Vivat Academia. Revista de Comunicación. 2022, nº 155, 241-263
ISSN: 1575-2844 http://doi.org/10.15178/va.2022.155.e1371

RESEARCH

Received: 14/04/2021---**Accepted**: 05/10/2021---**Published**: 03/01/2022

THE IT IN PRESCHOOL EDUCATION: A CRITICAR LOOK AT THE USE AND REFLECTIONS FOR GOOD PRACTICES AS AN EDUCATIONAL ALTERNATIVE

Las TIC en la etapa de educación infantil: una mirada crítica de su uso y reflexiones para las buenas prácticas como alternativa educativa

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Cómo citar el artículo:

Alonso-Sainz, E. (2022). The IT in preschool education: A criticar look at the use and reflections for good practices as an educational alternative. *Vivat Academia. Revista de Comunicación*, 154, 241-263. http://doi.org/10.15178/va.2021.154.e1371

ABSTRACT

ICTs are the tools that we are provided underneath the promise of an easier and bearable life. Even though the appearance gifts our sight an attractive element, underneath the screens, there are hided tons of issues and disadvantages in general, and for the pre-scholar stage, in particular. It can be converted into a Troya´s horse, which is the teacher and parent's responsibility to know about before allowing its entrance into our lives and in our child and pupil´s life too. Addiction, overstimulation, attention, and hyperactivity problems are some of the side effects, that can be caused by inappropriate use of new technologies. This text aims to analyze, from a theoretical and bibliographic point of view and with hermeneutical methodology, the different uses of ICT to educate children. This is studied in different environments: at home and school, following a vast literature review. For this, the didactic uses of ICT in different areas of learning are analyzed to reflect on the need to acquire certain prudence when putting a screen before the little ones. The negative effects that its use entails may be greater than the benefits they report, in addition to the fact that its formative power does not always equal its educational potential; not everything ICT can teach is good, is educational.

KEYWORDS: Screens – IT - Pre-Scholar age - Educational Innovation – Educational Situation – Good Practice - Educative technology

RESUMEN

Las TIC son herramientas que se nos brindan a nuestro alcance bajo la promesa de una vida mucho más fácil y llevadera. Aunque la apariencia regale a la vista un elemento atractivo, debajo del cristal de la pantalla se esconden multitud de problemas e inconvenientes en general y para la etapa Infantil en particular. Puede convertirse en un Caballo de Troya que es responsabilidad de los educadores y padres conocer antes de permitirle la entrada en nuestras vidas y en las de nuestros hijos y alumnos. Problemas como la adicción, la sobreestimulación, los problemas de atención o la hiperactividad son algunos de los efectos secundarios que pueden acarrear un uso indebido de las tecnologías digitales. El objetivo de este texto es analizar, desde un punto de vista teórico y bibliográfico bajo metodología hermenéutica, los diferentes usos que se dan a las TIC en edad infantil con objetivo formativo, en casa y en la escuela, basando las afirmaciones en estudios ya planteados con anterioridad. Para ello se analizan los usos en las diferentes áreas de aprendizaje de aplicaciones y didácticas con presencia digital para reflexionar, finalmente, sobre necesidad de adquirir una cierta prudencia a la hora de poner ante los más pequeños una pantalla para su formación. Los efectos negativos que conlleva su utilización pueden ser mayores que los beneficios que reportan, además de que su poder formativo no siempre equivale al potencial educativo; no todo lo que enseñan es bueno, es educativo.

PALABRAS CLAVE: Pantallas - TIC - Edad Infantil - Innovación Educativa – Situaciones Educativas – Buenas Prácticas – Tecnología Educativa

TIC NA FASE DA EDUCAÇÃO INFANTIL: UM OLHAR CRÍTICO PARA SUA UTILIZAÇÃO E REFLEXÕES PARA AS BOAS PRÁTICAS COMO ALTERNATIVA EDUCACIONAL

RESUMO

As TICs são ferramentas que nos são oferecidas sob a promessa de uma vida muito mais fácil e tranquila. Embora a aparência dê um elemento atraente aos olhos, sob o vidro da tela há uma infinidade de problemas e inconvenientes em geral e para o estágio infantil em particular. Ele pode se tornar um Cavalo de Tróia que é responsabilidade dos educadores e pais conhecê-lo antes de permitir que ele entre em nossas vidas e na de nossos filhos e alunos. Problemas como dependência, superestimulação, problemas de atenção ou hiperatividade são alguns dos efeitos colaterais que o uso indevido de tecnologias digitais pode causar. O objetivo deste texto é analisar, de um ponto de vista teórico e bibliográfico sob uma metodologia hermenêutica, as diferentes utilizações dadas às TIC nas crianças para fins educativos, em casa e na escola, baseando as declarações em estudos que já foram feitos anteriormente. Para tal, são analisadas as utilizações nas diferentes áreas de aprendizagem de aplicações didácticas com presença digital, a fim de refletir,

finalmente, na necessidade de adquirir uma certa cautela ao colocar uma tela em frente das crianças mais pequenas para a sua educação. Os efeitos negativos da sua utilização podem ser maiores do que os benefícios, e o seu poder educacional nem sempre é equivalente ao seu potencial educacional; nem tudo o que ensinam é bom, e nem tudo o que ensinam é educacional.

PALAVRAS-CHAVE: Telas - TIC - Idade infantil - Inovação educacional - Situações educacionais - Boas práticas - Tecnologia educacional

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1. INTRODUCTION

It is not necessary to be very insightful to affirm that in recent years we have been plunged into a digital metamorphosis that has encompassed multiple aspects of life in society, from communications to education. Information and Communication Technologies (ICT) are already an inseparable tool for human beings; an almost extension of our own body, which exhorts us to introduce them into our daily work as an indispensable tool.

This paradigm shift invites deep reflection, not only in the social sphere but also in the educational sphere on the drift taken in the last decade and the coming ones. The so-called new pedagogies, the new educational currents, and the appearance of digital materials encourage questions about the use of these media and their benefits. In Spain, in the 2016/2017 academic year, the proportion of computers per student was one in three (Ministry of Education and Professional Training, 2019); This proportion has tended to decrease in each school year, reaching a ratio of 0.8 computers per student (1.25 students per device) according to the latest OECD data (2020).

It is known by all that the Infant stage, from 3 to 6 years old, is fundamental for the holistic development of the person. Good progress on a mental, physical, and social level ensures correct future maturation and well-being (Romera and Ortega-Ruiz, 2018). Given the importance of this period, it is worth highlighting the role that parents and teachers play, and the responsibility they have, in safeguarding these years of full blooming (Kristjánsson, 2020).

The work presented here constitutes a critical analysis on controversial issues, but to which little attention has been paid, about ICT, such as: the true benefits in the use of digital media, the drawbacks, the different uses, or the current situation of Early Childhood Education regarding new technologies. To do this, we will first approach a literary review by resorting to the different data and reports that are presented to us and that seek to objectively argue the current situation of the use of ICT from a social and educational point of view. Secondly, we will analyze some uses that schools and families make of different digital media for training purposes from apps

focused on teaching certain areas of knowledge. For this analysis, we will use a theoretical methodology making use of hermeneutical research methods. Ultimately, a few short conclusive words that pose the ideas previously raised and leave other questions open as possible lines of future research and reflections that help implement good practices regarding education with screens at this stage.

2. LITERARY REVIEW AND OBJECTIVES

It is important, before the analysis, to clarify the concept of ICT or new technologies. Although there is no clear difference between the two, some people rise against the second term due to the ambiguity of its meaning as a novelty since all novelty ceases to be so after a while. That said, we will treat both terms synonymously in this work.

Taking as a reference the definition of Julio Cabero (1998), ICTs are "those technical instruments that revolve around information and new discoveries" (p.197). This leads us to affirm that almost any technological device that we have at home or in our pocket can be considered a new technology.

Having clarified the term, we can say almost apodictically that our day-to-day orbits around a series of machines that allow us to communicate, relate, organize, and inform ourselves in a certain way. Currently, the person who does not have a series of digital knowledge or a series of competencies that allow updating in these resources is relegated to the condition of digital illiterate (Moreno-González, 2019), making a new literacy in this field necessary to be able to follow the moving tempo of the contemporary world.

Certain data confirm this palpable reality. Taking the situation in Spain as a reference for analysis, according to data from the National Institute of Statistics, 95.4% of Spanish households have internet access (INE, 2020), 38.5% more than a decade ago (INE, 2009). In parallel, we know that there are 54.44 million mobile subscriptions in Spain, 117% of the total population (INE, 2020). Similarly, these same sources tell us that 96% of the population has a mobile device of any kind (3 points more than in 2009), that 87% of these mobiles are smartphones, and that 54% have profiles in social networks (We are social and Hootsuite, 2021). These data, similar to those of the rest of Europe, indicate the colossal progress that screens are having in people's daily lives.

There is no doubt that possession of an electronic device is not necessarily indicative of its high use. On many occasions, having a television at home or a specific number of computers does not have to force us to make prolonged use of them but the data indicates otherwise. In 2020, Spaniards consumed about 240 minutes of television per person per day, that is, about 4 hours a day, 30 minutes more compared to 2019 (taking into account the pandemic situation experienced that year) (Barlovento Comunicación, 2020), a figure somewhat far from the 2.5 hours on average in the rest of the world (Eurodata TV Worldwide, 2019).

By refining our gaze towards the educational field, we can observe that this technologically submissive reality maintains the same direction -or perhaps even more marked- in both adults and children.

Two decades ago, Mark Prensky (2001) coined the famous term "Digital Native" to refer to those generations born in the Technological Age. It is these digital natives that today are flooding the classrooms of schools and universities; young people who are expected to have almost innate facilities to understand, coexist, and interact with screens due to their habitual coexistence with these devices from the first years of life.

The educational model, in a deep metamorphosis, advances towards full technologization. As has been pointed out in previous lines, in Spain, in 2018 there was a proportion of 0.8 students per computer (OECD, 2020), a number that decreases each year in a clear direction towards the one-person computer. Most educational centers seek, in one way or another, educational innovation by modernizing their technological materials. The schools that do so the least are those with projectors in the classrooms or digital whiteboards; the ones that do the most, have one tablet per student or virtual and augmented reality tools.

This trend is accompanied by significant investments and support from different national and supranational governments. In 2000, the European Union approved a million-dollar project called the E-Learning Project that sought to lay the foundations for the new digitization in the classrooms to create a communicated space that would open the doors to the exchange of materials, access to information, digital learning support tools, etcetera; a project somewhat frustrated by the 2008 crisis.

In Spain, in the same way, plans have been approved for educational digitization, such as the 2009 School 2.0 project, which marked an investment path towards a 1 & 1 model (one computer per student); a project equally frustrated by budget cuts due to the 2012 crisis (Area et al., 2014). Since then, there have been regional, European, national, and private initiatives that have provided technological material to students, technological materials, internet connection, and other resources; all this supported by the incorporation of these materials into the school curricula (González Rodero, 2020). This idea has been recovered and put into practice almost immediately due to the health crisis experienced with COVID-19, where teleworking and online teaching became the only possibility during confinement.

The last educational law of 2013 (LOMCE) includes in its first pages the importance of the use of ICT as a "key tool in teacher training and the learning of citizens throughout life" and adds "it is essential that the model of digitalization of the school that is chosen is economically sustainable, and that it focuses on the creation of a digital ecosystem at the national level" (Organic Law 8/2013 for the improvement of educational quality). Currently, the law that is being implemented follows this same path, expanding digital possibilities in the curriculum and classrooms, providing didactic and training support (Organic Law 3/2020 by which Organic Law 2/2006 of Education is modified.).

Specifically, if we look at Early Childhood Education, we can see how, in the curriculum of this stage itself (Royal Decree 1630/2006 establishing the minimum teachings of the second cycle of Early Childhood Education) that sets the objectives and content, ICT or new technologies are mentioned fifteen times, which highlights their relevance in these early ages.

It is not surprising that the laws of the stage that concern the first ages include the use of ICT. We can observe, and this is shown by certain data, that children in the stages of 0 to 6 years old make prolonged use of digital media. According to certain studies, Spanish children between 0 and 3 years old spend an average of 1 hour and 15 minutes a day in front of a screen, a figure that rises 10 minutes in the range of 3 to 6 years old (Instituto Tecnológico de Producto Infantil y Ocio, 2019). This is why we should not be surprised by the early access of children to pornography through digital media (8 years old according to the latest study) (Ballester-Brage and Orte-Socías, 2019), or the gambling problems of young people (more than 44% of people with compulsive gambling disorders are under 26 years old) (FEJAR, 2018).

The current photography of the digital paradigm in which the 21st-century society is immersed is, thus, revealed, necessary for the understanding of the effects of the screens that we will address in later lines and that justify the general objective of knowing the consequences of the use of digital technologies in Early Childhood Education and the specific objectives of:

- Analyze the relationship between the use of ICT and the learning of children of Early Childhood Education age (3 to 6 years old).
- Provide scientific data on the negative and positive effects of ICT on children to make a critical judgment about them.
- Analyze different uses that are given to ICT in the teaching of different areas such as literacy or mathematics, among other school educational situations.
- Propose reflections that lead to good practices for the correct use of ICT in the Early Childhood Education classroom.
- Carry out a critical assessment and reflection within the framework of the current educational situation around new technologies.

3. POSITIVE EFFECTS OF ICT

Technology, like any innovation, has the ultimate goal of remedying the difficulties that arise and making life easier. Possibly the most important need that new technologies seek to meet, like many other advances, is the time and effort devoted to carrying out certain tasks.

The educational field has not passed unscathed by the technological tsunami either. Possibly, the world of education is one where this technological immersion

and its consequences are most appreciated. Educational centers, as mentioned, have invested a lot of effort in updating their traditional schools to a 2.0 model, which has brought many benefits.

In the first place, one of the most visible and palpable benefits is the communicative evolution between educational agents and students. A new relationship framework has been established where the, almost antediluvian, notes on the agenda have become direct messages to parents on the digital platform. There are no longer intermediaries between teachers and parents, it is no longer essential to arrange a meeting to discuss relevant aspects, now with a simple chat or email the teacher can contact them. Thus, thanks to these platforms, interactive spaces are created where teachers, students, and parents communicate and share material virtually and instantly. Thanks to this new model, there is greater control of students and greater participation of parents in the school environment, "the relationship between educators and students is changing, it is more democratic and participatory and not so authoritarian" (J.L. Fuentes et al., 2015, p. 39). Renowned authors on the subject, like Mark Prensky (2015), call this new paradigm "co-association", where parents and students have a new role, much more associative and involved with the school.

This conception of educational technology may seem somewhat superfluous to us since it is not only a means of communication or a bottomless well of information, it is also, as Burbules and Callister (2001) pointed out, "a potential territory for collaboration, a place where teaching and learning activities can take place" (p. 19), assumptions that have come true. From this new territory emerge, according to the authors, new educational objectives, such as education in critical reading or the search for the veracity of information. The relationship created with technologies is not unidirectional, it is rather one of reciprocity; Not only do ICTs adapt to educational and personal needs, but they also imply an adaptation by individuals to the technological requirements and knowledge necessary for the correct use of screens. It is, from this point, where the need for adequate training to the paradigm that is presented to us emanates, even more so in teachers: the so-called Teaching Digital Competence, so essential for good teaching work with ICT (A. Fuentes et al., 2019).

As a second beneficial point, we can address the attraction of little ones to screens. With simple observation, we can affirm that screens are objects that exert a centripetal force on children (and not so children). This attraction is used in many cases as an excuse for the use of ICT in the classroom. Indeed, taking advantage of striking and motivating elements can be of great help for more meaningful learning and greater sustained attention (Mora, 2017). Many authors cling to the motivation argument as the main reason for introducing screens and technological tools in classrooms (di Serio et al., 2013; A. Fuentes et al., 2019; Palomar-Sánchez, 2009), although, it is possible to wonder if this motivation arises from an interest in the task that is being developed and what is being learned or is it simply the result of a sufficiently strong stimulus. That is, if the motivation is intrinsic, extrinsic, or

transcendent, that it awakens astonishment (J.L. Fuentes, 2021). Still, as G.K. Chesterton (1967) pointed out, "when we are young children, we do not need fairy tales: we only need stories. Mere life is interesting enough" (p.39).

The third aspect that we could highlight as beneficial is the flexibility, adaptability, and possibilities that technology gives us to work in the classroom. The different software, apps, and tools make the materials adaptive, where the content is adapted to the needs of the users (Prieto Ferraro et al., 2003), such as, for example, those apps dedicated to learning mathematics, where the difficulty increases as the user overcomes goals. This framework of possibilities is not only in keeping with the materials used in the classroom. The possibility of creating new environments and new activities is, on many occasions, a great claim for teachers, being able to use methodologies very close to students such as gamification, which uses existing video games to create content and bring it closer to children's reality.

Some of the benefits that we can extract from an ICT education are, thus, outlined. Many others could be explored, such as access to more information by students and teachers (Ruiz-Arroyo and Tesouro, 2013), the approach to other realities, or the promotion of the child's autonomy thanks to the independent management of ICT. The internet is here to stay and, as with the Gutenberg press, we cannot think of this as momentary. We must accept that our life has changed, hence the need to perfect the use of technology for the sake of better education.

4. NEGATIVE EFFECTS OF ICT

Possibly, before outlining the negative effects of screens in early childhood education, it is worth clarifying the dichotomy that is often generated in this field between what is pedagogically correct and what is psychologically healthy. It is logical to think that the nirvana of almost any teacher is to get their students to learn quickly, having fun, and requiring little effort on the part of the teacher and the student (Luri, 2020a). This, which technology can apparently give us, is often in dissonance with the negative effects that the use of these devices has on children.

Nicolas Carr (2008, 2010) already warned us of the strange sensation that he felt when he saw how his brain, as he used the screens more, modified reading patterns and needs for visual stimuli. The inability to perform a slow reading, the desire for constant reception of information, and the immediacy with which he required any action, denoted how his mind was not the same since he used the computer: "whether online or not, my mind now expects to absorb information the way the internet distributes it: in a rapid flow of particles" (Carr, 2010, p. 19).

Returning to the negative effects of ICT, different aspects can be highlighted. First of all, one of the most relevant and triggering connotations of other causes, negatively speaking, is the overstimulation caused by prolonged use of the screens. Overstimulation is the effect resulting from the excessive presence of stimuli that act on the person, not only due to the visualization of screens but also due to a frantic

rhythm in the child's life (Banderas, 2017). Music classes, English hours, competitions in two different sports, or the daily viewing of educational videos, lead to a life rhythm in childhood that can take its toll; overstimulation is the price to pay for it (Millet, 2016). It has been shown that precarious learning environments where children do not receive the correct and necessary stimuli can be seriously detrimental to their holistic development and more so in the preschool stage (Madigan et al., 2019; Molnar et al., 2019). From this idea emanates the importance of a good Early Childhood Education; something that the OECD has warned in multiple reports for more than 20 years (OECD, 2001, 2006).

Now, screens overstimulate insofar as they contribute a very different rhythm to reality. One of the first studies conducted in 2009 determined that there was an average of 7.5 abrupt scene changes per minute when viewing 59 supposedly educational videos directed at children under 3 years of age (Samantha et al., 2009). It was shown that the more scene changes per minute, the more stimulating, eye-catching, and addictive the videos are; rhythms that differ greatly from reality and can trigger high levels of arousal and nervousness.

Second, and in line with the above, is the problem of self-control and what it entails. If the screens overstimulate and exhort the brain to high levels of arousal, it is logical to think that the greater the movement, the less control over oneself. Studies carried out by researchers such as Christakis (2011) reveal that, as expected, screens affect children's patience and self-control or aggressiveness (Bender et al., 2018), the longer the viewing time, the less the ability to wait for a reward (Madigan et al., 2020).

It is not surprising that in the last decade we have been experiencing a deep attention crisis, with an increase in diagnoses of attention problems (Sánchez-Rojo, 2019), as the third consequence. In the words of N. Katherine Hayles, we have gone from a Deep Attention that allowed us to focus our mind on a single task, to an Increased Attention, which forces us to constantly oscillate from focus, task, stimulus (Hayles, 2007) like if we lived on screens. The publication of works that relate exposure to ICT with attention problems (Swing et al., 2010) and its subsequent negative effect on academic performance (Rabiner et al., 2016), warn that the possible problem we face is not something trivial. We live in a digital world that commercializes and markets with the user's attention (Williams, 2021).

As a fourth aspect, something that was glimpsed previously stands out. It seems that it is not surprising that a 5-year-old can spend hours in front of a television but can hardly spend a few minutes reading or coloring quietly. Dependence on these devices is indisputable, not only on the part of the little ones but also on the part of young people and adolescents. The simple act of unlocking a mobile phone or tablet secretes high amounts of dopamine into the brain (Morgan et al., 2012), the hormone in charge of the reward circuit, the amount being greater when interacting with the screen in apps such as social networks (Sherman et al., 2016) being able to reach levels of addiction similar to those reached by the consumption of narcotic drugs

because for something to be considered an addiction, it is necessary to have a certain degree of dependence in the performance of that action (M.Á. Fuentes, 2008). This reward circuit, which sedates the user with a high degree of pleasure, is in which children interacting with screens are immersed. For this reason, it is not surprising, as we mentioned previously, that the access and addiction to pornography (a great generator of dopamine) has increased (Ballester-Brage and Orte-Socías, 2019), as well as an increase in pedophile material on the social networks (J.L. Fuentes et al., 2015), a higher level of gambling among young people (FEJAR, 2018), or an increase in harassment among minors due to this exposure to the internet, as expressed by the General Prosecutor's Office in its annual report (General Prosecutor's Office of the State, 2019). Sometimes, such is the point of dependence of many children that for many parents it is a problem to turn off the television or remove the tablet from their child; crying, aggressiveness, and anger reveal what exposure to ICTs means for the brain, a sensation close to withdrawal.

Lastly, it is worth highlighting the different side effects that prolonged exposure to ICTs can have. Let us remember that children of infant age spend around 1 hour and 20 minutes a day viewing digital content (Instituto Tecnológico de Producto Infantil y Ocio, 2019). Let's think for a moment about the need of little ones for outdoor play, the need for movement, sensory experimentation, and socialization. The same report that revealed the hours of digital viewing also indicates that 85% of children between 0 and 12 years old spend fewer hours a day than they should in outdoor play. Dedicating time to the common game involves learning to socialize, developing communication skills, promoting values implicit in the game, and accepting rules and decisions, among many other implications (Isaacs, 2003). Extracting this vital pleasure, as screens do, means in many cases mortgaging part of the time and health of little ones.

Other effects such as being overweight due to a sedentary lifestyle (Bawaked et al., 2019) and the display of food advertisements (most of them unhealthy) (Spitzer, 2012; Zimmerman and Bell, 2010), eye problems due to the blue light screens emit (Morgan et al., 2012), or the negative consequences on a correct night's rest (Vamping) (Chang et al., 2015) are some of the indirect consequences that can lead to difficulties regardless of age but with a higher incidence in children.

Although the negative effects are multiple in daily life, the school does not safeguard itself from such consequences. There are, today more than ever, vast amounts of technological materials for the classroom: apps, projects, videos, digital whiteboards, and so on. Many publishers, pedagogues, and educational centers may advocate these methodologies claiming outstanding results on the learning of different subjects but reality may be different. Although there are studies that defend the use of apps and software for teaching (Cabero-Almenara, 2010), there are other authors who affirm that there is no clear scientific evidence that supports the idea that the more technology, the greater the learning (Desmurget, 2020), it has even been shown that the OECD's own data in PISA do not confirm the technology-performance improvement relationship. According to a study, the students who use

computers the most in school are the ones with the worst scores in the different PISA competencies. Regardless of the country, demographics, or competition, a high or very high use of these devices reports worse scores than those students who make a medium use (a couple of times a month) of technology media at school, becoming an element of enormous value for learning (Gorjón et al., 2020). This trend has been noted by many authors for years (Berninger and Abbott, 2006; Fuchs and Woessmann, 2004; OECD, 2015; Sharif and Sargent, 2006).

Knowing this, it is not surprising that the greatest technology entrepreneurs take their children to schools where technology is almost non-existent (Guimón, 2019). It seems that the best schools are no longer those where more money has been invested in technological resources, but those that have safeguarded the integrity of students by educating them in an analog and real medium. This is not to say that the simple use of ICT has a negative effect on children. As we will see in later lines, a good and correct technological approach can be beneficial; but it can never be affirmed that, simply by putting a tablet in the hands of a child, they will learn more than in a class with a pencil, paper, blackboard, and teacher (Herrán & Fortunato, 2017). Although this deserves a more thorough and diligent analysis.

5. METHODOLOGY

The methodology that has been put into practice to achieve the objectives is hermeneutic. This methodology consists of analyzing from the theory what happens in education by relating the pragmatic with the theoretical (Gil Cantero, 2012). For this reason, in the first instance, an exhaustive search of the bibliography has been carried out, as required in this type of study (Navarro, 2021), on the positive and negative effects of ICT at a pedagogical and psychological level, going to the main databases such as GoogleScholar or Dialnet, selecting journals and reports with high indexing indexes (Scopus, JCR, etc.) published as of 2016; except for some studies before this date with great relevance, still having scientific validity. Furthermore, the keywords as search criteria were: ICT, Early Childhood Education, Positive Effects, Children, Negative Effects, Digitization, Internet, Screens, or Educational Technology.

Subsequently, these studied consequences are confronted with the uses that are given to digital technologies in Early Childhood Education classrooms. These uses will be divided into the main areas of knowledge of this stage for a better understanding and, thus, be able to propose, ultimately, certain criteria that allow good use of technologies in this age of great importance. The uses and apps have been selected after observing the number of downloads of these apps in the main search engines for apps and the elements offered by the main publishers in Spain as part of their didactic methodology.

6. ANALYSIS OF DIFFERENT USES IN DIFFERENT SITUATIONS

We know that new technologies are, as mentioned, an implicit element in our way of life. On many occasions, children use these devices for different uses, be they playful or educational. What we will describe below are the different uses that are given to these devices, using the most widely used apps and computer programs.

6.1. Teaching-learning of literacy

The teaching-learning of literacy is one of the main pivoting axes both in school and in families. From an early age, children are encouraged to read, write, draw letters, and so on. For this, there are many methods, from the classical syllabic method to the most modern ones that use games on digital boards, videos, and interactive stories. These numerous mobile apps and digital whiteboard programs address endless possibilities. You can find apps for finger review of letters, writing of complete sentences with digital pens on the digital board, or reading texts and books (many of them with hyperlinks to increase motivation) on screens.

Assuming the risks generated by the simple fact of presenting a screen to the child, specifically, it is worth asking whether this interaction with ICT substantially favors the learning of reading and writing in young children.

For all learning to be efficient, it is necessary to do mental work, focus attention, working memory, and search for tasks with a cognitive load that allows assimilating what is done (Colom, 2018). The fact that a child copies a sentence in their notebook with a pencil forces their mind to control the stroke, the visual-motor movement of the hand, or to take great care not to break the writing instrument. This mental work that must be done is not even close to the minimum effort that they make when they have, for example, to join two parts of a sentence on the digital board by dragging with a finger (Spitzer, 2012). It has been shown on different occasions that there is a notable difference between writing on a keyboard or writing on paper, obtaining in the second more significant learning of what is written due to the intellectual work that is carried out (Mueller and Oppenheimer, 2014; van der Fels et al., 2015).

That said, something tells us that writing and reading on paper can bring benefits that similar actions on screens do not reach. Despite every attempt to exile the paper book, it never manages to disappear completely. For different reasons, we continue to prefer the writing and reading of a palpable book (Perrin, 2016) to the hyper-texted paragraphs that the digital age provides us (Carr, 2008; Williams, 2021). Possibly, the senses that come into play when holding a paper manuscript are much greater. The experience provided by a physical book, with its defined space and time, is difficult to be overcome by the digital (Luri, 2020b) that will prevail in preschool classrooms.

6.2. Teaching-learning of mathematics with ICT

Mathematics, along with literacy, make up a duet of competencies that are essential in the first years of schooling. As in the previous discipline, this one has not

been safeguarded from technological influences. There are interesting tools such as the programming of movement patterns with robots or the construction of simple technological tools adapted to the age of children, which do not use screens. But, on the other hand, you only need to open a mobile app search engine and enter the children's section to be dazzled by several educational games; a multitude of them of mathematics.

Although there are apps that can be well focused, we must remember that María Montessori already underlined the importance of manipulative and self-correcting materials in school (L´Ecuyer, 2020). There are even apps with the Montessori surname that carry out mathematical activities supposedly using this methodology. For example, exercises of series, order, or puzzles with geometric shapes. Something contradictory, since one of the characteristics of Montessori's materials is manipulation, impossible to achieve on a screen (García, 2017). The importance of manipulation not only resides in the sensory factor, but it also encompasses a world of possibilities and possible solutions that the user can achieve, a characteristic that is difficult to assume on a screen with a single form of resolution or response.

In early childhood, it is essential to teach, not to do mathematics, but to think mathematically, to give tools so that the child can solve different problems of daily life (Dehaene, 2019); For this reason, 3-year-olds are not taught to use a calculator, a premise that should be respected before launching or using any of the educational apps. Although the different software may be in some way adaptive to the requirements of the child, it is difficult to evaluate the mathematical reasoning of an infant when faced with a problem, which is why the limitations that ICT resources in this area include can pose an obstacle to proper learning.

6.3. Teaching-Learning of Social and Experimental Sciences

Possibly, the study of science, both experimental and social, has been one of the fields that have best-taken refuge from bad technological influence. It is observed that, what was distant before, such as history, dangerous experiments, or remote places, is now a click away.

There are a considerable number of resources that can be of great help in carrying out these subjects. Access to information, images, or other tools is a bastion that brings together aspects such as: multiculturalism with the visualization of images and videos from other countries; history, with representative drawings and photographs; geography, with interactive maps; chemistry, with images from outer space or fast-motion videos that allow us to visualize the changes of days, seasons, and so on. Tools such as 3D or virtual reality have made it possible to bring distant realities closer to children. Being able to visit a museum thousands of miles away, talk to other people from other cultures, or see a rocket take off to Mars live, are experiences that are impossible to achieve without technological help.

Despite all the mentioned benefits, this contains a danger: falling into the laziness of technological accessibility as a substitute for manipulative and experiential actions. We have known since Dewey (2004) that it is better to *do* than to *see*, and the idea of experimenting rather than visualizing must be taken care of. The educational experience increases if what is taught is experienced. Technologies can never be a substitute for research or experimentation, only their complement.

6.4. Teaching-learning of art and music education

Art and music education, often undervalued in school, are a great source of knowledge.

Technologies have allowed, as in other disciplines, access to a lot of information in a short time. Pictures, sculptures, artistic constructions, musical creations, sounds of any kind, and songs of all genres can be viewed with just a swipe of the finger. This, which a priori seems like a great contribution, and it is, can be a problem since the excess of information and resources can make you lose the critical sense of art. If we refer to music, for example, anyone can create a composition, upload it to a digital platform, and share it with the world. Not all music is good, not all music has that groove that attracts (Levitin, 2008), and, consequently, not all music educates or not in the same way. Like everything in education, the learning that can be assimilated can be enormously formative but not very educational, since what is learned may not be morally beautiful, which would not respect the criteria of what is properly educational (Esteve, 2012). Awakening emotions, feelings, sensations, are the formative powers of music, only achievable with good choice criteria (López-Quintas, 2013).

In the same way, the apps we find for coloring or playing the piano on a screen may not provide real learning. Let us remember the importance of manipulation and experimentation through the senses. The interesting thing about drawing on paper or playing the piano is the perception of different sensations, the control of one's own body, the choice of different techniques, and the freedom that analog materials give. Freedom in art education is the seed of creation, any artist (or future artist) who does not have freedom of creation, will not be able to develop their talent or self-concept (in the case of art education) (Lowenfeld and Brittain, 1970; Pellicer et al., 2020). The use of ICT tools that do not promote free creation or perception of what is being worked on can pose a serious obstacle to the artistic development of the person.

6.5. Teaching-learning of motor education

Although ICTs have had little impact on psychomotor education, it should be noted that screens have indirectly influenced the correct psychomotor development of children (Madigan et al., 2019). A multitude of platforms have been created to share motor resources and different materials for the classroom but, as we saw previously, the hours dedicated to free movement have dropped dramatically in children (Instituto Tecnológico de Producto Infantil y Ocio, 2019).

Correct psychomotor development is based on the normal movement of the child through playing, exercising skills such as jumping, crawling, running, or throwing (Aguirre, 2005). With less dedication to outdoor play and the exercise of gross motor skills due to the hours spent consuming technological content, good motor progression could be compromised.

Although some studies defend the use of video games for fine motor practice, decision-making, speed of movements, or improved attention (Qiu et al., 2018; Revuelta-Domínguez and Guerra-Antequera, 2012), the reality is that they can bring more evils than benefits, accentuating the problems of aggressiveness (Bender et al., 2018; Grossmann, 2015; Tejeiro-Salguero et al., 2009) among other already mentioned effects. The importance of play and movement in everyday life must prevail over the promises of the screens.

7. CONCLUSIONS AND GOOD PRACTICES

It was Aristotle who in the 4th century B.C. described the three virtues of understanding: wisdom, knowledge, and prudence (Aristotle, 2001). The latter, also called practical intelligence or *phrónesis*, is possibly the key that opens the door to the compression of previous lines. Although it may seem like a negative and pessimistic view of technological reality, the truth is that everything, in its proper measure and with a good approach, can be of great help: being prudent when choosing a method with or without technology. Technology in itself is not bad, it is a contemporary element that we cannot turn our back on but it is worth wondering if it is being used correctly or simply makes our lives easier by having to pay a high price for it.

Educational innovation, which is talked about so much, does not have to go through the introduction of screens in the classroom (Herrán and Fortunato, 2017). ICTs do not assure anything; they are not the ideal solution to all the educational problems of our time. A master class, although scarcely innovative, can teach much more than a game on a screen; although it seems that, nowadays, to say this is to fall into old-fashioned pedagogies.

To maintain that prudential virtue, nothing but knowledge is required. It is not necessary to be technophobic to use ICT well, just good training and information would suffice. First, training teachers to know how to discern if screens can contribute more than take away; look at the fine print. Second, guidance to parents on the risks of exposing their children to lightboxes. If the risks involved in the technologies were popularly known, other types of decisions would possibly be made.

Regarding Early Childhood Education, we have seen how, at such a crucial stage for the proper development of children, technologies often play a too important role in the child's life, posing a danger to health and learning. Getting away from the glass, knowing and being dazzled by the offline world that surrounds us can be a better investment for student learning. It is not only necessary to question whether it

is good to use technology in the classroom but whether these technologies educate. A math app that can correctly teach whole numbers doesn't have to be educational. If the simple fact of being exposed to the screen generates addiction, if this leads to the visualization of content not suitable for children, if, after all, it does not make the person who interacts with it better, we can say that they can teach, but do they educate?

These reflections before the use of ICT in children can be a crucial first step to bring that practical intelligence or *phrónesis* into play. Not everything stimulating, attractive, easy, and motivating has to be educational. Hence the task of Infant teachers and parents is to know and make a deep reflection on the use of ICT in the daily life of children.

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