

Essay

Creating Interactive Learning Environments through the Use of Information and Communication Technologies Applied to Learning of Social Values: An Approach from Neuro-Education

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Abstract: In order to link learning and the brain, it is necessary to carry out a restructuring of pedagogical practice so that it can be linked to the contributions of Neurosciences. In this sense, Neuro-education is emerging as a new science that has as its main objective the synergy of Pedagogy, Cognitive Psychology and Neuroscience, and with this, being able to bring the different educational agents the necessary resources in terms of the brain and learning binomial (Campos 2010). This article focuses on the importance of education in values, and the acquisition of prosocial behavior and how this educational field can be developed from the use of information and communication technologies (ICT). The challenge before us is to build the map of values, which make the individual a fulfilled being and, in turn, a collaborator of the social environment. On the other hand, ICTs offer enormous potential in terms of their application in the field of education. In this article we will show the role that this type of tools can play in the learning and assimilation of values, bearing in mind the contributions of neuro-education.

Keywords: interactive learning environments; social values; neuro-education; ICT

1. Introduction

Neurosciences are developing investigations focused on the neural bases of learning, memory, emotions and different functions of the brain, the results of which have high applicability in the field of learning (Bowers 2016; Howard-Jones 2014). The development of neuro-education contributes to the advancement of educational innovation, as well as the development of educational systems. In this sense, Caine et al. (2008) establish the learning principles of the brain, based on the fact that this is a complex adaptive system that is configured with our relationship with the environment, the search for meaning takes place through guidelines, what is learned is influenced through emotions, learning involves both focused attention and peripheral perception, learning is a developmental process, and each brain is uniquely organized, because it is ultimately the biological substrate of personal consciousness.

Questioning education in values is as much as questioning education itself, since, with the educational process, it is intended that students achieve certain values. Thus, the quality of education is determined by the dignity, depth and extent of the values that we have been able to evoke and update (Díaz and Rodriguez 2008). The challenge before us is to build the map of values, which make the individual a fulfilled being and, in turn, a collaborator of the social environment.

The use of ICT in the educational field can promote values such as creativity, personal effort, self-discipline, organization, freedom, commitment to democratic and professional values, reflection, criticism, inquiry, dialogue, teamwork, non-sophistication, recycling, the pleasure of learning, activity, innovation, commitment to change, solidarity and the fight against inequalities (Paredes 2003). Therefore, from the use of technologies applied to education, we make a proposal in values education, creating interactive learning environments that contribute to the formation of citizens who will demand new knowledge and in which initiative, teamwork and social skills will be required (Buxarrais and Ovide 2011).

2. Neuroeducation and Its Contributions to Education in Values

Neuroeducation is a new discipline that is under development, thanks to the contributions of neuroscience, cognitive psychology and education sciences, to create a better understanding of how we learn and how this information can be used to create teaching methods, plans of more effective study and educational policies (Carew and Magsamen 2010). Despite the fact that neuroeducation is beginning in the field of research, it is sparking new critical dialogues between teachers, those responsible for educational administrations, families and the scientific field.

Going into the conceptual delimitation of the term, neuroeducation is classified as applied cognitive neuroscience, especially if there are no substantial differences in philosophical and methodological orientations found between education and cognitive neuroscience (Campbell 2011). Continuing with the author's argument, neuroeducation is an area of educational research that is based on the mechanisms of information processes, theories and methods of applied cognitive neuroscience, but unlike these, it is not limited to these elements, if only that neuroeducation has the person as its main object, and not only the physiological and biological mechanisms on which neurosciences are based. Considering the transdisciplinary approach of neurosciences, neuroeducation can contribute to the construction of new educational frameworks and new research methodologies that serve as a frame of reference in the learning-brain binomial, including the learning of social values in favor of a prosocial behavior that move towards an inclusive and sustainable society (Villardón-Gallego et al. 2018).

Regarding the centers of interest of the neurosciences with respect to neuroeducation, neuroscientific research addresses the pathologies of learning disabilities (Ferrari 2011); consequently, the objective from the educational research must be to understand the broader context of learning and personal development that complements the contributions of the neurosciences and avoids the labeling of atypical students that could lead to potential stigmatization. It is this conjuncture of greater interdisciplinary collaboration between neurosciences and education that has made possible the emergence of a new disciplinary field, such as neuroeducation, that will not only inform educational approaches, but will also promote scientific understanding of the relationship of neural processes with complex behaviors observed in the classroom (Howard-Jones 2014).

In respect of the contributions of neuro-education to the learning of social values, the task of the first is to find out how the brain bases predispose us to act in one way or another in relation to autonomy and happiness (Codina 2014), establishing a series of conclusions on how the brain bases influence and how they contribute to the learning of values. These conclusions establish that the human brain has neuroplasticity; the utility of knowing the moral codes inscribed in the brain is the best knowledge of itself, but in no case are they prescriptive, but descriptive; reason and emotion are dimensions, mainly through imitation and repetition of desirable behaviors and habits; the human brain takes shape through dialogue and interaction, the innate characteristics of the brain are concretized within the culture to which it belongs.

3. The Learning of Values as a Field of Work at School

For a better understanding, it is necessary to delimit the value term. A consequence, derived from the extensive bibliography on this subject to which we previously alluded, is the wide range of definitions that exist on this term.

Values are cognitive entities, beliefs or concepts, referred to certain objects and that serve as criteria in the selection and evaluation of behaviors (Schwartz 1992). The contribution of this author lies in the relationship established between the values and the motivation that gives rise to them and that is expressed in the actions of the person. When you think about values you think about what is important for life. The main characteristics of the conceptions of values, which are implicit in the different theorists and researchers, can be summarized as detailed below (Schwartz and Bilsky 1987):

- (a) Values are beliefs linked to emotions and cognitions;
- (b) Values are a motivational construct, that is, they are desired goals that people try to achieve;
- (c) Values transcend specific actions and situations. They are abstract goals. The abstract nature of values distinguishes them from concepts such as norms and attitudes, which refer to specific actions, objects or situations;
- (d) Values guide the selection or evaluation of actions, policies, people, and events. In other words, values serve as standards or criteria;
- (e) The values are ordered by their importance, with respect to others. People's values form an ordered system of priority of values, which characterizes them as individuals.

Faced with an increasingly complex social reality, in which not a few speak of a global loss of values, which hinders civic coexistence (Espino-Díaz 2017), we find ourselves with violent episodes of various kinds and intolerance towards difference. Individualism, relativism and hedonism (Espino-Díaz 2017) seem to impose themselves socially as principles of action (Álvarez-Castillo and Ares-Ruiz 2003; Quintana-Cabanas 2009). For this reason, it is necessary for the school to respond, as a socializing agent, by promoting learning aimed at conflict resolution, prosocial behaviors (Esteban 2003), the development of the capacity for empathy, respect for the plurality of ideals and, ultimately, to the assimilation of democratic norms.

Values education continues to be one of the challenges of the current educational system, given the need to improve prosocial behavior in society. In order to articulate a moral education project that is comprehensive and really practical, it is necessary to have the different spaces where that education is forged, which can never be reduced to a mere transmission of theoretical knowledge, however closely accompanied they may be by appropriate pedagogical procedures and strategies (García-Cano 2008). For this, it is essential to make secondary schools and classrooms model places of coexistence, in which the rules are respected, participation is encouraged, the exercise of rights is allowed, and individual responsibilities and duties are assumed.

For all this, "spaces are definitely needed in which participation is practiced, acceptance of plurality and appreciation of diversity that help students build a moral and civic conscience in accordance with democratic, plural societies, complex and changing in which we live".

Society is undergoing controversial political, social and economic changes affecting social attitudes, relationships and habits (Palmero-Cámara et al. 2005). These changes have motivated that the pedagogical curricula have been revised introducing a new type of teaching directed to the integral development of the person.

On the other hand, it is worth noting that attitudes do not have an innate character, but are learned, modified and mature; therefore, they are educable. Many authors agree, that is, that to work attitudes it is necessary to do it from three components. Therefore, it will be necessary to work from all three areas, even so, this is not a guarantee of success:

- Cognitive component, referring to knowledge and beliefs;
- Affective component, related to feelings and emotions;
- Behavioral behavior: linked to specific actions.

Therefore, it will be necessary to work from all three areas to facilitate the internalization of values.

4. The Use of Technologies in The Field of Education in Values

To continue with the topic, we need to address the field of information and communication technologies (ICT) and their applications in education.

Given the great variety that we can find within the field of information and communication technologies, we will focus on the possibilities that the Internet offers us. Three types of functionalities of internet use applied to education are established: information, communication and didactic support (Prat et al. 2004). The research describes these three educational internet applications in such a way that:

- Information source, given the large amount of easily accessible data that it offers us, from text, videos, photos, applications and computer programs;
- Means of communication, offering new possibilities of communication between people, companies and institutions through email, forums, chats, videoconferences and different social networks. In the educational field, this function is especially relevant, since it allows communication between students from different geographical areas, the development of cooperative projects, debates among students, teacher forums or the development of the class blog;
- Didactic support, offering a significant number of educational applications, among which we will highlight the following: telematic consultancies and tutorials, distance classes, virtual educational centers, website of the subject, access to online didactic materials and other websites of educational interest, libraries and online student advisory services.

It should be noted that the following considerations should be made regarding these three educational applications related to internet use (Prat et al. 2004). Based on the vision of the Internet as a source of information, it is the teachers who must shape the content and apply it in a pedagogical action, thus becoming an educational tool, since social values can be transmitted through this type of content, hence the importance of prior review and selection of content to avoid the inclusion of harmful content that may be potential transmitters of anti-values. Regarding the use of the internet as a means of communication, it should be noted that communication through the Internet involves establishing social relationships, and with them, the possibility of transmitting feelings, ideals, beliefs and values remains open. The virtual space comes to expand the possibility of social interactions that can occur in conventional spaces. This has immediate application, which is the possibility of starting cooperative or group work activities virtually, and thus being able to develop values such as collaboration, sharing or tolerance in the face of exposure to different points of view. Regarding the internet as a didactic support, everything reported so far leads us to affirm that, effectively, the use of the internet as a tool applied to education can favor the teaching and learning process.

According to a study (Buxarrais and Ovide 2011), the fact that students use the Web in their training is increasingly common (with the exception of countries with high levels of poverty where priorities are different). Internet access has become a necessity, and its use facilitates the search for information, collaboration between colleagues to carry out a common job or to send and receive files, among many other applications. However, limiting the use of the Web to “do homework” is missing a great opportunity to improve the learning process.

On the other hand, considering the internet as an educational tool involves a restructuring of the educational institution to adapt to current times and to contribute to promoting values in society.

This restructuring must contemplate three areas of work (Buxarrais and Ovide 2011):

- The role of teachers, which goes from being considered the greatest source of knowledge by students to not being able to compete with the web where students have access to information from the world’s best experts on any class content. In this sense, transforming information into knowledge requires reasoning skills to organize information, relate it, analyze it, synthesize it, and make inferences and deductions of different levels of complexity (Miralles Martínez et al. 2014). A study on teacher training (Ortega Sánchez and Gómez Trigueros 2017) analyzes the experiences and methodological conceptions of teachers in Primary Education training on collaborative learning with WebQuests and MOOCs in the curriculum area of Social Sciences. The results obtained demonstrate the educational need to transfer and integrate, in an

operational and functional way, the advancement and generalization of Information and Communication Technologies in the teacher training curricula. Specifically, the research reported low or very low values in the teaching staff in relation to the knowledge of technological resources in line with other research (Ortega-Sánchez and Gómez-Trigueros 2019). For this reason, it is necessary to acquire new pedagogical skills, based to a greater extent on facilitating access to information through helping in the process of selecting and identifying reliable sources;

- The role of the student, who goes from a passive attitude, in which he is the recipient of a finished product, to a new situation in which it is necessary to acquire tools to interpret reality and identify reliable sources of information, to engage with teamwork and be tolerant of the views of others;
- The role of the institution, which must assume the transformation of a series of factors for the aforementioned restructuring to take place. Among some of these modifications, we highlight flexibility in time and space, investment in technological infrastructure and openness to society.

Regarding the application of information and communication technologies applied to education in values, we find the bibliography, in this regard, supports this relationship. In an investigation carried out with students from Primary Education (Nancy-Alejandra et al. 2014), it was concluded that the use of multimedia resources, together with an education in values, reported a better attitude in students who presented lack of concentration in classes, attitudes passive, but, above all, shyness and insecurity. Likewise, educational projects based on technologies recover relational values in curricular development in classrooms, such as dialogue between the teacher and students, between the students, acceptance of others, international understanding, cooperation between professionals, involvement in collaborative work in the environment to which the school belongs, teamwork, and the intensification of other intellectual values, such as the desire to discover and creativity from material found on the networks (Paredes 2003).

A series of quality indicators applied to virtual environments are generated to educate in values around three dimensions: in relation to technical aspects, in relation to interaction and in relation to learning strategies (Lozano and Burgos 2008). This can be broken down as follows:

- In relation to technical aspects, these authors establish various elements that can facilitate education in values, such as accessibility to technical means, the presence of a friendly interface, does not represent a risk for the user, filtering of their personal data, social networks, chats, emails that encourage interaction can be included, no maintenance is necessary and it facilitates the exchange of images, videos and files;
- In relation to interaction, social and affective relationships are fostered, communication can take place in real time, it is possible to create discussion forums where there is a general enrichment generated by the use of the exchange of words, it allows multiculturalism;
- In relation to learning strategies, it maintains the interest of the students, keeping them motivated, which facilitates learning, allows constructivist methodologies to be developed, promoting meaningful learning, facilitates student participation through virtual debates, improves student monitoring, facilitating the learning processes. Evaluation: access to various digital materials that facilitate the teaching and learning process is offered, work guidelines can be established that promote group work, fostering camaraderie and mutual help among students.

On the other hand, virtual learning spaces have all the conditions for a good development of skills and learning in social values. As an example of methodological guidelines for the implementation of this type of learning, the following can be taken into account:

- Design time and space for students to analyze and reflect on the concepts, values and attitudes they are developing or strengthening, both individually and in groups;
- Promote higher order thinking, which involves both creative and critical thinking;
- Create a sense of presence and a transformative learning community;

- Have the technological means that allow students to work with materials, process information and then contextualize learning.

5. Conclusions

Values education continues to be one of the challenges of the current educational system, given the need to improve prosocial behavior in society in general. Regardless of whether it is considered that the school should influence to a greater or lesser extent the civic training of students, what seems to have more consensus is that more and more people and from younger ages spend more time in this institution. In this sense, there are four essential functions that the school has historically performed (Ruiz-Corbella 2003): (a) the transmission of the specific culture of the society in which it is located; (b) help the integration and adaptation of each student to that community, for which they will teach the norms, the guidelines of conduct, typical of that society; (c) the development of specific skills aimed at professional development; (d) the contribution of the possibility of living with peers and adults in regulated common spaces.

In this sense, the application of ICT to the field of education in values may involve the use of tools and methodologies with enormous potential for the assimilation of necessary prosocial behaviors in today's societies. For example, telematic projects recover values linked to social relationships, such as dialogue between teacher and students, and between students, acceptance of others, fostering cooperative work between teachers and contributing to the promotion of values typical of the academic field, such as the desire to discover and creativity from found material (Paredes 2003).

In the implementation of the use of technologies for educational purposes, a number of factors have been detected that hinder educational success related to the competencies of teachers in the use of ICT. Hence the need to develop proposals around teacher training that raise their skill levels.

Therefore, teachers need to be certain that technology can and should be used by students to improve their own learning, and it leads to the need for teachers to be trained in the instrumental use of technologies, but above all, to know how to connect with the learning process of their students, and carry out a true educational action—and all this takes into account the development and appeasement of the contributions of neuro-education.

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References

- Álvarez-Castillo, José-Luis, and S Ares-Ruiz. 2003. Identificación de Metas Crónicas Igualitarias y Altruistas En Una Muestra de Maestros En Formación. *Encuentros En Psicología Social* 1: 275–79.
- Bowers, Jeffrey S. 2016. The Practical and Principled Problems with Educational Neuroscience. *Psychological Review* 123: 600–612. doi:10.1037/rev0000025.
- Buxarraís, Rosa, and Evaristo Ovide. 2011. El Impacto de Las Nuevas Tecnologías En La Educación En Valores Del Siglo XXI. *Sinéctica* 37: 1–28.
- Caine, Renate Nummela, Geoffrey Caine, Carol McClintic, and Karl J. Klimek. 2008. *12 Brain/Mind Learning Principles in Action: Developing Executive Functions of the Human Brain*. Thousand Oaks, CA: Corwin Press.
- Campbell, Stephen R. 2011. Educational Neuroscience: Motivations, Methodology, and Implications. *Educational Philosophy and Theory* 43. doi:10.1111/j.1469-5812.2010.00701.x.
- Campos, A. 2010. Neuroeducación: Uniendo Las Neurociencias Y La Educación En La. O.E.A, 1–14. Available online: www.educoea.org/portal/La_Educacion_Digital/laeducacion_143/ (accessed on 6 May 2020).
- Carew, Thomas J., and Susan H. Magsamen. 2010. NeuroView Neuroscience and Education: An Ideal Partnership for Producing Evidence-Based Solutions to Guide 21 St Century Learning NeuroView. *Neuron* 67: 685–88. doi:10.1016/j.neuron.2010.08.028.

- Codina, M. J. 2014. Tesis Doctoral Neuroeducación En Virtudes Cordiales. Una Propuesta a Partir de La Neuroeducación y La Ética Discursiva Cordial. Available online: <https://core.ac.uk/download/pdf/71025424.pdf> (accessed on 6 May 2020).
- Díaz, Juan Manuel, and Juana María Rodríguez. 2008. La Educación En Valores Como Estrategia de Desarrollo y Consolidación de La Persona Moral Se Plantea La Centralidad de Los Valores a Través de Una Serie de N d 015. pp. 159–69. Available online: <https://revistas.unav.edu/index.php/estudios-sobre-educacion/article/view/23441> (accessed on 6 May 2020).
- Espino-Díaz, Luis. 2017. *Sociedad, Cultura y Religión: Hacia Una Educación Inclusiva En Un Contexto Intercultural*. Córdoba: Diputación de Córdoba.
- Esteban, Rosa María Esteban. 2003. Educación En Valores. Programa Para Su Desarrollo En La Educación Secundaria Obligatoria. *Tendencias Pedagógicas* 8: 99–108.
- Ferrari, Michel. 2011. What Can Neuroscience Bring to Education? *Educational Philosophy and Theory* 43: 31–36. doi:10.1111/j.1469-5812.2010.00704.x.
- García-Cano, Fernando. 2008. *Razón Pública y Razón Práctica. Una Convergencia Necesaria*. Valencia: Edicep.
- Howard-Jones, Paul A. 2014. Neuroscience and Education: Myths and Messages. *Nature Reviews Neuroscience* 15: 817–24. doi:10.1038/nrn3817.
- Lozano, Armando, and José Burgos. 2008. *Tecnología Educativa En Un Modelo de Educación a Distancia Centrado En La Persona*. México: Editorial Limusa, S.A.
- Miralles Martínez, Pedro, Cosme Jesús Gómez Carrasco, and Raquel Sánchez Ibañez. 2014. Ask Me Questions and I Will Tell You What They Assess and Teach. An Analysis of Social Sciences Exams in the 5th and 6th Grade of Primary School. *Aula Abierta* 42: 83–89. doi:10.1016/j.aula.2014.05.002.
- Nancy-Alejandra, Ronquillo, Gómez Marcela-Georgina, and Nancy-anett García. 2014. EL USO DE RECURSOS MULTIMEDIA PARA COADYUVAR A LA EDUCACIÓN EN VALORES EN ALUMNAS DE UN GRUPO DE TERCERO DE PRIMARIA. *Revista Científica de Opinion y Divulgacion* 30: 1–12. Available online: [https://scholar.googleusercontent.com/scholar?q=cache:wVP1Pi_TdH4J:scholar.google.com/+22.%09Ronquillo+Cárdenas,+N.+A.,+Gómez+Zermeño,+M.+G.,+%26+García+Vázquez,+N.+J.+\(2014\).+El+uso+de+recursos+multimedia+para+coadyuvar+a+la+educación+en+valores+en+alumnas+de+un+grupo+de+tercero+de+primaria.+Revista+científica+de+opinion+y+divulgacion,+pp.&hl=es&as_sdt=0,5](https://scholar.googleusercontent.com/scholar?q=cache:wVP1Pi_TdH4J:scholar.google.com/+22.%09Ronquillo+Cárdenas,+N.+A.,+Gómez+Zermeño,+M.+G.,+%26+García+Vázquez,+N.+J.+(2014).+El+uso+de+recursos+multimedia+para+coadyuvar+a+la+educación+en+valores+en+alumnas+de+un+grupo+de+tercero+de+primaria.+Revista+científica+de+opinion+y+divulgacion,+pp.&hl=es&as_sdt=0,5) (accessed on 6 May 2020).
- Ortega Sánchez, Delfín, and Isabel Ma Gómez Trigueros. 2017. Las WebQuests y Los MOOCs En La Enseñanza de Las Ciencias Sociales y La Formación Del Profesorado de Educación Primaria. *Revista Electrónica Interuniversitaria de Formación Del Profesorado* 20: 205. doi:10.6018/reifop/20.2.258551.
- Ortega-Sánchez, Delfín, and Isabel María Gómez-Trigueros. 2019. Massive Open Online Courses in the Initial Training of Social Science Teachers: Experiences, Methodological Conceptions, and Technological Use for Sustainable Development. *Sustainability (Switzerland)* 11. doi:10.3390/su11030578.
- Palmero-Cámara, Carmen, Pilar Sarto-Martín, and Alfredo Jiménez-Eguizábal. 2005. Educar En Valores: Protocolo, Recursos y Necesidades Educativas Específicas Para La Educación de Los Consumidores. *Revista de Ciencias de La Educación* 201: 45–68.
- Paredes Labra, Joaquín. 2003. Educación En Valores y Nuevas Tecnologías En La Formación de Maestros. *Tendencias Pedagógicas* 8: 121–31.
- Prat, Maria, Raquel Font, Susanna Soler, and Jordi Calvo. 2004. Educación En Valores, Deporte y Nuevas Tecnologías. *Apunts. Educación Física y Deportes* 78: 83–90. Available online: <https://www.raco.cat/index.php/ApuntsEFD/article/view/301531/391123> (accessed on 6 May 2020).
- Quintana-Cabanas, José María. 2009. Propuesta de Una Pedagogía Humanista. *Revista Española de Pedagogía* 209–30. Available online: <https://revistadepedagogia.org> (accessed on 6 May 2020).
- Ruiz-Corbella, M. 2003. *Educación Moral: Aprender a Ser, Aprender a Convivir*. Barcelona: Ariel.
- Schwartz, Shalom H. 1992. UNIVERSALS IN THE CONTENT AND STRUCTURE OF VALUES: THEORETICAL ADVANCES AND 20 COUNTRIES. *Advances in Experimental Social Psychology* 25. doi:10.1016/S0065-2601(08)60281-6.

Schwartz, Shalom H., and Wolfgang Bilsky. 1987. Toward A Universal Psychological Structure of Human Values. *Journal of Personality and Social Psychology* 3: 550–62. doi:10.1037/0022-3514.53.3.550.

Villardón-Gallego, Lourdes, Rocío García-Carrión, Lara Yáñez-Marquina, and Ana Estévez. 2018. Impact of the Interactive Learning Environments in Children's Prosocial Behavior. *Sustainability (Switzerland)* 10: 1–12. doi:10.3390/su10072138.



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