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The Use of Technology in the promotion of Children's Emotional Intelligence: The Multimedia Program "Developing Emotional Intelligence".

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"Developing Emotional Intelligence" is an Italian language multimedia tool created for children between 8 and 12 years of age. The software is based on the four 'branches' of model of emotional intelligence proposed by Mayer and Salovey and aims to evaluate and improve abilities in perception of emotions; using emotion to facilitate thought; understanding emotions; and managing emotions. In the software, four characters represent the four branches of emotional intelligence and guide children through the 'world of emotions' using drawings, animations, music, sounds and verbal instructions. The software is comprised of two components, namely an assessment section (27 items) and a training section (46 exercises). Both the assessment and the training sections aim to measure and improve children's abilities in perceiving emotions (faces, drawings and music); using emotions (emotional synaesthesia and facilitation); understanding emotions (blend and transformation of emotions); and managing emotions (personal and interpersonal situations). Two studies involving primary and secondary school children respectively, demonstrated the efficacy of the training performed with the software in improving performance in emotional tasks and academic achievement in the linguistic-literary area. A comparison between the two studies offers interesting insights about the best ways to integrate technology in social and emotional learning programs.

Keywords: emotional intelligence, social emotional learning, multimedia software, child mental health

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Introduction

The use of digital technologies is increasingly widespread in schools and throughout education. As children and adolescents are increasingly fascinated by digital technologies, engaging with them from early years,

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they would appear to be very useful tools for capturing and directing children's and young people's attention towards a specific task or activity. Multimedia programs have been used for many years to help children improve reading, spelling or mathematics, as well as for improving specific cognitive processes such as memory or attention and there is much evidence across these domains that demonstrates their effectiveness for learning (i.e. Guarnera & D'Amico, 2014; Klingberg, Fernell, Olesen, Johnson, Gustafsson, Dahlström & Westerberg, 2005).

In contrast, looking at the scientific literature concerning evidence-based programs for Social Emotional Learning (SEL) (Durlak, Weissberg, Dymnicki, Taylor & Schellinger, 2011), it seems that technologies have rarely been used as tools in this field. The Wallace Foundation recently published a report of 25 Leading SEL Programs (Jones, Brush, Bailey, Brion-Meisels, McIntyre… Stickle, 2017), analysing the aims, tools and the methods used in each program, and none of them reports specifically on employing contemporary technologies to support SEL. This may be due to the fact that many SEL programs are principally group-based activities: conducted by educators or psychologists and which focus on interactions among participants, employing largely dialogue, focus groups, and discussion as the preferred approaches. When technologies have been used, they are almost always based on watching videos or playing music (Jones et al., 2017). For many people, SEL programs possibly require a kind of "warm" approach education, which might be seen to be in contrast to the use of technologies, which seem "cold" and therefore possibly less suitable for improving social emotional learning.

International organizations, however, are starting to consider the utility of technologies for SEL. As reported by the World Economic Forum (2016), technology can strengthen SEL practices because it ensures self-directed learning, assessment, personalization, fidelity of programming and building agency. Technologies increase Self-Directed Learning, since children and young people are more engaged when they learn at their own pace and in their own style. Moreover, using technologies enables people who live in suburban or rural areas or have difficulties in participating in face–to-face meetings or training, to engage in personal and professional training and development. Technologies can also make assessments simpler, through for example, the automatic recording of data and using built-in text-to-speech software, to explain tasks or to read aloud instructions. Adaptive technologies allow personalization of training and activities, proposing activities that are at the level of learning of each student. Technologies can also ensure that a

program is implemented as intended as all participants/practitioners follow the same automatized trainer, avoiding individual differences among trainers, which can affect fidelity of the program. Finally, some type of technologies, gaming for instance, where young people engage in role-play games or simulations, may help students to build agency, through placing children directly into safe problem solving and decision-making situations within the game.

Whilst it is evident that the number of games, Apps and other technologies focusing on emotions is increasing almost daily in the marketplace, yet it is difficult to find published empirical research that focuses on the effectiveness of technologies for enhancing social and emotional health of children. For these reasons, the aim of this study is to report on two experiences of applying technologies in the promotion of emotional intelligence, using the multimedia software "Developing Emotional Intelligence" (D'Amico & De Caro, 2008). This program is available as a CR-ROM for purchase and installations on personal computers.

The multimedia software tool: "Developing Emotional Intelligence"

"Developing Emotional Intelligence" is an Italian language, multimedia software package/tool, created for improving emotional intelligence in children between about 8 and 12 years of age. The contents of "Developing Emotional Intelligence" (DEI) are based on the four branches of the emotional intelligence model by Mayer & Salovey (1997). In model, Emotional Intelligence is described as the cognitive ability of processing emotional information. The EI model considers EI to be the result of four main emotional abilities or branches, which are ontogenetically ordered. The first branch is the ability in Perceiving emotions; the second is the ability to use emotion for facilitating thought; the third is the ability to understand emotions in language and situations; and the fourth is the ability to manage emotion in personal and interpersonal spheres.

Developing Emotional Intelligence (DEI) consists of two components: (1) an assessment section and (2) a training section, respectively aimed at assessing and improving the four branches: perceiving, using, understanding and managing emotions. In the program, children are guided through their journey, by four key characters representing the four emotional intelligence skills, to carry out all the activities. They are the four inseparable friends of the " Gang of the Heart": Pircipò (Perception), Utor (Using), Captilla (Understanding), and Gerì (Management).

Assessment

The assessment section consists of four tasks respectively dedicated to assessing the perception, facilitation, understanding and management of emotions. There are 27 items in total and administration takes no longer than 30 minutes. Whilst this section has not yet been validated psychometrically, it does provide useful and practical information for teachers, educators and psychologists in terms of pre-post/test-retest differences in children's performance on the emotional tasks. In order to ensure that children's improvements can be monitored over time, their responses are coded and date stamped by the software.

Emotional perception skills (Perceiving branch, Figure 1) are assessed by 9 items requiring children to assign labels of basic emotions: joy, fear, sadness, surprise, disgust, anger to facial expressions, landscapes and music tracks.

Figure 1. Assessment of Perception abilities

The ability to use emotions for facilitating thinking (Using branch, Figure 2) are explored by 6 items that require children to select the best two emotions - among the basic six ones - that would be useful in order to cope with stressful or emotionally demanding situations such as: performing a difficult task; giving comfort to a friend or expressing disagreement with everyone else.

Figure 2. Assessment of Using abilities

The Understanding of emotions (Understanding branch, Figure 3) is assessed through 6 items: three items explore the ability to understand the transformation of emotional states as a result of changes in situations; and 3 items explore the ability to understand the blending of emotions that arise from particular events.

Figure 3. Assessment of Understanding abilities

The Management of emotions (Managing branch, Figure 4) is explored in 6 items dedicated to personal and interpersonal management of emotions. In all cases children have to select, among four alternatives, the most effective behaviour according to an emotional problem solving situation.

Figure 4. Assessment of Management abilities

In the entire assessment test, no feedback is given to children about their answers to each item, nor are they given the correct answers. At the end of the assessment, children only receive general feedback about their performance: for instance, “you are already quite good at perceiving emotions!” or “you need to improve at perceiving emotions!”) and they are invited to practice using the training section.

Training

The training section consists of guided activities that allow the participants to practise the four EI abilities, providing feedback for each exercise. As already mentioned, the multimedia characters Pircipò (Perception),

Utor (Using), Captilla (Understanding) and Gerì (Managing), accompany the children as they undertake the activities, and always suggest ways for them ensure the “head and the heart” agree. Perception activities enable children to practice and acquire the ability to discriminate facial expressions, or to reflect upon the emotional values of images, colours and shapes. (Figure 5)

Figure 5. Training of Perception abilities

Activities in the second branch: the facilitation area, are divided into "Using" and "Feelings": the first trains children to use emotions in order to achieve certain results (Figure 6); the latter stimulates children to reflect on the associations between emotions and sensations.

Figure 6. Training of Using abilities

Exercises related to the third branch: Understanding emotions, lead children to reflect on emotional state changes following specific events, and to understand how different basic emotions can blend together, giving rise to complex emotional states (Figure 7).

Figure 7. Training of Understanding abilities

Activities in the management area (the fourth branch) ask children to reflect upon various situations of personal or interpersonal emotional problem solving, asking the child to identify the appropriate strategies for dealing with the situation (Figure 8).

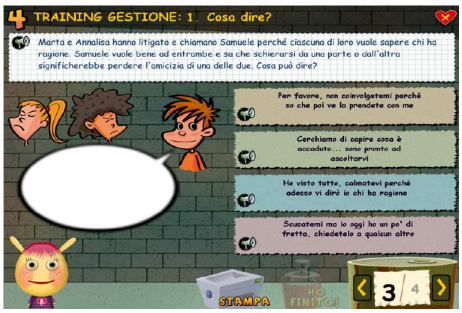

Figure 8. Training of Management abilities

The efficacy of using this software for improving emotional performance, school achievement and motivation to learn was examined in two studies, described below.

STUDY 1

Study 1 was aimed at verifying if the training with the software "Developing Emotional Intelligence" (DEI) improved performance of secondary school children on emotional tasks. In addition, school achievement and cognitive motivational ratings were also monitored before and after the treatment/training to explore if empowering with emotional intelligence skills (perceiving, using, understanding and managing) produced any effects on school achievement and motivation for learning.

Methodology

A comparison group pre-test/post-test design was adopted in order to study the efficacy of the training component of the Developing Emotional Intelligence (DEI) software in increasing the emotional capabilities of a treatment group compared with a control. Participants and test-treatment-retest phases are described in more detail below.

Participants

Forty-four children (16 Females and 28 Males) attending two first-year (grade) classes in an Italian secondary school participated in the study. Their age ranged between 12 and 14 years. As per ethical conventions, informed consent was gained by all participants' parents prior to the commencement of the study.

Materials and procedure

Test phase

Emotional Intelligence. In order to measure Emotional Intelligence, the Assessment section of the Developing Emotional Intelligence software was used as previously described. Children self-administered the test in a multimedia classroom at school, using personal computers and headphones. Experimenters supervised the self-administration in order to assist children with any problems in using the computers or the program. This Assessment section provides scores for the four domains: Perception, Using, Understanding and Management of emotions. Scores corresponded to the mean number of correct answers achieved in each subtest.

Vocabulary. Lexical abilities were measured using the Vocabulary subtest drawn from the Wechsler test battery (2003). The vocabulary test measures students' verbal fluency and concept formation, word knowledge, and word usage. The test comprises 32 words of increasing level of difficulty, and all children were tested individually by an experimenter, at school. A word is said aloud and children are asked to provide the name of the object or to define the word. According to test manual guidelines, it is possible to assign the score of 2, 1 or 0 to each definition, according to the level of response: exhaustive, generic but valid, or null. After five scores of "0" the administration of the test is stopped. The final score corresponds to the sum of scores assigned to words that have been correctly defined.

Non-verbal ability. Non-verbal abilities were not measured for diagnostic purposes, but only to ensure consistency for Treatment and Control groups. Non-verbal ability was thus identified using the Raven's Coloured Progressive Matrices (CPM) (1954). CPM measures clear-thinking ability and two versions are available: one for children aged 5-11 years, and another for older adults. Even though participants in this study were older than 11, (aged 12-14 years), the CPM child version was employed for

establishing a non-verbal score as it was simpler and shorter than the version for adults (Raven's Standard Progressive Matrices, 1941).

The CPM test consists of 36 items in 3 sets (A, Ab, B), with 12 items per set. Children were requested to select from six alternatives, the best picture to complete a visual pattern or a logical sequence of images. The CPM produces a single raw score, corresponding to the number of correct answers on the whole test. The raw score can be converted to a percentile based on normative data collected from various groups, however, as these data were not employed for diagnostic purposes, and were not of the specific age group for the test, the percentiles can only be used as a broad guide. All children were tested collectively, at school, in small groups of about 6 participants.

School ratings.

The participants' academic performance was assessed by asking teachers to rate the performance of each pupil on a five point Likert-type scale from 1 (lowest score) through 5 (highest score). Teachers of all subjects were involved in rating pupils' performance and two final mean scores were then computed: a Linguistic-Literary (LL) perceived performance score was calculated by averaging Italian, History, Geography and Foreign Language teacher scores; and a Logical-Mathematical (LM) score was calculated by averaging Math and Science teacher scores of the students' perceived performance.

Cognitive Motivational Style.

Teachers were also requested to rate the cognitive-motivational style of their pupils by completing a 16 item other-report questionnaire which was created to meet the aims of the study. The questionnaire asks teachers to rate, using a score ranging from "0" (not at all) to "3" (a lot), if pupils appeared engaged in school activities; if they were perseverant if they were aware of their difficulties, and so on. The total Cognitive motivational score is calculated by averaging the item's scores. Cronbach's alpha computed on the 44 participants of the study in test phase was equal to .99.

Assignment of children to the Treatment and Control group

In order to create two equivalent groups, children were assigned to Treatment and Control groups by counterbalancing gender, age, Vocabulary and CPM scores. The Treatment group comprised 22 children (14 males and 8 females, Mean age of 143 months' SD = 8.6). The Control group, similarly, comprised 22 children (14 males and 8 females, Mean age of 142 months, SD= 5.7)

Training phase

Following the Assessment phase, Study 1 was performed using the Training section of the Developing Emotional Intelligence software. Children in the Treatment group undertook the training at school: one day a week for two months, in sessions lasting 20-30 minutes each. Six children participated to each training session, using personal computers with headphones in the multimedia classroom. An experimenter assisted children in relation to any problems with the computer, but the learning session was basically guided by the software through automatized feedback on answers given by children. Children in the Control group continued with their normal school activities.

Retest phase

During the retest phase all children in the Treatment and Control groups were again asked to complete the EI test. Teachers were again requested to rate their perceptions of school achievement and the cognitive-motivational styles of their pupils. Verbal and non- verbal abilities were not tested again since they were used only to create two equivalent groups for the experimental design. Timeframe between baseline test and re-test was approximately three months.

Findings

Table I reports Mean and Standard Deviations for both groups. Notably, mean verbal abilities were quite low in both groups, corresponding approximately to a scaled score of 6 in the Italian WISC-IV norms. Mean percentile score in non-verbal abilities was in the medium range. However a series of t-tests demonstrated that there were no differences between Treatment and Control groups in mean age ($t = .205$ $p>.05$, $df = 42$), CPM scores ($t = .791$ $p>.05$, $df = 42$), and Vocabulary ($t = .053$ $p>.05$, $df = 42$).

Table I. Study 1 (Secondary School). Performances of Treatment and Control groups before and after the treatment and results of Time X Group ANOVAs

		Treatment Group (n 22)				Control Group (n 22)				ANOVAs' results					
		Before		*After*		*Before*		*After*		Time (1,42)		Group (1,42)		*Group X Time* (1,42)	
		M	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***F***	***p***	***F***	***p***	***F***	***p***
Age in months		142.91	*8.68*	-	-	142.45	*5.70*	-	-	-	-	-	-	-	-
Verbal abilities	**Vocabulary (raw score)**	28.45	*9.35*	-	-	28.32	*7.66*	-	-	-	-	-	-	-	-
Non Verbal abilities	**CPM (percentile score)**	63.18	*34.62*	-	-	71.36	*33.99*	-	-	-	-	-	-	-	-
Emotional abilities	**Perception**	5.55	*1.29*	6.32	*1.46*	6.59	*2.01*	6.59	*1.65*	4.94	*<.05*	2.06	*>.05*	4.94	*<.05*
	Using	3.57	*.685*	3.45	*.59*	3.11	*.49*	3.43	*.76*	1.15	*>.05*	2.04	*>.05*	5.15	*<.05*
	Understanding	2.27	*1.45*	2.77	*1.82*	2.14	*1.32*	2.80	*1.37*	8.15	*<.05*	.02	*>.05*	.15	*>.05*
	Managing	2.32	*1.43*	3	*1.54*	2.68	*1.52*	3.32	*1.21*	10.31	*<.05*	.80	*>.05*	.01	*>.05*
School ratings	**Linguistic Literary**	.50	*.74*	.64	*.72*	1.11	*1.17*	1.36	*1.14*	5.85	*<.05*	5.68	*<.05*	.42	*>.05*
	Logical	.41	*.59*	.68	*.71*	.82	*.91*	1.23	*1.23*	9.07	*<.05*	3.80	*=.05*	.36	*>.05*
	Mathematical														
Cognitive motivational style		1.21	*.79*	1.34	*.79*	1.6	*1*	1.44	*.91*	.00	*>.05*	1.01	*>.05*	1.25	*>.05*

For three out of four EI variables (Perception, Understanding and Management), results revealed a significant effect for Time, indicating that all children had improved their performance in these areas between test and retest. No significant effect was found by group, however, Time x Group interactions were statistically significant for two out of the four EI variables. The first was in the expected direction and demonstrated that the Treatment group improved more than Controls in perception of emotions. The second, unexpectedly, demonstrated that the Control group improved in Use of emotions: from test to retest, while the scores of the Treatment group slightly decreased. Concerning the school ratings, results revealed a significant effect for Time, evidencing that all children had an improvement of performance from test to retest in both Linguistic-literary and Logical Mathematical areas. However, there was no significant Time x Group interaction. Also in the case of cognitive motivational style, results revealed no significant effects for Time, nor a significant Group x Time effect.

The results of Study 1 demonstrated that children in the Treatment group improved their performance in Perceiving emotions as an effect of the training sessions undertaken. However, the training had no effect for any other considered variable. In fact, students in the control condition improved in their use of emotions over time, while the performance of the treatment group slightly diminished. This result demonstrates that the students who undertook the training improved only in terms of their basic emotional ability for perceiving emotions, and showed no maturation in regards to their higher level emotional abilities. Indeed, it is interesting to note that in the ontogenetic perspective proposed by Mayer & Salovey (1997) the perception of emotions is considered the lowest level ability of emotional intelligence.

These weak results could depend on many factors. Indeed, the school was situated in a peripheral metropolitan zone and students involved in this study belonged to a very disadvantaged cultural context. Many of the students had quite a limited lexicon –as demonstrated by poor scores in the Vocabulary test component- and therefore some difficulties in text comprehension. Secondly, during the training sessions, it was sometimes difficult to contain the exuberance of some students who left the multimedia classroom or started to disturb the other classmates who were undertaking the training. Moreover, some students were repeating the first class, so that they were older than others. Since the software interface uses comics and drawings aimed at a certain age cohort, it may be that these students perceived the games were too ‘young’

for them, thus appearing less motivated and interested in performing the activities. This highlights the importance of correctly pitching the look and "feel" of the intervention, to the age cohort. Notably, this did not relate to the content, which was quite difficult for them, only the visual appearance of the intervention. Lastly, students performed the training individually, with limited interaction with experimenters. All these aspects may have contributed towards reducing the expected effects of the training and have been taken into account when conducting Study 2.

STUDY 2

Study 2 was aimed at determining whether primary school children trained with the software Developing Emotional Intelligence *and assisted by experimenter* improved their performance in emotional tasks, school ratings and cognitive motivational ratings.

Methodology

The research design of Study 2 and the examined variables were the same used in Study 1. The most prominent differences between the two studies were in the age and gender distribution of children in the Treatment and Control groups, and in the delivery of the training phase: viz, the conduct of the experimenter during the training.

Participants

86 children (50 Females and 36 Males) attending an Italian *primary* school were eligible to participate in the second study. Forty five children attended the third grade and 40 attended the fourth grade. Their age ranged from 8 through 10 years. As per ethical conventions, informed consent was gained from all participants' parents before the study commenced.

Materials and procedure

Test phase

Emotional Intelligence, Verbal and non-verbal abilities, academic performance and cognitive motivational style were assessed using the same tasks used in Study 1. All tests were administered at school in individual

or small group sessions (6 students for each group) as previously. Each session lasted for about one hour. Each child used a personal computer with headphones for the EI test, under supervision of the experimenter. Cronbach's alpha (1951) of Cognitive motivational score computed on the 86 participants of this study in the test phase was equal to .97.

Assignment of children to the Treatment and Control Groups

Children were assigned to Treatment and Control groups on the basis of the scores they obtained in the test phase. Due to limitations both in time and in the number of computers that were available at the primary school, only 16 children were included in Treatment group. Additional children (n=16) were selected from the whole sample in order to create a pair-matched Control group. The Treatment group was comprised of 8 children attending the third grade (4 males and 4 females) and 8 children attending the fourth grade (4 males and 4 females). The mean age of children in the Treatment group was 108 months, SD =7.0. The Control group, similarly, was composed of 8 children attending the third grade (4 males and 4 females) and 8 children attending the fourth grade (4 males and 4 females). The mean age of children in Control group was 108 months, SD=7.4. Table 2 reports means and standard deviations for both groups in Study 2.

Training phase

The treatment phase was performed at the primary school; children in the Treatment group used the software twice a week for three months, in sessions lasting 20-30 minutes each. Two children participated in each training session, and they were always assisted by the experimenter. Children in the Control group carried on the normal school activities. In contrast to Study 1, where there was no involvement of the experimenter, in Study 2, the experimenter adopted a more active role by accompanying the student in using the software. During the first training sessions, the experimenter was instructed to not suggest the answers to the children, leaving them to reflect on the feedback that they received from the programme. After this first phase, the experimenter started to work individually with each child, asking them the reasons for their answers. Correct answers were never suggested, rather the children were guided towards understanding possible answers through reasoning, and to then transfer these new learnings to the following training sessions. Thus, in this

case, the training was used as a tool for explicitly discussing emotions with the children, rather than as a substitute for the trainer.

Retest phase

Similarly to Study 1, during the Retest phase all children in Treatment and Control groups were again asked to complete the EI assessment section, and their teachers were requested again to rate their perceptions the students' school achievement and cognitive-motivational styles. In study 2, the timeframe between baseline test and re-test was about four months.

Results

A series of 2x2 factorial ANOVA using Group (Treatment, Control) x Time (test, retest) were performed on data collected during test and retest phases of Study 2 (EI variables, school ratings, ratings of cognitive-motivational style), with no differences found between Treatment and Control groups in mean age ($t = .098$ $p>.05$, $df=30$), CPM scores ($t = -.171$ $p>.05$, $df=30$), and Vocabulary ($t = -.668$ $p>.05$, $df=30$). Again, mean verbal abilities were quite low in both groups, corresponding approximately to a scaled score of 5 in Italian WISC-IV norms. In non-verbal abilities, the group percentile score was in the high range. For all EI variables (Perception, Using, Understanding and Management), results revealed a significant effect for Time, evidencing that all children improved their performance in these areas from test to re-test. For each of these four variables, a significant interaction of the Time x Group was found demonstrating that the improvement was statistically higher for the Treatment group than for the Control group.

Concerning the school ratings, results revealed a significant effect for Time, evidencing that all children had an improvement of performance from test to retest in both Linguistic-literary and Logical Mathematical areas. In this case, however, the Time x Group interaction indicated statistical significance for the Linguistic-literary variable ($p = .07$), but not for the Logical Mathematical one. Thus, the Treatment group improved slightly more than the Control group in Linguistic-literary area. Regarding ratings of cognitive motivational style, results revealed no significant effects of Time, nor Group x Time interactions.

Table II: Study 2 (Primary School). Performances of Treatment and Control groups before and after the treatment and results of Time X Group ANOVAs.

		Treatment Group (n 16)				Control Group (n 16)				ANOVAs' results					
		Before		*After*		*Before*		*After*		Time (*df* 1, 30)		Group (*df* 1, 30)		*Group X Time* (*df* 1, 30)	
		M	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***	***F***	***p***	***F***	***p***	***F***	***p***
Age in months		108.13	*7.03*	-	-	108.38	*7.40*	-	-	-	-	-	-	-	-
Verbal abilities	**Vocabulary (raw score)**	19.75	*9.88*	-	-	17.31	*10.75*	-	-	-	-	-	-	-	-
Non Verbal abilities	**CPM (percentile score)**	92.81	*5.15*	-	-	92.50	*5.16*	-	-	-	-	-	-	-	-
Emotional abilities	**Perception**	6.06	*1.12*	8.88	*.500*	6.88	*1.20*	6.81	*1.28*	43.87	*<.05*	3.89	*=.06*	47.95	*<.05*
	Using	3.22	*.66*	5.91	*.37*	3.28	*.51*	3.44	*.57*	126.88	*<.05*	70.42	*<.05*	100.53	*<.05*
	Understanding	1.87	*1.26*	5.88	*.500*	3.06	*1.436*	3.12	*1.71*	113.37	*<.05*	3.46	*>.05*	106.50	*<.05*
	Managing	2.50	*1.26*	5.81	*.750*	3.44	*1.09*	3.62	*1.20*	77.62	*<.05*	3.52	*>.05*	61.88	*<.05*
School ratings	**Linguistic Literary**	2.56	*1.18*	3.02	*1.36*	3.37	*1.06*	3.44	*1.04*	6.19	*<.05*	2.36	*>.05*	3.60	*=.07*
	Logical Mathematical	2.94	*.88*	3.21	*1.22*	3.44	*.61*	3.97	*.87*	11.82	*<.05*	4.33	*=.05*	1.23	*>.05*
Cognitive motivational style		1.93	*1.05*	2.07	*.91*	2.37	*.57*	2.41	*.58*	1.87	*>.05*	1.96	*>.05*	.67	*>.05*

Study 2 (primary students) revealed more incisive results than Study 1 (secondary students). After the training, children in the primary school Treatment group improved their performance more than children in the Control group for Perception, Using, Understanding and Managing of emotions. Moreover, children in the Treatment group were rated by their teachers as improving slightly more in the Linguistic-literary area than children in Control group, while the same result was not found for Logical mathematical area. Possibly, this result can be explained by the fact that almost all the training activities used the linguistic medium extensively. For instance, during training children were asked to read and to reflect about the meaning of emotional words. In other cases, they are asked to solve problematic emotional situations, presented verbally

Moreover, linguistic-literary subjects probably request more emotional competencies than maths or science. For instance, in understanding the emotional tone of poetry or novels, as well as in expressing personal considerations in a written essay, children need to have a more developed emotional lexicon and need to be more empathic and self-reflective. Finally, the training had no significant effect on cognitive motivational styles.

Conclusions

Contemporary children and adolescents have been defined as “digital natives” by Marc Prensky (2001), as they have been surrounded by and immersed in technologies since the time they were born. Information Communication Technologies, and most recently, digital media have captivated, interested and motivated children and their impact on learning has been the subject of interest for many educators and psychologists.
We also know, however, that there is a debate about a possible ‘dark side’ in the use and the abuse of technology, and that in many situations it is considered as contributing to such issues as loneliness and lack of social interest of new generations, or even, under certain circumstances, can be construed as a new form of addiction (Tarafdar, Gupta, & Turel, 2013). (

The results of the studies reported in this paper suggest that technologies may be effective in supporting and developing Social Emotional learning if used in the right way: if they serve to captivate children’s and young people’s attention through gamification of the learning.

Specifically, results of Study 1 and Study 2, demonstrated that training both Primary and Secondary school students using the multimedia software: Developing Emotional Intelligence, improved some emotional abilities in students, even if the obtained effects were quite different in the two studies. These differences require ongoing examination and in order to determine the best way to use/apply such software in the future, it is important to consider possible reasons of these differences.

Firstly the age differences in groups of children involved in Study 1 (Secondary) and Study 2 (Primary) require consideration, and the activities with the computer were more enjoyable and a novel experience for the younger versus the older students. Moreover, the use of comics and the graphic style used in the software was more age-appropriate for younger students, highlighting the importance of not simply transferring media across age groups, but of tailoring the look and feel of the training package more directly to each age-specific cohort.

A second aspect refers to the difference in the ways the trainings were provided: training in Study 2 (Primary) was more frequent (twice a week rather than once a week) and lasted for a longer time than Study 1 (three months instead of two months). Moreover, Study 2 involved a smaller number of participants than Study 1, enabling the experimenter the opportunity to work directly with two children for each session, having more time to develop a more personal interaction/relationship with them.

Finally, Study 2 used a blended methodology in which the use of the software was *accompanied by more frequent discussions and interactions with the experimenter*. The latter is probably the most important difference. It demonstrated that, even if the ICTs may be useful tools to support Social Emotional Learning, human-computer interaction has to be integrated with more traditional methods in order to be effective, especially with younger students.

This does not mean that technologies cannot be used alone. Children who live in remote zones outside of cities and who do not have access to educational centres or to specialised professionals, could indeed benefit from the opportunities that training via technology can provide. In these cases, technology could help to introduce children to the world of emotions and SEL, and provide them with a vehicle to improve their emotional knowledges, experiences and literacies.

Multimedia programs and ICTs, can represent a useful tool both for students and for trainers to use, and can complement their learning from other areas, but they can never substitute the human-human

educational relationship. To engage in emotional learning, requires that children *feel* emotions and *share* emotions with adults and peers, and this cannot be done solely by interacting with a software programme which provides standardised - even if tailored - answers to children.

There are also some limitations in Studies 1 and 2. Indeed, it is important to note that the Control groups in this study carried on with normal school activities and were not presented with an alternative non-technological training on Emotional Intelligence. Thus, the results do not permit comparison: that using technologies produce more beneficial effects in EI than traditional programs; rather, the results demonstrate that it is possible and effective to use technologies in EI trainings, and that combining them with educator support, may maximise the learning outcomes. Further research exploring this aspect with older cohorts should be encouraged.

Due to insights gained from these two studies, we are now trialling a blended approach: a human-computer focused methodology. In these cases, children use the software individually only for the assessment phases. During the training phase, the software is presented collectively with a video-projector or an interactive whiteboard to a group of children or to a whole class. In these cases, it assists the trainer in conducting the activities, gaining children's attention with sounds, music and pictures; and simultaneously reduces the risk that different trainers may have, affecting the fidelity of programmed activities, through having consistent built-in activities and exercises. Lastly, using the software in collective sessions, children respond as a group: openly discussing emotions and emotional problem solving trying to find agreement about the "right" or "wrong" answers to each question. Sometimes, they debate the meaning of an emotional word or about the emotional synaesthesia evoked by a music track.

Further to this, and building directly upon the findings from these studies presented here, Developing Emotional Intelligence is now also being used as one of the tools of the SEL program *MetaEmozioni* (D'Amico, 2018): a program aimed at improving emotional and meta-emotional intelligence that can be used in psycho-educational contexts as well as in school contexts. MetaEmozioni uses both traditional methods for SEL (focus groups, role playing, art and music activities) and technological tools like Developing Emotional Intelligence, Moodle platforms for e-learning, multimedia blackboards for creating immersive environments, and LEGO robotics construction kits (D'Amico e Guastella, 2018) to help children understand the basic aspects of emotional functioning.

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