

DOI 10.51558/2490-3647.2023.8.1.567

UDK 371.13:004.738.5  
004.738.5:159.9

Primljeno: 12. 3. 2023.

Pregledni rad  
Review paper

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## **LESSONS FROM CYBERPSYCHOLOGY THAT EDUCATORS SHOULD BE REMINDED OF**

In recent years, cyberspace has emerged as a prominent realm for young people, perceived by them as at least as important as real life. Cyberspace has become a field for the satisfaction of many psychological needs and has brought to life novel factors that influence development among children and youth. As a consequence, the educational sphere has been dramatically affected by the changes in the psychological functions, behaviors, and habits of students, who are becoming increasingly different from what educators were trained for only a few decades ago. Causal connections are yet to be examined experimentally, and longitudinal research takes more time. In the meantime, based on theoretical assumptions in psychology and educational sciences, some of the changes that affect the motivation and behavior of students in the classroom can be assumed. With this being said, the following article, using the perspective of self-determination theory, is aimed at understanding changes in students' motivation, engagement, and behavior caused by cyber-psychological factors. How are the attention and habits of new generations different? How does this affect their involvement and motivation to learn in the classroom? How do students' emotional experiences that potentially permeate classrooms reflect their increased immersion in the digital world? What are the most important lessons from cyberpsychology that educational professionals need to be aware of to maximize the benefits of their teaching to students? This article attempts to provide some answers and recommendations regarding these vital issues.

**Keywords:** cyberpsychology; motivation; intrinsic; extrinsic; youth, education

## 1. INTRODUCTION

Digital technology has a tremendous effect on the everyday lives of people today, including the way in which they work, spend their free time, interact, educate, and so on. Over the years, an increasingly high proportion of common activities has shifted into the virtual world, which has consequently influenced mind and behavior. In order to keep up with the need to understand these effects, a new yet vital field of applied psychology emerged; namely, cyberpsychology, which focuses on the psychological phenomena that emerge as a result of human interaction with digital technology. Defined as the discipline of understanding the psychological processes related to, and underlying, all aspects and features of technologically interconnected human behavior (Atrill-Smith et al. 2019), cyberpsychology explores how these emerging phenomena influence not only individuals but also groups and society as a whole, both online and offline. The most commonly studied technology in the field of cyberpsychology remains the Internet, but it also explores smartphones, game consoles, virtual reality, and artificial intelligence.

The effects that the Internet and technology in general are having on human mind and behavior became especially evident during the COVID-19 crisis. People have “extended themselves” even more into the virtual world. In the field of education, anecdotal evidence indicates that both students and teachers had to make an effort to readapt to face-to-face interaction, which some looked forward to but others dreaded.

The change in the daily habits of people, which in turn has brought on changes in mind and behavior across generations, has reflected on the educational process as well. Teachers and educational professionals have changed along the way. However, depending on their age and the time at which they were trained, educators might feel “out of touch” with the overall psychological makeup of their students, most of which have been growing up “wired on technology”. Educators experience this in the poor results that their methods produce in the classroom, especially in terms of students’ motivation to learn. Subjectively, teachers notice the need to keep up with the pace that the Internet and overall technology development have set them up for. In this regard, they recognize that it is important not only to become a part of the students’ world, and adapt the methods used, but also to understand how different today’s students, so called “digital natives” (Levine & Dean 2012), are compared to their fore-runners. Although empirical evidence of cyber-induced changes is yet to be firmly established through longitudinal studies, it has been argued that digital technology has a profound impact on young people’s personalities, including their attitudes and

approach to learning (Keengwe 2007). While excessive use of technology has been linked to poorer outcomes in adolescents, including behavioral, attentional, physical, and psychological problems (Rosen et al. 2014), so far, the main focus has been on similar negative effects, unbalanced with potential positive outcomes (Gottschalk 2019).

With that being said, the aim of this article is to tackle some of the many theoretical assumptions from intersections of cyberpsychology, educational psychology, and educational sciences, with a special focus on how motivation for learning is affected in the classroom. In order to explain these effects, the framework of Ryan and Deci's self-determination theory (2000a) will be employed as a lens by which to view the assumed influence of technology on students' actual learning behavior and motivation. In the section that follows, we will briefly present the basic tenets of self-determination theory, which include key concepts relating to learning motivation. Later on, cyber-psychological factors bearing effects on student engagement will be introduced in the form of the most important lessons for educators, followed by recommendations regarding each.

## 2. SELF-DETERMINATION THEORY

Self-determination theory, proposed by Ryan and Deci (2000b), suggests explanations of human motivation in general, based on psychological needs and innate tendencies for growth. In this sense, human behavior can be understood as, more or less, self-determined. People can perform an activity as a result of a more or less internalized motive. The theory therefore offers a taxonomy of motives depending on the level of *internalization*. In other words, the active transformation of a motive that was initially extrinsic, into a personal value (Ryan 1995). Besides distinguishing intrinsic motives from extrinsic ones, the theory also proposes three universal intrinsic needs involved in self-determination: the need for autonomy, competence, and relatedness. The extent to which the environment fails to meet any one of these needs, can compromise self-determined motivation. According to self-determination theory, parental or teacher autonomy-supportive communication is one of the key factors in fostering intrinsic motivation (Ryan & Deci 2000). This theory is especially relevant in educational contexts, since it can be used to understand and affect the level of autonomy in students' motivation to learn.

In this regard, motivation extends on the continuum from *amotivation* (reduced intent to act), to *extrinsic motivation* (avoidance of punishments and drive for external

rewards), to *introjected regulation* (stemming from the pressure within), to *identified regulation* (recognizing the value of gaining knowledge or developing a skill, contributing to the community and society in general), and lastly, to *intrinsic motivation* (motivated purely by inherent benefits) (Deci et al. 1991; Ryan & Deci 2000a).

Notwithstanding other theories aimed at understanding academic motivation, this article will use the three prevalent terms commonplace in contemporary educational psychology: amotivation, intrinsic motivation, and extrinsic motivation. In this framework, intrinsic motivation refers to learning solely for its enjoyability, level of interest, or relevance to meeting one's core psychological needs (Ryan & Deci 2000a). This type of motivation is triggered by challenge, curiosity, control, and fantasy, without any external compulsion. On the contrary, extrinsic motivation is based on reward, compulsion, or pressure (Ryan & Deci 2000a). It is argued that intrinsic motivation is more persistent and can sustain the learning process longer than that of extrinsic motivation (Pintrich & Garcia 1991). Intrinsically motivated students engage in a deeper level of learning, regardless of their age (Turner et al. 1998; Wolters & Pintrich 1998). However, in the absence of engagement and interest, it can be beneficial to cultivate motivation extrinsically through rewards. As the learning process settles in, intrinsic motivation may take over, creating stronger engagement in subsequent learning. All types of motivation are important in different contexts, and all have their unique features and contributions to student engagement in learning.

### **3. (A)MOTIVATION IN TODAY'S CLASSROOMS**

Motivation is an internal process that activates, guides, and maintains individuals' behavior over time, and it can vary in both intensity and direction (Slavin 2019). Not only has motivation always been a valuable topic within the research of psychology in general, but it has also been a practical issue, especially in classrooms. Teachers have always struggled to find ways to get students motivated. However, there are some indicators that students are less motivated to accomplish academic tasks in recent years (Schwan, 2021) and are becoming increasingly more apathetic (Goodman 2010). Why is this? Is there any input from cyberpsychology that could help answer this question? Let us first explore in brief, the issues of motivation and amotivation on their own.

The term "amotivation" describes a student who lacks any desire to engage in academic activities. This may include a lack of motivation to complete homework, to study for exams, or to participate in class discussions. Amotivation is considered a

serious problem in many students around the world. It can have a negative impact on academic performance (Steinmayr et al. 2019; Huang 2011). Furthermore, lack of motivation is related to career indecision (Ferguson 2007), and it can even be a risk factor for stress and depression (Huang et al. 2016).

Although the topic of motivation is one of the most extensively studied in psychology, high-quality research on amotivation is lacking. The existing research is fundamentally focused on the link between amotivation and academic achievement (Steinmayr et al. 2019; Möller et al. 2009). However, motivation remains a central focus within educational psychology, since it is widely accepted that motivation can in fact be targeted through interventions. While there may be a plethora of reasons for the decline in student motivation to learn, this paper will focus specifically on those hypothetically relating to the impact of digital technology.

The next section will begin by highlighting the most prominent effects of digital technology thought to impact student motivation and engagement, followed by recommendations for addressing these effects. Needless to say, these effects are not independent of each other.

#### **4. LESSON NUMBER ONE: DIGITAL NATIVES' ATTENTION MIGHT BE DIFFERENT**

Attention as a basic cognitive process is a precondition for memory and learning. Being able to direct attention voluntarily, to keep it intensive and focused (concentration) is essential in the classroom. With regards to this, certain changes in the attention of “digital natives” seem to be related to digital technologies and to the fact that portable devices allow individuals to occupy themselves with digital applications anytime and anywhere, leading to a sharp increase in overall technology usage times (OECD 2018). In this sense, many teachers nowadays describe their students as “easily distracted,” while others believe that this label only reflects the changes in information processing that “we” (non-digital natives) have not yet caught up with. Due to methodological challenges, studies explicitly tackling the longitudinal effects of technology on attention are, at this point, nonexistent. There are rare studies that compare cohorts, such as the study of Dempsey et al. (2000), which used a measure of early mobile phone ownership and two measures of children’s psychosocial development (including attention measures), who were between 9 and 13 years of age. The study found no generalized associations between these. One somewhat outdated meta-analysis, which included 45 studies up to September 2013, investigated the relation-

ship between media use and ADHD-related behaviors in childhood and adolescence, finding a moderate positive correlation between attention problems and media use (Nikkelen et al. 2014).

#### ***4.1. Multitasking and sustained attention***

With all this being said, it could be argued that digital multitasking has become a comparative “advantage” of the younger generations, almost half of which (45%) were, according to Anderson and Jiang (2018), constantly online. Multitasking refers to *rapid* task switching, and not, contrary to intuition, the simultaneous processing or execution of two or more tasks. However, task switching may place increasing demands on neurocognitive networks responsible for controlling and sustaining attention (Alzahabi & Becker 2013; Waskom et al. 2014). When individuals switch from one task to another, the benefits of automaticity and efficiency relating to the former task are lost, and additional effort is required to undertake the new task (Waskom et al. 2014). The process known as inhibition helps the mind switch from one task to another by directly limiting the secondary task’s exposure. As the brain switches back and forth, a “bottleneck” occurs, resulting in a loss of efficiency (Marois et al. 2005). In other words, digital natives multitask with decreased efficiency, not necessarily with less accuracy. However, literature also presents an alternative viewpoint, stating that multitasking has benefits for younger generations in the context of future work designs and learning environments optimized for multitasking (Courage et al. 2015; for a review, see Kirschner & De Bruyckere 2017). In addition, as Vedeckina and Borgonovi (2021) note in their literature review, long-term implications and higher-order benefits derived from multitasking with digital technology may be quite different from the immediate effects reported in short-term studies that are currently available.

Nevertheless, it seems that the tendency to multitask may have been taking its toll on the teaching process for some time now. And not simply because students are being distracted by their phones during class. Some believe that frequent multitasking interferes with the development of attention networks and executive functions, therefore causing difficulties in attention and a susceptibility for frequent task switching over sustained attention (Fox et al. 2009). In other words, leading to increased distractibility and impaired executive control abilities (Moisala et al. 2016; Ophir et al. 2009). And sustained attention, i.e., the mobilization of concentrated effort for some time, is a necessary precondition for learning in the classroom. With regards to this, some argue that the technology used in classrooms as a learning tool benefits today’s

students. But in spite of that, no matter how engaging the classroom technology gets, it cannot be expected to compensate for the sustained attention that students increasingly seem to lack. The habit of simultaneous browsing and exploring activities extends to the classroom environment, making it difficult to achieve full and sustained attention. Unsurprisingly, Burak (2012) found a correlation between multitasking in the classroom and lower GPA scores. Needless to say, sustained attention is an important aspect of learning, as it allows individuals to absorb and process new information effectively. Students should therefore be able to maintain sustained attention and ignore a variety of distractions, thus inhibiting attention shifts to irrelevant stimuli, in order to fully engage with the material and stay motivated to learn, both intrinsically and extrinsically. This is because, regardless of the type of motivation the teacher is aiming for, it will be futile if no information passes the attention threshold.

More precisely, a lack of sustained attention can negatively impact both intrinsic and extrinsic motivation for learning in the classroom. If a student is struggling to maintain sustained attention, it may be more difficult for them to fully engage with the material and experience the sense of accomplishment and personal satisfaction that comes with intrinsic motivation. *Vice versa*, students who are intrinsically motivated are often more engaged and interested in learning, and they are more likely to maintain sustained attention. Regarding extrinsic motivation, if a student is struggling to maintain sustained attention, they may also struggle to meet the task requirements, which could lead to a lack of this type of motivation. For instance, if a student is not paying attention in class, they may be unable to complete assignments or participate in discussions, which could affect their grades and, in turn, lead to a lack of extrinsic motivation to continue engaging with the material.

#### ***4.2. Attentional scope***

Attentional scope is another important aspect of attention relevant for classroom engagement and learning and is influenced by habitual and intensive Internet browsing. It has been experimentally established that when surfing the Internet, attentional scope is reduced, and this effect may persist throughout the day (Peng et al. 2018). The presentation, vastness, and speed of information available online is such that it increases browsing behaviors (Loh & Kanai 2016), and, according to some authors, hinders deep processing and integrative thinking (Carr 2011). This is because, unlike abstract, concrete information reduces the scope of cognition (Trope & Liberman 2010), and this is a predominant type of information on the Internet. Furthermore,

the presentation of information is different on the Internet than in books or magazines. Since the content of books and magazines are fixed and limited, people are used to thinking about the information as opposed to immediately searching for new material. In contrast, with the prevalence of hyperlinked information, the Internet often encourages people to look through information quickly and then search for more, rather than thinking thoroughly about the original information (Nicholas et al. 2009). This processing of Internet information is a low-level process due to the lack of synthesis (Peng et al. 2018).

Related to this issue is creativity itself. It is known that creativity is enhanced by a broad attentional scope. Because creative tasks require exploration of problem space (Arreola & Reiter-Palmon 2016), a broader attentional scope is beneficial for creativity, since it requires utilization of peripheral stimuli and global information processing. Therefore, expanding the pool of elements to be combined in a new and original way facilitates creativity. For example, brainstorming in the classroom activates a different mindset (which manifests in the attentional breadth) than engaging in, for instance, planning an agenda, because planning does not require as broad a search for solutions as brainstorming (Wronska et al. 2018). To conclude, we have reason to believe that the attentional scope of students might be diminishing, along with deep information processing. However, more research is needed in this field.

Apart from anecdotal inputs from educational professionals attesting to a reduction in the attentional scope of today's students, empirically valid research confirming this on a global scale is still rare (Bradbury 2016). Some studies do indicate that people prefer even shorter pieces of information. When it comes to educational videos for example, one large-scale study showed that videos should be segmented into short chunks, ideally less than 6 minutes (Guo et al. 2014), and were found to be more engaging for students. These indicators make us rethink the traditional class duration time, as well as the duration of the main instructional period during class. Even if potential attention changes in today's students are put aside, it is clear that they prefer faster paced and more interactive learning. This is another reason why contemporary literature has progressively raised basic questions like this one in light of emerging changes in learners (review in Bradbury 2016).

#### ***4.3. Recommendations apropos attention***

Considering the aforementioned changes in attention, it is an ever-increasing challenge to keep students motivated throughout the whole lecture. Based on these find-

ings, what follows includes some of the recommendations for educational professionals.

Firstly, teachers ought to be made constantly aware of any attention-related issues in their students and thus put additional effort into achieving and maintaining sustained attention, as well as widening their attentional scope. Obviously, this cannot be achieved only by using traditional and widely known methods, but with an up-to-date approach that includes understanding digital natives' perspective and adapting accordingly. Needless to say, pathologizing attentional issues is not helpful and only adds to the ever-increasing gap between educators and learners.

Secondly, breaking up information into chunks with intermittent periods of lesser engagement, combined with dynamic group work, is a promising way to reduce attentional difficulties. The idea is to break in-depth lessons into smaller pieces, usually ranging from between 5-15 minutes (see Hug 2012, for a review), thus creating hyper-focused peaks of learning ("microlearning", referring to short-term learning activities with microcontent). In this regard, using micro-assessments that tackle knowledge and understanding may be a convenient and attention-tailored method of keeping students' attention, yet not as intensively as during the peaks of learning. Moreover, this enhances retention and recollection of information.

Thirdly, we have reason to believe that creative tasks have a twofold outcome. On the one hand, they can potentially broaden attention scope (Wronska 2018), while on the other hand, they can increase intrinsic motivation by stimulating personal engagement and curiosity about the topic at hand. In that sense, all activities that create opportunities for divergent thinking and freedom of expression in the classroom, and allow different assignment formats, are recommended.

Fourthly, the effects of competition and cooperation in the real classroom setting cannot be overestimated. Depending on the level of autonomy in learners, various dynamic tasks could help successfully tackle attention challenges. Using gamification strategies is also advised as an attempt to engage students. Besides games per se, particular gaming elements can be added to non-gaming activities. Studies reveal that the social aspects of games are the most important factors for many gamers who create strong friendships and emotional relationships (Patrick et al. 2013). As the effect is so powerful for online gamers, we can assume that it is even larger when games are played in a shared physical space and require a degree of cooperation and group decision-making. Education games are usually designed to promote collaboration in teams, thus fostering social-emotional bonds among students and supporting their relatedness need, therefore enhancing individuals' psychological growth. Additionally,

game playing is a valuable activity from both an extrinsic and intrinsic motivational perspective. It is enjoyable due to its entertaining design and its inclusion of challenge and fantasy, which ultimately stimulates interest and curiosity about the content, i.e., intrinsic motivation. On the other side, if rewards, competition, collaboration, group pressure, etc. are present, students' extrinsic motivation is sparked. The types of engagement implemented depend on the specific learning goal, learner characteristics, and setting (for a review, see Plass et al. 2015).

## **5. LESSON NUMBER TWO: THE “WHY LEARN WHEN WE CAN FIND IT ONLINE?” PHENOMENON**

The traditional role of the teacher as an almost exclusive “owner” of information and knowledge has changed. Students live under the impression that knowledge is readily accessible elsewhere. And most of the time, they are right. With respect to this, they may be reluctant to acknowledge the classroom as a gateway to knowledge and a teacher as “the gatekeeper”. This attitude can erode their already limited attention to the content. The lack of motivation to engage in learning stems partially from the so-called “Google effect”, i.e., the tendency to forget information that can easily be found online (Sparrow et al. 2011). It has been empirically established that simply realizing that information can be easily acquired online makes people less likely to pay attention to it and remember it (Sparrow et al. 2011).

However understandable the phenomenon of relying on Google and technological devices in general may be, the *ability* to think and reason in complex ways, to integrate multitudes of information and opinions, and to deduce conclusions, cannot be googled, yet. It remains crucially important to experience live interaction with an expert who can provide not only information but also inspire and demonstrate a critical lens through which to address, reflect upon, and criticize that information and therefore model this approach in their students. This cannot be googled either. Unfortunately, the Google effect seems to multiply itself in a way that creates an illusion of knowledge and understanding of the world. Considering that the illusion of knowledge is more dangerous than the lack of it, teachers still remain the necessary link to its higher levels, as well as models for not only intellectual but also personal and moral values. Students should be aware that knowing where to find information does not equate to understanding its implications, its context, or being able to evaluate it. The task of increasing their awareness of reasons for learning is still mostly at the hands of teachers, as a way of introducing identified regulation.

For that matter, according to the World Economic Forum's Future of Jobs report, critical thinking and complex problem-solving are the highest-ranking job skills of the future (WEF 2016). However, similar to the illusion of knowledge, digital natives now have the illusion of easy skill attainment, or even the redundancy of some skills altogether. The abundance of applications available for all sorts of daily and routine activities nips the development of problem-solving skills in the bud, at least those related to practical and "real" life. Consequently, identified regulation as an autonomous type of motivation to learn (Ryan & Deci 2000a), i.e., recognizing the value of gaining knowledge or developing a skill, is less likely to arise. For example, peoples' awareness of location maps does not motivate them to actually employ their spatial perception and orientation skills or develop them in the first place. For example, a study by Brügger et al. (2019) shows that reliance on navigation systems may have negative effects on spatial cognition and navigation skills. In their study, participants who used a navigation system to navigate through a virtual setting did worse on a spatial memory task compared to participants who only had a paper map. The authors concluded that these results are due to a "cognitive offloading" effect, that manifests through less cognitive effort and engagement. Similarly, attempts to motivate students to learn for practical reasons (handling everyday challenges, calculating in their heads, etc.) seem to be less and less persuasive with the availability of computer devices. To illustrate this, in a representative survey of 425 US respondents, around 49.4% had 2-5 phone numbers memorized, and around 1 in 5 of them had googled "what's my own phone number" in the past (Long 2022). This highlights just how quickly humans adapt to the lack of everyday challenges. Truth be told, had there been a need for memorization, these indicators would be different. However, it is plausible that with time, many of the methods and skills involved in these rudimentary processes (like memorization) would have atrophied as a result of not being engaged with.

### ***5.1. Recommendations apropos amotivation to learn***

Regarding the aforementioned motivational consequences of digital use, teachers could represent the link to the real world and its problems, along with using knowledge to address them, but only once they fully grasp the position of their learners. Therefore, total abstinence from the digital world is not advisable and would not benefit the educational process as such. At the same time, however, modelling "unplugged" activities from time to time, designed to connect students with their social environment, could be beneficial as an attempt to restore balance in students' lives,

especially if conducted in natural settings. Not only would these activities have social-emotional benefits and keep social skills relevant, if regularly scheduled and integrated in the curriculum, but they would also serve as a prompt reminder about the necessity of attaining/ refreshing skills and knowledge that should be inherent to each and every individual. In this way, more autonomous forms of motivation to engage and learn in the classroom would be stimulated by these activities, particularly addressing overall reliance on devices. Such “digital detox”, especially in nature, would spark not only intrinsic motivation but also introjected regulation and identified regulation. Students’ self-awareness and introspective insights about the effects of digital technology on their cognitive processes would be another significant aspect of these unplugged activities, leading to a more autonomous and mindful use of devices. This awareness might serve as a starting point of self-directed learning, leading to the development of various strategies that come close to what Ryan and Deci call internalization, i.e., active transformation of an initially extrinsic motive into a personal value (Ryan 1995). Moreover, developing knowledge and skills as an individual is inherent to the need for autonomy and competence. Therefore, activities designed as a part of digital detox may be beneficial in this regard as well, leading to self-determined motivation in the long run. The idea is to create tasks that a student can feel competent doing, gradually progressing to more demanding ones. If it is done in a context of connectedness with others and (some) autonomy, an authentic interest in learning is kindled.

## **6. LESSON NUMBER THREE: THERE MIGHT BE SOME NOVEL EMOTIONAL EXPERIENCES TO CONSIDER**

There are some emotional factors and reactions plausibly stemming from wide-reaching cybereffects in the lives of learners, that might have an impact on their engagement. Along with negative mood, anxiety, and frustration, which will be discussed later, an especially relevant for learning is boredom. Considering boredom as “an emotion that occurs when an individual experiences both the (objective) neurological state of low arousal and the (subjective) psychological state of dissatisfaction, frustration, or disinterest in response to the low arousal” (Vogel-Walcutt et al. 2012: 102), we can begin to grasp how vulnerable to its effects today’s students might be becoming. While this particular academic emotion has always been an issue in the classroom, it seems that nowadays there is an additional challenge to address. High arousal that is present elsewhere in their lives, in smartphones, on screens, and gadgets, is

difficult to mimic in the classroom, thus making boredom a continuous challenge for educators. In that regard, cultivating intrinsic motivation to learn might be beneficial as a way to yield more persistence, presumably also in the context of superficially less exciting content.

Also, negative emotions that can arise from habitual use of social media can permeate the educational context as well and affect learning and engagement. A particular type of social anxiety known as “fear of missing out” has been recognized recently as a consequence of social media use (Blackwell et al. 2017; Przybylski et al. 2013), and includes concerns about being left out of rewarding experiences. Clearly, classroom activities and engagement with school-related tasks in general take away time that could otherwise be used to check precious social media pages, and thus cause the feeling of missing out on something valuable. This is a potential cause of frustration, especially in the context of problematic smartphone use. Educators should be aware that even mere physical separation from a device can trigger feelings of anxiety, as some experimental studies have noted (Cheever et al. 2014). Such an emotional load can have an effect on their overall readiness to take part in class activities and engage fully.

Another important aspect of student emotional life has been widely discussed in recent literature, and it relates to social media affecting self-related feelings (Woods & Scott 2016). Considering the growing importance of social networking sites, their impact on emotional experiences, especially in youth, is deemed very significant as they have become contexts for development (Wood et al. 2016). While there are positive consequences that include social contact, independence, and communication (Ito et al. 2008), a potentially problematic aspect of social networking sites refers to the fact that they now represent a platform for youth self-development, making them more dependent on others’ feedback (especially regarding body image) and thus more vulnerable. Not only do constant comparisons with peers and celebrities bring an additional burden to their developing sense of self, but they are also becoming more exposed to cyberbullying. This practically means that various forms of harassment can now be pervasive and exponentially increased, causing depressive symptoms, substance use, and even suicide attempts (Bottino et al. 2015). In that regard, a study has shown that adolescents who used social media more and those who were more emotionally invested in social media experienced lower self-esteem and higher levels of anxiety and depression (Woods & Scott 2016).

Furthermore, there are particular phenomena of the digital age that need to be empirically explored as factors in student real-life behavior in the classroom. One of

these is “online disinhibition”, which refers to more self-disclosure and acting out more frequently or intensely in an online environment than one would in a real-life setting (Suler 2004). Considering the amount of time spent online, it is reasonable to contemplate how online disinhibition spills over into real-life settings, and affects student behavior. Theoretically, loosening up one’s boundaries in the online world due to specific facets of the virtual environment could potentially permeate a real-life setting, plausibly leading to more openness, but also more impulsivity and less care for social constraints, which is especially relevant in an educational context. Another important aspect of online disinhibition is minimization of authority because, on the Internet, everyone is equal (Suler 2004). This could particularly affect the student-teacher relationship, and plausibly have an impact on different types of motivation, especially extrinsic motivation and identified regulation. However, at this point, we are in need of empirical studies specifically tackling the spill-over effects of online disinhibition in an educational context.

### ***6.1. Recommendations apropos emotional experiences***

Since preconditions to learning and engagement in the classroom are a supportive and respectful classroom environment on one side and learners who feel good about themselves and are secure and accepted on the other, educators should not neglect various novel emotional experiences augmented in the digital age in an attempt to incite students’ motivation. Therefore, recognizing and tackling negative emotional states and contextualizing them in the digitalized lives of learners is the first necessary step. Negative experiences of boredom and fear of missing out, for example, should be validated as such and approached as a “technical issue” caused by a lower arousal level, and therefore understandable, while at the same time, attention-grabbing methods described previously are implemented. In that sense, any efforts invested in cultivating intrinsic motivation will help overcome this negative emotion grounded in less exciting stimuli.

In relation to anxiety and negative emotions toward self, students should be made aware of the impact that the online world is having on their emotional lives. Furthermore, they should be systematically empowered to be proactive in modifying this impact, thus not feeling trapped as an object in the virtual world. Introspection and understanding of their own emotional reactions and, at the same time, critical approach to social media are crucial in reducing students’ vulnerability, which can have detrimental effects on every aspect of their lives, including their education. In that

sense, any program that provides students with resources to boost their mental-health, prevent mental-health issues, and/or intervene in early stages of such issues should be prioritized by educational institutions.

Similarly, regarding cyberbullying, educators should directly address this issue, or any negative interaction among students, as well as provide guidance on how to act. Any empathy-inducing activity will contribute to creating a more understanding and more positive learning environment, which will in turn produce a more fruitful learning experience. Again, the level of student engagement will reflect how well the learning environment satisfies this universal need for relatedness involved in their self-determination.

## **7. LESSON NUMBER FOUR: DIGITAL NATIVES ARE PROBABLY NOT SLEEPING TOO WELL**

Satisfaction of biological needs has a detrimental effect on daily activities. When considering the restoring function of sleep, its effects on motivation and learning in the classroom are of enormous significance. In this sense, lack of sleep should be considered an issue of concern. Around 60% of middle schoolers and 70% of high schoolers in the US get an inadequate amount of sleep on school nights (CDC 2020). Similarly, in a recent comprehensive European study that included 13- to 16-year-old participants, poor sleep quality was found in 44% of the boys and 53% of the girls, whereas 68% and 69% did not get the recommended 8–10 hours of sleep (Galan-Lopez et al. 2021).

One of the factors contributing to this problem is the use of electronic devices late into the evening. In one systematic review of studies involving school-aged children and adolescents, sleep time was found to be adversely associated with screen use in 90% of studies (Hale & Guan 2015). Using self-luminous devices at bedtime became a widespread habit among digital natives, causing suppression of melatonin production. Moreover, adolescents might be more sensitive to light than adults, and more time spent using a device has been linked with a larger reduction in the melatonin response (Figueiro & Overington 2016). Additionally, electronic devices are stimulating, and incoming notifications may disrupt sleep. The largest reduction in weekday sleep duration was found in those who frequently used social media. This was related to almost an hour less of sleep (Arora et al. 2014). An explanation for the established lack of sleep combines delayed melatonin release due to light with mental excitation (Arora et al. 2014). A study by Graham et al. (2021) explored whether sleep quality

can account for the link between social media use and wellbeing and demonstrated that taking a break from social media led to a small improvement in wellbeing. This improvement, at least in part, is thought to be associated with changes in sleep quality.

Studies have shown that electronic media use was negatively correlated with sleep duration and positively with sleep difficulties, which in turn were related to depressive symptoms (Adams & Kisler 2013; Lemola et al. 2015). Short sleep duration during the school week is related to poor attention and high depression (Lehto & Uusitalo-Malmivaara 2014). Hence, there is a consensus that students who have trouble setting boundaries when it comes to technology may be at risk of developing psychological health concerns.

While there is widespread agreement that insufficient sleep causes a general slowing of response speed and increased variability in performance (alertness, attention, and vigilance), there is much less consensus about its effects on higher-level cognitive abilities (Kilgore 2010). However, a negative association between early morning courses and student learning has been established in numerous studies (Wolfson & Carskadon 2003; Achen et al. 2009). Similarly, students in early morning periods have been found to earn lower grades than those in periods of the same course offered later in the day (Diette & Raghav 2017). Grades were especially low for 8 a.m. and 9 a.m. classes. With regards to this, an experimental study in the US revealed that a delayed start to morning classes contributed to students' sleep quantity and improved attention during the school day (Owens et al. 2019). Unfortunately, educational policies are unlikely to change the traditional early morning starting times on a global scale, for numerous reasons. Educators should therefore be aware of early sleep offset as a factor that continuously interferes with the motivation and engagement of students and that it can have a detrimental effect on their motivation.

### ***7.1. Recommendations apropos sleep-related issues***

It has become a part of digital natives' lifestyle to use devices late at night, which results in a drowsy and lethargic start to their school day. However difficult this habit is to break, since it is sustained through a dopamine-driven feedback loop, educators should be committed to promoting healthy sleep habits in their students. Implementing limits of technology, on the other hand, is the family's responsibility.

Although solutions for this problem are not straightforward and depend on numerous factors, it is clear that lesson plans should take this into serious consideration

and have slower-paced activities scheduled earlier in the day, while those requiring high levels of attention should be scheduled later. This would enable students not to miss out on opportunities to fully engage in the content and would help develop appropriate motivation. This would also reduce the stress of having to catch up with the content during times allocated for leisure and sleep at home. In this sense, activities that take place in pairs and groups, leaving ample time for students to self-pace their work, will relieve the pressure and potential discrepancy between students' wishes to engage and their biological inability to do so fully. In this way, students' motivation for engagement could be preserved on the basis of fewer demands being required during "preliminary" classes. In contrast, failure to perform tasks successfully due to drowsiness may backfire exponentially and lead to decreased interest and motivation to learn altogether, especially in students sensitive to approval and rewards (extrinsically motivated).

In addition, students might benefit from short educational and training interventions regarding device use at night and sleep hygiene in general. With this being said, it is advised to develop a bedtime routine and consistency, while refraining from electronic devices before going to sleep. Encompassing content like this one, studies have recommended school-based sleep interventions as an effective measure for promoting and maintaining healthy sleep knowledge and practice (Lechasseur et al. 2003; de Sousa et al. 2007). For example, a study by Moseley and Gradisar (2009) demonstrated an increase in sleep knowledge and a subsequent change in sleep behavior for adolescents with delayed sleep timing. The authors advise that it is more important to motivate adolescents to make simple behavioral changes as opposed to learning more complex techniques (i.e., cognitive strategies).

## **8. CONCLUSION**

The effects of digital technology on students are palpable in today's classrooms and call for awareness and a proactive approach from educators. The infiltration of omnipresent devices into every aspect of students' lives has made this a vital issue. Although longitudinal research is still lacking, cyber factors are evidently becoming progressively more important in today's classrooms. While most of these factors are yet to be explored empirically, it is plausible that their effect is yielded through deficits in attention, motivation, emotional experiences, and overall alertness in students. This review article addressed these particular fields of influence, not disregarding that there are more. Educators are advised to acknowledge cyber factors that continuously

affect learners and to work to promote self-determined learning. Regarding difficulties in sustained attention and students' tendency for superficial information processing, educators are advised to employ various strategies, like microlearning, gamification, as well as creative, competitive, and cooperative activities, etc. Relating to the motivational aspect of learning, it is concluded that both intrinsic and extrinsic motivation are being affected by the omnipresence of devices and availability of information. Consequently, it is important to keep students informed about reasons for learning and skill attainment. This can be achieved by modelling unplugged activities and (re)connecting students with their social environment. Awareness about the effects of an occasional "digital detox" promotes increasingly autonomous and critical usage of devices, therefore leading students toward self-directed learning. Educators should also be aware of students' emotional reactions that stem from digitalization, that can hinder their motivation to learn and engage. This article focused on boredom, anxiety, negative mood, and negative self-appraisals that can be traced to increased social media usage. Finally, regarding habitual and extensive use of self-luminous devices prior to sleep, educators are encouraged to promote simple behavioral changes as part of school-based sleep intervention programs, in order to address engagement capabilities in early morning classes. With that being said, educators will undoubtedly have to remain vigilant to cyber effects on their students in the years to come, understand digital natives' perspective, and act accordingly, in order to maximize teaching benefits.

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## LEKCIJE IZ KIBERNETIČKE PSIHOLOGIJE NA KOJE EDUKATORE TREBA PODSJETITI

### Sažetak:

Posljednjih godina kibernetički prostor je za (mlade) ljude postao jedna značajna domena, koju percipiraju u najmanju ruku jednako značajnom kao i stvarni život. Kibernetički prostor postao je poligon zadovoljavanja mnogih psiholoških potreba i iznjedrio nove faktore koji utječu na razvoj djece i mladih. Kao posljedica toga, i sfera obrazovanja je dramatično izmjenjena usljed promjena u psihološkim funkcijama, ponašanjima i navikama učenika, koji postaju sve različitiiji od onog za što su se edukatori školovali prije nekoliko decenija. Uzročno-posljedične veze se tek trebaju ispitati eksperimentalno, a za longitudinalna istraživanja treba više vremena. U međuvremenu, ipak, na osnovu teorijskih pretpostavki iz psihologije i odgojnih znanosti, već možemo pretpostaviti koje su to promjene koje danas utječu na motivaciju i ponašanje učenika u učionici. Stoga, ovaj rad polazeći sa osnova teorije determinacije ima za cilj da doprinese razumijevanju ovih promjena u motivaciji, angažmanu i ponašanju učenika koje su uslovljene kibernetičko-psihologijskim faktorima. Po čemu se pažnja i navike novih generacija razlikuju? Kako to utječe na njihovu uključenost i motivaciju za učenjem u učionici? Na koji način emotivni doživljaji učenika koji se potencijalno prelijevaju u učionice odražavaju njihovu sve veću uronjenost u digitalni svijet? Koje su najvažnije lekcije iz kibernetičke psihologije kojih edukatori trebaju biti svjesni kako bi maksimizirali efekte podučavanja kod svojih učenika? Ovaj članak nudi neke odgovore i preporuke koje se tiču ovih značajnih pitanja.

**Ključne riječi:** kibernetička psihologija; motivacija; intrinzična; ekstrinzična; mladi; obrazovanje

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