# Training School Activities to Promote a Conscious Use of Social Media and Human Development According to the Ecological Systems Theory

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Abstract: The analysis of the scientific literature suggests interesting results both on the positive and negative consequences of the use of the internet and social media during human development, during the school age. Yet several studies underline the need to consider Internet as a life context, therefore mediated by environmental factors, that can influence human development. In this article we emphasize the importance of the "educability" of the Internet and social media environments following an ecological perspective. In this regard, according to Bronfenbrenner's ecological systems theory of human development, we argue that it is possible to educate the school microsystem through specific training activities and innovative tools that assist students in analysing the effects of Web content personalization, understanding the algorithms controlling the social media mechanisms, and realising how toxic content propagate on the Web.

## 1 INTRODUCTION

Many scholars have analysed the impact of the Internet on everyday life, and in many studies the Internet is considered as one of the greatest discoveries of the last century (Montalcini, 2005). In fact, the Internet has triggered a change of paradigm in the scientific world, in the society, in the development of relationships between people and, in general, in the context of life (Kuhn, 1972).

The evolution of the Internet-based technologies has brought to the development of solutions that have profoundly changed the way we live, from the World Wide Web to the platforms for remote work, from open resource repositories to online learning solutions, and so on. The advent of social media represents another milestone in the history of Internet, opening up to profound reflections on the "virtualization" of relationships and their growing importance in everyday life.

Some authors argue that internet should no longer be considered as a tool to connect to a virtual reality that is separate from the real world, but as a place in which users live daily (Carr, 2011; Musetti et al., 2016; Taymur et al., 2016). This has been emphasized in the last year when the outbreak of the COVID-19 pandemic has affected, at different levels, any sector of the society including education. Face to face activities have been notably reduced and in certain cases completely banned, and several activities that were conducted in presence before the pandemic spreading, have been performed remotely through Internet-based technological solutions (Király et al., 2020).

In this perspective, a new concept of the Internet that takes its environmental features into account is needed (Musetti et al., 2016; Musetti et al., 2018; Musetti & Corsano, 2018). Furthermore, it is necessary to analyse the concept of the internet and then the world of social media.

The Bronfenbrenner's ecological systems theory of human development (1976; 1978; 2001; 2001) fits perfectly this new perspective on the internet and the social media environments. In fact, the opportunities offered by the Internet-based technologies are different from older "technologies", and the theory

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argues that humans have the ability to respond constructively and often progressively to the changes introduced by the specific reference context.

In the Bronfenbrenner's model, the life of each person is immersed in a specific environment or a system where each element is linked to all the others through a relationship of interdependence, so that every change in one part influences all the others. The development of a child is favored by participation in different environmental contexts with different educational opportunities. Amongst them, the school environment represents an essential opportunity for children, precisely because at school they experience environments rich in educational affordances and resources.

Johnson (2010) reprises the Bronfenbrenner's theory to fulfill the needs of conceptualizing Internet use in school age: Internet use in school age occurs in three contexts: home, school and community. *"From an ecological perspective, Internet use in an environment influences Internet use in other environments"* (Johnson, 2010, p. 9). In fact, the time spent by students on the Internet has undergone a steep rise in recent years, especially because of the virtual/social relationships developed through the social media (Burnett & Wilkinson, 2005). As far as the use of social media amongst young people is concerned, there are many downsides but "*there is mounting evidence that using the Internet provides children with cognitive and social benefits*" (Greenfield & Yan, 2006). In order to further investigate this issue, and on the basis of these theoretical premises, our research work is aimed at analyzing the "educability" of the internet environment framed in the ecological systems theory. In this article we focus on the Internet-based solutions mostly used by children and adolescents, including social media, the risks connected to their use, and the educational potential of these environments. In particular, since the school system has a central role in the education process, we propose specific educational moments integrated with innovative tools that can make students aware of the potential and risks of the technological instruments and support them in the conscious use of Internet and social media.

## 2 ECOLOGICAL SYSTEM THEORY, INTERNET AND SOCIAL MEDIA

The ecological systems theory of human development, also known as theory of "human ecology", was originally formulated and continually revised by Bronfenbrenner (1976; 1978; 2001), in order to facilitate the understanding of the dynamic interrelationships between the various personal and environmental factors affecting human development. In his theory Bronfenbrenner (1978) postulated that, in order to understand human development, the entire ecological system in which a person grows must be considered. Specifically, Bronfenbrenner (2001; 2006) organized the environment of child development into five nested environmental systems (macro, eco, meso, micro and chrono) with bi-directional influences within and between systems.

In one of the main revisions of his theory, Bronfenbrenner recognized the relevance of the biological and genetic aspects of a person for the purpose of human development, thus introducing his bioecological theory of human development (Bronfenbrenner, 2001).

The ecological systems theory provides a holistic point of view of environmental influences on human development and places the person within a system of relationships with family, school, peer group influencing each other. It is in this perspective that the Internet and social media can be considered "places of life" permeated with social relationships between individuals and between individuals and the environment.

In fact, Johnson and Puplampu (2008) have extended the Bronfenbrenner model with the ecological techno-subsystem, a dimension of the microsystem that can better account for the increasing use of technology in the age of development for children and adolescents. The ecological techno-subsystem is part of the microsystem like the family, the school and the peers. As argued by the authors, the techno-subsystem includes the child's interaction with both "living" elements (peers, family, classmates, etc.) and "non-living" elements, such as the internet, the media, and so on (Johnson & Puplampu, 2008).

In their model, Johnson & Puplampu do not explicitly refer to the social media. However, by considering the role that social media has taken on in everyone's life, even among the youngest, we argue that it is necessary to explicitly include social media in the techno-subsystem. To this aim, we shortly describe the 5 environmental systems identified by Bronfenbrenner making explicit reference to some examples of integration of social media in the model (see Figure 1). The most external environmental system is the macrosystem, that includes political and economic concepts, the values of society and its culture. In this sense, the complexes of beliefs and

behaviours that characterize the macrosystem are transmitted from one generation to another through the processes of dissemination, usability and socialization of information that are supported by the vastness of the internet environment. Social media can also be an excellent tool to transmit cultural and social knowledge between people and from one generation to another (Tudge et al., 2009).

The exosystem is made up of the interconnection between two or more environments which are not directly related to the child but that can indirectly influence him/her. For example, at this level we find the neighbourhood, parent's workplaces and parent's friends. Even in this case digital technologies support interconnections through the social media use.

The mesosystem is characterized by the relationship between microsystems. In this sense, social media is a place for the promotion of relationships. For example, two or more social environments on the internet in which the subject participates directly and actively.

The microsystem is the level within which the children develop interpersonal relationships with their immediate environment, such as peers, the school and the family. A microsystem is a model of interpersonal relationships, shared activities, roles, and rules. Finally, the chronosystem highlights the effect of time on all ecological systems and all development processes, including the training experiences to which students participate.

## 3 EDUCATIONAL SOCIAL MEDIA IN THE ECOLOGICAL SYSTEM MODEL

The ecological approach is intended as a lens through which to observe and analyse the world of young school students, even though the analysis of their behaviour in social media. In fact, having in mind that the different life environments in which a person lives significantly affect his/her behaviour, people's behaviour can be better understood when it is studied through different levels of analysis (Edinete & Tudge, 2013). Furthermore, every system contains roles, norms and rules that can shape psychological development and offer educational opportunities (Bronfenbrenner & Morris, 2006).

However, the Internet and social media have become part of the Bronfenbrenner model quite recently. This raises an important challenge: is it possible, and how, to "educate" the microsystem layer in order to make the most of the potential
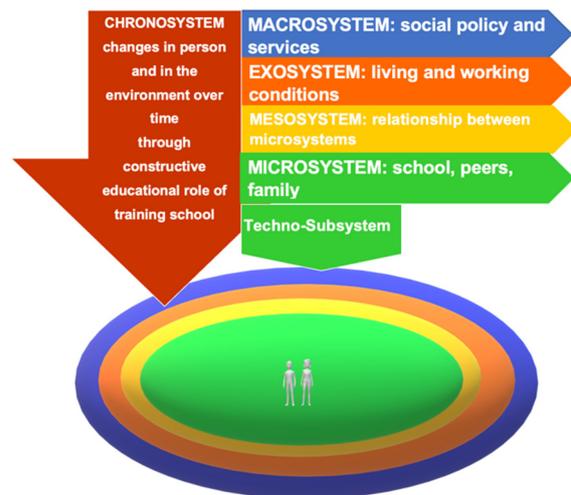


Figure 1: Ecological system theory and the educational role of training school activities.

offered by the Internet and social media yet avoiding the risks connected to their use? We argue that, by acting on the school microsystem through training school activities, an educational change can be made that supports aconscious use of social media.

Only by acting on the school microsystem can we also act on the relationships with the family and peer microsystem, as well as on other systems in the Bronfenbrenner according to the principle of the mutual influences among systems. Finally, an action on the school microsystem can lead to long-term positive changes in a person behaviour.

The school is a microsystem that can be educated through specific activities to support changes in people and the environment over time and that support students in a conscious use of the social media environments.

### 3.1 Internet and Social Media Threats

Few technologies have impacted education as the Internet and social media have done. Research on learning supported by internet technologies is extremely rich. In particular, studies on social media in formal and informal education have proliferated over the last decade (Chen & Bryer, 2012; Mbati, 2013; Mao, 2014; Greenhow & Lewin, 2016; Selwyn & Stirling, 2016). In fact, social media offer important affordances for students' learning, that Greenhow, Galvin and Staudt Willet (2019) summarize in: fostering active learning, enhancing students' collaboration, and increasing their community connections. However, the potential offered by these technologies could be compromised by the risks associated with their use.

Actually, the risks to children and young people of using social media have been widely discussed in literature. Based on the analysis of the literature, Willoughby (2018) has identified four areas of risk: cyberbullying and online abuse, exposure to negative forms of user-generated content (such as self-harm, hate, pro-anorexia or sexually explicit content, also known as toxic content), the converging of offline and online networks, and developing interpretations of privacy. The urgency of the risks deriving from the use of social media is so evident that it has become not only the subject of study by researchers, but also of investigations and journalistic insights that have allowed to open a debate at the society level.

The American docudrama film "The Social Dilemma", released in 2020, tackled the evolution of social media and the increasing risks they triggered in society. The documentary unveils how social media leverages big data produced by their users, on top of which executing sophisticated machine learning algorithms in the background that impact decisions of billions of people. As a consequence, social media are alleged to manipulate their users thus inducing different forms of addiction and affecting mental health of adolescents.

Another risk originated by Artificial Intelligence techniques is related to the recommendation algorithms that are more and more implemented by search engines and social media to filter the content and draw the attention of users only to a selected portion of Web content. The consequences of this scenario are polarization, radicalization, and the creation of filter bubbles and echo chambers (Pariser, 2011; Sunstein, 2018).

Internet and social media users are unwary of these mechanisms, or at best they underestimate the effects that these virtual environments have in real life. Furthermore, these effects are more exacerbated when it comes to adolescents. Actually, adolescents are more exposed to the social media threats, since they are unable to perceive the profoundly different dynamics that govern offline and online networks. The meaning and nature of friendships is altered by social media insofar as the interactions and connections children and young people make are not contained to the physical boundaries of being present with one another (Willoughby, 2018). Livingstone et al.'s research indicated that 1 in 12 children have met an online contact offline, with a further 30% suggesting they have communicated with someone they have not met face-to-face but have considered it (Livingstone et al., 2011, p. 8). Moreover, the uncontrolled convergence between offline and online networks does not help the most emotionally fragile

subjects (this can happen in controlled contexts). The evidence arising from most of the reviewed literature suggests that in general, those with offline vulnerabilities are most at risk of being harmed by their online activity and that as offline and online social networks converge, so do offline and online problems (Willoughby, 2018). Children with low self-esteem or unsatisfying friendships or parental relations are considered higher risk from social networking sites (Ballantyne et al., 2010; Kwan and Skoric, 2013; O'Neill, Livingstone, & McLaughlin, 2011). Finally, Kwan and Skoric (2013) argue that in relation to cyberbullying on Facebook in particular, those likely to be bullied in school are also the most likely to be bullied on Facebook.

The importance of the problem also arises from studies that show how the age of subjects at risk is getting lower and lower. In their study with 593 middle school students, Martin and colleagues (2018) have found out that 17% of them started using social media at age nine or younger, 40% accepted friend requests from people they do not know, and 40% reported that their parents did not monitor their social media use.

In this scenario, in which the internet and the social media are no longer intended as a tool but as a "place" to live in, children and adolescents must be educated to live in this environment. Training school activities and specific tools that can support students in a conscious and correct use of the internet environment are presented in the next section.

# 4 TRAINING ACTIVITIES AND TOOLS

Training school activities should be focused on promoting proper use of social media as a living environment characterized by positive and negative aspects. In particular, the training activities should aim at educating and supporting adolescents to face specific problems that arise within social media. The indiscriminate use of social media can lead to discrimination, prejudice, the spread of hate speech, violation of personal rights, psychological attacks, symbolic violence, transmission of private views without the consent of interested parties, deceiving people with fake accounts, spreading negative speech that they intend to abuse, as well as bullying, harassment and insults along with the circulation of malicious opinions and information on the Internet. Furthermore, content that incorporates violence not only produces negative effects on users, but also

makes them quite dysfunctional. Therefore, the training should aim at favouring students learning strategies for avoiding the unconscious or uncontrolled use of social media.

Furthermore, various constructs that characterize the Internet as a new environment should be analysed, in particular, interpersonal skills, self-esteem, self-efficacy, resilience, problem solving skills, motivational emotional aspects, internet addition. In order to analyse these variables and the processes underlying these constructs, specific methodologies, such as structured interviews or already validated and published questionnaires, can be used. For instance, the following questionnaires are suitable for collecting data related to the constructs introduced above: The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation (Tennant, et al., 2007); Satisfaction with life scale (Diener et al., 1985); Internet-related psychological and psychopathological variables: construction and preliminary validation of the U.A.D.I. survey (Del Miglio et al., 2001); Mood and Feelings Questionnaire (MFQ) (Angold & Costello, 1987); Resilience Scale for Adults (RSA) (Friborg et al., 2003). Analysing the living environment of social media through specific activities allows us to better understand what the toxic contents are and what are the positive aspects that must be highlighted and enhanced in the new living environment.

## 4.1 Training Activities

Adopting a specific training programme is the first step to allow students to develop adequate competences to live in the Internet environment and evolve within the school microsystem of the ecological model. However, traditional learning approaches are not adequate to engage students and implementing learning actions aimed at educating students for a proper use of social media is necessary.

The training activities should integrate specific learning tasks with the use of appropriate tools and devices. Training activities should be developed on top of suitable learning content and immersive experiences specifically designed to shed the lights on the mechanisms behind the Internet environments and social media. Tools and devices should be as close as possible to the ones the students use every day. In this perspective, for example, mobile devices and smartphones should not be demonized or banned but integrated into those learning activities aiming to promote and increase awareness in the use of social media.

In particular, we propose that the training objectives should be focused on the three factors that underlie the functioning mechanisms of the Internet-based solutions and social media, and that, in turn, can determine the risks highlighted in section 3: the personalization of Web content, the effect of artificial intelligent algorithms in social media, and toxic content detection.

The personalization of Web content has the positive effect of facilitating the retrieval of Web resources by providing users with the content most likely they are looking for. The increasing availability of content on the Web has made this feature indispensable. Therefore, search engines (such as Google) or very common media platforms (such as YouTube), have introduced this feature in their procedures for content retrieval and presentation. Users are usually informed of this characteristic, through the Term of Services documents, even though it is commonly ascertained that a very few percentages of users take care of them. The problem of overwhelming amounts of content is one of the problems that social networks have to cope with when it comes to improving users' experience. To this aim, artificial intelligence approaches are commonly adopted to filter the content to be proposed to the users. However, these approaches are often biased and criticized to foster more users' addiction than users' benefit.

Learning activities aimed at increasing students' awareness have to use the appropriate tools to unveil these mechanisms and to make students aware that what they see in their favourite social platform is only a portion of the content they could effectively access; and, moreover, in most of the case this content is polarized offering a limited view (on a social event for instance) from only one angle.

Training activities should bring students in practicing the effects of the approaches adopted by the social media. In order to experiment these mechanisms innovative and suitable tools have to be introduced. In the following sections, we present three different types of tools and the learning contexts in which they can be effectively used.

## 4.2 Tools to Learn Web Content Personalization

Tools in this category are designed to emphasize the effects of recommender systems in proposing personalized content to the users. For instance, in the area of search engines this is reflected in different ranked results depending on several factors such as: the previous searches performed by users, the

localization of the content, cultural aspects, and so on. All these factors contribute to filter the search results and present them in different order according to their assumed relevance, leading to a different perception of reality. In (Taibi et al., 2020) authors present an experiment in which students analysed the results of search engines with respect to selected queries. The effects of the polarization of the content were investigated with the support of teachers.

In fact, appropriate tools to investigate those factors are needed. In particular, it is important to provide users with functionalities that support the analysis of the search results, permitting comparisons between results of the same user with the same search keyword in different time (to answer the question how does the search results change over time?), or to analyse the results of the search of different users for the same keyword (to answer the question, how does the user profiles affect the search results?).

Investigating whether different search results are shown according to the cultural aspects (most of the time expressed with the location and the language used to perform the search) is also relevant. In fact, search engines have been proven to be effective to support social research (Fulantelli et al., 2016; Taibi et al., 2017; Taibi et al., 2019).

The role of teachers is also relevant to guide students in the analysis. Teachers should highlight the presence of mechanisms used by search engines to propose the results. Moreover, teachers should invite students in developing critical thinking processes, by looking at the search results critically.

## 4.3 Controlled Social Networks

The effects of the artificial intelligent algorithms used by social networks to present content to their users cannot be analysed within the social network, for several reasons. First of all, they use different algorithms, very often in combination between them and, as in the case of search engines, they do not reveal the secret receipt they use to elaborate content in background. These algorithms work as a black box, sometimes different algorithms are used for different groups of users, trying to unveil how these algorithms work by using the real social networks is very complex and specific tools are needed.

In (Puvia et al., 2020) authors propose the customization of an open-source alternative to Instagram to study the effects of different algorithms in showing the content to the users. This tool has the same functionalities of a common social network, it is possible to create a personal profile, manage a list of friends, and publish posts. In this way, students use

a platform to which they are familiar, equipped with the same features of those that they use every day. The advantages of this solution are twofold: firstly, it creates a closed environment in which all the variables can be taken controlled and analysed, secondly the effects of each algorithm can be studied separately before and in combination afterwards.

Moreover, the use of an open-source solution allowed a high level of customization in implementing the different algorithms and in extending the platform to include new functionalities to monitor students' activities.

The availability of closed environments, with similar functionalities to the ones that students are familiar to use, allows teachers and researchers to investigate students' interactions as they happen in a real context, and allows students to better understand how the content publishing changes according to the tuning of parameters of the same algorithms.

## 4.4 Virtual Assistants

Coping with the different types of risks that intervene in social networks could be particularly complex for students that in adolescence faced already one important period of their development. This is also more critical when it comes to early school children accessing the social network with a profile most of the time cheating their age. In this case, the algorithms used by social network to prevent the access to toxic content are less effective since they are not specifically designed for this age range.

A solution comes from the use of virtual assistants that counteract the artificial intelligence of social media environments with the same weapon. In the last few years, virtual assistants have been developed to support students and adolescents in general when interacting with social media (Courage, 2019). Virtual assistants filter the content proposed by the social network hindering the spread of toxic content. Moreover, they integrate educational activities including gamification and questionnaires aimed at identifying the situations at risk, exactly when they happen. These tools use AI algorithms to recognize toxic content and help students in interacting properly with them.

## 5 CONCLUSIONS

The Internet and the social media have created new forms of sharing and have greatly speeded up the development of links between people, providing

undisputed advantages in terms of educational affordances and sociality.

However, further research is needed to prove that Internet-based technologies and social media are appropriately designed to support intra and interpersonal relationships of young people and not only. In this article we underline the importance of the "educability" of the internet and social media environment by following an ecological perspective.

In this regard, according to Bronfenbrenner's ecological systems model, it is possible to promote educational actions at the school microsystem level. Amongst them, specific training activities, when conducted in a functional way, can support students in acquiring a constructive and responsible use of the Internet environment and social media.

In this paper we have proposed training activities, integrated with innovative software tools, that assist students in analysing the effects of Web content personalization, understanding the algorithms controlling the social media mechanisms, and realising how toxic content propagate on the Web.

Future perspectives of our study concern two main aspects; firstly, the age of students to which address the learning actions; secondly, the microsystems to be involved in the analysis of the interactions between students and social media. As far as the first aspect is concerned, it should be noted that in the last few years, several educational actions aimed at thwarting the spread of dangerous behaviours amongst students have been undertaken. The privileged target group of these actions is made of adolescents, since generally social media (e.g. Facebook) requires users to be at least 13 years old. However, the actual age of users accessing the social media for the first time is lower than the one fixed by the companies. This consideration motivates the introduction of specific multiliteracy actions aimed at younger children (e.g. middle and primary school students).

Concerning the second aspect, we argue that the role of other microsystems such as the peers and the family, in addition to the school, must be investigated. This is necessary to better analyse the relationships between the students' development and the use of Internet and social media. In fact, according to Bronfenbrenner's theory, the relationship between microsystems is fundamental for understanding the development trend of each student.

Furthermore, the theory argues that every environment is rich in educational resources that support the human development. In this regard, each microsystem must support the other microsystems in order to favor the growth of each student.

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