Emotional Competence and Affective Computing as Factors of Formation of Individual and Social Identity

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ABSTRACT

This experience of psycho-emotional education is part of more extensive international researches based on the hypothesis that the "emotional experience", if inserted in the daily conduct of the school curriculum, especially in the nursery school one, represents an excellent training opportunity, since it fosters the learners' best perception of the self, thus strengthening their expressive and communicative attitude. On the basis of Social and Emotional Learning (SEL) principles and inspired by a previous experience carried out by the Department of Human Science for training, this experimental project has been put into practice by some nursery schools in RC, thus providing very interesting data for the confirmation of the hypothesis. It has been also developed a study on the affective computing and the cognitive computing pursuing a new perspective that exceeds the traditional vision of what is defined as artificial intelligence and analyzes intelligence and aspects of perceptions, often neglected, with a methodological approach considering the emotional processes as important as the cognitive ones.

Keywords: *Curriculum, Emotion, Emotional Machines, Field Of Experience, Music, Nursery Schools, Personality, Social and Emotional Learning (SEL), Social-Emotional Competence*

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1. INTRODUCTION

It is amazing that, until quite recent times to us, psychology greatly neglected to investigate and to emphasize the important function that the emotional component has on learning. Such lack of interest is pretty obvious, for example, in a remarkable protagonist of the developmental psychology, Jean Piaget, whose studies were focused on intellectual development but not on the emotional one (Brockmeier, 2011).

In recent years (Barone, 2009), however, the situation is deeply changed. The psychological research, in fact, is strongly focused on the theme of the emotional roles in the exercise of human acts, to demonstrate the strong relationship of interdependence existing between emotion and behavior. It highlighted, for example, that emotion is to be correlated with a constellation of complex responses that the body produces in response to certain stimuli, from which arise bodily reactions, from a physiological (heart rate acceleration, sweating ...), behavioral (facial expression, body posture...) and cognitive (assessment of the emotigenous stimulus...) point of view. Thus, the emotion not only is increasingly recognized as an essential element of the psychological sphere, but in relation to it the shaping of the psycho-physical well-being of the person, is also considered an insuppressible element for the quality of social identity formation.

Hence, special attention is paid to educational institutions, especially in the early levels of school attendance and in close continuity with the experiences carried out in family, in planning and in carrying out educational actions.

Antonio Iannaccone and Claudio Longobardi, for example, in the text Outlines of School Psychology, analyzing the teacher-pupil relation highlight that one of the fundamental duties of all educational figures entering the field in the educational process is to promote and support students in the complex and delicate task of approaching to personal and social life. This task, resolvable with the use of a significant ability to listen and understand the needs of their learners, promotes the construction of an "emotional nest" where they can live peacefully the different conditions of learning (Iannaccone & Longobardi, 2004).

The real problem is that education is committed, now more than ever, having to deal with a problematic and complex society, whose identification characters are shown in the "knowledge" (Lisbon European Council 2000) and in "globalization". It is a society that increasingly leads to the use of media and electronic languages, such as emails or chat, placing in second order so much of the verbal language, so as non-verbal one. This one is typical of the languages of corporeality related to mimic and gestures and elements of skills and competences.

To investigate the matter, it can be said that in this society communication and digital information are monopolized and aimed to purely consumerist models of social identification, while having to impose ethical conduct inspired by the principles of democracy and the protection of the person, such as respect, solidarity, cooperation, dialogue. In fact, even in the family context it can be observed a lack of communication among its members. Children in particular are often totally "immersed" in the full fruition of increasingly compelling technology and development attention.

The school takes on the task of promoting the mental well-being of learners acting not only on intellectual development, but also on the emotional and motivational aspects, considered foundational components of personality and able to orient the new generations in the complex system of ethical, social and cultural values.

They are used, according to the results of several recent surveys (Zins et al., 2004; National Institute for Early Education Research, 2005; Dumbleton & Gliman Bennett, 2009; Sel, 2004) which have unanimously shown that socio-emotional skills have a significant impact both on cognitive development and the acquisition of competences. In particular experiences these surveys highlight the need, during the basic formation, of experiences based on themes such as fairness, respect for others, cooperation, ability to resolve conflicts, the ability

to assess their own and other people's emotional states and a growing emotional self-regulation (Goleman & Gyatso, 2004). An assumption, this one, shared by many international authors, such as Goleman and Growald (1996), Kindlon and Thompson (2000).

Indeed, Goleman affirms: "Because many young people the family context no longer offers a secure foothold in the life, schools remain the single institution to which the community may seek to correct the emotional skills, and social guys [...] the school is a place that allows you to reach each of them and to provide it with basic lessons for life which, otherwise, could never receive [...] emotional literacy extends our vision of mission schools, giving them more explicitly a social role in imparting to children essential life lessons [...] we must not leave the emotional education to chance, but adopt innovative school courses that teach self-control, self-awareness, empathy, listening and cooperation" (Goleman, 1996, p. 173).

Likewise Kindlon and Thompson, assert:"teaching the alphabet of emotions to help boys become young men balanced and peaceful [...] so we learn to appreciate the complexity of the emotional life and this improves our personal and professional relationships, helping to strengthen bonds that enrich our life" (Kindlon & Thompson, 2000, p. 72).

Application of the foregoing, with regard to procedures and educational pathways, can be traced back to several experimental initiatives, although they seem to emerge, due to their capabilities, those based on musical experience (Kindermusik) and those related to the drafting of "standard of learning" (SEL).

2. PROPOSALS BASED ON MUSICALITY

Among the proposals spread throughout the world, having as main objective to promote the increase of social and emotional skills, in order to ensure the overall development of the person, are those designed on musicality. Among these, there is the one of Kindermusik Music & Social-Emotional Development which originates from the early music programs produced in Germany around '60 (Neuhäuser, 1971 & Jengtes). It is a methodology that has found widespread application in many parts of the world, for early childhood education, having demonstrated its strong utilities for the enrichment of intra-psychic world of the child. It is based on materials, instruments and musical activities, aimed at facilitating the acquisition of greater security of the self and the expressive and communicative full development, promoting inclusive and "integrating" processes with which the individual has the possibility to assert his/her identity in a multi-cultural and multi-linguistic society.

The basic principles of the methodology are the following:

- Each parent or tutor is the most important teacher for the child;
- Every child is "musical";
- The House is the most important place for learning;
- The music helps cognitive, emotional, social, linguistic and physical development.
- Children grow up in an environment focused on the baby where the activities are appropriate from a developmental point of view;
- Educators emphasize the learning process – not even the performance –of making music;
- Every child should experience the joy, the fun and learning that music brings in life (Kindermusik, Italy, 2010).

The Kindermusik, therefore, has a very strong methodological basis and the results of some research show that the development of a good social and emotional capacity is closely related to cognitive development and school success (National Institute for Early Education Research, 2005).

Children attending a Kindermusik class can be engaged in activities that allow them to build a sense of themselves and of competence. These could play a homemade battery in creativity, "flying" metaphorically (like birds), feeling

like the seeds that grow from the Earth, freely expressing the self. The acquisition of skills is, therefore, directly related to the exploration, to do, to build things creatively, fully expressing their individuality.

Learners, supported by songs, are driven to emotional exploration, experience empathy games, recognize and identify moods, they free progressively from dependence on their impulses. Importantly, in this program, it is also the continuity of domestic routes, to be completing the work initiated at school and sharing with parents (Dumbleton & Gilman, 2009).

On the line is important to cite the research carried out by E. Glenn Schellenberg and Monika Mankarious, at the University of Toronto (Schellenberg & Mankarious, 2012), which aimed to examine the predictive role of musical education in the understanding of emotions. The results of the research have highlighted the existence of a positive correlation between musical training and performance testing of emotional competence in childhood.

It must be remembered, however, that the very nature of music is linked to sentiment, to the expression and perception of emotions (Hunter & Schellenberg, 2010).

3. EMOTIONAL INTELLIGENCE PROGRAMS (BOND & HAUF, 2004; HAWKINS, SMITH, CATALANO, 2004 &; NATION ET AL., 2003; WEARE & NIND, 2011)

In 1983 Howard Gardner, with the theory of multiple intelligences, expanded the concept of human intelligence, indicating seven kinds of intelligences (Gardner, 1983).

Among these, interpersonal and intrapersonal intelligence can be considered the closest ones to the concept of emotional intelligence which will be proposed by Salovey and Mayer in 1990 and then popularized by the American psychologist, writer and journalist Daniel Goleman.

He has the great merit of having declined and shared the concept of emotional intelligence, considering it as the ability to motivate oneself, to persist in pursuing a goal despite the frustration, to control impulses and delay gratification, to modulate the moods to avoid suffering, of being empathic and hoping (Goleman, 1999).

Indeed, Goleman had already worked on the emotional component of man, creating, in 1994, with Eileen Rockefeller Growald, a non-profit organization. CASEL (Collaborative for Academic, Social and Emotional Learning) which soon became the largest world Research Institute on SEL (Social Emotional Learning) already committed to supporting scientific research and educational practice, with regard to social and emotional learning. The goal was to be able to stimulate and/or encourage, through proper interaction between the educational activities, proper management of emotions, that mature in the appropriate strategies to defend pupils against the pressure and the opposition of the group, as well as learn how to handle stress.

In 2007 CASEL, in *The positive impact of social and emotional learning for kindergarten*, published the results of a meta-analysis, based on 213 studies in SEL programs, involving approximately 270,000 students in urban, rural and suburban schools of America. The data collected and codified confirmed that the use of emotional abilities allows the implementation of the level and the quality of teaching and education, helping the formation of both individual and social identity. Indeed, the pupils emotionally formed, compared with peers, demonstrated to have achieved a better academic performance, to present lower levels of emotional stress, less problematic behaviors and more social and empathetic attitudes (CASEL, 2007).

It is the publication of those results to encourage the United States of America to adopt and develop "programs" of emotional education, placing them in the ordinary school curriculum.

One of the most important reference for the evaluation of this initiative is the one of Illinois (k-12), with the participation of students of different school levels, from kindergarten to secondary school (Kendziora, Weissberg, Ji & Dusenbury, 2011).

The Illinois project focused on three global objectives, each one including specific learning standards:

Objective 1: Development of the self-awareness and self-management. Promotion of skills to achieve success in school and life.
- Learning standard a: learn to identify and manage their emotions and their behavior.
- Learning standard b: Recognize personal qualities and external supports.
- Learning standard c: Promoting the skills related to personal and academic goals.

Objective 2: Use of social awareness and interpersonal skills to establish and maintain positive relationships.
- Learning standard a: learn to recognize the feelings and expectations of the others.
- Learning standard b: Recognize the similarities and differences between the individual and the group.
- Learning standard c: Use communication and social skills to interact effectively with others.
- Learning standard d: Demonstrate an ability to prevent, manage and resolve interpersonal conflicts in a constructive way.

Objective 3: Establish decision-making capacity and responsible behavior in personal situations, school and social contexts.
- Learning standard a: Consider ethical factors, and social security in making decisions.
- Learning standard b: apply decision-making skills to respond responsibly to the academic and social situations of everyday life.
- Learning standard c: contribute to the well-being of their own school and community.

It is a model also followed by Kansas, Oklahoma, Pennsylvania, etc., with other interesting results, confirming the initial hypothesis (Kansas Standards for Communication; Oklahoma Rubric Describing School Climate; Pennsylvania School Climate Standards – Draft; Pennsylvania Interpersonal Skills – Draft Standards; Tennessee Service-Learning Standards; Vermont's Vital Results Standards within its Framework of Standards and Learning Opportunities; Washington Communication Learning Standards).

4. ASSESSMENT TOOLS

The increase and spread of SEL in the world led to the creation of more accurate assessment tools. Indeed, in 2008 the CASEL has set up a working group for the drafting of a specific assessment grid concerning the application of these programs in basic school, based on the evaluations of teachers.

This choice was based on the assumption that the use of the scales of assessment by teachers allows a more appropriate assessment of the learner and of his/her behaviors.

The advance Team of CASEL has identified the fundamental criteria for the construction of assessment tools, i.e.:

1. The assessment should measure the SEL constructs;
2. The assessment should be appropriate for grades pre-k up to five;
3. The assessment should be carried out within a reasonable amount of time (e.g., 10-20 minutes);
4. The assessment must have adequate reliability and validity;
5. The assessment relies on standard data or reference values to interpret the results;
6. Where possible, the measure must be available for electronic delivery, which is faster and less expensive than paper.

Of remarkable interest is also the project realized by Davide Antognazza and Luca Sciaroni at the University Professional School of Locarno, which focused on the increasing socio-emotional competences in pupils of some

kindergartens and primary schools of Canton Ticino (Antognazza & Sciaroni, 2010).

Teachers, properly trained for managing emotions in the classroom, were engaged in stimulating their learners to understand, recognize and manage emotions, by applying SEL skills into everyday life.

Educational interventions that followed have focused on the realization of designs and storytelling, Act real life episodes, etc. It has been also used specific material such as "Madam" or "Mr. anger disgust", puppets for the invention of stories with a rich emotional content. There are also some tools that encourage self-control, as the story of the turtle:

A young turtle is teasing and can't find friends. An older turtle suggests it to retreat into its shell and take a deep breath to think about how to solve the problem, then to come out and try different behaviors to overcome difficulties, each one with different results. The old turtle teaches to deal with emotions in a responsible way, in addition, crossing hands on chest and breathing to calm down, offers to young children a gesture associated to the solution of the problem. At this point the teacher can intervene, by letting the child know the emotion he is feeling, trying to confront him and helping him breathe deeply and once the problem has passed, asking him if he feels calm.

The results obtained have further demonstrated the validity of the hypothesis promoting experimentation models of psycho-educational intervention that focus on emotional competence and that have as final objective the acquisition of social competence.

5. EMOTIONAL COMPETENCE

Emotional competence, also known as socio-emotional competence or emotional-affective competence (Bonichini, 2002), reflects the social and relational nature of human beings. One of the first to define this competence was Steven Gordon, in 1989, who indicated it as a collection of knowledge and behaviors, such as knowing how to express and interpret emotions, being able to control the emotional expression in context, adequately know the emotional vocabulary and, finally, to cope with painful emotions (Gordon, 1989).

Subsequently, this competence was defined as the set of practical skills necessary for effectiveness (self-efficacy) of the individual and social transactions that provoke emotions (emotion-eliciting social transaction) (Saarni, 1999).

Susan Denham (1998), analyzing constructs and ideologies of previous authors, structures the emotional competence into three main categories of skills: the expression, the understanding and the regulation of emotions.

With the expression of the emotions the author refers to the ability of people to communicate using symbols of verbal and nonverbal kind integrated to convey the meaning. Through these "signals" children express their emotional states, such as the joy to see MOM, after a brief separation, through the smile; or the fear of taking part in a school play, through the jangly in front of a large audience, etc.

The expression of the emotions is conveyed, therefore, through different communication channels, many of them of non-verbal kind, such as face, gestures, voice, use of space, or proxemics, posture and body contact (Argyle, 1998; Zani et al., 1994; Anolli, 2009).

If such up-front competence of childhood is based on the pre-verbal emotional dialogue, with the growing age it becomes indispensable for social exchanges. In fact, understanding emotions is essential to recognize the intentions, desires, moods and feelings that motivate the actions of the others. It deals with the "theory of emotional mind" (Saarni & Harris, 1989), which seeks to define the nature of emotions, the different causes that generate and manage them.

Important in this context is the development of the psychological lexicon, which marks the children achievement of linguistic symbols for emotional sphere and the inner world. Terms like "angry", "be happy", "be afraid", are used by children at an early age to refer to emotions just by themselves and by others. This competence is present since the early years of life and tends to increase with the normal psychophysical development, while understanding complex

emotions develops from five or six years of age, that is when children begin to categorize such emotions: pride, embarrassment, guilt, shame, hatred, and so forth.

The regulation of emotions is a complex and articulated that the child should win because it represents a fundamental features of social functioning (Gross, 2007). In the course of its normal development the child passes by a Dyadic regulation of emotions, in the care of a caregiver self-regulating emotions (Tronick et al., 1978).

While initially the active role of the parent is essential for the recognition and management of an emotional experience, over time and through experience the child becomes increasingly autonomous, emulating the same parent. Why, if the child has a good bond of attachment with the parent, will tend to get involved in situations that trigger emotions, learning to express them clearly and directly. Over time, he becomes an "emotional agent", capable of expressing their affective States intentionally and emotional, checking them and modifying them if necessary.

6. PROPOSAL AND TESTING OF A PROJECT OF "EMOTIONAL LITERACY"

Starting from these assumptions and taking into account the positive results obtained with the various emotional education projects realized all over the world, a psycho-educational path has been proposed, with the aim of fostering the development of emotional competence in children of the kindergarten.

The definition and content of the methodological experimentation project followed the the guidelines formulated by the Department of Human Science for Education "R. Massa" (Grazzani Gavazzi, Ornaghi & Antoniotti, 2009), as well as the theoretical constructs and the educational practice of SEL (SEL 2004), taking into account the specific nature of the context of realization.

The project has a socio-constructivist-approach (Saarni, 1999; Sroufe, 2000) which directly involves the adult for guiding and sharing the experience with learners, facilitating conversation and communication between the members of the group during the activities. All these activities referred to the emotional competence approach.

The entire project has been formulated taking into account two specific aspects of an outbreak of emotions: understanding and expression. Aspects which are related to different skills/abilities, such as: knowing how to express and acknowledge their own and others emotions, be aware of the channels for expressing and communicating the emotions, to recognize and understand the various types of causes (internal and external), and so on.

6.1. Objective

The aim of the project was to determine whether and to what extent the emotional experience, structured in micro-laboratory activities, could implement the emotional competence of children attending kindergarten, declinable in a better understanding and expression of emotions. In particular, it aimed to observe if, by emotional training, it was possible to promote the development of detection and discrimination of the emotions, and their external and internal causes. This in the belief that acquiring adequate skills in the management of emotions has a strong impact on the formation of individual and social identity.

6.2. Methodology

6.2.1. Definition of the Sample

The first issue was the definition of the reference sample.

The choice involved 76 children aged 4 - 5 and attending 4 kindergartens in a quite homogeneous area of the town hall of Reggio Calabria:

- "Baby planet" Gallico (outskirts of Reggio Calabria)
- "Green Island" (the area South of Reggio Calabria)

- "Train of dreams" (the area South of Reggio Calabria)
- "Baby Popeye" (the North-Central area of Reggio Calabria)

However, it was necessary to determine in advance what was their real emotional competence, such as to justify the application of a specific emotional training.

6.2.2. Assessment Tool

The instrument used for the above-mentioned evaluation, was the TEC (Test of Emotion Comprehension) designed by Pons and Harris in 2000 and standardized in Italy by a group of researchers from several universities (Albanese & Molina, 2008).

The TEC is composed of 23 card boards, in double version: male and female (the first starring a child, the second a little girl).

The first five plates depict four faces expressing different emotions (happiness, sadness, fear and an absence of emotion – defined as "regular expression"); for each of these the child is asked to recognize and identify the emotion (recognition). The remaining plates consist of two parts: the upper part is a short story, the lower one – to discover after you have told the story represents four faces, each one expressing an emotion; the child must choose the emotion that corresponds to the life of the protagonist of the story (component cause).

The answer page allows the recording of the answers given by children. The coding page allows the calculation of the raw score of the child quickly and easily. Finally, the standardized score page, allows the allocation of its standardized scoring in relation to age.

6.2.3. Application Process

In the initial stage, the test (TEC) was applied to all children individually, in the form of a game, and in a peaceful context (section).

The results obtained have led to establish the need/opportunity to increase emotional competence only in 42 children who had obtained the lowest scores in the recognition of emotion and its cause ("baby planet" and "Train of dreams").

6.2.4. The Program

The program was divided into eight activities: four devoted to the emotional expression, three to the understanding of emotions and its possible causes and a concluding activity. The realization of each work session was focused generally on the main emotions (happiness, sadness, fear and an absence of emotion – defined as "regular expression") with particular reference to those little recognized and understood by children, or "normal" (often mistakenly confused, as shown in Table 1) and "happiness" (which often were not including causes, as shown in Table 2).

Referring to the expression of emotions, two laboratories were made, an artistic laboratory, characterized by the use of graphic and manipulative material, and a laboratory of expression, consisting of video-media material. By means of these laboratories, it was necessary to stimulate children to experience, reflect and discuss on the different ways in which emotions can be expressed.

With reference to the understanding of emotions, the project was divided into two phases:

1° Stage: Work on understanding of emotional expression.

Table 1. Position indices and dispersion (assessment phase)

	Subjects	Medium	Deflection standard	Std. Error Mean
TOTAL PRE	42	3,17	1,591	,246

Table 2. Results of the recognition of emotions (assessment phase)

Emotion	correct answers	wrong answers
Sad	80.76%	19.3% (11.5% angry and 7.6% happy)
Happy	78.84%	21.15% (9.6% normal, 3.8% scared and 5.76% sad)
Angry	94.7%	5.76% (1.9% normal, 1.9% happy, and 1.9% scared)
Normal	**57.6%**	**42.3%** **(30.7% happy, 7.6% sad and 4.3% angry)**
Scared	86.5%	13.46% (9.6% angry, 2.1% happy and 2.1% normal)

2° Stage: work on understanding of external and internal causes of the emotions.

The work on the understanding of the causes is based on storytelling and dramatization of small fables aimed to foster the discrimination of two scenarios, one for internal causes and one for external ones.

The different activities carried out in the micro-thematic workshops, were structured in three distinct phases:

1. An initial moment of formation of the Working Group, by creating an environment and a good and co-operative atmosphere;
2. An intermediate stage, with the presentation of a stimulus-situation (discussions, presentation of different material, guided conversations, etc.);
3. A final phase of shared meanings.

The psycho-educative path, with all its laboratory activities, was achieved through the formation of group-classes, in a quiet place, acoustically isolated from the rest of the school, called "the angle of the emotions", which is a suitable place picked out together where children could freely express their emotions.

Initially children were gathered and led in the "Emotional Angle", where the stimulus-situation was presented; request for drawing or verbally expressing an emotion (in the case of emotional expression), or invitation to listen to short illustrated stories (in the case of understanding of emotions). At the end, children laid out in circles, and actively involved in discussions about the activities carried out, encouraged to exchange the points of view and to summarize together the findings from such experience.

Significant were the final moments dedicated to free expression of feelings, impressions and thoughts that every little "emotional agent" had felt during the making of the work.

5.2.5. Activities

The activities carried out were eight:

1. **Activity 1:** The children were asked to draw emotion "happiness", having shown their characteristics of a happy face (like a smile). The drawings were hung on a bulletin board used as a stimulus for conversation about this emotion.
2. **Activity 2:** Similar to the first task, children were asked to draw the "normal" face, highlighting the features of the face that "wear" everyday. During the conversation in group the feature that children mostly highlighted was the "face with a straight line".
3. **Activity 3:** Reminding to the other most common emotions (fear, anger and sadness), children were asked to "wear them",

that is, to crop a photo with the faces that express different emotional states and put them on their face.

4. **Activity 4:** Children, arranged in a circle, were asked to express the emotions of anger, sadness and fear, paying attention especially to the expression of happiness, highlighting the differences from a normal facial expression. Children, through voice, body, movements and puppets (sel), tried to express the different emotional states. In particular, uttering or making a short sentence in a neutral way (e.g. "today is Thursday") the children were asked to repeat it expressing anger, sadness, fear, happiness and, finally, with regular expression.
5. **Activity 5:** Children, after reaching, as a group, the angle of emotion, sat down in a circle and, using the graphic material gathered during the previous activities started a conversation about signals that help to understand when a person feels happy, sad, angry, etc. (e.g. demand stimulus: "from what we understand that a partner and/or person is happy?", "looking at photographs what can we see?")
6. **Activity 6:** Children were presented two brief scenarios, for stimulating the understanding of external causes that commonly cause happiness. The two short stories, described below, were accompanied by cartoons.
    a. Today is Andrew's birthday, he turns 5 years old. He is going with his parents to buy a present. "It's a nice surprise" tell him his parents. At the shop, Andrea discovers that it is a pet store. MOM says:

we know that your biggest desire is to have a dog all for you, so we decided to give you one. Then you can choose what you like best about .

    b. Samuel is playing football with his teammates. During the game, his partner passes the ball and he, with a beautiful shot, scored a goal! His first goal.
7. **Activity 7:** similar to the previous task, children were presented two brief scenarios that encourage the understanding of internal causes that commonly cause happiness. These stories, described below, were accompanied by cartoons.
    a. Its summer and Alice are leaving for the beach with the whole family. This year will be in the same camp last year and Alice is happy because he knows they will be still the same friends who met last year.
    b. Stephen is at home and he is getting bored. Then, however, he remembered that later in the evening his dad has promised that he will bring home a new game and play so much together. So, Stephen, happy, waiting for his dad.

After reading the short stories showing children the cartoons that accompanied them, has enabled a conversation focused on how the protagonist feels and which are the causes that have brought happiness.

The whole thing was repeated with the thrill of normality.

8. **Activity 8:** during the final phase the contents of the previous meetings have been summarized, inviting children to express emotions and stimulating them to reflect on the fact that emotions may be caused by external events but also by internal states such as memories, thoughts and beliefs.

Eventually it was decided to assign "homework" to be done at home with their parents, or to create a graphical representation of an "emotional" state where history highlights the type of cause that creates the emotion.

6.3. Results

6.3.1. Assessment

From the detection and analysis of data obtained through the administration of the TEC, it appears that, in general, the score achieved by the subjects, with a trend of 3 is slightly lower than the value expected from the modal Tec. The instrument provides a score modal waited for 5 years of age of 4.

In Table 1 are shown the position indices and dispersion of the data obtained in the preliminary phase the training.

Specifically, they investigated the different components of the instrument through the working out of percentage calculations on the responses emitted by the student. most of the children are able to attribute shows the basic emotions, however, not all are able to recognize the signs of facial emotion, indicating, erroneously, emotions different from those shown graphically. The main difficulties encountered by children regarding the labeling of the face that did not express any emotion. In fact, 42.3% of the sample, even in the absence of indicators denoting a particular state of mind, emotion has attached to the face presented, emitting a response is not consistent with the visual representation (Table 2).

A further aim of the research was to investigate the ability of children to identify possible contextual situations (external cause) that could give rise to emotions. As can be seen from the table, in the processes of attribution of cause of the emotions, the percentages of correct responses have decreased. In particular, the 59.6% of the sample showed considerable difficulties to indicate the reasons that could have determined the absence of emotion (Table 3).

6.3.2. Training Outcomes 3.2.

At the conclusion of emotional training, to verify the results, children were referred back to the administration of the TEC.

At the conclusion of emotional training, to verify the results obtained, the children were retested by the administration of the TEC.

The scores obtained were average and modal approached the normative value of the TEC by age, as shown in Table 4.

It is apparent, therefore, that fashion is equal to 5, that is slightly higher than the expected value. Also, in reference to specific components covered in the training, you may point out the following improvements:

- Recognition of the absence of emotion and correct labeling of the face matching: Unlike the answers given before training, after training by the evaluations, it appears that 78% of the sample has recognized the

Table 3. Results related to the recognition of the causes of emotions

Reason-emotion	Correct answers	Wrong answers
Sad	65%	35% (25.4% normal and 9.6% happy)
Happy	78.8%	21.1% (7% normal, 11% scared and 3% sad)
Angry	67.3%	32.6% (6.2% normal,15% happy and 11.5% scared)
Normal	**40.3%**	**59.6%** **(46.1% happy, 7.6% scared and 6% angry)**
Scared	90%	10% (8% angry, 1% happy and 1% normal)

Table 4. Position indices and dispersion (fase post training)

	Subjects	Medium	Deflection standard	Std. Error Mean
TOTAL POST	42	4,48	1,292	,199

phrase "emotionally neutral", formulating a correct answer (Table 5).

- **External Cause:** The 69.4% of the sample has recognized the "normal" emotion caused by certain situations (Table 6).

In order to verify if the differences between the results collected during the assessment phase and those that emerged after training were significant, we proceeded to more in-depth statistical analysis. In this regard, recourse was made to the Student's t test, useful for assessing the significance of the difference between the means.

As shown in Table 7 are significant differences between the average response obtained during the two phases (assessment and training).

7. AFFECTIVE COMPUTING AND COGNITIVE COMPUTING: APP-PERFORMANCE AND EMOTIONS

This study examines different proposals linked to the concept of education to emotions and arising both from a theoretical reflection (points A,B,C,D) and from practical application lines (point E).

The point F links these theoretical considerations to some operational lines that examine in depth the function of emtions' modulation or regulation which is an important element especially in relation with the formation of the individual and social identity and the interpersonal motivational systems intervening this way. Underlining the social function of emotions is

Table 5. Results related to the recognition of emotions (after training)

Emotion	Correct answers
Sad	90.1%
Happy	83.8%
Angry	97%
Normal	78%
Scared	92.2%

Table 6. Results of the recognition of the emotions causes (after the training)

Reason-emotion	Correct answers
Sad	73%
Happy	85.1%
Angry	72.2%
Normal	69.4%
Scared	95%

Table 7. Paired samples T-Test

T	DF	SIG. (2-TAILED)
9.188	41	, 000

an essential element of the research based on the undisputed awareness that emotions regulate our daily interactions and permeate the relation with the others.

The difference of the models analyzed above is compensated by the analysis of common discriminating elements: the possibility to identify the emotions, the use of emotions in a functional way, the understanding of emotions and the regulations and management of emotions. The instruments used can thus measure four essential domains: perception, use, comprehension and management of emotions. The emotional and affective-cognitive component allow the person to reflect on his-her own frame, until he-she can produce a change in relation to the his-her vision of the world, of others and of him-herself, so as to reach a metacognition level which allows the adaptation and regulation of the feelings he-she has produced. The joining elements expressed before are emerged from the necessity to assess and intervene on the following points: development of the self-acceptance and construction of the self-esteem; recognition of one's own and others' emotions and attitudes; emotional expression and regulation; cognitive flexibility; construction of meaningful relations; regulation of the behavior; perceptive and sensory regulation; functional integration and adaptation for an autonomous life. The psychology of communication (Anolli, 2009) highlighted how people communicate through the simultaneous and interdependent use of different communicative systems, such as verbal-linguistic and nonverbal systems. Nonverbal communication includes different signals which integrate the individual intersubjective sphere with the cognitive-emotional, context-related, social and interactional one.

The affective computing and the cognitive computing pursue this perspective that exceeds the traditional vision of what is defined as artificial intelligence and analyze intelligence and aspects of perceptions, often neglected, with a methodological approach considering the emotional processes as important as the cognitive ones. They represent an innovative methodology for the development of systems able to of interpret, recognize, and mimic human emotional behavior. In addition to laptops, specifically artificial intelligence and soft computing, within this methodology there are other scientific disciplines such as psychology, cognitive and neurological sciences, providing tools and additional important elements enriching the educational, pedagogical and didactic contexts (Rivoltella, 2011).

Already in 1997, Rosalind Pichard argued that affective computing was a type of computing connected to emotions, originated by emotions and that intentionally influenced emotions. At the base of practical applicability of this new computational paradigm she placed the sensory technology and the *computing embedded* which together gave rise to an application platform for building systems able to measure and interpret emotions using mainly sensors, in the case of Pichard's experiments, two affective sensors, Q and Q Pod Curves, both capable of measuring human body signals such as the electrical conductivity of the skin, skin temperature and movement.

Rosalind Pichard also affirmed that emotions are physiological and cognitive responses that body gives in relation to certain external stimuli and that these emotions are associated with realization of purposes related to the survival of the individual and of the species in a physic and socio-cultural environment.

We refer to the limbic system (Corona, Cozzarelli, 2011), the system assigned to the elaboration and regulation of emotions and to the activation and mediation of essential functions for survival. Emotions and feelings together take part to our multiple cognitive processes. The researchers conducted by Damasio (1994), LeDoux (1996) and Isen (2000) have confirmed the essential role of emotions in the cognitive mechanisms.

The role of body and emotions on cognitive processes is particularly evident when we consider the development of the human being. Knowledge is intuition and consolidates its position on a native self-perception and body since it is manifest that the individual is formed initially by the body's own representations (Sibilio, 2011), constituting a temporal and spatial frame that bring subsequent representations of the external world.

On the basis of these premises it is clear that emotions and feelings contribute to the construction of reality, by attributing to objects and situations certain features and qualities in relation to somatic state which they cause. This principle is linked to the phenomenological conception of Sartre (1939) according to which emotions transform the world and decode it so as we live it through the body's experience, i.e. give a meaning to reality that is contextual to the way in which the body lives in reality.

This our emotional experience of the world influence the way we understand the world and act in the world. The realization of a machine or an emotional software leads to the application of this process and this theoretical paradigm.

The *affective computing* and *cognitive computing* are types of computing specific of artificial intelligence based precisely on the realization of systems that can recognize and express emotions. These emotional machines and emotional computer applications are able to detect the feelings of the user, such as joy, grief, or fear. The recognition and identification of an affective state, doesn't mean to automatically answer in an emotionally intelligent way manifesting an empathic process (Corona, Cozzarelli, & Di Tore A., 2013) with the interlocutor. So this sort of emotional intelligence (Goleman, 1999) requires that we feel our emotions so that we are fully aware of what is happening and also able to influence the action.

The great achievements in the field of HCI, Human Computer Interaction, have allowed, in recent times, the development of computer applications closely related to contexts in which users use it allowing a high degree of interaction. Clearly without making marginal the interaction between man and machine focused on the mutual influence between action and reaction. The new frontiers reached in the realization of computer products aim to improve and implement these emotional machines to ensure that they firstly consider the user's reaction to the system and then interact with him according to his emotional state.

The researchers who have taken advantage of consolidated research about the affective computing mainly analyzed the multimodal processes that distinguish the emotional response.

In particular they observed four main areas or dimensions of application corresponding to the affective computing: *emotional expression* through the implementation of interfaces and software agents MEPs to emotional expressions, thus communication of emotions through, for example, the representation of digital faces able to perfectly imitate the characteristics of the human emotional expression. The goal of this type of interfaces is not to assign the emotion to the machine or to the software but to ensure that it can give it to them, for example Zoe, the avatar that expresses the emotions of face or as concerns the apps, how are you?, Emotizer app, Akinator or Mr. Mood; recent studies in the educational field have shown the value and effectiveness of these systems thanks to the researchers conducted in collaboration with prestigious Universities such as the University of Rochester (USA) and the University of Vermont; other application size is linked to emotional recognition: these affective computing products are programmed to recognize the emotional state of the user to be able to adapt to it by improving the performance of tasks in relation to the influence that emotional state

exerts on the individual, examples are app, and Emotional Apptripper, Philips Electronics Rationalizer; it can't be ignored, however, another macro area which is the *emotional manipulation*: this valid path of research aims to examine the ways that can influence the emotional state of the user as they interact with the machine by creating an *affect interaction*; some specific computer were realized with this purpose, the principal prototype is definitely the Ibm Watson. Glenn Wightwick, Director of IBM Research Australia, exposing the technologies present in Watson underlined the fact that they have tried to evolve the concept of cognitive computer passing from a learning approach, which is typical of the machines to the re-elaboration of a natural language, reiterating that the cognitive computing has a variety of application fields for almost all areas in which human beings are engaged in a dialogue, make questions, call into question their own ideas and make decisions moving into a real cognitive system; the last macro area is the *emotional synthesis*, the most simplex dimension of the affective computing. The studies of our scientific domain aim to this last dimension, to equip a computer of emotional intelligence, making it able to feel emotions, by the sophisticated technological means currently in use.

In the laboratories of MIT, Massachusetts Institute of Technology, researchers have been working for years on the possibility of achieving an *emotional computer*. Given that most of the research has been addressed in the basic perceptual abilities of machine, such as sight and hearing, so that it can develop the ability to recognize what is being said and who said it. An emotional computer cannot have the limit to recognize only verbal expressions but it should also recognize affective states. That's why the MIT research focus on the recognition of facial expressions and vocal harmony, unavoidable elements for the approval of moods. The human face is the interesting part of the body as concerns the expressive and communicative aspects, as it is the privileged channel to express emotions and interpersonal attitudes.

For this purpose, it is useful first to register the facial movements of a person in a video, digitalize them and then apply to them some algorithms that recognize emotions.

The algorithms for the recognition of emotions, based on contextual sensing, are derived from models of emotions that are universally recognized.

Some cross-cultural research conducted by Ekman (1999) have verified that there is a concordance in the ability to recognize facial expressions of the emotions that are defined *primary emotions*: joy, anger, fear, sadness; If it exists, it would be possible to identify models of facial expressions to recognize basic emotions.

The survey conducted on each expression can then be performed with different techniques, depending on whether you support a componential or globalist hypothesis on the genesis of emotional facial expressions. The precursors of a globalist hypothesis such as Ekman, support the idea that the expressions of emotions are *Gestalt* produced by innate neuro-motor programs, analyzing the facial expression as a whole. According to componential theory, instead, the facial expression of an emotion breaks into pieces, which are the outcomes of individual steps of the evaluation of the emotional stimulus; therefore supporters of these assumptions, like Scherer, (1993) investigated the activation of each facial muscle of emotional expression. What is the most correct of the two theories is subject of continuous debate. What is certain is that for the realization an emotional machine is necessary to elaborate some algorithms for the recognition of emotions that once implemented on a computer equipped with a camera and a scanning system, allow the computer to recognize the user's emotions. If the facial expression of emotion plays a role in the recognition of emotions, it can be crucial also the role played by the voice, one of the most important means through which the individual transmit emotions to others.

A computer should not consider only what is being said, but also how it is said to be able to recognize affective States of the subject,

the super-segmental traits, phonological and phonetic phenomena of speaking.

These traits for the recognition of vocal expression of emotion seem to be referred to the variables that accompany the different parameters of the hearing, duration, tone, articulatory quality and intensity. However these traits analysis of communication is very complex; so far the research has been focused on a limited number of sentences and the results achieved are still dependent on what is being said. A methodology which can separate what is said from how it is said is still in development. Facial and vocal expressions aren't the only signs that decode the emotional expression; emotions are manifested, as we noted earlier, noting the position of the body and its motor and physiological changes and gesture. The applications and *emotional machines* so far carried out manage to perceive when their interlocutor feels fear, joy or anxiety and pain; but identifying the emotional state is very different from providing an emotionally intelligent response to it, showing emotional competence in coping with simplex situations and empathy with the interlocutor. Emotional intelligence is a principle that goes beyond the recognition of emotion; emotional intelligence requires that you feel and experience your own emotions, so that you can be fully aware of what happens and then to act as a consequence.

The research field could be broaden both from a technological and pedagogical point of view in order to give to computer the possibility of using the *wearable computing* technology or an application allowing it *to feel emotions*. Pichard affirmed that it could be possible to realize a robot able to cry digital drops; considering the innovations of robotics research and of the new multimedia systems we can assert that this possibility is going to be concrete.

8. CONCLUSION

The experimental set proposed thus include both a simple observation, methodologically organized in a natural environment by means of an emotional training action based on activities able to stimulate the development of the emotional competence, supporting especially the abilities/capacities of recognizing and understanding of the emotional forms shown and the causes that create them; and different and more complex approaches deriving from the observation and comprehension of specific interactions which arise in artificial environments deriving from affective computing.

The degree of empathy traceable in both cases puts in evidence similar neurophysiological, perceptive and formative correspondences and shows the efficacy of experiences focused on a sort of mind reading neurons as a capacity of reading one's own and others' emotions through interactions, no matter if they are real or created in a virtual context.

The role of communication, both verbal and nonverbal, is a main element, especially as concerns an *affective communication*, which is very important and meaningful as a therapeutic agent. The positive effect relies in the type of connection realized in a process like this, due to the fact that they allow the communication between the representable systems and the inner unrepresentable part of the emotional brain. The attention during the training and during the affective computing is focused on the acquisition of a greater consciousness about the sensitive and sensory configurations which characterize the subjects involved and which often produce automatically and unconsciously for trying to decode and interpret them basing and thanks to the above mentioned instruments.

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