from its use, it is treated with suspicion and mistrust, and is even mocked in academic circles (Jemielniak, 2019).

The paradox of this is that this community represents the professionals best prepared to shape *Wikipedia* , both for their knowledge and experience, and for access, in addition to the fact that they could take advantage of their students so that , in a collaborative and supervised way, they can work the encyclopedia (Shafee *et al.*, 2017).

This mistrust lies in the presence of errors and inaccuracies, although there are authors who claim that the amount of errors is similar to the amount found in other professional and peer-reviewed sources (Mesgari *et al.,* 2015; London *et al.,* 2019).

However, the types of inaccuracies in *Wikipedia* are different. These may involve replacing the content of an article with banalities or someone's name with an insult. There is no doubt that this vandalism damages the perception of the quality of *Wikipedia* as a whole. Still, *Wikipedia* takes this vandalism seriously and is constantly developing new methods to combat malicious edits, including, for example, machine learning algorithms, as well as human patrols (Jemielniak, 2019).

Vandalism on *Wikipedia* can mislead readers, but they are generally quite rare, especially in popular articles. More importantly, the vandalism is easily detected and, as such, is harmful primarily for image *Wikipedia* as a reliable source, although not actually misinform readers (Jemielniak, 2019).

This is one reason why *Wikipedia* is rejected by academics, although its inaccuracy is already understood. Another reason for the rejection is its association with plagiarism by students, who perform copy / paste; however, we do not have to blame *Wikipedia* for this, since performing the same action on a traditional encyclopedia should not be attributed to the source from which the plagiarism is made. Therefore, it may be worth considering reasons for academics' reluctance to use, recommend, and incorporate *Wikipedia* into courses.

Some elements to evaluate research and avoid spreading unfounded myths

It is the responsibility of educators and educational researchers to be knowledgeable about what constitutes trustworthy science. In this regard, Quinn (2018) proposes a series of principles that can serve as a guide to assess whether the suggested result seems reliable and whether there is indeed a potential scientific problem. Based on these principles, a summary and other complementary comment regarding the limitations of the studies are presented, based on Avello *et al.* (2019).

When we perform the search process of the state of the art you can find authors who say that their data suggest X. A good rule is to always ask whether the data were published in a peer-reviewed journal. Unpublished data is suspect, because why wouldn't you post it if you could? Peer review is not everything, it may have its own flaws and loopholes, but it is a good source of scientific rigor. If the justification is that the data and the method of collection are proprietary, be suspicious. Be wary of someone who says they have data that cannot be shared, as one of the main goals of scientific publication is to include enough information to replicate the study and see if the same results occur.

Similarly, it is possible to find a study that represents a particular point of

view. You may not be able to figure out whether the data is skewed. Unfortunately, there is evidence that organizations influence data in all industries and fields (Creswell, 2014); this is not only to educational research.

When you come across studies with very round numbers (especially totals), particularly multiples of 10, you need to check whether the researchers or organizations behind them are saying that the numbers come from real data or that they are using them as a framework. The actual data tends to look messy - you'll get, for example, 7.1 percent of those who do this and 34.9 percent of those who don't. Quality research is unlikely to result in clean numbers (although non-round numbers are not a guarantee either (see 7-38-55, Quinn, 2018).

In many cases, organizations or researchers can choose data that addresses a small fraction of what they say and then generalize to support their idea to defend. For example, there are combined studies on online learning and the use of mobile devices to enable mobile learning. In the study, the two things were completely separate, and inferences were used from something that was at the (empty) intersection (Quinn, 2018). Good research clearly establishes the limits to which data can be generalized (Avello *et al.*, 2019).

On the other hand, in many studies correlation and causality are confused or equated. If things happen together, it is easy to infer that they are related. However, that is not necessarily the case. For example, if more people die in hospitals than at home, is it because hospitals are not safe, or because people tend to be in hospitals because they are already bad?

Use studies that show rigor in science, those who have demonstrated a consistent ability to make sense of the science of learning.

Check the studies that reject or criticize the idea defended. Don't just accept a source, look for reinforcement. Answer these questions: Are there multiple studies? Is there other convergent evidence? Has anyone replicated the results? Has the study been published in a peer-reviewed journal?

Check for implications restrictions and limitations: Under what conditions should you use the result? Are the results extrapolated to situations that are not representative of the initial study? Obviously, none of this is foolproof. Evidence can be contaminated in multiple ways. There are no guarantees. The best thing to do is to search abundant sources and be skeptical.

If particular beliefs are tied to an individual's values or worldview, the facts will really strengthen them. This makes myths and misconceptions difficult to deal with.

CONCLUSIONS

Based on the comments made, an attempt has been made to demonstrate the need to carry out teaching based on evidence and to prevent teachers from basing their teaching strategies on not very rigorous studies and much less on newspaper articles; The latter can serve as an alert to new published studies, but whenever possible the original publication should be found and examined with care and skepticism, before introducing it into our teaching methods.

In this work, only five of the most widespread myths or beliefs about the use of educational technology are discussed; However, it is not an exhaustive list at all, there are many other legends, myths and beliefs, "very well" created and disseminated, that need a critical look and deep analysis of the evidence, its rigor and quality of the investigative process, size and context of the

participants, the way in which the data is processed and the analysis of the results shown.

This work uncovers some suggestions and clues for dealing with those who might argue against science. Unfortunately, this will not always be the case, there are those who have a great interest in the myth and will cite studies that demonstrate the validity of their claim (Quinn, 2018) . Here's the importance of being well-trained in research methodology, to make it easier to identify potential flaws in the data (though practicing being a smart consumer will help). As suggested above, unless your data has been published in a reputable, peer-reviewed journal, it is open to suspicion.

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