Argumentative writing –moral justification- critical thinking through collaborative computer supported environments

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Abstract: This article is an excerpt of research conducted in the framework of a doctoral dissertation on the development of argumentative written speech in 6th grade students by utilizing electronic collaborative learning environments. We examine the evolution of the written argumentative discourse regarding the Structural Elements of Argumentation, the Organization and Presentation of the Content, the Typical Formalist Characteristics and the General Impression of the text.

Keywords: Argumentative text, electronic collaborative learning environments, written speech, ICT utilization, primary school

1. Conceptual and teaching context of the research

This study is an educational Action Survey designed and implemented in the context of international thinking to enhance and evaluate the effectiveness of argumentative writing teaching in primary school students in the sixth grade of elementary school through the use of electronic collaborative learning environments. A basic assumption, according to which the activities of this research study were designed and implemented in the production of argumentative speech of pupils of the 6th grade of primary school, was the theory of social psycholinguistics. Its basis is the interdependence of language and thought (Vygotsky L, 1962).

It was also based on the theory of Systemic-Functional Linguistics with Halliday's key representative and a basic assumption that language plays an essential role in the construction and exchange of meanings through social interactions in the communication context that take place and help in language learning (Halliday, 1989). The use and interpretation of language in the community gives the concepts uniqueness and special cultural features. According to functional system theory, linguistic development is achieved through communication activities in a socio-cognitive context (Halliday, 1985).

These theories underline the role of the socio-cognitive environment in the development of language skills through authentic communication situations. The communicative dimension of the language, which dominated the design of the activities of our intervention, was also enriched by person-centered theories focusing on pupils' personal and social development (Stewart, 1992, Mahoney, 1991). The learning process must treat students both as individuals and as members of a wider group to respond to the whole spectrum of human life and personality.

Within this framework, we have designed individual and collaborative writing activities in the intervention we have carried out.

Critical Pedagogy redefines the role of traditional literacy in critical literacy, emphasizing the socio-cultural model. According to Shor & Freire (1987), Giroux (1997), literacy allows people to think study and reflect their ideas on the world, acquire cognition freedom and cultural awareness to be emancipated, to change the world by associating language with ideology and power. Kostouli T. (2005) states that understanding the information contained in the texts and the acquisition of knowledge is not enough. What is needed is "subjects to become critically literate" through textual and communicative processes that take place in the classroom to co-modulate the Reasons (attitudes, views) as defined by Gee (1996).

The design and implementation of the program was largely based on the Genre- based literacy Model, which emphasizes the text, where the structure and the lexicomorphological elements of the language are harmonized to give meaningful clarity and to respond to their communication purpose. The aim is knowledge of the rules of construction of different genera and types of speech and text (Sinor, 2002), the argumentation in this case. In the three stages, pre-writing, writing and post-writing, various teaching aids are proposed. Learning takes place within a pedagogical framework that activates the learner's cognitive and linguistic potential by contributing experienced individuals to the development and evolution of the student as a gradual autonomy, with decreasing leadership, following the principles of Mediation Pedagogy (Cope & Kalantzis, 1993). The new knowledge is realized through participation in group collaborative schemes that are gradually evolving into a Learning Community and results from the mediation of the teacher, who organizes and guides the students in this process, and the more experienced members of the group. The pedagogical application of Multilingualism has been utilized so that students can use new social practices in structured activities that alternate different forms of speech (spoken, written, electronic, digital) without being manipulated by them in the modern world of technological development.

The learning activity was organized, structured and simplified by the researcher in order to be perceived by the student and thus to regulate himself in the performance of this activity. The sharing of knowledge was foreseen between the members of the learning community and between individuals and tools, such as computers in our case. The theory of situated learning examines learning within the social context in which it is realized, but also the mental and material tools that mediate for its realization. From this point of view, learning is a social interaction that takes place through cognitive apprenticeship processes with experienced social scientists such as the teacher and cognitive apprenticeship (Rogoff, 1990) and with activities that are integrated into wider communities of practice, where members work together to achieve a "community of practice" (Wenger, 1998). Socio-cultural approaches and theoretical models of framed and distributed learning have formed the basis of collaboration between students to achieve their computer-aided work.

Within this framework, that extends socio-cultural theory, we have included electronic environments as mediating tools in the Developing Zone for the implementation of learning.

The Computer Assisted Collaborative Learning Systems (CSCL, Computer Assisted Cooperative Learning) teaching model that we initially followed in the Inspiration environment provided for the collaboration of students who were physically present in the same space (Scardamalia et al., 1989, Lipponen et al., 2003). Then the computer was the mediator of communication and collaboration of students, without their physical presence in the same space, in the peer-writing activities of their classmates and in the collective article writing (Wiki). The teaching model we have followed is more suited to Knowledge Integration, where "reason and dialogue play a key role in exploration and understanding, as well as technology used to mediate but and to structure this dialogue "(Avouris et al., 2009). The basic principle is cooperation on the synthesis of knowledge, where through the discussion the students present their ideas and the others comment, think further, revise and compose new ideas. Thus, reason and dialogue allow the externalization of ideas and the reasoning of the answer or positioning is depicted and can be used as a model for other pupils (Avouris et al., 2008).

The learning of the argumentation in our teaching experiments foresaw its delimitation as a textual genre, the understanding of the nature of the argumentation, the choice of teaching methods and techniques and the creation of a social (cooperative) and framework material (mediation of electronic environments) for the effective implementation of our goal. In contrast to the narrative, which informs the receiver, in argumentation the function of the language is intended to affect the receiver. Every text / speech is also a "speech event", as it is produced, "distributed" and "consumed" within a particular communication context, which is moreover characterized by a lesser or greater degree of conformity "and this determines the style of argumentation (Politis P., 2000).

In our program we followed a variety of teaching practices aimed at mediating in the knowledge and understanding of the argument and the other elements of the argumentation that make up this textual type of written discourse. The use of explicit teaching in our application has been proven to be a positive contribution to the writing of arguments as well as the standardization and analysis of examples (Nussbaum & Schraw, 2007) . The method of explicit teaching and through the decomposition of the textual kind of argumentation into its structural features enhances self-observation and self-improvement in the writing of texts and cultivates the metacognitive abilities of the students.

Toulmin, for the first time through "thinking schemes" (Verheij, 2005) modeled the shape of the everyday argument and the superstructure of the arguments in six structural components: questionable topic, evidence supporting the positions, warrant for justification / justification between data and position, backing to logically rebuttal of the opposite view and Qualified claim with redefinition its position. His model is considered classical and has power even today.

In order for students to understand the structure of the argument, we relied on the simplistic model of Mitchell and Riddle (2000,) to construct the arguments on the maps they constructed. Three are the dominant elements of this model:

- The claim, that is, the conclusion or assertion that the author of these two points leads to. Here is the adverb "then".
- The justification that provides evidence for the justification of the item and is attributed to the justification link "because".
- Validation principles are possible facts and claims that make it easier to link the position to the information. Here is the time-hypothetical link "if" (Englezou, 2011).

The use of graphs, used in the electronic environments of conceptual mapping, for the construction of the organizational structures of the argument and the argument, has been a mediating tool in the organization of knowledge in visual formulas that are more easily incorporated in the work memory (Nussbaum & Schraw, 2007), so pupils are exempted from extra cognitive load during writing.

2. Methodological practices

The sample of the survey consists of 40 students in two parts of an urban area in Eastern Attica. Didactic intervention took place two hours a week in each department for 8 months. The methodology for developing the learning scenario is that of the Project.
In our research we used tests (initial and final) before and after didactic intervention which is one of the most widespread techniques in pre-post testing. The analysis of content of the Worksheets and the written texts produced by the students in two different phases (initially before the intervention and eventually after the intervention) was used in the diagnostic and final evaluation of the development of linguistic and argumentative capacity, critical thinking and moral judgment, and justification. We note that we have quantified the data that resulted from the analysis of texts in order to highlight personal research crises with the quantitative aspects of our experience.

3. Research cases and results

The results of the study are presented below based on the research questions that have been asked. The first question is:

- "If - and how - the pedagogical exploitation of the particular capabilities of some open tools of modern digital technology (in particular digital conceptual mapping and word processors) greatly facilitates the upgrading of the quality of textbooks of elementary school students at form level , structure and arguments, as well as the justification of the moral crisis".

Then we present the statistical analysis of the written data, ie the texts produced by the students before (Post-test) and post-test implementation of the Program "Development of Argumentation in Cooperative Electronic Learning Environments" to students of FT class of a municipal urban area of the prefecture of Attica in Greece. In order to evaluate the data of our

research intervention, we relied on the analysis of speech and the "Protocol for the Analysis of Written Expression in Elementary School" (Papoulia-Tzelepi, 2000) with some adjustments to examine the parameters of the argumentation that was at the heart of our research.

In the main research activity "Creating Written Argumentation" the pupils produced texts in the Word Processor (Word Microsoft Office and Writer Open Office) before the interdisciplinary intervention on a subject of intercultural education: "A foreign student keeps the Greek flag in the parade. What is your view? ".

At the pre-scholastic stage the pupils created argument maps in electronic environments (Inspiration) where, through the possibilities of schematic representation of the discourse, colors and images, the students modeled and built their speeches on the arguments of argumentation (Position - Argument with Arguments - Reconciliation - Conclusion) as well as the arguments in their structural elements (Allegation - Justification - Evidence).

At the writing stage, they transcribed the conceptual map into a textual text (Word, Open Office Writer).

At the post-writing stage, in a word processor environment, text correction has also been made by facilitating the "Introduction of comments" function as well as the revision of the writings, facilitated by the dynamic electronic environment that allowed for multiple corrections, as well as the reconstruction and transformation text in an easy way.

The texts were examined with regard to:

A) As regards the Components of the Explanatory Memorandum:

- Relationship of the subject with the produced text.
- Clarity: the subject deals with the subject so that it becomes clear to the reader.
- Coherence: ensuring the logical sequence of speech in the text.
- Coherence of arguments: Internal argumentation with Argument-Final- Hypothetical links, linking the structural elements of the argument with grammatical ways of connecting.
- Coherence of arguments (Linked Indicators): linking the structural elements of the argument with Anticorruption-Linking-Conclusion-Concessional Links (Nakas, 2003).
- Arguments of Tropicity, Personal Engagement: are meta-linguistic expressions that indicate the degree of certainty of the author and indicate the degree of commitment, personal engagement of the speaker.
- Argumentation mitigation arguments: expresses potential writer's commitments, as it is obvious that his / her views are subjected to subjectivity, e.g. probably, of course.

The Rating Scale is from 0-3: Not at all = 0, Mins = 1, Moderate = 2, Sufficient = 3.

B) Content Organization and Presentation:

- Personal opinion, making a personal standpoint for the controversial subject.

- Supporting position with arguments, using arguments that support the position of the author.
- In contrast, reference to the opposite view from the author's point of view.
- Contradictions, reference to the arguments of the opposite view.
- Rebuilding counter-arguments to strengthen the author's position.
- Supporting arguments with evidence, testimonials, examples, expert opinions, personal explanations, special details, laws-proverbs.
- Conclusion, deduction of the resulting position as a result of the foregoing reasoning.

Rating scale from 0-3: Not at all = 0, Mins = 1, Moderate = 2, Sufficient = 3.

C) For Typical Formal Characteristics:

- Text extent, counting the number of words.
- Number of paragraphs of the text.
- Number of Suggested Ideas.
- Spelling errors in absolute numbers.
- Grammatical errors in absolute numbers.
- Punctuation errors in absolute numbers.
- Editorial errors in absolute numbers.
- Conceptual errors in absolute numbers.
- Inappropriate Words in absolute numbers.

D) Regarding the Communication Dimension of the Text:

- Audience's Social Parameters: if the style is appropriate for the recipients of the text

  Rating scale from 0-3: Not at all = 0, Mins = 1, Moderate = 2, Sufficient = 3
- General Impression of the text: it is about the appropriate use of the language, if it is correct and accurate at all levels, to convince the audience, the integrity of the argumentation and the clarity of speech

Assessment scale from 1-6: Insufficient = 1, Insufficient = 2, Moderate = 3, Good = 4, Very Good = 5, Excellent = 6.

4. Quality assessment of the components

With the calculation of the individual and total indicators, 40 pairs of observations were created, so for the statistical analysis, tests for Dependent Samples were used. Indeed, due to the type of data and non-compliance with the normality requirement in most cases, non-parametric techniques and more specifically non-parametric Wilcoxon Test (Paired Samples Wilcoxon test) were preferred. The level of statistical significance for all controls was set at 5% (0.05).

5. Structural details of business text

The quantitative analysis of students' arguments based on the language criteria we set up helps us to draw useful conclusions about the objectives of our research. In the table below we present in a graph comparative data before and after the intervention.

Table 1. Comparative presentation of the Means of Structural Texts of the Text

Structural elements of Argumentative Writing	N	Average	Typical Deviation	p-value
Connection of Title-Theme (Before)	40	,15	,533	**<,0001**
Connection of Title-Theme (After)	40	2,18	,984	
Clarity (Before)	40	1,58	,636	**<,0001**
Clarity (After)	40	2,23	,800	
Cohesion (Before)	40	1,20	,516	**<,0001**
Cohesion (After)	40	2,15	,770	
Cohesion (internal support of argumentation) (Before)	40	,75	,670	**<,0001**
Cohesion (internal support of argumentation) (After)	40	1,80	,883	
Cohesion (Connecting Indicators) (Before)	40	,33	,474	**<,0001**
Cohesion (Connecting Indicators) (After)	40	1,78	,862	
Arumentative Indicators (Tropicity) (Before)	40	,50	,784	**<,0001**
Arumentative Indicators (Tropicity) (After)	40	1,93	,829	

Arumentative Indicators(Personal Involvement) (Before)	40	1,20	,464	**<,0001**
Arumentative Indicators(Personal Involvement) (After)	40	2,18	,781	
Arumentative Indicators (Mitigation of absoluteness) (Before)	40	,45	,749	**<,0001**
Arumentative Indicators (Mitigation of absoluteness) (After)	40	1,63	1,170	
Structural Elements of Argumentative Writing (Before)	40	6,15	2,760	**<,0001**
Structural Elements of Argumentative Writing (After)	40	15,85	5,677	

The implementation of the program showed a remarkable improvement in the quality of the structural features of the arguments in all the subcategories we analyzed. Statistically greater difference is noted in the Link Title-Content, Clarity and Consistency. To a lesser extent, use of Reason-Final-Hypothetical links to support arguments. We also see improvement, to a lesser extent, in the use of Contradictory-Linking-Conclusion-Concession Liabilities and in the use of the three types of argumentative arguments (Tropicity, Personal Involvement and Mitigation of the Absolute). The inclusion of links and argumentative arguments in students' speech is essential in rendering ideas and ideas clearly, as well as in the logical linking of the elements of argumentation, so that their reason meets the requirements of the readership.

6. Organization and presentation of the content

As regards the Presentation and Organization of the Content, we examined the structural elements of the textual argument.

Table 2. Comparative presentation M.Organization and Content Presentation

Organisation and Presentation of Content	**N**	**Average**	**Typical Deviation**	**p-value**
Personal Opinion (Before)	40	1,45	,639	**<,0001**
Personal Opinion (After)	40	2,40	,744	

Support of opinion with arguments (Before)	40	1,25	,588	**<,0001**
Support of opinion with arguments (After)	40	2,33	,797	
Opposite Opinion (Before)	40	,43	,636	**<,0001**
Opposite Opinion (After)	40	1,48	1,198	
Counter- argumentation (Before)	40	,28	,554	**<,0001**
Counter- argumentation (Before)	40	1,50	1,086	
Refutation of opposite arguments (Before)	40	,38	,705	**<,0001**
Refutation of opposite arguments (After)	40	1,50	1,177	
Support of Arguments with evidence(Before)	40	,33	,572	**<,0001**
Support of Arguments with evidence(After)	40	1,03	,947	
Conclusion (Before)	40	,88	,648	**<,0001**
Conclusion (After)	40	1,85	1,001	
Organization and Presentation of Content (Before)	40	4,98	2,974	**<,0001**
Organization and Presentation of Content (After)	40	12,08	5,815	

The results of the post-audit are higher in all sectors. The most significant improvement is observed in the formulation of the personal position, in supporting the position with arguments and in the final conclusion, while less noticeable improvement is observed in the counter-position, counter-arguments, recalculation and support of the evidence with evidence. We note that in the pre-audit, the students' inability to incorporate in their speeches arguments of the opposite view, to overthrow it, as well as evidence, to support their claims was evident. The result proves that our teaching proposal has been successful and has helped students to overcome the weaknesses in negotiating with the opposite position, and this is to some extent attributed to the mapping of argumentation in an electronic Inspiration mapping environment.

7. Typical formalistic characteristics

Regarding typical formalistic features, we notice a statistically significant improvement in the extent of the text, the number of paragraphs, the number of ideas, and the spelling and conceptual errors.

Table 3. Comparative presentation of formal characteristics of the texts

Typical Formalistic Features	N	Average	Typical Deviation	p-value
Length of text (Before)	40	73,93	40,480	**<,0001**
Length of text (After)	40	146,93	62,344	
Number of Paragraphs (Before)	40	1,68	,888	**<,0001**
Number of Paragraphs (After)	40	2,98	1,121	
Number of Ideas (Before)	40	1,70	,939	**<,0001**
Number of Ideas (After)	40	4,08	1,474	
Spelling Errors (Before)	40	2,85	1,673	**,025**
Spelling Errors (After)	40	2,03	1,776	
Grammatical Errors (Before)	40	,58	,781	,839
Grammatical Errors (After)	40	,60	,810	
Punctuation Errors(Before)	40	1,78	,920	**<,0001**
Punctuation Errors(After)	40	3,45	1,377	
Syntax Errors (Before)	40	,98	,862	,056
Syntax Errors (After)	40	1,43	1,130	
Notional Errors (Before)	40	,88	,723	**,034**
Notional Errors (After)	40	,55	,597	
Inappropriate Vocabulary (Before)	40	,53	,716	,333
Inappropriate Vocabulary (After)	40	,40	,672	
Grammar Conventions (Before)	40	7,58	3,194	,384
Grammar Conventions (After)	40	8,45	3,728	

On the other hand, the intervention does not seem to improve pupils' performance in the morphological characteristics of the texts, which are related to Grammar and Syntax errors and Punctuation errors, and this may be due to the increase in the extent of the texts and to the fact that our didactic intervention the morphological elements.

8. Communication dimension of the text

Encouraging results are the results concerning the social aspects of the audience and the general picture of the writings as illustrated in the graphs below. Students take their audience into account and adapt their speech to communication.

Table 4. Comparative presentation of results on the social aspects of the texts

Communicative Aspect of Text	N	Average	Typical Deviation	p-value
Social Parameters of audience (Before)	40	1,43	,636	**<,0001**
Social Parameters of audience (After)	40	2,23	,800	
General Impression (Before)	40	2,38	,979	**<,0001**
General Impression (After)	40	3,98	1,187	
Communicative aspect of text (Before)	40	3,80	1,506	**<,0001**
Communicative aspect of text (After)	40	6,20	1,911	

9. Conclusions

From the detailed analysis of the data, we come to the conclusion that, with the appropriate teaching, the pupils of the last grade can respond satisfactorily to the demands of the textual kind of argumentation, by mediating easy-to-use electronic tools that facilitate learning. However, we find that they do not incorporate in their words with the same success all the structural elements of the argumentation and that there is no improvement in some formalistic features.

The implementation of the program showed a remarkable improvement in the quality of the structural features of the arguments in all the subcategories we analyzed. Statistically greater difference is noted in the Link Title-Content, Clarity and Consistency. To a lesser extent, use of Reason-Final-Hypothetical links to support arguments. We also see improvement, to a lesser extent, in the use of Contradictory-Linking-Conclusion-Concession Liabilities and in the use of the three types of argumentative arguments (Tropicity, Personal Involvement and Mitigation of the Absolute). The inclusion of links and argumentative arguments in students' speech is essential in rendering ideas and ideas clearly, as well as in the logical linking of the elements of argumentation, so that their reason meets the requirements of the readership.

As regards the Presentation and Organization of the Content, we examined the structural elements of the textual argument. Higher results are presented in post-audit in all sectors. The most significant improvement is observed in the formulation of the personal position, in supporting the position with arguments and in the final conclusion, while less noticeable improvement is observed in the counter-position, counter-arguments, recalculation and support of the evidence with evidence. We note that in the pre-audit, the students' inability to incorporate in their speeches arguments of the opposite view, to overthrow it, as well as evidence, to support their claims was evident. The result proves that our teaching proposal has been successful and helped the students to overcome to a good extent the weaknesses in negotiating with the opposite position and this is attributed to a certain extent to the mapping of arguments.

Regarding Typical formalistic features, we notice a statistically significant improvement in the extent of the text, the number of paragraphs, the number of ideas, and the spelling and conceptual errors.

Instead, intervention does not seem to improve pupils' performance in the morphological features of texts, which are related to Grammar and Syntax errors and Punctuation errors, and this may be due to the increase in the extent of the texts and the fact that our didactic intervention was not focused in the morphological elements of the text.

An encouraging end is the results concerning the social aspects of the audience and the general picture of the writings. Students take their audience into account and adapt their speech to communication.

The Text Editor used in our didactic intervention, one of the most widely used and easy to use cognitive tools, responds to students' needs and learning levels. It allows for the correction, reconstruction, transformation and constructive synthesis of students' speech without limitations and without the inhibitions of error. It allows them to think about the structure and purpose of the language. It allows formatting and importing images, sounds, links, etc. making the text multimodal. It contributes catalytically to the production of sensible and easy-to-read sounds. From research it is documented that it helps the quality of the written word in relation to the traditional method with paper and pencil, improves the writing ability, produces more texts in a pedagogical euphoria there is the ease of typing which helps spelling with the error flagging mechanism and the correction options (Mastrogiannis, 2009). The word processor, which is a versatile educational mediation tool, offers a "neat" image of the text, test possibilities, and gives the lesson the element of authenticity and creativity (Raptis & Raptis, 2007).

10. The Moral Justification Arguments

According to Kohlbeg (1969,) there are three Moral Justification levels, divided into two sub-levels. The levels represent the socio-moral perspective of the person and are connected with his/her cognitive development. On the first level, the Pre- conventional, the moral justification of the person is self-centered and non-negotiable. On the second ,Conventional, level the person accepts the standard norms that ensure social cohesion. On the third , Post- conventional, level the person uses principles that surpass those of society and become global.

Table 5. Summary of the stages of moral development of Kohlberg

Level I Pre-conventional	**Stage 1**	Obedience and punishment orientation. Reward and punishment (correct is that which avoids punishment). (Orientation of punishment and obedience)
	Stage 2	Self-interest orientation. Personal Interest (correct is what you enjoy). (Early functional hedonism)
level II Conventional	**Stage 3**	Interpersonal accord and conformity (correct is it that makes others accepted). (Moral of the "well- behaved child")
	Stage 4	Authority and social-order maintaining orientation(the right coincides with the written laws, rules). (Orientation of law and order)
	Stage 5	Social contract. (human rights have priority over laws).(human rights have priority over laws)

Level III **Post-Conventional**	**Stage 6**	Universal ethical principles.(ethics is a matter of individual conscience of each). (Global ethics)

We carried out data analysis of the justification of text created by the students before and after the implementation of the Program, on the levels of moral development according to Kohlberg. The evaluation of the text as to the justification of moral levels was done by an independent researcher and a teacher , without significant observed deviations. To classify the texts in the respective level of moral development, due to different levels in students' justifications, we took into account the frequency of justifications to the corresponding level. In our study we utilized the SPSS statistical package for data processing.

11. Analysis of written texts as far as moral justification is concerned

The analysis shows the positive effect of the intervention in the development of students' moral reasoning through the negotiation of controversial issues, verbally and in writing, the dialectic confrontation and osmosis of ideas with reasonable peers and adults in teamwork and collaborative activities using cooperative electronic learning environments.

The following table shows the percentage rank 40 initial and 40 final argumentative writings students of sixth grade elementary school urban area of Attica at the stages of Moral development.

Table 6. Moral Development comprehensive comparative assessment

Stages of Moral development		**PreTest**		**PostTest**	
		f	**%**	**f**	**%**
Pre – Conventional Level	Obedience and Punishment orientation	1	2,50%	0	0%
	Self-interest orientation	14	35%	8	20%
Conventional Level	Interpersonal accord and conformity	16	40%	5	12,50%
	Authority and social-order maintaining orientation	7	17,50%	8	20%

Post-Conventional Level	Social contract orientation	2	5%	12	30%
	Universal ethical principles	0	0%	7	17,50%
	TOTAL	**40**	**100%**	**40**	**100%**

Students following the implementation of the program move to higher levels of moral reasoning and judgment, go through the individualistic ethic in mutual interpersonal expectations and the persistence in maintaining law and order in the values and principles of social relations in intercultural and global level. This transition is accomplished in parallel with the development of the dialogue, the development of argumentation and critical capacity, socio-psychological collaboration skills and teamwork within the learning community, which acquires cohesion and harmony to achieve common goals in a positive climate.

12. Discussion – Conclusions

The findings are primarily moral reflection and in no case is supported that the students mastered the highest moral development stages, characterized by the adoption and consolidation of attitudes and values in students' daily lives. The concern and the movement of the justification of students to another way of thinking through the strong interactions between them as well as the teacher during the intervention is emphasised. We also note that the data examined concern the moral justification and in no case the morality of the person and his moral behavior.

The survey results show that in the writings of the students authoritative arguments show progress at the level of justification and moral crisis. Moving to higher stages of moral reasoning and judgment is also observed. Specifically, the movement was made from the heteronomous moral individualism, pragmatism and self-centered perspective to the stage of mutual interpersonal expectations and social consciousness. Significant movement of the students' complaints was made towards the stage of the social utility of individual rights and moral values . The individualistic and utilitarian principles tend to universal values of justice, empathy and greater cognitive deepening.

Comparing the evolution of speech argument with the development of moral reasoning in students' writings, as we analyze in the next section, we find that there is interaction between them. As justification for departing from the egocentric and rigid thinking to social and

universal values that exceed the one-dimensional way of thinking, both awareness of argumentation and the quality of the texts evolved.
The dilemmas that the students are invited to face in their class allow them to argue with the teacher and with their classmates that their explanations (counter-argumentation) is at a higher level than their own, giving them the opportunity to explore in depth the issue and to see it with new perspective. Learning does not take place in a social context, but is socially and empirically framed. Students interact with the mediation of electronic environments that facilitate and promote cooperation (Inspiration, Text Editor). They refer to the process of learning not as passive recipients, but as autonomous and responsible individuals who are actively involved in the learning process » (Jonassen & Reeves, 1996).
This process causes cognitive conflict, which in turn promotes further investigation, through debates and trials new data is retrieved and the pupil is expected to confirm or deny. The student is led to search logical reasoning to substantiate the reasons and arguments and with the guidance of an experienced teacher is trying to build a more sophisticated justification template. When the cognitive balance occurs, the learning community has gained a clear understanding of common goals and planning actions that lead to their achievement with developed critical thinking (Lipman, 1991).

Kohlberg described the development of the individual's moral thinking as a regular, gradual process that gradually leads to higher levels. It is a qualitative process that is not linear, that is fluid and changing. The experience, knowledge and cultural background lead through interactions and interactive conflict to stables opinions and certainty. The justifications of students start from self-centered perceptions, to return after the negotiation with the teacher or peers to a more elaborate interpretation of the world (cognitive deepening), and to increasingly sophisticated mental-emotional skills and abilities of their adjustment to new situations.

13. Critical thinking and argumentation: a unique interaction

Argument mapping provides substantial and cognitive benefits to students. It cleanses thought, deepens reading comprehension, improves critical thinking and written argumentation. The construction of a map of arguments is far from a mechanistic process that obeys unwieldy rules. It requires critical, logical thinking and language skills in constructing allegations and evidence and requires good knowledge and understanding of the subject. Of course, it is extremely difficult even for high school students to go through the understanding of the argument in its assessment, where high-level complex cognitive abilities are required.

The Argumentative Maps developed by the students evolutionarily and constructively in collaboration with their classmates reflect the evolution of students' thinking, and in particular the Critical Thought directly related to the argumentation. We compared 21 initial and final maps that co-produced two-tier students in terms of grouping and prioritizing concepts, reasoning logically, structuring the arguments clearly and consistently in the goal, analyzing and evaluating the arguments in terms of their truth and their power. From the statistical

processing of the sample, we can see that there has been a marked improvement in the five critical thinking skills we have examined and which are related to the argument.

14. Methodological approach

The second research question of our study was:

- "If and how collaborative and communication digital learning environments contribute constructively to the transformation of students' ideas into a controversial social issue of intercultural education and the development of critical thinking".

In the research activity "Design and development of argumentation maps in an electronic environment" the pupils collaborated on two argument maps before the interdisciplinary intervention on the topic of intercultural education we negotiate in our teaching intervention: "A foreign student keeps the Greek flag in the parade. What is your view? ".

We chose to evaluate five key critical thinking skills developed through the gradual construction of argument maps. To study the evolution of pupils' critical thinking, we evaluated the initial and final maps of argumentation made by students about:

- Grouping and hierarchy of concepts: Hierarchical order with fullness, internal clarity, minimal recording, abstraction and correspondence.
- Justification: To construct arguments with logical or evidential reasons, properly structured and strong arguments based on presumptions and bases.
- Structure of Arguments: Present the justification with clarity and absolute consistency to the goal.
- Analysis: Recognition of the logical structure (reasoning) in the Argument, recognition of the implicit argument.
- Evaluation of: Arguments and Truth.

Twenty one (21) argument maps were examined before and after the didactic intervention on these five features of Critical Thought

which were scored on a quadratic scale and more specifically: 0-Not at all, 1-Minor, 2-Moderate, 3-Sufficiently.

15. Results

As can be seen from the comparative presentation and analysis of the results, there is a statistically significant difference in the pre-post and post-intervention outcomes for all indicators in the Critical Thinking of the Mapping Papers ($p < 0.05$). Indeed, in all cases, post-intervention results are clearly higher than those before intervention.

Table 7. Kinetic Mapping Critical Thinking Indicators

Indicators of the Critical Thinking of the Mapping Papers	N	Average	Typical Deviation	p-value
Grouping (Before)	21	1,00	,447	**<,0001**
Grouping (After)	21	2,67	,730	
Justification (Before)	21	,86	,964	**<,0001**
Justification (After)	21	2,33	,796	
Constuction (Before)	21	1,05	,669	**<,0001**
Constuction (After)	21	2,24	,768	
Analysis(Before)	21	,57	,746	**,001**
Analysis(After)	21	2,05	,974	
Evaluation(Before)	21	,67	,730	**,003**
Evaluation(After)	21	1,76	1,044	

16. Summary - Conclusions

The use of graphs, used in the electronic environments of Conceptual Mapping, for the construction of the organizational structures of the argument and the argument, has been a mediating tool in the organization of knowledge in visual formats that are more readily incorporated in the work memory (Nussbaum & Schraw 2007), so pupils are exempted from extra cognitive load during writing. The visualization and modeling capabilities provided by electronic environments have contributed to building, shaping and clear expression of concepts, ideas, and the development of logical reasoning and speech with clarity and consistency that fulfills their communication role. It provides students with substantial and cognitive benefits: it allows clear expression of thought, deepens reading comprehension, improves critical thinking and written argumentation. Language-Argumentation, Critical Thinking, Ethical Crisis: Interrelated Relationships.

From the analysis of the written texts produced by the students, before the implementation of the Program, on the elements of their argumentation and the levels of ethical justification, as well as the analysis of the Mapping Documents (in two phases, early and final) as to the critical thinking skills we consider language-argumentation, moral justification and critical thinking to have a dialectical relationship of interdependence and evolution. The development of the written argumentative text has a unique value in the teaching practice of the modern school, as it relates, apart from interactive and dialectical language skills, to critical thinking and moral

judgment skills. This creates a grid of complementary skills that promotes high-level skills, both cognitive and psychosocial, that contribute to the central pursuit of education, according to Critical Giraffe Pedagogy, to the Citizenship of the individual.

The social context of the class, without ignoring the self-action of the student, influences moral development through engaging in collective negotiations of dilemma situations. Critical thinking within the social environment in which learning takes place, drives the student into the awareness of the mechanisms of language with which language constructs social reality and meanings. The learner uses the language tools that allow him to talk with himself and interact with others in the direction of building ethical knowledge. Language, as a thinker, transmits thought content more or less effectively, but at the same time it is a cultural tool that influences and shapes thought itself. Through dialogues with peers and adults who have more sophisticated reason, internalizes ethical crises and integrates them into existing ones, to develop his personal identities and then to express his or her autonomous will. The development of argumentation is borne out by logical reasoning that helps the individual to organize his knowledge and experience and to make sound justifications and judgments. The emotional side of the moral dilemma plays a key role in delivering safe conclusions, and the balanced judgment comes from the ability of logical reasoning and reasoned crises. The reason for argumentation, in order to be acceptable and balanced, must have passed through the filter of the person's critical thinking and moral value system.

Cultivation of argumentative, critical thinking and moral judgment skills is not an occasional process with established results. It is dynamic, time consuming, laborious and complex and not mechanistically acquired. It presupposes the "total" development of students 'argumentative abilities through the balanced cultivation of oral and written speech, logical-abstract ways of thinking, with the effective utilization of pupils' cognitive, cognitive, metacognitive, linguistic and metlanguage potential. The implementation of our research proposal has highlighted the difficulty of the project due to the many and complex factors involved. These factors are the dynamics of the relationships that develop in the group, the need for social and emotional development of the individual, the ability of thinking, the use of language and the moral attitude of the individual.

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