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ATINER's Conference Paper Series
EDU2016-2207

Creative Learning.
Embodied Education through a Multimodal Interface

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This paper should be cited as follows:

Zambaldi, N. (2016). **"Creative Learning. Embodied Education through a Multimodal Interface",** Athens: ATINER'S Conference Paper Series, No: **EDU2016-2207.**

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URL Conference Papers Series: www.atiner.gr/papers.htm

ISSN: 2241-2891
29/05/2017

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Abstract

In the contemporary world, the Internet and digital technologies seem to amplify the possibilities of learning for the New Generations, the "Digital Natives". But does the so-called "augmented reality" mean increased intelligence but reduced humanism? (Benassayag 2016). The research "Embodied Education through art and theater" attempts to create an experiential (embodied) background, starting from the relationship between the artistic and theatrical languages, the neurosciences and the discovery of the MNS Mirror Neuron System (Gallese, Rizzolati 1996), in order to offer a contribution for enactive (Varela, Thompson, Rosch 1991), creative and multimodal learning. The Embodied Simulation (a common underlying functional mechanism that mediates our capacity to share the meaning of actions, intentions, feelings, and emotions with others, thus grounding our identification with and connectedness to others (Gallese 2014)) tells us that at the basis of the understanding of the world, there is the representation of the aim and the sensory-motor involvement, motor and intentional basis of learning, that art and theatre express through pre-linguistic instruments: images and actions. In the last years, the educational sciences and the cognitive sciences have intensified their connections to the point of identifying (Fischer, Daniel, Immordino-Yang, Stern, Battro, Koizumi 2007): this common field concerns the classical themes of learning, memory, attention and language, but also the themes of consciousness and the body. The theoretical and empirical research, that arise at the end of the XXth Century, and now develop in cognitive sciences, is causing the change of the research interests from the brain study itself to the study of an ecological mind, of an interdependent mind between body and environment: the focus is the concatenation of mind-body-environment, the extended mind. In the amplified reality and intelligence of the 21st century we need an "interface between digital and living model" (Benassayag 2016): during the first phase, the pilot study had the goal of identifying the experiential learning to be tested in the experimental research. E.C.O. Electronic Cooperation Online mainly supplies visual tools in a learning environment embodied, using the web and network as a creative ground: from A.R. augmented reality to M.R. material reality. The action-oriented training is integrated in the kinesthetic channel with theatrical techniques (Alschitz method). The resulting experiential training E.M.I. Experiential Multimodal Interface integrates virtual and material learning environments as example of creative education practice.

Keywords: Embodied education, art, theatre, multimodal interface.

Introduction

The theoretical part of the thesis opens with the relationship between art and neuroscience. In particular, art and theatre are the languages that have always explored the world and created experiences, symbolic, aesthetic, synthetic: Zeki (2001) has even talked about "neuroaesthetics". However, this study would be better defined within an "experimental aesthetic". In fact, "the crucial point is not to use art to study the function of brain, but consists of studying the brain-body system to understand what makes us human and how. More than neuroaesthetics, I think we should speak of experimental aesthetics, where the notion of aesthetics is understood according to its original etymology: aisthesis, that is, multimodal perception of the world through the body" (Gallese 2014).

With this aim, I introduce the philosophy of "als ob" (Vaihinger 1911), in which the approach to the world as a "fiction" creates a "fictional" theoretical backdrop to the experimentation. Therefore the thesis refers to the distinction between "Leib" and "Korper" of phenomenology, in a lived experience, Erlebnis. I pass next to Heidegger - from whose deconstructive philosophy all of "critical" contemporary philosophy descends genealogically - with particular reference to Zollikon Seminars. In these seminars, physicality - to which Heidegger in Sein und Zeit paradoxically dedicated few lines - is heavily discussed, a significant fact given that philosophy is talking to psychology and psychiatry (configuring itself also as a meeting point between the spheres being discussed here). From the philosopher who authored Über den «Humanismus», I address Humanism, Post-humanism and Transhumanism as a link between culture and technology, in which Biopolitics (Foucault) is a practice of biopower, realising the "dream of eternity" within new, virtual technologies, conceiving thought as information that survives the body.

School, where knowledge is shared and transmitted, has for a long time preferred abstract (amodal) knowledge that reproduced a society of selection and control following a linear (historical) and hierarchical (political) pattern. Productive learning is based on energies that reside mainly in an emotional sphere, a deep rather than superficial learning. This deepness resides in the body or rather in fields of learning which use an integrated model of “mind”. According to this, school is the place where these models are experimented and put into practice, a place for “real experiences” (Dewey 1934). This change into active, participative embodied models is hindered when put into practice by organizing systems. This research tries to underline the contribution of a new way of conceiving art and theatre - aesthetics - as a “work on oneself”, a reflective and expanding work, an embodied one. It also offers some instruments of self-assessment and it opens a set of a self-effective learning (Bandura 2000).

E.C.O. Electronic Cooperation Online

After the introductive phase of theoretical and epistemological research, in 2015 a pilot study is carried out, with high school as a research field. The study identifies four groups of pupils (classes with the same teachers team), where an artistic and theatrical intervention will be tested (E.C.O. Electronic Cooperation Online).

"New digital technologies are removing language from its position of the main mean of experiencing realitiy. They are putting a new visuality in the body rather than in language at the centre of our world perception" (Gallese 2014).

E.C.O. is an artistic and theatrical project, created by the theatrical director Pietro Babina that has been adapted and used in the didactical practice since 2012. It considers the new forms of communication - digital, web, social network, blog, smartphones, tablet - as enhanced realities where a passive assent is transformed into relational, narrative, dialogical competences (which happens when staging and shooting). There is in the E.C.O. project a reflection and a practice about new media where you can grasp both meanings of the word "enactive" (action connected with material environment and virtual), in a traditional or blended learning:

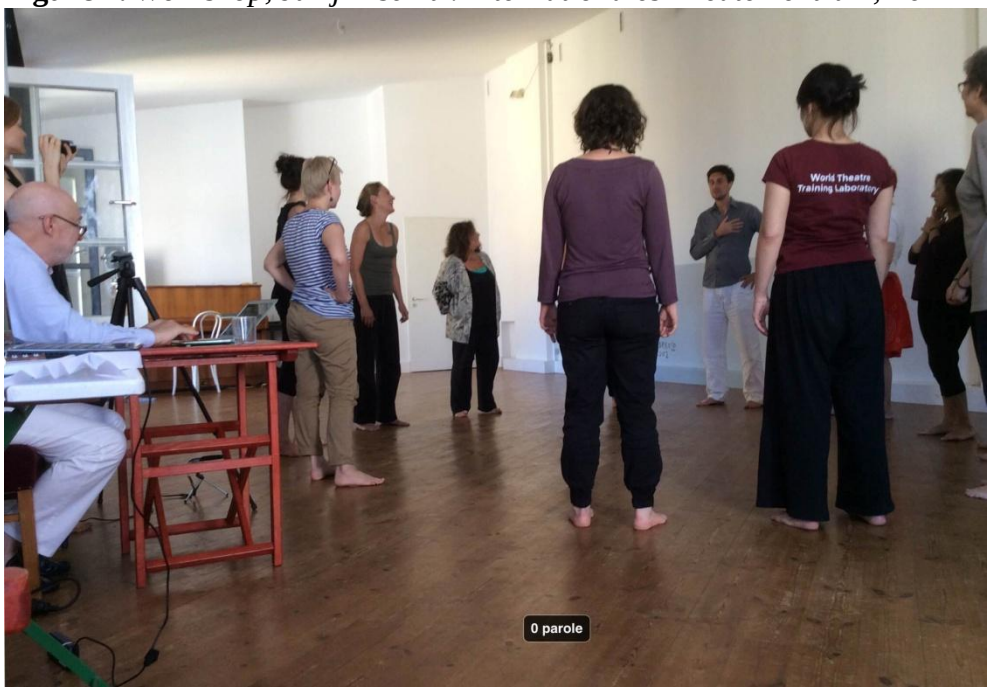
- "Cognition is not the representation of a pregiven world by a pregiven mind but is rather the enactment of a world and a mind on the basis of a history of the variety of actions that a being in the world performs" (Varela, Thompson, Rosch 1991).
- "Enactive Interaction between humans and the world (including humans and technologies) is seen as a process participating to: the co-construction of the mind with the body and the co-construction of the humans and the world. Mediated Artificial systems, called "Enactive Interfaces", which preserve this type of interaction, would be favourable conditions to understand such complex processes to allow humans to produce and create in a really fruitful way" (Luciani & Cadoz 2007).

Figure 1. *"ECO lab", Pietro Babina. Liceo "Pascoli", Bolzano, Italy*

ALSCHITZ Method

Esiaba Irobi, Nigerian dramatist and anthropologist, observed that native Americans, Asian, African as well as Aborigenal cultures all have at least ten forms of expression, other than language: iconographic, kinaesthetic, sonorous, calligraphic, proxemics, tailoring, linguistic, gustatory, olfactory, tactile and spiritual (Gallese 2014). There are two reasons why E.C.O. laboratories have been integrated and extended with some Jurij Alschitz exercises (Alschitz 2003). On the one hand because of my personal collaboration with Jurij Alschitz and on the other because of an internationally recognized pedagogic contribution, dealing with the "work on oneself" of the Russian school (there is more than a mere symbolic descendance: Alschitz is a student of one of Stanislawskij's students). This theatrical pedagogy - from which all theatrical experiences up to modern time derives - puts the vitality of the scene, the relation among actors, the actor's body in the centre. Everything that goes beyond the reductive use of the text as a mere instrument. In the middle there is the Energy where words find their reason more than in their meaning.

Figure 2. *Workshop, Jurij Alschitz. Internationales Theaterzentrum, Berlin*



E.M.I. Experiential Multimodal Interface

The experimental EMI construct, Experiential Multimodal Interface, inherits the set and mapping (Scocco 2008) of ECO to represent thoughts, imaginings and actions. The dialogue conducted online is a base for a narrative and theatrical embodiment, integrating it with a part of the theatrical training (Alschitz), a "meet and greet": - conscious breathing in a circle - patrolling the free classroom space - hand and eye contact as a greeting. In addition to the tools used in the pilot study, qualitative questionnaires were administrated during the activities, and a retrospective dialogue interview was done with the experimental group. Pre and post-test, questionnaires for a sociometric analysis of the entire sample were also done, with both the experimental group and the three controls. This was a different experimental group to the pilot study. The experimental group was additionally given a questionnaire to evaluate metacognition and a final qualitative questionnaire on the aspects investigated in the quantitative questionnaire.

The concept and construct of "interface" is put in relation to those contexts that use it (constructivism and online education), and to those suggestions pertinent to organisation and the construction of experimentation (connectionism and neural networks). The Extended Mind (Clark, Chalmers 1998) on an environmental level, situated, like empathy, on an intersubjective level, recalls the relationship between phenomenology and neurophenomenology. The "extended mind" inspires mapping, inter and intraconnectivity, in "situated" experimental methodology, as “experiential learning” (Kolb 1984).

The mixed learning environment, blended learning, can metaphorically be considered as a “Plato’s cave”, of which the school room can be the “atelier”, one of the different material environments. In this environment two mirrors are placed. The first one is a virtual mirror, where interconnective, reflexive and transformative experiments about augmented web, video and smartphone reality are experimented. The second mirror reflects the theatrical work on the self, the body, the relation, the visual contact, the breath.

If the pilot phase was more focused on defining contents and instruments, the experimental phase emphasizes the multimodal training as a laboratory of creative education practices:

- using the web as a virtual platform of sharing and open resources, tools and practices
- organizing the classroom not in vertical (amodal) but in horizontal (multimodal) team work, with the teacher in the role of facilitator
- using a material and virtual environment for a integrated learning inside and outside the school and the classroom
- integration of differents learning environments and disciplines (through mapping, framing) as exercise to increase knowledge as free dissemination, connection and collaboration.

Figure 3. “*EMI” workshop, Nazario Zambaldi. Liceo “Pascoli”, Bolzano*

Measurements

Tests and questionnaires for the measurement of the life skills are administered at the beginning (Pre-test) and at the end of the intervention (Re-test). In addition to the tools used in the pilot study, qualitative questionnaires were administrated during the activities, and a retrospective dialogue interview was done with the experimental group. Pre and post-test, questionnaires for a sociometric analysis of the entire sample were also done, with both the experimental group and the three controls. This was a different experimental group to the pilot study. The experimental group was additionally given a questionnaire to evaluate metacognition and a final qualitative questionnaire on the aspects investigated in the quantitative questionnaire. The E.C.O. laboratory aims at acquiring the knowledge of artistic and theatrical languages which include transversal competences: organization, participation, communication and relation. The experimental study is thus used for testing variation in life skills, in the levels of agency, self-efficacy felt as self-awareness as well as self-consciousness. The pilot study focuses on those elements in art and theatre which make the perfect ground for embodied learning - syntonization between communicating people, relational background as an extended mind, and self reflection on the process as metacognition.

Table 1. *Between-Subjects Factors.*

		N
classe	2E	11
	2M	20
	3D	19
	3E	12

The interviews of the participants (both pupils and teachers) complete the study and prepare the real experimental research. E.C.O. is a project which lasted 50 hours over a period of two weeks time but in a second phase the experimentation will take place over a period of some months time. In this first phase of the year 2015 the empiric research is focussed on instruments of quantity and on experiencial tools that need to be applied. The tests about self-efficacy are taken from GSE General Self Efficacy Scale (Chen, Gully, Eden 2001), and from GSES General Self-Efficacy Scale (Sibilia, Schwarzer, Jerusalem 1995). Besides, tests are used dealing with adolescents' positive and negative emotions, with their perception of school, the empathic self-efficacy (Caprara 2001). As far as self awareness is concerned, it refers to the SSAS Situational Self Awareness Scale (Govern, Marsh 2001), SCS-R Self-Consciousness Scale (Scheier, Carver 1985), Private Self Consciousness Scale (Trapnell, Campbell 1999). Some items on emotional dealing and on the "locus of control", are taken from MSWS Multidimensionale Selbstwertskala (Schütz, Sellin 2006) and from FKK Fragebogen zu Kompetenz- und Kontrollüberzeugungen (Krampen 1991). These two scales are experimented too (ESAS Embodiment Self Assessment Scales:

EmSAS, EnSAS). One is about self-assessment of embodied quantity of experience, in a traditional environment whereas the other scale refers to a mixed environment (blended learning).

Table 2. *Estimated Marginal Means*

Pairwise Comparisons								
							95% Confidence Interval for Difference[b]	
Measure	classe	(I) som1som2	(J) som1som2	Mean Difference (I-J)	Std. Error	Sig.[b]	Lower Bound	Upper Bound
GSE	2E	1	2	7,105E-15	,610	1,000	-1,221	1,221
	2M	1	2	-,400	,452	,380	-1,306	,506
	3D	1	2	-,632	,464	,179	-1,561	,298
	3E	1	2	,750	,584	,204	-,419	1,919
GSES	2E	1	2	-,182	,561	,747	-1,305	,941
	2M	1	2	-,250	,416	,550	-1,083	,583
	3D	1	2	-1,368	,427	,002	-2,223	-,514
	3E	1	2	,583	,537	,282	-,492	1,658
APGEN	2E	1	2	3,553E-15	,767	1,000	-1,535	1,535
	2M	1	2	-7,105E-15	,569	1,000	-1,138	1,138
	3D	1	2	-2,316	,583	,000	-3,484	-1,148
	3E	1	2	-1,500	,734	,046	-2,970	-,030
APGEP	2E	1	2	,182	,491	,712	-,800	1,164
	2M	1	2	,150	,364	,682	-,578	,878
	3D	1	2	1,263	,373	,001	,516	2,010
	3E	1	2	,833	,470	,081	-,107	1,774
SAEP	2E	1	2	,091	,669	,892	-1,249	1,431
	2M	1	2	,500	,496	,318	-,493	1,493
	3D	1	2	-,789	,509	,126	-1,809	,230
	3E	1	2	,667	,641	,302	-,616	1,949
SASP	2E	1	2	,091	1,118	,935	-2,148	2,329
	2M	1	2	,300	,829	,719	-1,360	1,960
	3D	1	2	-,842	,851	,326	-2,545	,861
	3E	1	2	-1,750	1,071	,108	-3,893	,393
APSP	2E	1	2	1,421E-14	,805	1,000	-1,611	1,611
	2M	1	2	,750	,597	,214	-,445	1,945
	3D	1	2	,158	,612	,797	-1,068	1,384
	3E	1	2	-,500	,771	,519	-2,042	1,042
APCIS	2E	1	2	,545	1,466	,711	-2,388	3,479
	2M	1	2	-,400	1,087	,714	-2,576	1,776
	3D	1	2	-,579	1,115	,606	-2,811	1,653
	3E	1	2	1,750	1,403	,217	-1,059	4,559
ESAS	2E	1	2	-1,636	2,753	,555	-7,148	3,875
	2M	1	2	-,450	2,042	,826	-4,537	3,637
	3D	1	2	-2,368	2,095	,263	-6,562	1,825

	3E	1	2	5,667	2,636	,036	,390	10,943
SCSR	2E	1	2	-1,421E-14	1,308	1,000	-2,618	2,618
	2M	1	2	-,400	,970	,682	-2,342	1,542
	3D	1	2	-3,737	,995	,000	-5,729	-1,745
	3E	1	2	2,917	1,252	,023	,410	5,423
SSAS	2E	1	2	,273	,630	,667	-,989	1,535
	2M	1	2	-,250	,468	,595	-1,186	,686
	3D	1	2	-2,053	,480	,000	-3,013	-1,092
	3E	1	2	-1,333	,604	,031	-2,541	-,125
EmSAS	2E	1	2	-1,364	,885	,129	-3,135	,408
	2M	1	2	-,400	,656	,545	-1,714	,914
	3D	1	2	-2,684	,673	,000	-4,032	-1,336
	3E	1	2	,250	,847	,769	-1,446	1,946
EnSAS	2E	1	2	-,727	,721	,317	-2,170	,716
	2M	1	2	3,553E-15	,535	1,000	-1,070	1,070
	3D	1	2	-3,579	,548	,000	-4,677	-2,481
	3E	1	2	,333	,690	,631	-1,048	1,715

Based on estimated marginal means

b. Adjustment for multiple comparisons: Bonferroni.

Table 3. *Multivariate Tests*

classe		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
2E	Pillai's trace	,089	,346[a]	13,000	46,000	,980	,089
	Wilks' lambda	,911	,346[a]	13,000	46,000	,980	,089
	Hotelling's trace	,098	,346[a]	13,000	46,000	,980	,089
	Roy's largest root	,098	,346[a]	13,000	46,000	,980	,089
2M	Pillai's trace	,142	,587[a]	13,000	46,000	,852	,142
	Wilks' lambda	,858	,587[a]	13,000	46,000	,852	,142
	Hotelling's trace	,166	,587[a]	13,000	46,000	,852	,142
	Roy's largest root	,166	,587[a]	13,000	46,000	,852	,142
3D	Pillai's trace	,702	8,346[a]	13,000	46,000	,000	,702
	Wilks' lambda	,298	8,346[a]	13,000	46,000	,000	,702
	Hotelling's trace	2,359	8,346[a]	13,000	46,000	,000	,702
	Roy's largest root	2,359	8,346[a]	13,000	46,000	,000	,702
3E	Pillai's trace	,547	4,271[a]	13,000	46,000	,000	,547
	Wilks' lambda	,453	4,271[a]	13,000	46,000	,000	,547
	Hotelling's trace	1,207	4,271[a]	13,000	46,000	,000	,547
	Roy's largest root	1,207	4,271[a]	13,000	46,000	,000	,547

Each F tests the multivariate simple effects of som1som2 within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Conclusions, Expected Outcomes

The conclusions arrive at a point but are to be continued:

- in the pilot study: the definition of an enactive and embodied practice, in a mixed and traditional contest,
- in the experimental research: the efficacy of the experimental training,
- in the tests with the EMI interface, as an experiential didactic mediator, it displayed an embodied set (visual and physical contact, mapping of thoughts and environment),
- in experimental aesthetics in which in the artistic and bodily dimensions integrate a discursive phenomenological approach in visual, incorporated thinking,
- in the connection of Embodied Education as a pedagogy of embodiment (Verkörperung) between empirical and theoretical dimensions, cognitive and phenomenological neuroscience in dialogue.

After the discussion, using schemas, constructs and models, which were the tools used in the representative "games" of the experience, we pass to the videographic phenomenological analysis (Brinkmann, 2015).

The techniques become the multimodal interface to build an environment for enactive learning that could be a model of creative education practices. The testing of EMI took place from January 2016 to April 2016 during a period of four months. The processing of the experiment's results, the quantitative and phenomenological analysis are ongoing.

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