



## Research Article

## Correlation between the comprehensive skills and metacognitive teaching strategies during the COVID-19 pandemic: implications for study motivation

 Franco Bin <sup>1\*</sup>, Rosa Disnan <sup>2</sup>, Viviana Langher <sup>3</sup>, Daniela Marchetti <sup>4</sup>, Maria Michaela Bin <sup>5</sup>

<sup>1</sup> Ph. D., Psychopathology and Mental Functioning, Sapienza University of Rome, Italy

<sup>2</sup> Comprehensive Institute of Secondary School, Codroipo (UD), Italy

<sup>3</sup> Department of Dynamic and Clinical Psychology, and Health Studies, Sapienza University of Rome, Italy

<sup>4</sup> Department of Psychological, Health and Territorial Sciences, University of Chieti-Pescara, Italy

<sup>5</sup> Medical student, University of Siena, Italy

Corresponding Author: \* Franco Bin 

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## Abstract

**Background:** In the educational field, more importance has always been given to linguistic production instead of comprehension, considering it an immediate and automatic aspect (Zanetti, Miazza, 2019). Currently, two dimensions of understanding are considered: "vertical" and "horizontal". In the vertical, an interaction with reality is identified through a spiral process. On the other hand, the horizontal dimension is related to the meaning of the statement (De Mauro, 1994).

**Methods:** This research involved children who attended the "G. Bianchi" secondary school of Codroipo (UD, Italy), and it was conducted through a three-year period, overcoming the Covid 19 pandemic.

**Objectives:** The objectives of this study were: a) to verify the presence of a significant correlation between comprehension and metacognitive teaching strategies; b) to verify the existence of a correlation between the decrease in the results obtained at the beginning of the third year and the decrease in motivation to study that occurred after the pandemic period.

**Results:** The results obtained show a significant correlation between comprehension and metacognitive strategies and the effectiveness of the teacher's role and motivation to study.

**Conclusions:** Despite the smallness of the sample, which does not allow us to give a global view of the school situation in Italy, this study suggests the importance of the metacognitive strategies for the understanding skills, the effectiveness of the teacher's role as a personal teaching promoter and the presence of a significant relationship between profit and motivation to study. In the future, it is expected to involve other classes of the same institute and other Secondary schools in the Friuli Venezia Giulia Region (Italy).

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**KEYWORDS:** comprehension, metacognitive strategies, motivation to study

## 1. INTRODUCTION

Scientific interest has always focused more on the study of linguistic production and less on the comprehensive aspects of the language. It was only in the 1980s that these aspects began to be studied not only as memory recalls, but also as personal constructive activities (D'Odorico, 2002; Camaioni, 2001; De Mauro, 2002).

According to current knowledge, understanding the words heard or written is no longer an obvious conclusion, but the sum of several processes. Consequently, understanding cannot be considered immediate and automatic (Zanetti, Miazza, 2019).

In the early years of the twentieth century, the father of Linguistics, De Saussure, proposed a linear communicative model in which understanding was seen as a passive action of the listener who only had the task of decoding the information with almost zero role in the message and in the communication situation.

However, De Saussure contributed to highlighting the problematic nature of understanding by arguing that the meaning of the word can be given by "syntagmatic" and "associative" relationships linked to memory, which help to determine the meaning of the word itself (Saussure F. De, 1922).

In the last century, there have been various reasons, historical and cultural variables, that have led to the changing of the theories (De Mauro, 1994).

First, the birth and diffusion of Psychoanalysis has given impetus to a search for the meaning of the word that goes beyond the semantic meaning: the listener must reconstruct the authentic meaning of the discourse, and the utterance becomes the expression of a network of mental associations (Lacan, 1974).

A second reason for the change in theoretical horizons can be identified in the development of societies in the 1920s and 1930s and in the spread of media communication, such as radio and television. These technologies have highlighted the plurality of attributions of meaning for the same message. Moreover, globalisation and interculturality with the consequent progressive multiracial crossing over, have highlighted numerous linguistic and communicative fractures (Berman, Slobin, 1994).

The third factor concerns the study on graphic and auditory perception, which has the aim to demonstrate how prior knowledge and socio-cultural skills can guide and influence visual or auditory reception. Studies on perception have demonstrated that the visual or auditory reception is not a passive sensorial factor separated from semantic, syntactic and pragmatic evaluations (Zanetti, Miazza, 2019).

A fourth element, which has challenged the more traditional view of understanding, is based on the studies on the structural ambiguities of sentences by Noam Chomsky (1957). They have carried out studies on the processes for the search for the meaning of syntactically ambiguous sentences, assigning the reader a more active role in the search for the meaning of the utterance. Studies in textual linguistics, pragmatics and cognitive psychology have shown that the understanding of a text must take into account the antecedent and following context, the situational context and the purposes for which it was

created. The comprehension activity, therefore, brings into play all the intellectual abilities of the reader becoming an autonomous and complex experience, a "mental gymnastics", a "going back and forth in the co-text, beyond the text towards the situational context, behind and beyond the text towards its infratexts, its purposes, its superscopes" (De Mauro, 1994; Zanetti, Miazza, 2019).

The current challenge is to integrate different theoretical and methodological approaches by finding the strengths of each discipline to arrive at a shared epistemological universe (Zanetti, Miazza, 2019).

## 2. MATERIALS AND METHODS

### 2.1 Participants and Procedures

This research was carried out in a class of the "G. Bianchi" of the Istituto Comprensivo di Codroipo (UD) with an observation that it started at the beginning of the first year of Secondary school and it ended at the beginning of the third year of the Secondary school (which is the last year of Secondary school), in a period between September 2018 and October 2020, and it is part of the usual practice of the measuring of the children' comprehensive skills at the beginning of each school year.

The Istituto Comprensivo di Codroipo includes all the schools, from nursery to high schools, of the municipalities of Codroipo, Camino al Tagliamento, Bertolo and Varmo in the province of Udine in the Friuli Venezia Giulia region. There are 4 nursery schools, 5 primary schools and 2 secondary schools. The total number of pupils is around 1877.

The Institute has developed a specific area of interventions for children with special educational needs (SEN) with teachers trained and specialised, called SENco (Special Educational Need Coordinator). In addition, there are offices for children and parents' counselling. There are also protocols for the prevention and the contrast of early school leaving, for promoting school inclusion and the rights to study of the children with special educational needs. There is also strong support and collaboration with the social and befriender services.

The passages of the children from nursery to primary and secondary school are guaranteed by specific focus groups in which various teachers of the different grades of school meet each other's for transferring information about personal and academic details of each student.

All this work is particularly useful for the transition from the fifth grade of primary school to the first grade of secondary school.

At the beginning of the year, tests are usually administered to pupils to evaluate scholastic skills in the various subjects and to obtain useful information for teachers about the educational needs of the new class and for preparing and setting up school programs.

Examination of reading skills is an essential aspect of verifying the learning process. Furthermore, assessment is considered to be transversal for all disciplines where the use of written texts and study skills is required. (Cornoldi, Colpo, Carretti, 2017).

The results obtained by the tests carried out at the beginning of the third year of secondary school and coincident with the

return to face-to-face teaching after the period of closure of the school owing to the pandemic period, put into discussion the effectiveness of online teaching. Therefore, it was decided to administer the questionnaire "Why I go to school" taken from the text "Diagnosis of specific school learning disorders" (Vio C., Tressoldi PE and Lo Presti G., 2012) to investigate the motivational level towards school, which may have a possible repercussion on the results obtained at the beginning of the third.

The present study aims to verify if there is a significant correlation between the ability to understand written narrative/informative texts and metacognitive strategies. The hypothesis is that comprehension skills can be maintained, strengthened or recovered with specific teaching activities that they can develop metacognitive strategies.

Specifically, it was hypothesised that there is a significant correlation between the improvement of the results obtained thanks to these teaching activities conducted in the first and second classes.

Moreover, it has also been hypothesised that there is a correlation between the results obtained at the beginning of the third class and the decrease in motivation and self-esteem resulting from the "lockdown" period, which led to online teaching.

Starting from the results obtained, it was possible to plan certain activities to solve problematic aspects or to support the development of emerging skills. In the most critical cases, a referral to the Specialist Services for a diagnostic evaluation was effectuated.

The present research project was illustrated to the school headmaster and to the parents, who, except for one, gave their consent. Subsequently, the results of the three-year trials were collected and examined.

At the beginning of the first year, following the results of the tests, the pupils were divided into four groups based on performance levels:

Group A: CFAD (Criteria Fully Achieved Didactically), corresponding to children who achieved full marks at the test.

Group B: SPD (Sufficient Performance Didactically), corresponding to children who can understand sufficiently, even though they have not reached the optimal levels achieved by their classmates in the higher band.

Group C: RDA (Request for Didactic Attention). These are children who present some difficulties in understanding. For these children, remedial programs were designed within the teaching programme.

Group D: RIEI (Request for Immediate Educational Intervention) corresponds to children who present serious difficulties and who need immediate intervention by the teacher. After an initial period of observation and specific interventions, these children were referred to specialist services, with parents' consent. At the end of these consultations, some of the children were diagnosed with Specific Learning Disorder (SLD), ADHD and mild intellectual disability.

A specific intervention program was then designed for each group: maintenance of understanding skills for group A, strengthening for group B and recovery for groups C and D.

At the beginning of the first class, the texts used were: Narrative text "The fisherman, the fox and the bear" as a narrative text; "The Masks: from magic to Carnival" as an informative text.

After the specific intervention period of 5 months, in February, the following texts were administered, and the results were compared with those at the beginning: "The king who had to die" as a narrative text; "Work in the mine" as an informative text.

At the beginning of the second year, the procedure was repeated with the following text: "A busy afternoon in the life of the circus" as a narrative text; "Life among the rocks" as an informative text.

In February, the texts used were: "Big Crow" as a narrative text; "The Caryatids, Old Girls of the Acropolis" as an informative text. A comparison was made with the texts previously used.

At the beginning of the third year, a narrative text titled "Don Orione" and an informative text titled "The deterioration of the environment" were administered.

## 2.2 Description of the evaluation tools used for the research

To evaluate the understanding skills, the following specific kit was used for the lower secondary school: Cornoldi C., Colpo G., Carretti B. (2017), *Tests MT - School kit, Classes 1, 2, 3, Secondary grade, From the Evaluation of reading comprehension to the reinforcement learning*, Giunti EDU. The original tests were elaborated at the Department of General Psychology of the University of Padua in 1981 and subsequently revised in 1989 (Cornoldi, de Goods and Group MT, 1989) and in 2017 (Cornoldi, Colpo, Carretti, 2017).

The tests include "multiple choice questions" that is easily administrated and that have safer standardisation and assessment (Coroldi, Oakhill, 1995). Cronbach's reliability coefficient has a value of .74.

To evaluate the motivation to school, the questionnaire "Why I go to school" was used, which is an adaptation of the *Academic Motivation Scale* of Vallerand (Vio C., Tressoldi PE, Lo Presti G., 2012). It is composed of 28 items with a score from 1 corresponding to "I do not agree" to 7 corresponding to "I think exactly like this" (Likert Scale). It was given to the students at the beginning of the third year at their coming back to school after the "lockdown" period. An adequate motivation was considered for values up to 5,7.

## 2.3 Description of the metacognition activities proposed to the single groups

These activities had been proposed with the aim of strengthening the knowledge and the metacognitive awareness of the processes of decoding and understanding the text.

The goals were to increase the students' awareness of these processes and to give them good strategies to achieve the task effectively and efficiently. With specific readings focused on children's interests, it was possible to:

- Read text of different styles (novels, detective stories, fantasy, adventure, essays and comics);
- Recognise the more important features of all reading types;

- Identify the essential parts of the text (title, images and words in Bold);
- Read the questions at the end of the chapter and the notes for each image;
- Put questions to yourself and activate the previous knowledges
- Recognise different strategies of reading (at high or low voice to acquire specific information);
- Underline the opportunity of the fast reading and then to repeat only the words previously highlighted;
- Learn the strategies of the "jumping reading" with the analysis of the words highlighted and the identification of main concepts.

#### Group A: CFAD (Criteria Fully Achieved Didactically)

In this group, the cognitive and metacognitive processes were strengthened by promoting personal reading and listening.

Specific goals were:

- To develop their motivation and their interest in reading;
- To develop their analysis ability of the significant messages;
- To develop their silent reading;
- To practise high voice readings without second purposes;
- To develop their personal writings;
- To encourage listening and understanding without texts;
- To identify the most important information and to create a mental representation.

#### Activities carried out:

- With external and expert support, reading tournaments were conducted in which the children, after reading texts appropriate to their age independently, analysed and commented on the topics with the help of some traces set up by the teachers;
- Readings from local newspapers and creation of a class journal to be published on the site of the Institute;
- Readings performed by the teacher of narrative and informative texts and personal work of understanding and analysis. Students took notes and wrote down some questions. Specific forms were used for: 1) understanding the different purposes of listening (such as staying informed, learning new things, or for fun or to become more expert); 2) looking for information; 3) finding the main idea or the main theme. By listening to more complex texts, children practised in reconstructing the plot of the story, and they developed their skills of learning inferential thoughts.
- The children of this group were also involved in *peer education activities*

#### Group B: SPD (Sufficient Performance Didactically)

**Specific objectives to enhance comprehensive ability were:**

- To identify the main theme of the tale;
- To identify protagonists, facts, times and places;
- To identify the textual sequences;
- To recognise the cause-and-effect relation;

- To acquire knowledge on the grammar and syntax structure of the Italian language;
- To recognise different topics, to understand inferential thoughts and to build up mental models.

#### Activities carried out:

- Reading activities to participate in the online class journal;
- With the teacher's supervision the student learned to identify the principal topics of the text and to ask themselves questions about the text for recollecting information from previous knowledges They also learned that in a text there are various information (main and secondary) and these can be reported in a conceptual map After analysing short texts and underling the main information with different colours, they learned to build up conceptual maps;
- In small groups, there were proposed short readings, and they researched and identified the more important elements of the text (personages, places, times, facts and sequences);
- In short readings, children learned to find the chronological order of the storytelling, the duration of events and the cause-and-effect relation;
- With semi-structured sheets prepared by the teacher, children recognised the correct grammatical and syntax structures, the internal coherence of the story and the explicit and implicit inferences;
- Independent peer education activities with children of group A;
- To improve the use of technological devices and software.

#### Group C: RDA (Request for Didactic Attention)

In this group, some children had a diagnosis of Learning disabilities.

#### Specific goals were:

- To promote the ability of comprehension through a work starting with the recognition of the comprehension components;
- To promote the use of appropriate strategies;
- To enhance the basic vocabulary for immediate recognition of words.
- To enhance the basic grammatical and syntax forms.

#### Activities carried out:

- In small groups, coordinated by the teacher, various texts were read and listened to, and specific comprehension cards were filled in by the student to verify their understanding skills. These sheets were prepared with a gradual increase in the level of difficulty
- With suitable worksheets composed by short paragraphs and a track guide, children had to identify the main topic of a text;
- In short texts, children had to identify the personages, the places and the facts and report this information on a worksheet with the 5-keys (who, what, where, why, when) prepared by the teacher;

- In a short story, children had to identify the sequence of the story in a temporal order of events;
- With simple exercises of deduction, children had to write a conclusion and develop simple, explicit and implicit inferences. The worksheets used were structured from a simple level to a more complex one;
- To improve the use of technological devices and software.

**Group D:** RIEI (Request for Immediate Educational Intervention).

Children in this group had important reading and comprehension difficulties. Teachers paid particular attention and presented special and individualised programs for these students and promoted their inclusion and participation in general activities proposed in class.

Owing to their difficulties, special activities were prepared to implement specific strategies for the memorisation, the control of their executive functions (such as the ability to predict their own performance, their planning of the task) and for the recollecting of information.

**Activities carried out:**

- Controlled peer education activities with children of the other groups;
- To promote the importance of checking the time and the use of the diary;
- To develop the ability to take notes during the lesson;
- To develop the study through one's own books;
- To learn how to face the test in class and to cope with the fear of these tests;
- To improve the use of technological devices and software.

**3. RESULTS AND DISCUSSION**

At the time of the final data analysis, the sample group consisted of 14 girls and 9 boys born in 2007 and 2006 (Table 1). One student was excluded from the study because the parents did not give consent.

**Table 1:** Sample size

	Number	Mean age
Male	9	13y 2m
Female	14	13y 4m
total	23	13y 3m

There is a prevalence of females, and the average age is slightly higher than for males.

Table 2 shows the four groups into which the pupils were divided on the basis of the results obtained by the initial comprehension test in the first year of secondary school. The subdivision also takes into account the male and female genders.

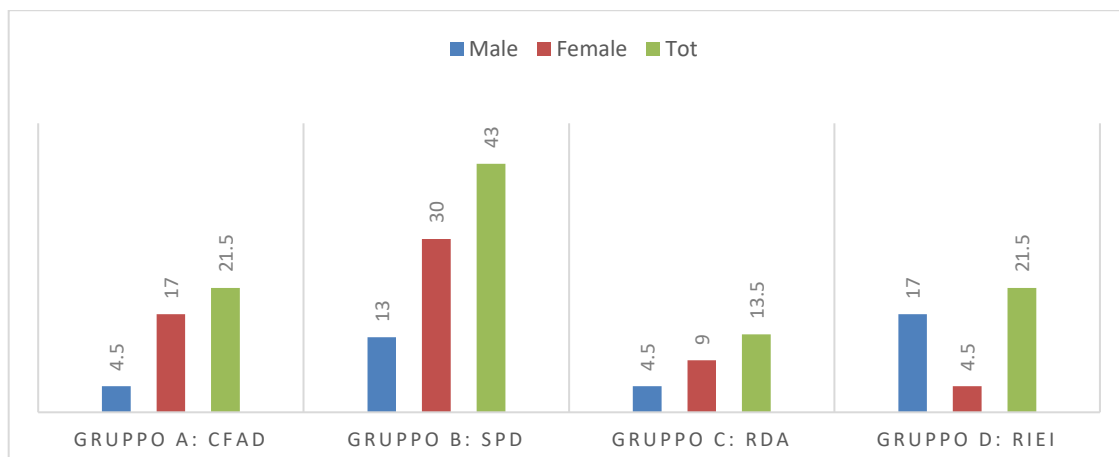
**Table 2:** Groups divided by levels in September 2018

Group	Male	Female	Total (%)
Group A: CFAD	1(4.5%)	4(17%)	5 (21.5%)
Group B: SPD	3(13.5%)	7(30%)	10 (43.5%)
Group C: RDA	1(4.5%)	2(9%)	3 (13.5%)
Group D: RIEI	4(17%)	1(4.5%)	5 (21.5%)
Total	9(39.5%)	14(60.5%)	23 (100%)

CFAD (Criteria Fully Achieved Didactically); SPD (Sufficient Performance Didactically); RDA (Request for Didactic

**Attention:** RIEI (Request for Immediate Educational Intervention).

Although the sample is small, the table shows that the male component in group A (criteria fully achieved didactically) is poorly represented compared to the female component, while male children are mostly present in group D (request for immediate educational intervention) in accordance with the data reported in the literature. The table also shows that most of the students are placed in an average range with a sufficient performance. Moreover, no significant differences were observed between males and females in group B (request for didactic attention). In Figure 1, there is the distribution of the pupils into the four groups.



**Figure 1:** Distribution of the levels at initial tests in the first year of secondary school

CFAD (Criteria Fully Achieved Didactically); SPD (Sufficient Performance Didactically); RDA (Request for Didactic Attention); RIEI (Request for Immediate Educational Intervention). The figure reported above shows that the most represented group (Group B) is the one in which the performance was sufficiently achieved, and that corresponds to 43.5% of the sample. Group A and Group D are less represented, with a percentage of 21.5%. Group C, in which the performance reached attention request, corresponds to 13.5% of our sample.

The same method was used to analyse the results of the final comprehension tests of the first year (February 2019), of the initial tests (September 2019) and final tests (February 2020) of the second year and the initial tests (September 2020) of the third year of secondary school. Subsequently, the results of the tests administered in all three years were reported in a comprehensive table. A qualitative and quantitative analysis of the questionnaires completed by the students at the beginning of the third year was carried out, and the hypotheses reported in the introduction of this study were verified using the most appropriate statistical tests.

Table 3: Levels in the final tests of the first year of secondary school in February 2019

Group	Males	Females	Total (%)
Group A: CFAD	3(13%)	4(17%)	7 (30%)
Group B: SPD	2(9%)	9(39%)	11 (48%)
Group C: RDA	3(13%)	1(4.5%)	4 (17.5%)
Group D: RIEI	1(4.5%)	0(0%)	1 (4.5%)
Total	9(39.5%)	14(60.5%)	23 (100%)

CFAD (Criteria Fully Achieved Didactically); SPD (Sufficient Performance Didactically); RDA (Request for Didactic Attention); RIEI (Request for Immediate Educational Intervention).

Table 3 reports the results obtained in the final comprehension tests of the first year and after the activities of strengthening.

and recovery of metacognitive skills, and it is evident that there is a percentage increase of students belonging to group A, group B and group C, and a percentage reduction of students belonging to group D. These variations can be interpreted as a general improvement in metacognitive skills responsible for the shifting from the lower groups to the immediately higher ones (see Figure 2).

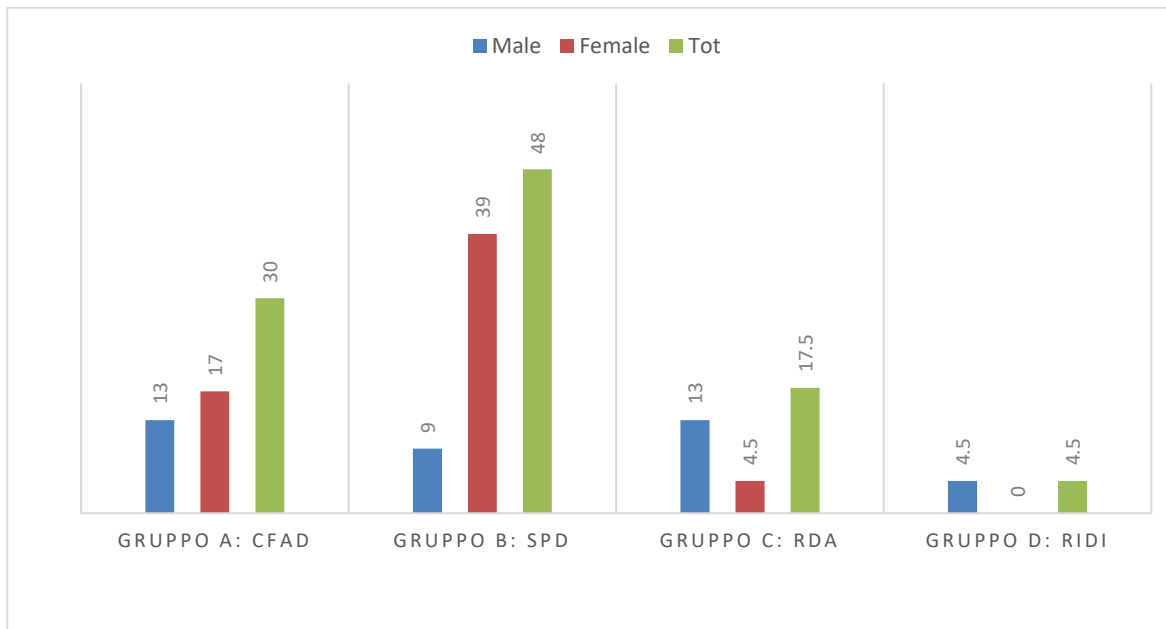


Figure 2: Distribution of the skill levels at the final tests in February 2019

CFAD (Criteria Fully Achieved Didactically); SPD (Sufficient Performance Didactically); RDA (Request for Didactic Attention); RIEI (Request for Immediate Educational Intervention). In the period between February 2019 and September 2019, the interdisciplinary metacognitive activities went on until the end of the school attendance. During the

summer holidays, the students had to continue reading and elaborating on the text with the aim of maintaining the metacognitive skills acquired during the school year.

Table 4 shows the results of the tests administered at the beginning of the second year of secondary school.

**Table 4:** Groups and levels at the beginning of the second year in September 2019

Group	Males	Females	Total (%)
Group A: CFAD	2(9%)	7(30%)	9 (39%)
Group B: SPD	2(9%)	7(30%)	9 (39%)
Group C: RDA	1(4.5%)	0	1 (5%)
Group D: RIEI	4(17%)	0	4 (17%)
Total	9(39.5%)	14(60.5%)	23 (100%)

CFAD (Criteria Fully Achieved Didactically); SPD (Sufficient Performance Didactically); RDA (Request for Didactic Attention); RIEI (Request for Immediate Educational Intervention).

The two groups, A and B, are equally represented because some students shifted to the higher group corresponding to higher levels of understanding. Also, group C has a percentage reduction due to the movement of some pupils both to higher levels of understanding and to the lower ones, which shows a percentage increase.

These variations can be justified by various factors: the increase in the level of difficulty of the texts proposed, the personal motivation, and the lack of guidance by the teacher during the summer homework.

In consideration of the initial situation identified, in the period of September 2019 and February 2020, the metacognitive activities were maintained in all groups, especially in the two lower-level groups (Groups C and D).

The results of the final tests carried out in February 2020 are shown in the following table 5.

**Table 5:** Groups and levels in the final tests in February 2020

Group	Males	Females	Total (%)
Group A: CFAD	4(17%)	7(30%)	11 (47%)
Group B: SPD	2(9%)	6(26%)	8 (35%)
Group C: RDA	1(4.5%)	1(4.5%)	2 (9%)
Group D: RIEI	2(9%)	0(0%)	2 (9%)
Total	9(39.5%)	14(60.5%)	23 (100%)

CFAD (Criteria Fully Achieved Didactically); SPD (Sufficient Performance Didactically); RDA (Request for Didactic Attention); RIEI (Request for Immediate Educational Intervention).

This table shows that the most represented group is Group A, while the two weakest groups are those that reported a lower percentage. Group B remains almost stable. There is an evident recovery by the students who were most in difficulty at the beginning of the second year.

**Table 7:** Percentage distribution in the three years (2018-2020)

Group	Initial I year			Final I year			Initial II year			Final II year			Initial III year		
	m	f	%	m	f	%	m	f	%	M	f	%	m	f	%
CFAD	4.5	17	21.5	13	17	30	9	30	39	17	30	47	9	9	18
SPD	13	30	43.5	9	39	48	9	30	39	9	26	35	9	30	39
RDA	4.5	9	13.5	13	4.5	17.5	4.5	0	5	4.5	4.5	9	4.5	17	21.5
RIEI	17	4.5	21.5	4.5	0	4.5	17	0	17	9	0	9	17	4.5	21.5

CFAD (Criteria Fully Achieved Didactically); SPD (Sufficient Performance Didactically); RDA (Request for Didactic

The period from February 2020 to September 2020 was characterised by the interruption of face-to-face teaching activities due to the "Lockdown" following the spread of the Covid19 infection. The lessons continued with online teaching. In the Codroipo Secondary School, the online teaching started in March 2020 after a short period of training and education for both teachers and students and after the delivery of the technological tools to students who did not have them. Lessons in presence were replaced by online activities, and students' participation was inconsistent, not only for problems related to the new technology, but also for the teacher's physical absence, who had an important role of promoter, coordinator and facilitator in the study activities and was also an important referee for the students with his/her actions of support and mediation. Table 6 illustrates the situation in September 2020 at the reopening of face-to-face school activities.

**Table 6:** Groups and levels in the initial tests of the third year of the secondary school in September 2020

Group	Male	Female	Total (%)
Group A: CFAD	2(9%)	2(9%)	4 (18%)
Group B: SPD	2(9%)	7(30%)	9 (39%)
Group C: RDA	1(4.5%)	4(17%)	5 (21.5%)
Group D: RIEI	4(17%)	1(4.5%)	5 (21.5%)
Total	9(39.5%)	14(60.5%)	23 (100%)

CFAD (Criteria Fully Achieved Didactically); SPD (Sufficient Performance Didactically); RDA (Request for Didactic Attention); RIEI (Request for Immediate Educational Intervention).

The most represented groups are B, C and D, while group A shows a percentage decrease. There was a reversal trend. Previously, all groups showed a more or less evident improvement, but in the September 2020 tests, after the "Lockdown", there was a drop in performance with a percentage reduction in group A and an increase in groups C and D. Group B remained more or less stable. Table 7 and Figure 3 specify the trend over the three years.

Attention); RIEI (Request for Immediate Educational Intervention).

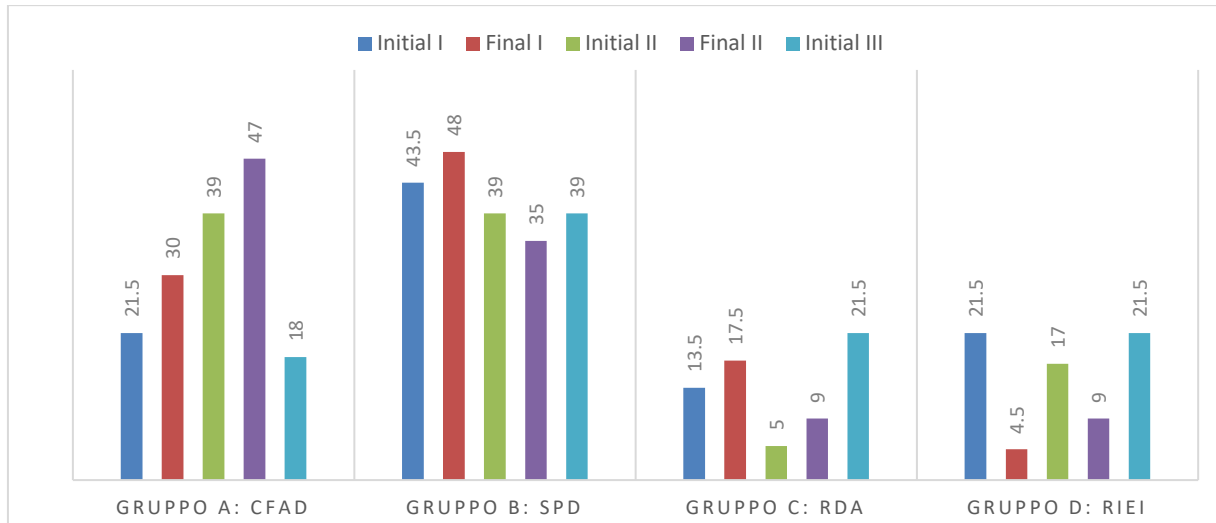


Figure 3: Percentage distribution over the three years

CFAD (Criteria Fully Achieved Didactically); SPD (Sufficient Performance Didactically); RDA (Request for Didactic Attention); RIEI (Request for Immediate Educational Intervention).

It can be noted that the students of

Group A (Criteria Fully Achieved Didactically) showed a clear improvement in the transition from the first year to the second year, but in the initial comprehension tests of the third year, after the closure of the teaching activities in person, they suffered a major drop in performance.

Group B (Sufficient Performance Didactically) presented a more or less stable trend over the three years with an increase at the end of the first year, a reduction in the second year due to the shifting of some students to group A and a further increase at the beginning of the third year due to the passage of several pupils from group A to group B.

Group C (Request for Didactic Attention) had a decrease in the second year and subsequently, at the beginning of the third

year, a greater increase compared to the beginning of the first year.

Group D (Request for Immediate Educational Intervention) had a significant percentage at the entrance to the first year, had a substantial reduction at the end of the first and second year, but subsequently at the entrance to the third year presented a substantial increase compared to the other years.

#### 4. Statistical analysis and hypothesis verification

##### 4.1 First Hypothesis: Relationship between metacognitive activities and level of competence

By taking into account the metacognitive activities carried out by the teachers, the students were divided into two groups: the Strengthening group and the Remedial group. Within these two groups, the levels of their comprehension skills were: Adequate competence (A) or Basic competence (B) (See table 8)

Table 8: Comparison between skills and metacognitive activities adopted

Group	Skills						Total
	Adequate	f	f	Basic	f	f	
STRENGTHENING	18			1			19
REMEDIAL	0			4			4
Total	18	14,87	3,13	5	4,13	0,87	23

Test “ $\chi^2$ ” with 1 degree of freedom was used, with a level of significance  $\alpha=0.05$ . The p-value obtained at “ $\chi^2$ ” is 14,29 which is greater than the critical value (3.84 for 1 degree of freedom), so the hypothesis that the metacognitive activities

adopted influenced the level of comprehension competences positively. Table 9 shows the mean scores obtained at comprehension tests administered each year in September.

Table 9: Mean scores obtained at initial tests of the first, second, and third year of secondary school

Year (Initial test)	Mean	Standard Deviation
1	11,21	2,78
2	9,51	3,37
3	8,11	1,70

To support the truthfulness of the first hypothesis, a t-test was performed to compare the initial mean results at the

comprehension test of the first and second years. Statistical analysis reported an empirical value of 1.85. The critical value

with  $\alpha = 0.05$  and 44 degrees of freedom corresponds to 1.68. It can be accepted the hypothesis that the metacognitive activities carried out in class with the teacher's presence promoted and facilitated the best skills of the students.

The beginning of the third year was after the "Lockdown", and the results of the comprehension tests pointed out a significant decrease. The statistical analysis with a "t" test (Mean 8,11 and Standard deviation 1,70) reported an empirical value of 1.77, which is greater than the critical value of 1.68 with 44 degrees of freedom and with  $\alpha = 0.05$ , and therefore it is confirmed that the differences in the comprehension tests between the second and third year are statistically significant.

#### 4.2 Second Hypothesis: Relationship between the level of motivation and the evident decrease in comprehension level at the beginning of the third year of secondary school

The decrease in the comprehension level at the beginning of the third year, after the Lockdown period, suggested that there was a relationship between motivation to study and comprehension skills. To verify this statement, a small group was extrapolated among students who obtained low scores at the initial comprehension test, and these scores were compared with the scores obtained on the motivational questionnaire titled "Why do I go to school". The Pearson "r" coefficient was used. The comprehension test scores were transformed into numerical marks on a scale from 0 to 10, where 0 corresponded to "no correct answers" and 10 to "all correct answers". A value up to 5.7 on the motivational questionnaire was considered as an adequate motivation (See table no.10). The empirical Pearson "r" coefficient was 0.48 while the critical value of "r" with  $\alpha = 0.05$  and 21 degrees of freedom was 0.360. Since the critical value is lower than the empirical value, it can be confirmed that there is a significant relationship between motivation and profit. The decrease in motivation to study affects the results in the initial comprehension tests administered at the beginning of the third year of secondary school after the "Lockdown" period.

## 5. CONCLUSIONS

This research, despite the small sample, permitted the formulation of the following conclusions:

1. The metacognitive activities carried out by the teachers with their presence are important and efficient for the improvement of reading and comprehension skills in children of the secondary school;
2. The best improvements are present in children with adequate reading and comprehension levels;
3. The students with basic comprehension skills may achieve sufficient levels if supported and motivated, along with a day-to-day study;
4. The teacher has an important role as promoter, coordinator and facilitator not only for the study but also in the pre-adolescents' relationships;
5. For this range of age, the online teaching does not have the same efficacy as the face-to-face teaching in the classroom;
6. The lack of the teacher's daily presence in the classroom may lead to a decrease in interest and motivation to study,

with a consequent decrease in profit and in the maintenance of the acquired skills;

7. There is a significant correlation between profit and motivation. This is maintained by the teacher's day-to-day work;
8. Pupils with minimal comprehension skills can achieve levels sufficient to be self-supported and motivated adequately together to study consistently;
9. The teacher covers a role important as educator, promoter of knowledge and comparison, facilitator of relations And from the dynamics of pre-adolescents;
10. For this age group, distance learning, while having its validity, Not presents there itself effectiveness of the didactic personalised promotion by the teacher in the classroom That daily basis, stimulates the work of the pupils;
11. The lack of presence of the teacher can bring to a decline in the interest and motivation of the pupil towards their school, with an impact on the profit and on maintenance of the skills acquired;
12. There is a significant correlation between profit and motivation, which can be sustained by the teacher either giving her figures of reference;
13. The performance decrease obtained at the beginning of the third year of school might have been interpreted not only as a motivational decline but also as a direct consequence of the climate of instability and uncertainty that characterised the CoVid 19 emergency period, as reported from the children's story in the daily interaction with the teacher.

This research, despite its simplicity, does not claim to give a global vision of the Italian school situation but represents a punctual observation about the validity of some teaching metacognitive activities carried out in a class of the secondary school during three years coinciding with a historical period characterised by major changes in all community contexts.

**Ethical approval:** This study was approved before its start by the school ethical authority of the Istituto Comprensivo di Codroipo (UD, Italy) in accordance with the principles of the Declaration of Helsinki and conducted in accordance with the EU General Data Protection Regulation (GDPR).

**Informed Consent Statement:** Once the children's eligibility had been established, an informed consent, in which the study was illustrated in detail, to participate and for publication was obtained and signed by their parents before the intervention.

**Data Availability Statement:** The data and materials that support the findings of this study are available from the corresponding author upon reasonable request.

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#### About the Corresponding Author



**Franco Binn** holds a Ph.D. in Psychopathology and Mental Functioning from Sapienza University of Rome, Italy. His research focuses on psychopathology, mental functioning, cognitive development, learning processes, and educational psychology. He has contributed to interdisciplinary research aimed at advancing mental health, psychological assessment, and evidence-based educational practices.