Journal of Physical Education and Sport ® (JPES), 18 Supplement issue 5, Art 327., pp. 2157 - 2174, 2018
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Educational research: motor area and relational area during children's personality development

MANUELA VALENTINI[1], FRANCESCO RICCARDI[2], GAETANO RAIOLA[3], ARIO FEDERICI[4]
[1]Department of Humanistic Studies, University of Urbino Carlo Bo, Urbino, ITALY
[2]University of Urbino Carlo Bo, Urbino, ITALY
[3]Department of Human, Philosophical and Education, University of Salerno, ITALY
[4]Department of Biomolecular Sciences, University of Urbino Carlo Bo, Urbino, ITALY

Published online: November 30, 2018
(Accepted for publication November 20, 2018)
DOI:10.7752/jpes.2018.s5327

Abstract:
This study will analyse the correlation between physical education and emotional development of children, focusing on nonverbal communication. The hypothesis formulated after having read international literature, is the following: " Is it possible to facilitate emotional development through physical education and other school disciplines?"The research is based on a experimental project which involved 75 pupils between 6 and 8 years of age for a duration of two years. The results were analysed using TEC "Test of Emotion Comprehension" and borough to the validation of the hypothesis.
Key words: childhood, physical education, nonverbal communication, emotional development.

Introduction

Emotions are at the foundations of a person's development and facilitate the adaptation to the environment. The cognitive and socio-cognitive methods of psychology define emotions as a "complex and multifaceted phenomena which needs to be comprehended and managed by the subject through cognitive interpretations of the stimuli and the social context" (Albanese e Molina, 2013). It has been proven that it is possible to comprehend emotions only by analysing the relationships of a subject. The active role of the subject is very important, for he gives meanings to his and others' emotional experiences through his cognitive skills, his physiologic functioning, the context in which he lives and the social relations (D'elia et al., 2018, Raiola et al., 2018, Altavilla, Di Tore, 2016, Gaetano, 2012).

From this type of analysis comes the concept of Emotional Comprehension, understood as "the abilities and skills which help consistently recognising, understanding and answering other people's emotions, and act accordingly in order to fit well in the environment" (Saarni, 1999). By living in his socio-cultural context, the child has to gather an emotional knowledge which he will use to become more competent in the comprehension of his emotions and those of others, therefore developing the ability of showing the most adequate one for the situation he finds himself in, and to tolerate their so-called negative emotions. Denaham (Denham, 2001) has identified the three main components of emotion comprehension: Expression, Comprehension and Regulation. Each emotion produces an energetic load and it is very important to learn how to use this energy. Emotional comprehension is not intuiting emotions, meaning the capacity of reacting to one's emotion or theirs without using the energy produced in the best way possible. In an unpleasant situation, where the subject may feel anger, there can be two outcomes.

The subject may fall victim of his emotion, hence his body will try not to channel this energy. In the worst case scenario, this can lead to psychosomatic illnesses. There is also a likelihood of Developing difficulties in relational and social areas; the rage that has not been dealt with could lead to inadequate behaviours creating uncomfortable situations. If the subject had a good emotional comprehension, he would be able to manage the produced energy and to use it in their favour in that particular situation. A healthy development of a child highlights the importance of spurring, knowing and recognising one's emotions and those of others. Therefore correctly using the energy produced by the emotions. Working on emotional comprehension enables the improvement of awareness which allows the possibility for two emotions to be present at once.

Both of these are caused by the same stimulus, as well as developing empathy which takes part in other people's emotional experiences. On empathy Anolli (Anolli, 2002) says that "being aware that internal emotions, of one own and of others', are not necessarily caused by what can be seen happening around the subject. This allows the preschool child to distinguish his emotional experiences from what happens on the outside. The process of regulating the expression of emotions is learnt and comes from the continuous exposure behavioural and cultural models". In fact the child will understand how his actions and emotional behaviour can aid or hinder relationships, hence learning to manage them by behaving within the social norms to safeguard his self-

Corresponding Author: GAETANO RAIOLA Email: graiola@unisa.it

esteem. Studies on communication (Watzlawick, 1971) have always demonstrated the close link between nonverbal communication and emotional comprehension. Indeed nonverbal communication allows us to express our emotions and to grasp the emotions of other individuals. This relationship allows to link many modern discomforts to emotional incompetence, that is being unable of understanding emotions of others and our own.

For instance, in cases of self-harm the subject does not want to acknowledge his emotions, provoking an even greater physical pain not to listen to himself. Another example is bullying, where the bully is unable to comprehend other people's feelings. If only the bully could understand the sadness and pain that he is inflicting to the victim, he would stop the abusive behaviour.

Body language and the nonverbal communication are included in physical education (Raiola, Di Tore, 2012ab), which transmits emotions through the posture of the subject and his movements, grouped in:

1. Spatial behaviour: an analysis of how the subject utilizes physical contact, proximity or distance, posture and orientation in space (Di Tore et al, 2012, D'Isanto, Di Tore, 2016);
2. Body movements: gestures and nods (Raiola, 2017);
3. Face expressions: an analysis of the mouth, eyes, forehead…;
4. Gaze: an analysis of how a look can reveal the emotional state;
5. Exterior: an analysis of the body as a whole;
6. Nonverbal aspects of speech: an analysis of all the information coming from nonverbal communication (Raiola, 2012, Di Tore, Raiola, 2012, Gocci e Occhini, 1996).

The hypothesis for this experimental project is derived from a scrupulous study of scientific literature. This goes on to explore the emotional comprehension, and its growth during the age of development thanks to physical education. Many articles have been examined, the main ones are shown in table 1.

Table 1 Main international articles analysed

Article number	Search engine	Magazine	Year	Title	Authors	Country	Setting	Number of children	Age of children	Activity	Duration	Results
1	EBESCO	<<Infants and Young Children>>	2003	"*Emotional Expression of Young Infants and Children. A Practitioner's Primer*"	Margaret Wolam Sullivan e Michael Lewis	New York USA	School	Unknown	Childhood	Coding of data collected with recordings of facial movements	Research about different cultures	Body language, especially facial, is an innate skill which can and must be developed
2	EBSCO	<<International Journal of Language e Communication Disorders >>	2006	"*Understanding emotions in context: the effects of language impairment on children's ability to infer emotional reactions*"	Mattew P. Spakman, Martin Fujiki, Bonnie Brinton	Provo, Utah, USA	School	21, of which 11 boys and 10 girls	7 years old	The children taking part in the research are shown stories where the main character is in situations that can cause anger, fear, happiness or sadness. After having herd the story, the children have to point out the emotion lived by the main character and shown in folders.		Emotional comprehension develops as the child grows.
3 I' study	EBSCO	<<European Child & Adolescent Psychiatry>>	2008	*"Investigation of the construct of trait emotional intelligence in children"*	Stella Mavrovelli, K. V. Petrides, Chloe Shove, Amand	London, U.K	School	139, of which 70 boys and 69 girls	7 years old	Statistic analysis to verify correlation between emotional intelligence and academic performance	6 months	No correlation between emotional intelligence and academic performance has

					a Whitehead							been found.
3 II' study	EBSCO	<<European Child & Adolescent Psychiatry>>	2008	"*"Investigation of the construct of trait emotional intelligence in children"*	Stella Mavrovelli, K. V. Petrides, Chloe Shove, Amanda Whitehead	London, U.K.	School	188 all of which boys	10 years old	Research to find out if the perception that the children have of themselves affects the behaviour at school and if they correlate to the teachers' evaluation.	3 months	A positive correlation had been found, showing that the perception that children have of themselves affects their behaviour.
4	EBSCO	<<Psychology and Health>>	2011	"*Children's sense of coherence and trait emotional intelligence: A longitudinal study exploring the development of somatic complaints*"	Francine C. Jellesma, C. Rieffe, Mark Meerum Terwogt and P. M. Westenberg,	Leiden Holland	Bilbiogarphic research	717, of which 393 boys and 324 girls	10 years old	Self-report compilation		The final results have shown a high correlation between emotional intelligence and a lesser number of somatic illnesses in children.
5	EBSCO	<<The American Journal of Occupational Therapy>>	2015	"*Comprehensive Social Skills Taxonomy: Development and Application"*	Nancy A. Kauffman e Moya Kinneley	Philadelphia, USA	Bibliographic research	6,897 children	Between 3 and 18 years of age	Analysis of works done at school.	It begun in 1987 and ended in 2013	Great importance of nonverbal communication, which facilitates normal social interactions and has positive effects on physical development, social behaviour and the socio-emotional success of the child.
6	EBSCO	<<American Journal of Speech-Language Pathology >>	2016	"*A Synthesis of Relevant Literature on the Development of Emotional Competence: Implications for Design of Augmentative and*	Ji Young Na, Krista Wilkinson, Meredith Karny, Sarah Blackstone e Cynthia Stiffer,	Pennsylvania, USA	School	120	Childhood	A test derived from Saarni's studies (very similar to TEC in structure and graphics) was used		Supporting the developing of emotional comprehension is crucial for the learning of a language. Furthermore, being able to identify

				Alternative Communication Systems"							one's emotions and those of others is fundamental for the development of the child's autonomy
7	EBSCO	<<Journal of Clinical Nursing Wiley>>	2017	*"Curios, Thoughtful and affirmative – Young children's of participation in healthcare situations when using an interactive communication tool"*	Anna Stalberg, Thomas Larsson, Maja Sonderback, Annette Sandberg e Imelda Coyne,	Vasteras, Switzerland	Health care setting	20, of which 13 boys and 7 girls	Between 39 and 70 months	Video recordings to analyse verbal and nonverbal communications which show the prospective of the child	It is important when working with children to have technological tool of communication. This allows the professionals to adopt a focused approach on the child who will respond

Source: self elaborated

The researches have been conducted in the following countries:

1. The first in New York, USA;
2. The second one in Provo, Utah, USA;
3. The third one in London; U.K.;
4. The fourth one in Leiden, The Netherlands;
5. The fifth one in Philadelphia, USA;
6. The sixth one in Pennsylvania, USA;
7. The seventh one in Vasteras, Switzerland.

The data collected by the studies can also be applied to Asia, for the two researches of the third study included foreign children living in the U.K. Some of these children were also Indian and Pakistani. This allows the research to be generalised even more in the final conclusions of the authors. The articles are listed in ascending order of the year of publication. We will try to compare the selected studies and their results to our experimental research.

The first study highlights the importance of emotional comprehension and the identification of the ways in which a body expresses itself. Essentially, an analysis on different ethnicities leads to a nonverbal communication which can be applied universally, regardless of race and cultural lag. This factor is very important to us, since students from different cultures and nationalities were present in the classes involved in the research. Some of these children were born in Italy from foreign parents who have been living in Italy for many years and are well-integrated. Because of this, there is now a cultural background similar to the Italian one. Others were born in Italy from parents that had emigrated not so long ago, so they have an "indefinite" cultural background, in which parts of the culture of their provenience blend with the Italian one. Finally, some children were born in a foreign country and moved to Italy quite recently. By having other studies proving the universality of nonverbal communication, we are able to generalise this data. Throughout the activities and tests of the research, no issues correlating nonverbal communication and cultures were found, strengthening the validity of the data collected by Study 1.

In the second study, the research demonstrated that emotional comprehension develops progressively since the very beginning of childhood and perhaps even since gestation. These conclusions are important to our study for three reasons:

a) They justify the difference of results between years 2 and years 3. The tested group of children in year 2 got a 7.8 on the TEC, and the control group a 6.9, meanwhile, the tested group in year 3 got a 8 and the control group a 7.5. As shown the greater improvement took place between the year 2 children where the difference from one group to the other was of nearly a whole point out of 9. This happened because the children in year 2 are younger, and therefore in the middle of the development of their emotional comprehension phase.

The big improvement in the years 3 (0.5 out of 9) demonstrates that throughout the development age, children can still improve their emotional comprehension through physical education.

b) They justify the inclusion of all the children of both years, without excluding those with a learning impairments. The research has shown that even children with learning difficulties (in the cited study they refer to verbal difficulties) can amply benefit from programs improving emotional comprehension. When we presented the learning units, tests and correction of the data, no issues came from children with learning difficulties.

c) They justify how emotional comprehension was monitored. The researchers showed some files where the main character, Chris, found himself in various situations which should have caused anger, fear, happiness or sadness. The children were then asked to point out what emotion Chris was living. One after the other, all the different scenarios were presented to the children who had to talk about the emotions linked to them. The children were asked to explain why, to them, Chris was feeling the emotion they had chosen. Finally, to present a detailed description of the effects provoked by every single emotion, also by not referring to the scenario. This experimental project used a similar procedure which analysed other areas too, such as simulated feelings.

The third article, which comprises two important confirmations to our experimental study, is formed by two independent forms of research.One proves the lack of correlation between emotional intelligence and academic performance. This helped the experimental project, as we made no distinctions between pupils according to their academic performance. If the emotional comprehension was influenced by the academic performance, it would have been fruitless analysing its correlation to physical education without foreseeing preliminary distinction. It needs to be noted that at no point during the research, asking the teachers about the academic performance of some of the children was relevant, for all the pupils actively and profitably took part in the actives.

The second one analysed if the self-perception of children influenced their behaviour at school and if that was correlated to the evaluation of the teachers. In this case, the authors found a positive correlation, proving that the self-perception of children does indeed influence their behaviour. This finding is relevant to our experimental project because it extends its validity to the teachings that were discovered. Knowing that self-perception influences the behaviour at school, working on improving one's emotional comprehension results in preventing behavioural inconveniences, particularly frequent during the age of development. During this stage of life, the children discover and build their inner self in an ever-changing body. The instability of identity makes it very difficult for the child to control himself, hence why sometimes children respond physically during stressful situations. Just think about situations where the child throws himself on the ground after having had a tantrum or when another child makes a grimace and he pushes him. These kinds of behaviour can complicate the teaching. Considering the findings of this second research, we can affirm that our study produces positive effects on the teaching field, indirectly improving behaviours that would disrupt the work of the teachers.

The fourth study shows a high correlation between emotional intelligence and somatic impairments of children. The research affirms that the correlation between the two seem to be bidirectional. Therefore, work on emotional comprehension has positive effects on somatic impairments and on the body of the child. Analysing the correlation between emotional comprehension and physical activity (knowing that the former has a great protective effect), gives even more importance to research during this stage of development. Emotional comprehension means recognising the emotion that the subject is experiencing and knowing how to correctly make use of the energy it produces. Teaching the child how to work on his emotional intelligence means we are also helping him how to manage his own body and energy. This links to the second research of the third study, highlighting the importance of physical education as a means to improve emotional comprehension.

In the fifth study's final analysis, the writers stress the importance of nonverbal communication, which helps the improvement of social skills and physical development. This also relates to the social behaviours and on the socio-emotional success of the child. The following taxonomy of social skills on children is also focused on nonverbal communication, and additionally helps in identifying children who will have issues in socialising.

Without taking into account that the children that took part in the study were disabled, the interesting part of this study is not the final result, but rather the focus on social skills and the final taxonomy. The authors clearly defined the social skills in:

1. Social behaviours, like maintaining eye contact, knowing when it is someone's turn to speak and asking permission to take another child's toys;
2. The capability of controlling emotions and behaviours which restrain inadequate social behaviours (pro-social behaviour);
3. The socio-cognitive processes used by children to solve social issues, such as participation and interpretation of social signals to intuit the intentions of others;
4. Knowing society's norms, like knowing what being friends means.

Furthermore, they pinpointed a taxonomy of social skills with the addition of indicators:

1) The verbal introduction: parameters which face the necessity of changing the use of words (according to their semantic meaning, hence their content) that do not allow the acceptance of the subject by other children;

2) The nonverbal introduction: parameters which face the necessity of changing behaviours that do not allow the acceptance of the subject by other children;

3) The emotional response: parameters which face the necessity of modifying the emotive response to frustrating, new, casual, unforeseen events or when there is a transition to one scenario to another;

4) Playing: parameters which face the necessity of changing behaviours while playing or doing activities with others;

5) Being self-aware and aware of the others: parameters which face the necessity of bettering a conscious evaluation and consideration of themselves and of other people;

6) Interpersonal relationship: parameters which face the necessity of starting and maintaining effective relationships with other people;

7) The perception of one's self: parameters which face the necessity of changing the level of self-esteem.

The definitions of social skills and the categories which have been presented facilitated this project's realisation of learning units. It needs to be said that the results found by the authors fit the results of this research. The writers researched and found a correlation between physical education and emotional comprehension, which has been found in this experimental research by adding social skills to it.

In the sixth study, the authors give a definition of emotional comprehension as the capacity to identify, answer and manage our emotions and those of others, an assumption also present in this study. According to the authors, there seems to be a link between the development of speech and the development of emotional comprehension in children that do not have impairments with words. Although there is not a great deal of research on the use of Argumentative and Alternative Communication (AAC), the article goes into how AAC systems can be designed to help the communication of emotions and the overall development of emotional comprehension.

The sixth study analysed the data collected from the evaluation of 120 children of different ages both with a normal capability of speech and not. The researchers concluded that it is essential to improve the emotional comprehension in order to learn another language. Furthermore, knowing how to manage one's own emotions and those of others is very important to develop one's autonomy.

The article did not use actual data nor statistics to show the results of the research. Nevertheless, it is an important article, for it confirms that it is right using TEC in this experimental research. The authors chose a test coming from Saarni's studies quite similar to TEC, both in its graphics and structure. It could have been interesting to compare the data collected by the research of the data collected for this study, but it is impossible to do as there are no statistics.

In the seventh and final study, there was a focus on the meanings that children give to situations where interactive tools were used, knowing that the children's participation was a multimodal concept influenced by contextual and situational factors.

The researchers refer to healthcare environment but, by extension, the principles can be applied to experimental situations, like those present in the workplace. Children, the main subjects, express their desire to take part in new situations to obtain information, to satisfy their curiosity and to feel an active part of a context.

Hence, the following hypothesis was formulated: "Is it possible to facilitate emotional development through physical education and other school disciplines?".

Experimental procedure

Italian schools in the province of Pesaro, were examined to find one with at least four classes of children willing to take part in the research. When the Istituto Comprensivo A. Olivieri di Pesaro gave its availability, an analysis of the pupils of two of the four year 2 classes and two of the four year 3 classes took place, to determine is the classes were suited for the research. An initial numeral evaluation took place, followed by a gender composition evaluation and finally one on their emotional comprehension. For the latter evaluation we used the Italian version of the TEC, Test of Emotion Comprehension, edited by O. Albanese and P. Molina.

The following table 2 shows the data collected:

Table 2. Composition of the selected classes:

Year 2, Section A, 6-7 years old	Made up of 18 Pupils of which: 11 boys 61%; 7 girls 39%
Year 2, Section B, 6-7 years old	Made up of 12 pupils, of which: 7 boys 50%; 7 girls 50%
Year 3, Section A, 8-9 years old	Made up of 23 pupils, of which: 13 boys 57%; 10 43%
Year 3, Section B, 8-9 years old	Made up of 20, of which: 9 boys 45%; 11 girls 55%

Source: self elaborated

The mean TEC value for the year 2 A is 5.8 and 5.9 for the year 2 B. The year 2 A boys got a 5.7 while the year 2 B boys got a 5.4; the year 2 A girls got a value of 5.9 while the year 2 B girls got a 6.3. The two classes can be considered equivalent by analysing the numerical and psychological factors. Because of the school's timetable we decided to consider the year 2 A the control group, who do not go to school on Saturdays,

and the year 2 B as the tested group, who go to school on Saturdays. The year 3 mean emotional comprehension results given by TEC were of 6.4 for the year 3 A and of 6.5 for the year 3 B. Both the boys of year 3 A and year 3 B got a TEC value of 6.1; the girls of year 3 A got a value of 6.8 while the girls of year 3 B a score of 6.7.

The two classes can be considered equivalent by analysing the numerical and psychological factors. Because of time management, we decided to consider the year 3 A as the test group, who go to school on Saturdays, while the year 3 B as the control group, who do not go to school on Saturdays.

We have arranged some learning units where physical education and other school subjects, such as Italian language and History, merged together, with the aim of improving emotional comprehension. We reserved some time for the children to perform some of Ovid's myths from *Metamorphoses*, so that they could express their emotions through the body and read what other people felt. At the end of every teaching unit, we asked them to reflect on how their body and that of others expressed its feelings, and to dwell upon how knowing what the other person was feeling influenced their interactions. Activities on how to manage anger during conflicts through the body and physical education, also took place.

Results and discussion

Along with the first and last data collected, consistency was regarded as important to the progress of the children during time. Because of this, we collected data four times: before starting the research to evaluate the emotional comprehension of the children at the beginning, at the end of the first school year, at the beginning of the second school year and a summative data collection at the end of the project.
The following tables 3 and graph 1 contain the results of the years 2 and 3.

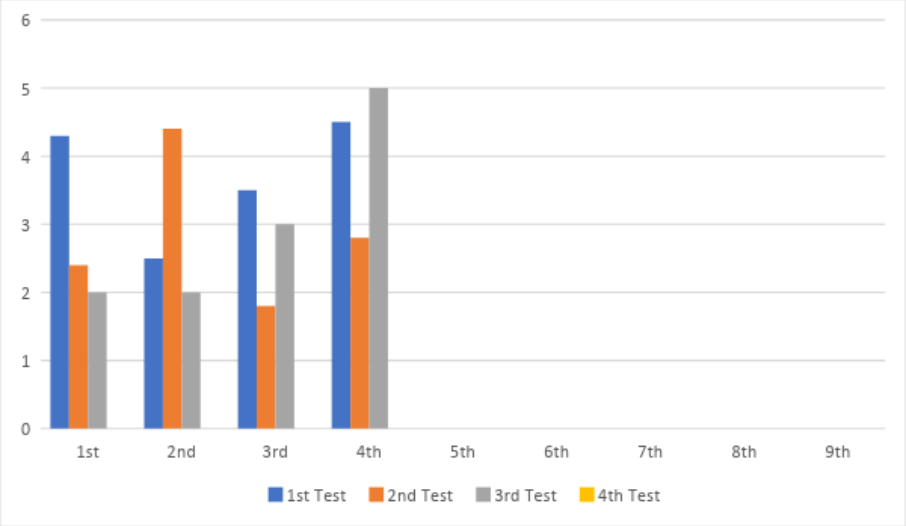
Table 3 Year 2's data
Analysis of the data collected in each component
TESTED GROUP
Table 3a

Year 2 B	1st Test	2nd Test	3rd Test	4th Test
1st Comp.	0.9	1.0	1.0	1.0
2nd Comp.	0.9	0.9	0.9	1.0
3rd Comp.	0.7	0.9	0.9	0.9
4th Comp.	0.6	0.7	0.8	0.9
5th Comp.	0.5	0.6	0.7	0.9
6th Comp.	0.6	0.8	0.9	1.0
7th Comp.	0.7	0.7	0.7	0.8
8th Comp.	0.3	0.5	0.4	0.6
9th Comp.	0.6	0.6	0.6	0.7

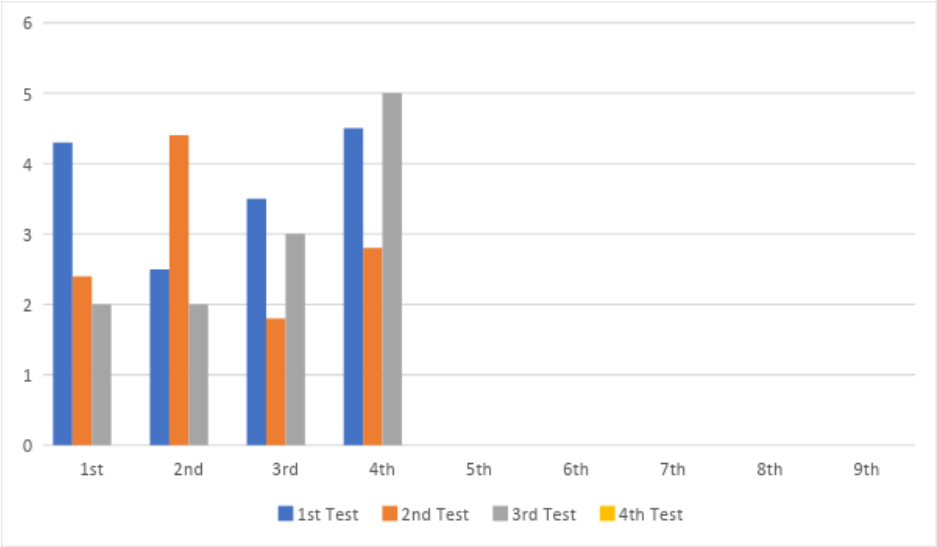
CONTROL GROUP
Table 3b

Year 2 A	1st Test	2nd Test	3rd Test	4th Test
1st Comp.	0.9	0.9	1.0	1.0
2nd Comp.	0.8	0.8	0.9	0.9
3rd Comp.	0.8	0.7	0.9	0.8
4th Comp.	0.6	0.6	0.8	0.7
5th Comp.	0.6	0.4	0.7	0.7
6th Comp.	0.5	0.7	0.9	0.8
7th Comp.	0.6	0.5	0.7	0.6
8th Comp.	0.4	0.5	0.4	0.6
9th Comp.	0.8	0.7	0.6	0.8

TESTED GROUP
Graph 1a



CONTROL GROUP
Graph 1b



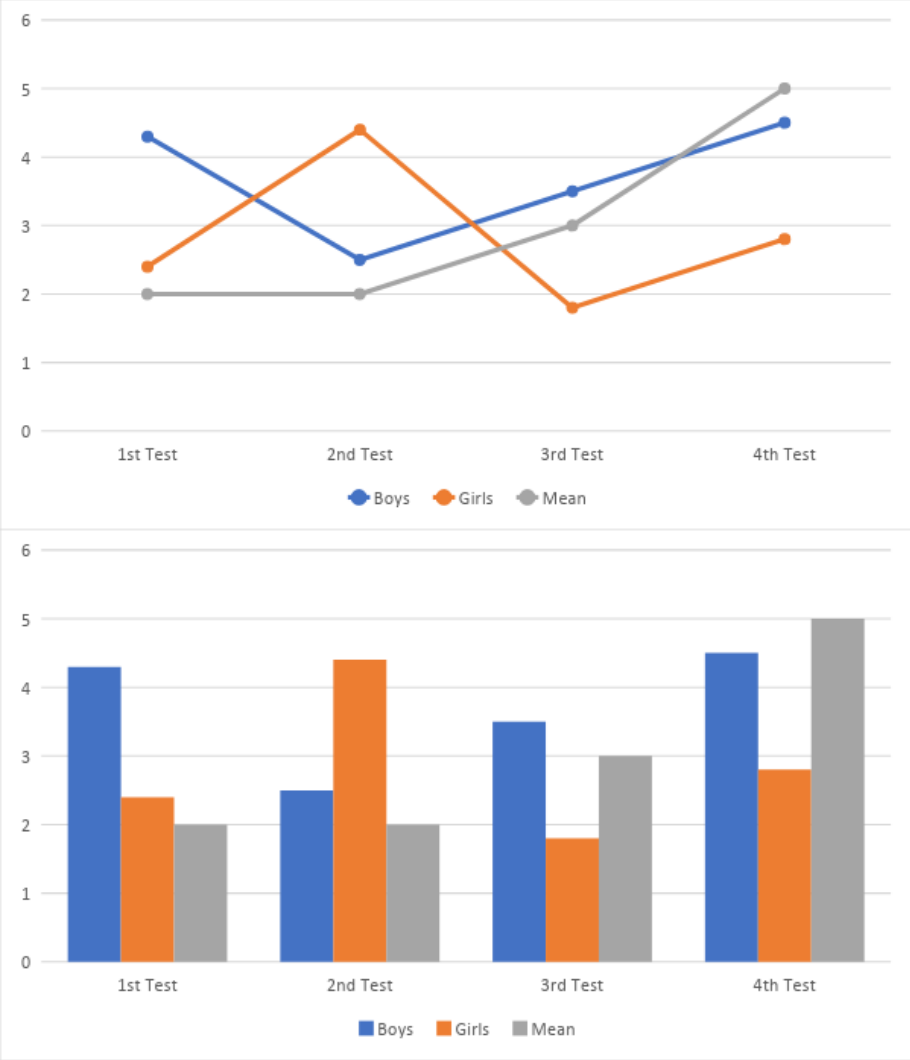
Analysis of the mean value:
TESTED GROUP
Table 1c

Year 2 B	Boys	Girls	Mean
1st Test	5.4	6.3	5.9
2nd Test	6.3	7.1	6.7
3rd Test	6.4	7.4	6.9
4th Test	7.7	7.9	7.8

CONTROL GROUP
Table 1d

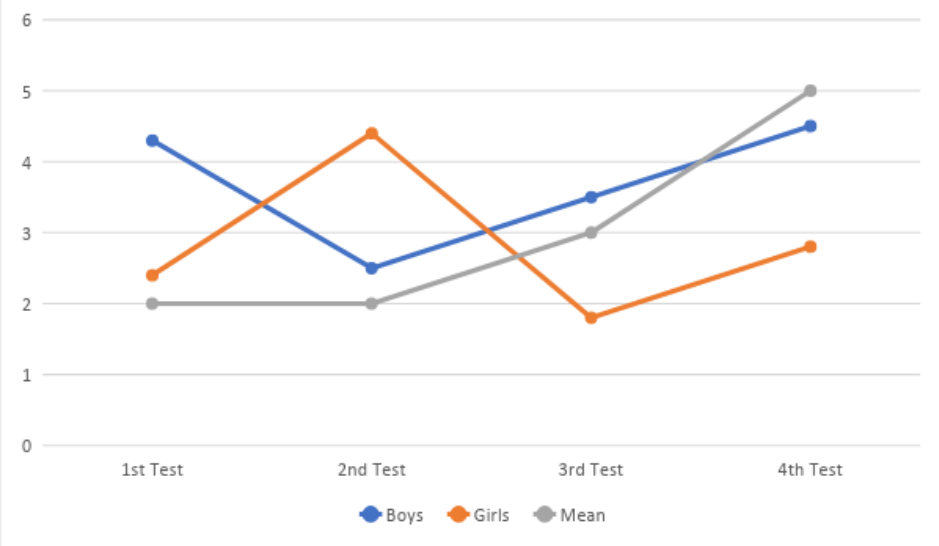
Year 2 A	Boys	Girls	Mean
1st Test	5.7	5.9	5.8
2nd Test	5.9	6.0	5.9
3rd Test	6.2	6.4	6.3
4th Test	6.8	7.1	6.9

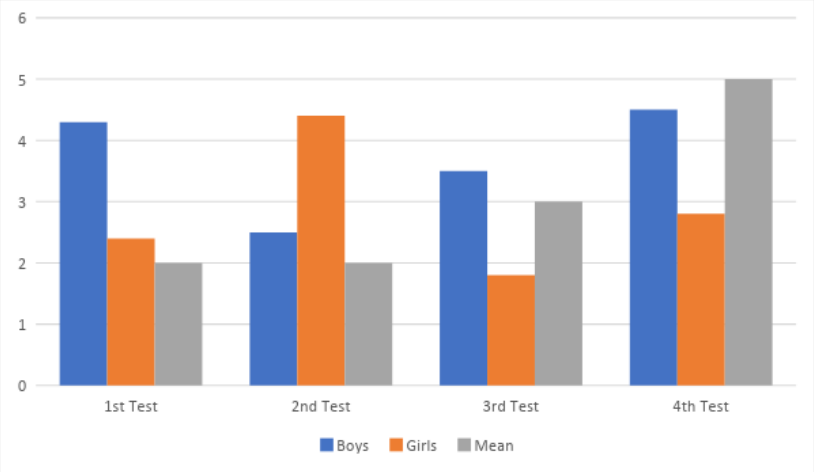
TESTED GROUP
Graph 1c



CONTROL GROUP

Graph 1d





Analysis of the numbers of students divided by value:

TESTED GROUP

Table 3e

Year 2 B	1st Test	2nd Test	3rd Test	4th Test
Value 0	0	0	0	0
Value 1	0	0	0	0
Value 2	1	0	0	0
Value 3	0	1	0	0
Value 4	2	1	2	0
Value 5	2	1	0	0
Value 6	3	2	2	2
Value 7	4	3	5	3
Value 8	2	5	3	5
Value 9	0	1	2	4
	14	14	14	14

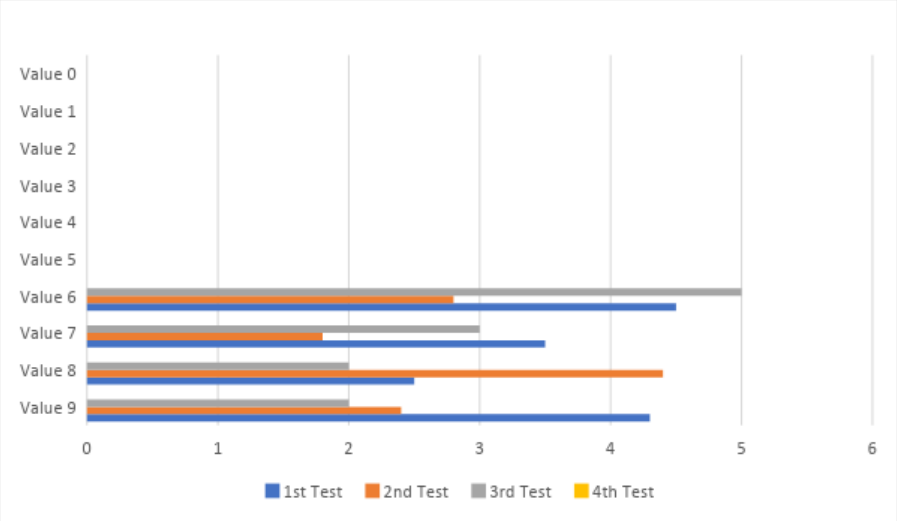
CONTROL GROUP

Table 3f

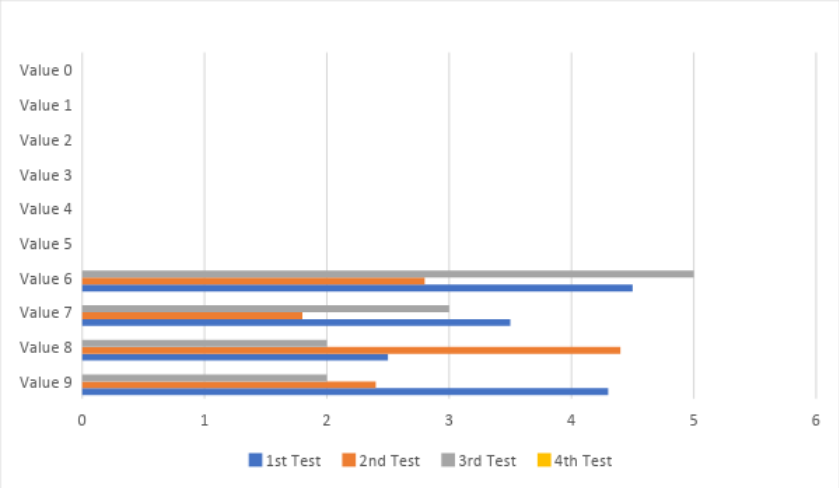
Year 2 A	1st Test	2nd Test	3rd Test	4th Test
Value 0	1	0	0	0
Value 1	0	0	0	0
Value 2	0	1	0	0
Value 3	2	1	1	0
Value 4	1	0	2	0
Value 5	3	4	2	1
Value 6	3	5	3	7
Value 7	3	4	6	3
Value 8	5	3	4	6
Value 9	0	0	0	1
	18	18	18	18

TESTED GROUP

Table 3g



CONTROL GROUP Graph 1e



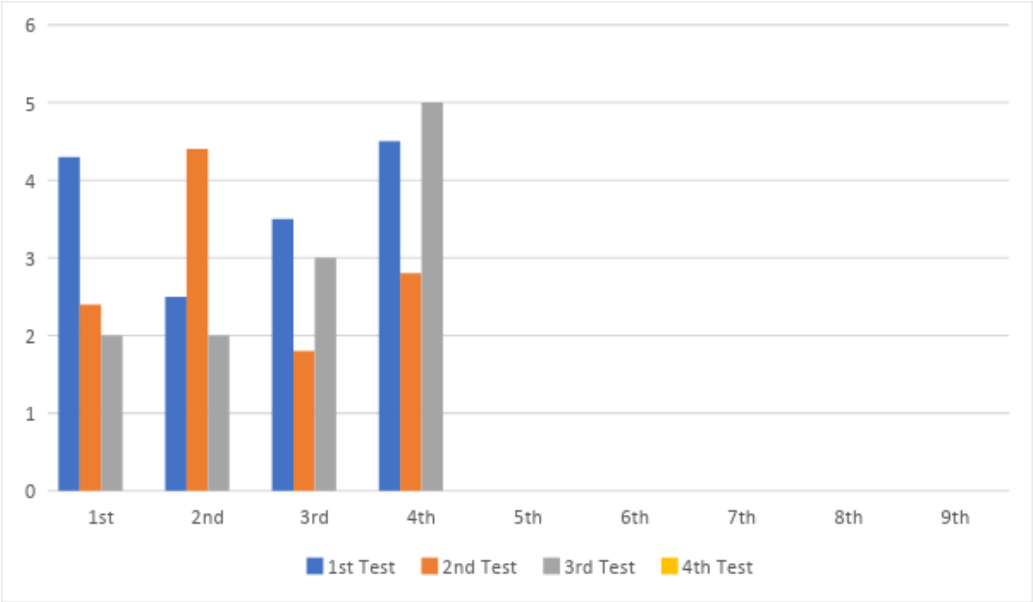
Source: self elaborated

Table 4 Years 3's data Analysis of the data collected in each component

TESTED GROUP Table 4

Year 3 A	1st Test	2nd Test	3rd Test	4th Test
1st Comp.	1.0	1.0	1.0	1.0
2nd Comp.	0.9	1.0	1.0	1.0
3rd Comp.	0.7	0.8	0.8	1.0
4th Comp.	0.6	0.7	0.8	0.8
5th Comp.	0.6	0.8	0.9	0.9
6th Comp.	0.7	0.6	0.7	0.8
7th Comp.	0.8	0.9	0.9	1.0
8th Comp.	0.6	0.6	0.7	0.7
9th Comp.	0.5	0.6	0.7	0.9

Graph 1e

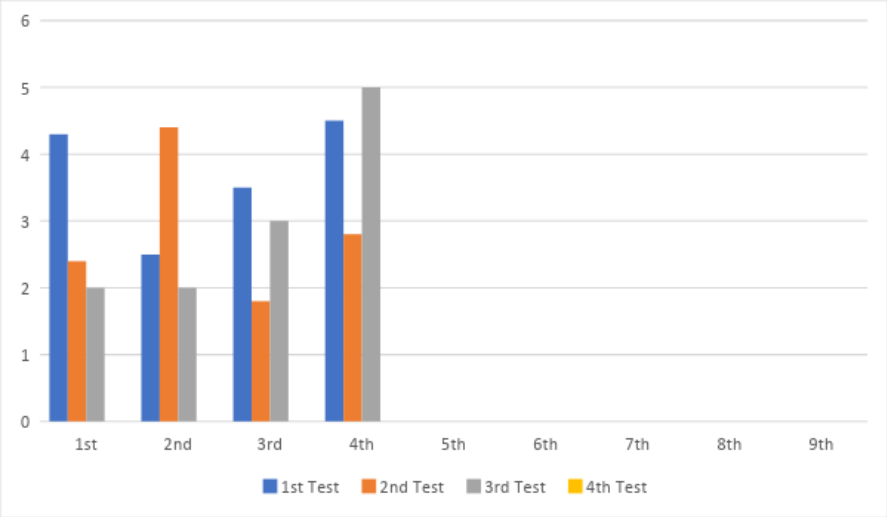


CONTROL GROUP

Table 3g

Year 3 B	1st Test	2nd Test	3rd Test	4th Test
1st Comp.	1.0	1.0	1.0	1.0
2nd Comp.	1.0	1.0	1.0	1.0
3rd Comp.	0.8	0.8	0.8	0.9
4th Comp.	0.7	0.8	0.8	0.8
5th Comp.	0.7	0.7	0.8	0.9
6th Comp.	0.7	0.8	0.7	0.9
7th Comp.	0.7	0.8	0.8	0.8
8th Comp.	0.3	0.5	0.5	0.6
9th Comp.	0.7	0.6	0.7	0.7

Graph 1g



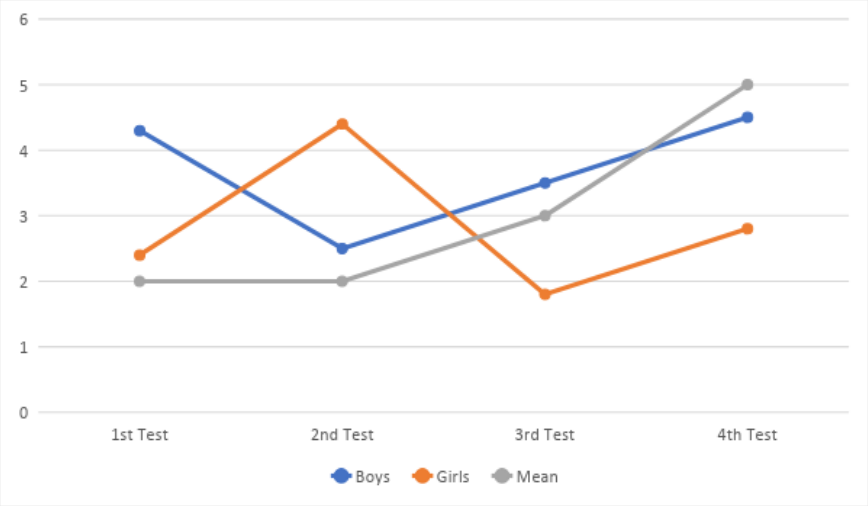
Analysis of the mean value:

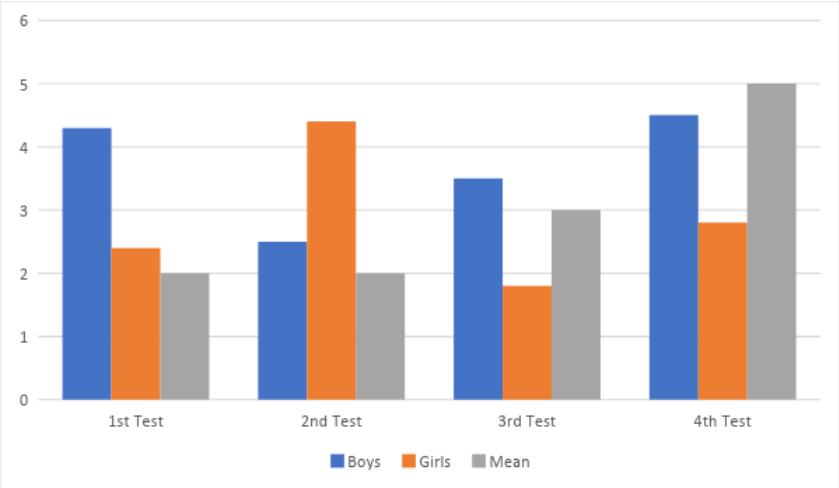
TESTED GROUP

Table 3h

Year 3 A	Boys	Girls	Mean
1st Test	6.1	6.8	6.4
2nd Test	6.6	7.3	6.9
3rd Test	7.0	7.6	7.3
4th Test	7.9	8.2	8.0

Graph 1h



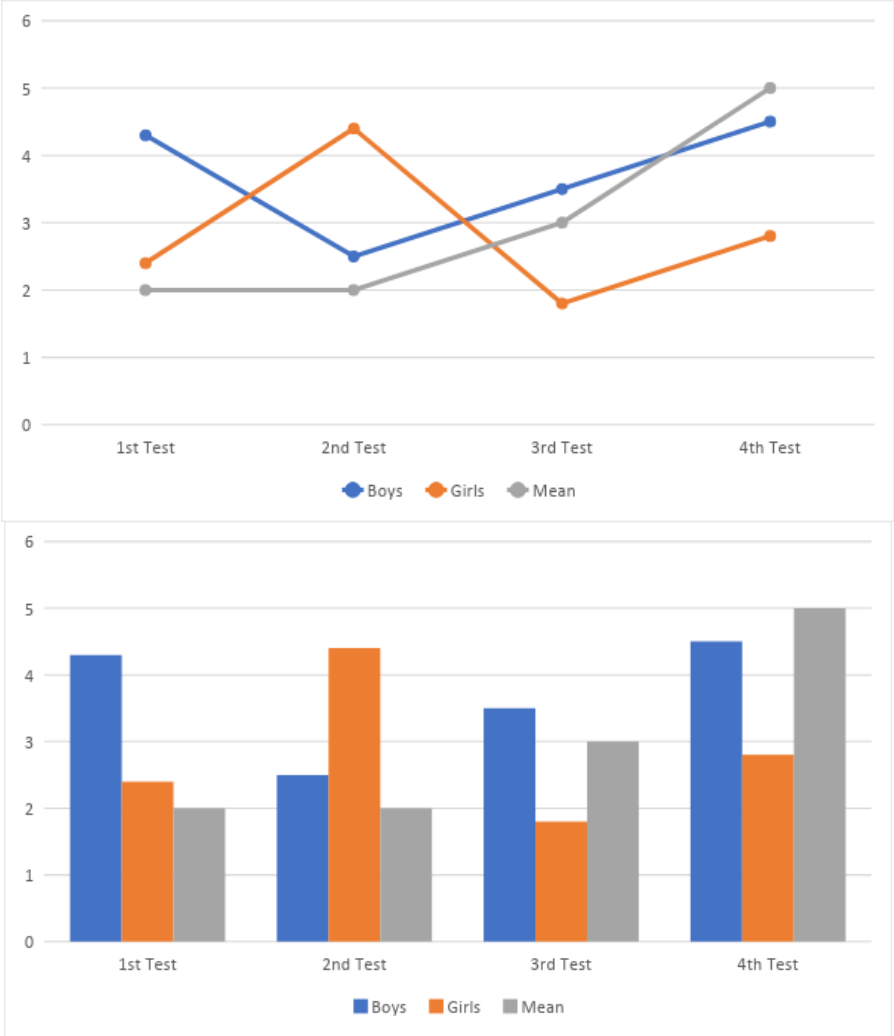


CONTROL GROUP

Table 3i

Year 3 B	Boys	Girls	Mean
1st Test	6.1	6.7	6.5
2nd Test	6.4	7.0	6.8
3rd Test	6.6	7.1	6.9
4th Test	7.4	7.5	7.5

Graph 1l



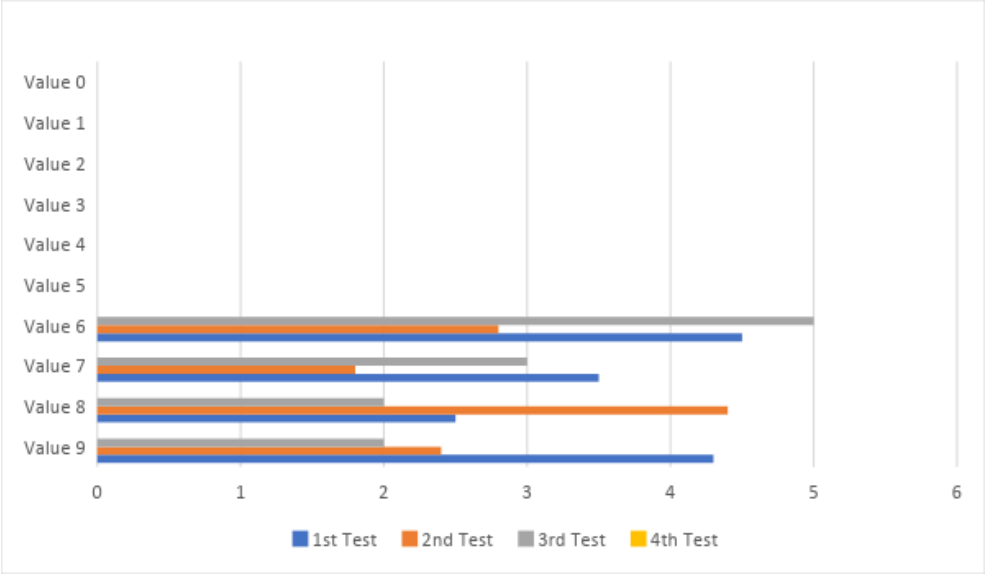
Analysis of the numbers of students divided by value:

TESTED GROUP

Table 3l

Year 3 A	1st Test	2nd Test	3rd Test	4th Test
Value 0	0	0	0	0
Value 1	0	0	0	0
Value 2	0	0	0	0
Value 3	0	0	0	0
Value 4	5	0	0	0
Value 5	2	2	2	2
Value 6	4	7	4	0
Value 7	6	7	6	1
Value 8	3	5	8	12
Value9	3	2	3	8
	23	23	23	23

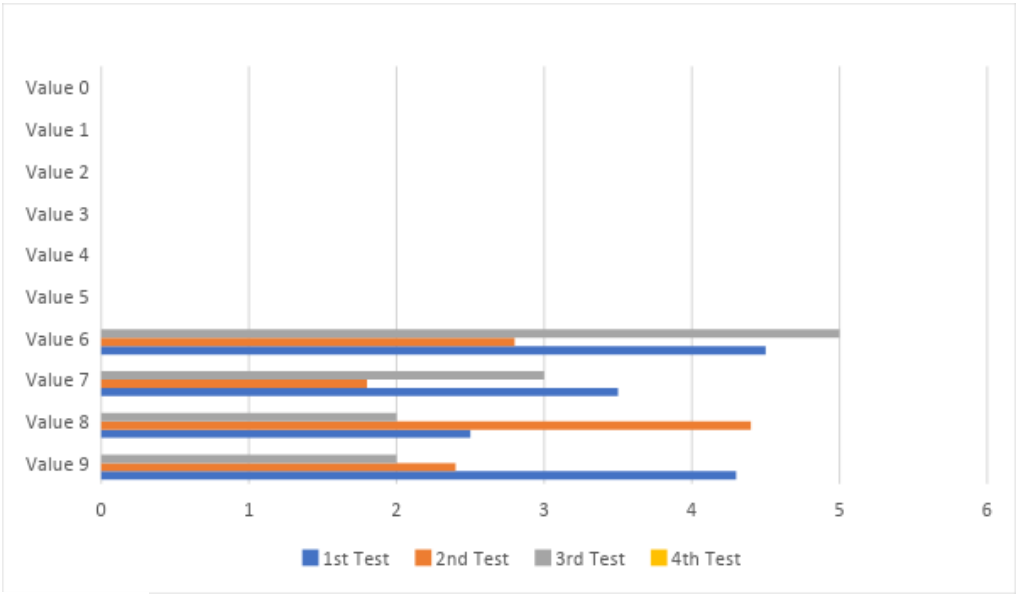
Graph 1m



CONTROL GROUP Table 3m

Year 3 B	1st Test	2nd Test	3rd Test	4th Test
Value 0	0	0	0	0
Value 1	0	0	0	0
Value 2	0	0	0	0
Value 3	1	0	0	0
Value 4	0	1	1	1
Value 5	4	2	1	0
Value 6	5	5	6	2
Value 7	5	6	7	6
Value 8	4	5	2	7
Value9	1	1	3	4
	23	23	23	23

Graph 1n



Source: self elaborated

The collected data is statistically relevant for the value P of the "Student's Test t", where the difference of the mean values is $P<0.05$, is of 0.0375 for the years 2 and 0.046 for the years 3.

Afterwards, the range (the difference between the highest and lowest distribution value) was analysed using the formulae $R=Xmax - Xmin$. The final values of the test are used for the evaluation.

The following table 4 sums the data up:

Table 4 Calculation of the range

RANGE

	Highest value	Lowest value	Range
Year 2 A (Control group)	9	5	4
Year 2 B (Tested group)	9	6	3
Year 3 A (Control group)	9	5	4
Year 3 B (Tested group)	9	4	5

Source: self elaborated

The values obtained from the control and tested groups are quite similar, meaning that the trend is similar and comparable. Another interesting finding is that the range is the lowest in the tested groups, demonstrating a less chance of changes in the collected data.

Another important statistics is the analysis of the standard deviation, a wastegate rate of experimental measures. It is a way of representing the deviation of the data from the expected value, that is analysing how the data is distributed compared to the mean. The more the standard deviation is closer to 0, the more the mean is reliable. A standard deviation close to 0 shows little variability in the data.

The following table 5 shows the data collected from the four groups specifying the variance:

Table 5 Standard deviation and variance

RANGE	STANDARD DEVIATION	VARIANZA
Year 2 A (Control group)	9	5
Year 2 B (Tested group)	9	6
Year 3 A (Control group)	9	5
Year 3 B (Tested group)	9	4

Source: self elaborated

The values shown in table 6 are close to 1, hence the mean is reliable.

By closely analysing the data, it shows that the results from each parameter are better for the control group. Since the data is statistically correct, we can say that the improvement occurred thanks to the experimental project.

From analysing the data reported in components tables, it is clear that the Year 2 tested group got better results in the first eight components and a slightly lower value in the ninth. Because the children were 6 to 7 years old, we can affirm that the last two components have not yet been acquired by everyone, hence it is normal that the values are altered.

When analysing the mean value, it can be noticed that the tested groups got a score of 7.8 which is much higher than the control group's one of 6.9. This value is very important because it allows to evaluate the overall research.

Finally, the table presenting the students divided by achieved score, highlights how the majority of pupils in the tested group got a 8 while the majority of pupils in the control group got a 6. In the tested group no student is below the score of 6 while in the control group no one is below 5. This value lets us surpass the mean value showing the possibility of having too big internal differences. If only one child had a score too low, that cannot be used when calculating the mean value, ascribing it to the lack of understanding the assignment or to cognitive and/or emotive issues.

Overall, these three parameters show the positive effect of the experimental project and the confirmation of the hypothesis.

The year 3 classes overall got better results in the single components, as shown by the two tables. However, since the children were 8-9 years old, not all the components could have been acquired by then, therefore the results are quite satisfactory.

When analysing the mean value, it can be noticed that the tested group got a score of 8 which is higher than what the control group got: 7.5. Thus value is important for it allows the evaluation of the whole research. Although this year's difference between the control and variable group is 0.5 and hence less compared to the year 2 , it still is notable for at the age of 8-9 years children are about to end maturing their emotional comprehension.

Finally, the table presenting the students divided by achieved score, highlights how the majority of pupils in both the variable group and the control group got a value of 8. Nonetheless, most students in the control group have a value between 8 and 9, while many students in the tested group have a score between 7 and 8. Furthermore, the minimum value achieved by students in the tested group is of 5, and the control group's one is of 4. This value lets us surpass the mean value showing the possibility of having too big internal differences. If only one child had a score too low, that cannot be used when calculating the mean value, ascribing it to the lack of understanding the assignment or to cognitive and/or emotive issues.

Overall, these three parameters show the positive effect of the experimental project and the confirmation of the hypothesis.

Conclusions

The data collected has been meticulously and amply analysed in order to verify the hypothesis. This project involved students in the midst of development, a stage when only one month of difference can have a monumental effect on development. Both years gave positive results, demonstrating a close relation between physical education and emotional comprehension. The test that was used (specific to this ages) showed big differences in favour of the variable group.

The improvements are shown in each of the test's components (1. Identification, 2. External cause, 3. Desire, 4. Belief, 5. Recollection, 6. Regulation, 7. Concealment, 8. Mixed emotions, 9. Moral), in the mean values, and in the distribution of the students by the TEC value. Therefore, we can statistically accept the hypothesis.

Through the use of statistics, analytics and description on the collected data, it is demonstrated that the development of emotional comprehension can be aided with physical education and other school subjects during the age of development. The positive correlation was found both in the years 2 and years 3, validating even more the initial hypothesis.

However, no other paper about the correlation researched by this study, was found on the main search engines (Eric, Psyinfo, Ebsco and SportDiscuss). It would have been interesting to confront the results on the same subject but researched by other authors in different contexts, times and places.

Nevertheless, there are many articles containing the keywords of this study (childhood, age of development, physical education, nonverbal communication and emotional development). This suggests that there is some awareness around this theme.

For this project, we chose engaging activities in order to make the children feel more involved, as we wished them to acquire new knowledge. At the same time we left the children some moments to adapt to a new situation and to reflect, and gain some recognition. All the activities were done at school. While planning the research, we decided that the TEC would have been the suitable tool to collect data. We chose the TEC before the article "Curious, Thoughtful and affirmative – Young children's meanings of participation in healthcare situations when using an interactive communication tool" by Anna Stalberg, Thomas Larsson, Maja Sonderback, Annette Sandberg and Imelda Coyne, published on the Journal of Clinical Nursing Wiley on the 6th of May 2017, 2018, 27, pages 235-246, became public. This article underlines the importance of using new technologies when working with children, in fact in their research they used tablet apps. During the initial planning of this study, we looked for a tool taking advantage of modern technology, such as a tablet, but a tablet is not backed up with the required scientific research. Nonetheless, the TEC has captivating images. At the beginning of the project, there was an idea of scanning the pictures and showing them in a digital format, but it was dismissed, because it could have falsified the final results, for the image used by the authors of the test was not digitalized. It would have been risky to think that using a completely different TEC method was not going to have any repercussions on the results.

The TEC handbook says that the teacher should pay attention to the background during the test by using nonverbal and paraverbal communications. During the test there are some phrases that should be pronounced exactly as they are written on the handbook. Having had a tool as described in the aforementioned article would have facilitated the research and would have caught more the attention of the children.

Thanks to the comparison of the article's data and the data obtained through the use of TEC in this experimental research, it shows that both tools can precisely reveal the level of emotion comprehension of a child. Knowing that the first tool is eye-catching and the second one is precise, it could be interesting to do a new Italian research using the allure of the former tool and the detailed analysis of the latter. Focusing on the personality of the child pondering on his motoric area, cognitive area, the affective and emotional one, social area and relational means looking after our future.

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