SPATIAL IDENTITY IN VIRTUAL LEARNING ENVIRONMENTS

IDENTITÀ SPAZIALE NEGLI AMBIENTI DI APPRENDIMENTO VIRTUALI

Alessandro Ciasullo
Università di Napoli Federico II
alessandro.ciasullo@unina.it

Abstract

The mediation framework between aspects that are structured and continually mediated by evolutionary responses of a cultural type and characteristics proper to the bios find the reason for convergence and mutual coexistence in action, which is the functioning that subjects exercise within the environment they 'exist.' The relationship between subjective biological instances and cultural paradigms within which the ways of being and acting of trans-forming issues are expressed are constituted as perennial dynamic parameters that characterize the unstable and restless nature of formative processes. The better the implementation formula between the technological operation and society, the greater the possibility that the technology represents and supports the subjects in their human expression. The more the evolutionary processes will create beneficial osmosis for the overall development of humanity itself. The advantage of VLEs (Virtual Learning Environments) lies in their possibility of strong subjective declination and the possibility of mediation with one's learning community. For these environments to carry out their function effectively, it is necessary that the subject involved in the training experiences a sense of self-efficacy, that he/she is not frustrated by the executive and interactive difficulty with the environment, that he/she is adequately involved and that he/she can autonomously manage some elements contained in that environment.

Il quadro di mediazione tra aspetti strutturati e continuamente mediati da risposte evolutive di tipo culturale e aspetti propri del bios trovano ragione di convergenza e coesistenza reciproca nell'azione, che è il funzionamento che i soggetti esercitano all'interno dell'ambiente in cui 'esistono'. Il rapporto tra istanze biologiche soggettive e paradigmi culturali entro cui si esplicano i modi d'essere e d'agire dei soggetti in trans-formazione si costituiscono come parametri dinamici perenni che caratterizzano la natura instabile e irrequieta dei processi formativi. Migliore è la formula d'implementazione tra l'operatività tecnologica e la società; maggiore è la possibilità che il tecnologico rappresenti e supporti i soggetti nella loro espressione umana; tanto più i processi evolutivi saranno in grado di creare osmosi vantaggiose ai fini dello sviluppo complessivo dell'umanità stessa. Il vantaggio dei VLE (Virtual Learning Environments) risiede nella loro possibilità di forte declinazione soggettiva ma anche di possibilità di mediazione con la propria comunità di apprendimento. Perché tali ambienti svolgano la loro funzione con efficacia è opportuno che il soggetto coinvolto in formazione viva un senso di autoefficacia, che non sia frustrato dalla difficoltà esecutiva e interattiva con l'ambiente, che sia adeguatamente coinvolto e che possa gestire in autonomia alcuni elementi contenuti in quell'ambiente.

Keywords

Spatial education, Virtual Learning Environments, bioeducational sciences

Educazione spaziale, ambienti d'apprendimento virtuali, scienze Sioeducative

Introduction

The transitions that society has undergone in the last period and the severe pandemic that has affected it at all levels bring the attention back to how individuals can implement adaptation processes that allow them to manage better the 'crisis' situations they experience.

This tendency towards adaptability - which is a central element of human nature - is exercised in processes that start from biological characteristics but end up being expressed according to adaptive solutions determined by conscious, articulated, and refined response processes mediated by culture (Santoianni & Ciasullo, 2019).

In this framework of adaptive transitions, man exercises direct control over response elements, characterized by his choices regarding the solutions to be used. More deeply, autonomous and automatic bio-intelligent responses are well-rooted in the phylogenetic process of evolution of the species (Frauenfelder et al., 2018; Santoianni & Ciasullo, 2020).

The mediation framework between aspects structured and continuously mediated by evolutionary responses of a cultural type and characteristics proper to the bios, find the reason for convergence and mutual coexistence in action, which represents the executive functioning a subject exercise within the environment in which they 'exist.' In other words, a continuous coexistence is established between the cultural instances of the society in which one lives (which strongly influence what the subject is called to become) and also what we might call the implicit, biological, corporeal, primary substance that the issue embodies as a biological being (Ciasullo, 2018). A perennial mediative realization between what the subject is as an animate being and what the subject represents within the society they live. It is the relationship between subjective biological instances and cultural paradigms within which ways of being and acting of the trans-formation subjects are constituted as perennial dynamic parameters that characterize the formative processes' unstable and restless nature (Zwiers et al., 2003). Nature that is realized thanks to the conditions of cerebral plasticity, those of the active mental processes and the stimulative environmental conditions, capable of soliciting the adaptive responses of the learning subject, first and continuously in an implicit way and then in a straightforward way above all within the educational systems with which the various societies are equipped.

There is, therefore, no expression of the biological without environmental stimuli, and there would be no social environment without the physiological characteristics of subjects that make it up.

1. The learning evolution path

The learning processes work ceaselessly and silently to mediate between man's two different natures in society' and man 'as a society.' The latter affirms themselves as physiological characteristics that contribute to the metabolization and evolution of the cultural datum. The entire mediation process is carried out by the adaptive nature of individuals, who can actively compensate for change external to the individual subjectivity by remedying it through articulated, new, intelligent solutions with new organizations of responses capable of bringing about further change (BRIBIESCAS, 2009; Cavalli-Sforza & Feldman, 2003; Eccles, 1953; Eccles et al., 1954).

It is in the combination of adaptive changes brought about by new environmental contexts and the need to master external elements which the organism activates itself and provides for its internal and external reorganization.

In other words, we can say that change is the right and most profound essence of man.

These transitions, however, can undergo a strategic advantage (evolutionarily speaking) determined by the training processes put in place by adult society concerning the young community in the making. It is not by chance that the experience that characterizes the learning process is significantly influenced by its context, which can orient and benefit - according to its cultural principles - the development of characteristics close to the society to which it belongs(Luijtelaar et al., 2006).

From this overall picture, one cannot exclude the instruments that have continuously en-

sured different degrees of development of certain societies throughout history.

The development, from technical to technological has, throughout history, absorbed all the evolutionary energies in terms of education, training, research, and scientific evolution(Amadei & Borgida, 2019; Santoianni & Ciasullo, 2019, 2020). This observation cannot limit us to identifying existence, living as a process that does not in itself involve a genetic transformation that also embraces the sphere of technological development. In other words, there is genetic physiology of growth processes stimulated both by natural and social stimuli and by technological and virtual ones. Man is a technologically advanced being, and as such, technology should support the actualization of an accomplished, improved, and evolved humanity.

The better the implementation formula between technical operations and society, the greater the possibility that technology can represent and support human expression subjects. The more the evolutionary processes will create beneficial osmosis for the overall development of humanity itself.

This long reflection leads me to imagine that society and its educational expression - formally represented by the school - cannot shut itself away in caves of out-of-this-world preservation which, instead of helping to train users, developers, equipped with critical tools for analyzing and managing digital tools are striving submissively to shut themselves up in a bubble outside the world and outside time (Hargreaves, 2011).

The theme of the development of subjective identity within digital learning environments comes up again. If, on one hand, they pose as elements of personal realization insofar as they are connected to the relevant digital identity, on the other hand, they contribute to the question of whether the digital identity can be considered part of the overall essence of the subject and/ or a parallel and different representation of it (Ciasullo, 2020; Meghini et al., 2011; Santoianni & Ciasullo, 2019).

When the subject represents him/herself in the digital world, does he/she represent him/ herself, part of him/herself, or something else? This question, which is not easy to interpret or easy to solve, significantly recalls the subjective representation and the development of one's personality linked to one's identity. This theme becomes all the stronger if we place it within the debate on the development of characters in children and adolescents' realization.

In the meantime, we need to define a new concept of spatiality, understood as the place or places within which subjective action develops; spatiality becomes the real background variable of existence and therefore of the learning development within which subjects experience their activity in the world.

Therefore, spatiality becomes the background of materiality where both animate and inanimate relevance is realized, leading us to identify it as one of the central ontological aspects of existence.

Within this third dimension, which is spatiality, we can experience reality, represent it, realize our actions, build and live our physical and bodily size and thus figure out our learning being through experiences of the world and about the world. We can form ourselves because we have space within which to learn our being in the world. In a logical principle, therefore, without freedom, there can be no learning(Afrooz et al., 2019, 2019; Bogusevschi et al., 2020; Livingstone et al., 2008).

Despite this, societies' cultural evolution for millennia counted on systems of linear graphic representation, where the book has been the most effective technological tool. Through a narrative or consequential type of presentation, mostly two-dimensional, represented and disseminated knowledge, becoming knowledge itself. It is clear that narrative processes activated spatialized representation mechanisms in subjects; if I think of reading a story in a book, what comes to mind is the immersive consequence a text produced images, places, representations in me, however that text has grown through a projective and experiential activity operated by my mind translating into mental images what in substance was and is something written linearly.

This centuries-old linearity of reading/writing determined individuals and society that the three-dimensional dimension of action in space is a space of life and experience or a phenom-

enon to be studied in its phenomenological and ontological manifestation (think of the object of the exact sciences). However, with a few exceptions, one of which is the Greek Paideia in its need to form integral men, spatiality and space have never been considered as essential physiological and social elements for learning. Yet space and spatial perception are intrinsic elements of humanity, the background against which experiences of personal transformation are sustained and thus the locus of knowledge.

Knowledge is declined in its three fundamental matrices as "situated" in a given socio-environmental context; "distributed" among the various subjects that make up society, made up of social groups belonging to it as plural homogeneous and inhomogeneous learning communities; "embodied" because it is strongly linked to the organic dimension of the subjects, the mind coinciding with the full expression of the body and no longer identifiable with the cerebral faculties alone.

In this sense, a specific, personal, unique cognitive dimension emerges in the subjects, made of active localization, relationship with the environment and other individuals, knowledge, and awareness of one's corporeity as a not secondary characteristic of learning processes. Dynamic localization is understood as a spatial presence within a geographical, geopolitical, cultural, and environmental context in continuous relation with one's personality in reciprocal exchanges. Connection with other individuals is understood instead as a constant exchange for the realization of collective, plural, culturally mediated, and historically defined forms of intelligence, resulting in discussion with the other than oneself. On the other hand, the embodied dimension is understood as the implicit place of the mind where the primary processes of spatial perception, synaptic epigenesis, bodily and physical learning realize the complete subjectivity of the individual.

This leads us to say that subjectivity expresses itself physically/mentally, consciously or unconsciously, in a continuous relationship with places, other individuals, the environment.

In this sense, Environments can represent a space with its internal organization because their composition is entrusted to an ontological value of constituting the world, which means that the environmental reality is already a spatialized expression. Therefore, the mental subjectivity of individuals must possess within itself a series of implicit faculties capable of rendering the subject capable of managing this spatialized set of elements.

In other words, there is a spatial peculiarity of the mind that is characterized as a central element for the learning evolution of the human species.

This allows us to think about the reconstruction of virtual environments, with their specific spatial peculiarities, capable of stimulating this profound dimension of the individual who learns. In other words, we can respond to a primary extent of learning by reproducing environments, circumstances, tasks, and situations that allow the experimentation of adaptive and cognitive responses to create both collective and personalized learning conditions. In this process of reconstructing situations, contexts, digital worlds and spatiality can be experienced through the most profound mechanisms of physical representation in the dynamics of cognitive functions, since the personal simulation is not only physical but also mental, which means that experiencing a virtual environment through the graphic representation of one's corporeity stimulates deep neuronal faculties typical of real actions.

2. Virtual Learning Environments potentials

The advantage of VLEs (Virtual Learning Environments) lies in their possibility of strong subjective declination and the option of mediation with one's learning community. A further consideration comes in this framework of options: if the social conditions and its instruments of interaction change (for example, the transition towards digital devices), the school's formal educational reality cannot remain the same. Suppose the social conditions that hold the world and its relations together change. In that case, the school cannot become a battleground between those who support the integration of digital systems in education and those who maintain that it should continue to preserve what it has been for centuries. If we were to go along with the

second option, we would risk creating a disconnection between reality outside and inside the school. However, we already observe this truth daily in our school system.

The advantage of innovating teaching also through the use of VLEs is given by the possibility of integrating real contexts in a virtual framework, offering conditions in which the subject, through the neuronal mechanisms of personal simulation, can experience situations that he could not participate in reality (Afrooz et al., 2019; Aluja-Banet et al., 2019; Bogusevschi et al., 2020; Livingstone et al., 2008; Santoianni & Ciasullo, 2020). He/she can verify his/her learning characteristics by experiencing self-efficacy and satisfaction, provided the course is appropriately programmed (Liu et al., 2017).

VLEs have been shown to retain an authentic, inclusive matrix as they exert an additional compensatory and/or supportive function towards people with learning difficulties who have not acquired adequate learning levels through traditional modes of training (X. Pan, 2020; Z. Pan et al., 2006).

A further possibility offered by digital VLEs is the possibility of mediating the 'rules of the game' between the participants in one of the possible multi-user sessions in cooperative and metacognitive teaching strategies.

To establish the structure of meaningful VLEs, it would be useful to look at the model proposed by McGrath (1993, 1995), the "Time, Interaction, and Performance" (TIP). In this model, the group development process is multi-functional rather than sequential. In the TIP model, groups perform three main and distinct functions: production, well-being, and support of members moving simultaneously into one of four operational possibilities: (a) initiation, (b) problem solving, (c) conflict resolution, and (d) execution (Mcgrath et al., 1993; McGrath et al., 1995).

Thinking about VLEs certainly means imagining how some implicit and explicit components of trainees should be declined:
- Rethinking individual adaptive matrices;
- The role of stimuli;
- Of perception;
- Intersubjective mediation of relationships;
- The reorganization of tools and software;
- Assistive technologies;
- The kind of immersiveness that is sensitive, bodily, and cognitive;
- To the type of environment, you think you need to create.

Rethinking the adaptive matrices, the role of stimuli and perception means building virtual environments which can stimulate the subject in its implicit functions and its specific neuronal characteristics; to do this, the digital and virtual cannot be outcomes without careful multidisciplinary scientific reflection that builds their educational significance. The inter-subjective mediation of relationships calls for evaluating how virtual learning environments impact the sociality of the subject; it is not convenient to imagine the fruition of the learning experience mediated in VLEs that is exclusively subjective. It would always be desirable to have an inter-subjective mediation that allows the individual to experience learning in the most personalized way possible and about other subjectivities present in the virtual environment.

Another critical issue is the development of appropriate software and the use of assistive, immersive, compensatory, interactive technologies such as NUI (Natural User Interfaces) able to envelop the subject, to involve him in mental and physical processes that are dynamic, within his reach and that allows him to exercise as naturally as possible his relationship with the interfaces, environments, and objects contained therein. These conditions determine different degrees of sensitivity, both perceived and exerted on the ground, at a physical and cognitive level (Norman, 2010; Wigdor & Wixon, 2011).

The educational relationship in VLEs can undoubtedly be considered subjective since it meets the specific needs of the person who uses it according to his or her cognitive and physical characteristics. Still, we cannot and must not consider it "singular."

The individual experiences a subjective approach to training, but always through a plural

relationship with other individuals, so we could call it 'smart'.

After all, subjectivity is given by how much the user can be there in that virtual environment and how much he can exercise control over the elements contained in that virtual world. This implies that the crucial part capable of actively involving the user in this process of mediated learning is the "meaningfulness of the act of perception." The organization of a particular space, of certain learning situations, calls upon the personal capacity, the individual's adaptive responses, and is all the more significant, the more they can produce adequate adaptive reactions.

Motor simulation, the involvement of spatial skills, creative organization, and modifiability of contexts call for appropriate formulas for representing environments, possible learning situations, organization of problems, and situations capable of stimulating transformative processes (Eccles et al., 1954).

In order to have these environments effectively perform their function, the trainee should experience a sense of self-efficacy, not be frustrated by the difficulty of acting and interacting with the territory, be adequately involved, and manage some aspects in that environment autonomously. To be avoided in the management of these VLEs is the elaboration of heterodirected paths (Afrooz et al., 2019; Aluja-Banet et al., 2019; Annansingh, 2019; Bogusevschi et al., 2020; Bondarenko et al., 2020; Ciasullo, n.d.-b, 2018; Dillenbourg et al., 2002; Ouherrou et al., 2019; Santoianni & Ciasullo, 2019, 2020; Slot et al., 2019).

Once again, it is essential to recreate the proper conditions within a learning community.

Conclusions

Today, billions of people's daily lives appear more than ever to be mediated by the use of technologies, which are no longer just alternative forms of communication but real personalized centers for exchanging information, social transmission, and displaying and reporting their digital dimension.

The school can make what is already there useful for education, forming individuals, making them aware and critical.

Excluding digital technology from the school context, or using it as one would a television or a book, means handing over to society, without the school, the pervasive role of adaptive processes centered on the use of technologies; in this case, without the management tools, guidance and educational conditions to induce critical, constructive and mature digital thinking. It is a question of bringing digital technology into schools, not to make it 'sit in the classroom' or replace the functions performed by teachers and the community of peers in the flesh, but rather to make it part of a growth process that takes the educational advantages possible from its countless possibilities and allows the educating community to set limits on the many dysfunctions that occur precisely in the absence of critical and conscious use of it. Educating trainees with digital technology to make it part of an overall growth process for society itself.

References

Afrooz, A., Ding, L., & Pettit, C. (2019). An Immersive 3D Virtual Environment to Support Collaborative Learning and Teaching. In S. Geertman, Q. Zhan, A. Allan, & C. Pettit (Eds.), Computational Urban Planning and Management for Smart Cities (pp. 267–282). Springer International Publishing. https://doi.org/10.1007/978-3-030-19424-6_15

Aluja-Banet, T., Sancho, M.-R., & Vukic, I. (2019). Measuring motivation from the Virtual Learning Environment in secondary education. Journal of Computational Science, 36, 100629. https://doi.org/10.1016/j.jocs.2017.03.007

Amadei, C. A., & Borgida, M. B. (2019). Education and Technology as Levers for Sustainable Change. In Y. Song, F. Grippa, P. A. Gloor, & J. Leitão (Eds.), Collaborative Innovation Networks: Latest Insights from Social Innovation, Education, and Emerging Technologies Research (pp. 61–72). Springer International Publishing. https://doi.org/10.1007/978-3-030-17238-1_3

Annansingh, F. (2019). Mind the gap: Cognitive active learning in virtual learning environment perception of instructors and students. Education and Information Technologies, 24(6), 3669–3688. https://doi.org/10.1007/s10639-019-09949-5

Bogusevschi, D., Muntean, C., & Muntean, G.-M. (2020). Teaching and Learning Physics using 3D Virtual Learning Environment: A Case Study of Combined Virtual Reality and Virtual Laboratory in Secondary School. Journal of Computers in Mathematics and Science Teaching, 39(1), 5–18.

Bondarenko, O., Pakhomova, O., & Lewoniewski, W. (2020). The didactic potential of virtual information educational environment as a tool of geography students training. ArXiv:2002.07473 [Cs]. http://arxiv.org/abs/2002.07473

BRIBIESCAS, R. G. (2009). Men: Evolutionary and Life History. Harvard University Press.

Cavalli-Sforza, L. L., & Feldman, M. W. (2003). The application of molecular genetic approaches to the study of human evolution. Nature Genetics, 33(3), 266–275. https://doi.org/10.1038/ng1113

Ciasullo, A. (2020). Animazione digitale per la didattica—FrancoAngeli. Retrieved October 19, 2020, from teacher

Ciasullo, A. (2018). L'eredità scientifica di E. Frauenfelder. Per una prospettiva epigenetica nel virtuale | RESEARCH TRENDS IN HUMANITIES Education & Philosophy. Retrieved August 11, 2020, from http://www.tema.unina.it/index.php/rth/article/view/5457

Ciasullo, A. (2018). Universal Design for Learning: The relationship between subjective simulation, virtual environments, and inclusive education. Research on Education and Media, 10(1), 42–48. https://doi.org/10.1515/rem-2018-0006

Dillenbourg, P., Schneider, D., & Synteta, P. (2002). Virtual Learning Environments. 3. https://telearn.archives-ouvertes.fr/hal-00190701

Eccles, J. C. (1953). The neurophysiological basis of mind: The principles of neurophysiology. Oxford University Press.

Eccles, J. C., Fatt, P., & Koketsu, K. (1954). Cholinergic and inhibitory synapses in a pathway from motor-axon collaterals to motoneurones. The Journal of Physiology, 126(3), 524–562.

Frauenfelder, E., Santoianni, F., & Ciasullo, A. (2018). Implicito bioeducativo. Emozioni e cognizione. RELAdEI. Revista Latinoamericana de Educación Infantil, 7(1), 42–51.

Hargreaves, D. (2011). The Challenge for the Comprehensive School: Culture, Curriculum and Community. Routledge.

Liu, C., Brattico, E., Abu-jamous, B., Pereira, C. S., Jacobsen, T., & Nandi, A. K. (2017). Effect of Explicit Evaluation on Neural Connectivity Related to Listening to Unfamiliar Music. Frontiers in Human Neuroscience, 11. https://doi.org/10.3389/fnhum.2017.00611

Livingstone, D., Kemp, J., & Edgar, E. (2008). From Multi-User Virtual Environment to 3D Virtual Learning Environment. ALT-J, 16(3), 139–150. https://doi.org/10.1080/09687760802526707

Luijtelaar, G. V., Sumich, A., Hamilton, R., & Gordon, E. (2006). Brain Resource International Database.

Mcgrath, J. E., Arrow, H., Gruenfeld, D. H., Hollingshead, A. B., & O'Connor, K. M. (1993). Groups, Tasks, and Technology: The Effects of Experience and Change. Small Group Research, 24(3), 406–420. https://doi.org/10.1177/1046496493243007

McGrath, J. E., Berdahl, J. L., & Arrow, H. (1995). Traits, expectations, culture, and clout: The dynamics of diversity in work groups. In Diversity in work teams: Research paradigms for a changing workplace (pp. 17–45). American Psychological Association. https://doi.org/10.1037/10189-001

Meghini, C., Bartalesi, V., Benedetti, F., & Metilli, D. (n.d.). Sistemi basati su ontologie per le Digital Humanities. 2.

Norman, D. A. (2010). Natural user interfaces are not natural. Interactions, 17(3), 6–10.

Ouherrou, N., Elhammoumi, O., Benmarrakchi, F., & El Kafi, J. (2019). Comparative study on emotions analysis from facial expressions in children with and without learning disabilities in virtual learning environment. Education and Information Technologies, 24(2),

1777–1792. https://doi.org/10.1007/s10639-018-09852-5

Pan, X. (2020). Technology Acceptance, Technological Self-Efficacy, and Attitude Toward Technology-Based Self-Directed Learning: Learning Motivation as a Mediator. Frontiers in Psychology, 11. https://doi.org/10.3389/fpsyg.2020.564294

Pan, Z., Cheok, A. D., Yang, H., Zhu, J., & Shi, J. (2006). Virtual reality and mixed reality for virtual learning environments. Computers & Graphics, 30(1), 20–28. https://doi.org/10.1016/j.cag.2005.10.004

Santoianni, F., & Ciasullo, A. (2019). Digital and Spatial Education Intertwining in the Evolution of Technology Resources for Educational Curriculum Reshaping and Skills Enhancement [Chapter]. Virtual Reality in Education: Breakthroughs in Research and Practice; IGI Global. https://doi.org/10.4018/978-1-5225-8179-6.ch016

Santoianni, F., & Ciasullo, A. (2020). Teacher Technology Education for Spatial Learning in Digital Immersive Virtual Environments [Chapter]. Examining the Roles of Teachers and Students in Mastering New Technologies; IGI Global. https://doi.org/10.4018/978-1-7998-2104-5.ch019

Slot, P., Romijn, B., & Nata, G. (n.d.). D5.4 A Virtual Learning Environment model of professional development aimed at enhancing diversity and inclusiveness. 234.

Wigdor, D., & Wixon, D. (2011). Brave NUI World: Designing Natural User Interfaces for Touch and Gesture. Elsevier.

Zwiers, M. P., Van Opstal, A. J., & Paige, G. D. (2003). Plasticity in human sound localization induced by compressed spatial vision. Nature Neuroscience, 6(2), 175–181. https://doi.org/10.1038/nn999