A NEW WRITING SYSTEM FOR A NEW "KNOWLEDGE MODEL": RESOURCES OF CONCEPTUAL MAPS AND CMAPTOOLS FOR A SCIENCE OF EDUCATION

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Abstract. For ten years in our school, the research into a relatively coherent system (capable of falsifiable hypotheses of vast application on the problem of the representation of knowledge) is the background to projects finalised with the multi alphabetization through didactic routes based not on technology but on learning through technology. Inside a unitary frame represented by some of the theories of knowledge, the enquiries to find links that are not casual between new technologies/ acquisition of meaning systems/ development of the faculty of complex thought in children of school age, have brought us to experiment with ever younger children conceptual maps and CmapTools intended as a system for writing. This communication attempts to demonstrate some of the opportunities offered to the mind which is learning to build itself, if the school goes beyond the traditional transmissive, linear, textual modality and uses generative/ transformational grammar in the language of the 21st century. The examples, taken from normal classroom activities, show some stages of acquisition of meaning systems in relation to the development of symbolic thought (during the first two years of school) in children who have been given a laptop, as Nicholas Negroponte suggests, for play, communication, reading and writing from the earliest months of primary school.

1 Introduction

Formatted by open cognitive systems, supported by the use of ever more sophisticated technologies, characterised by linguistic multimodality, communicative interaction, use of visual, musical and metaphoric language, the future is here and the Net generation – metalinguistic – always on - not only populates the Net but also the classrooms of schools of every order and grade all around the world.

To thousands of children the possibility to possess a computer has been granted: a magic exercise book for playing, communicating and growing culturally. This is a condition that is indispensable, but not sufficient to guarantee effective opportunities for equality and inclusion.

Only school as an allocated institution can offer effective opportunities for interaction between development of the faculty of language and complex thought/new technologies/ acquisition of meaning systems and can teach how to "speak" the language of the 21st century. An infinitely discreet language which if understood surpasses all languages and all sense and meaning systems produced by the human mind, which with its potential for joining its elements could be defined tout court as the "human language". And it is in its vastness, in the creative complexity of its structure that the obligation, the moral duty exists for all school systems to make available the change from an alphabetic education to a multi alphabetic education.

2 Problems, opportunities, challenges

But if multimedia and hypertext have found ever more convincing theoretical justification (cognitive, metacognitive, affective and social) for their didactic use, where it comes to didactic strategies, in practice they struggle (find it difficult) to become an essential part of the "educational language". The main difficulty in transforming the opportunities on offer by technology to cognitive development into **a *relatively coherent system*** (Dewey, 1929: 22) is not due to its continual evolution (for example in the difficulty in updating the equipment available), but more to the fact that many people continue to question their use in the wrong way. In fact still nowadays most teachers approach the *systems of technological metacognitive writing*, motivated more by *"convenience and practicality"* – looking at the results of learning or particular strategies of organisation of spatial visualisation of the hypermedial links, etc rather than at the need to question their effective influence on the development of *creative and complex language/ thought*.

Accepting the fact that the linguistic reality which makes up the Net generation is something radically different from the traditional linguistic environments which have fed the evolution of man's expressiveness, leads one to

examine the question from another perspective: if ⇀⇀ how: or even not to ask any more "if one should use the technologies but how to do so; not if they can be positive, but how they can be" (Oxford et al. 1997) Starting from a few doubts and questions:

-should these causes that are the sources of serious learning difficulties and knowledge problems, signalled in many countries from notable sources (ex. OCSE – Pisa) not be researched in the gap between the linguistic perspective (extension, form, structure) practiced in life (hypertext, cybernetics, multimedia) and that practiced at school (linear, textual and academic)?.

-whether the actual processes of alphabetization and development of competence should continue to be defined by aims and pre-existing models which were not defined by the technology of writing, but which were already present before the latter was available:

-which characteristics should have a formative hypothetical route, aimed at the multi alphabetization focused not on technology but on learning through technology;

- when and in what way is it opportune to approach the learning mind with the symbolic language in the extraordinary forms allowed by computerised and interactive machines.

3   The school of the future. A "relatively coherent system"

Standard discussions of the difference between Vygotskij and Piaget place a crucial difference in the proximal locus of cognitive development. Piaget did not deny the social role in the construction of knowledge. (It is possible to find plenty of places where he says that both individual and society are important). But he stressed the fundamental importance of the individual. Vygotskij, on the other hand, recognized co-equal roles between nature and culture, but insisted more on the importance of instruction.

80 years on, we retain that the panorama has radically changed.

We owe to the re-reading of the theories of Piaget, Vygotskij, Chomsky and Novak, through the filigree of "writing" expressed in a conceptual way, linguistic hypertext and metacognition thanks to its new "immaterial" support, the computer, the vision of extraordinary didactic perspectives.

In fact the monitoring throughout the entire schooling age of the functional role of the meaning of the word in the act of thinking has given us, over time, extraordinary confirmation on the "generative" capacity of the principles and rules of the faculty of language, allowing us to represent ourselves in our fundamental traits as the process of verbal thought evolves as a whole.

But most of all, it has allowed two crucial actions for the interaction of teaching /learning /development of thought: a) the possibility to identify the optimum moment for learning; b) to plan formative actions in a congruent way (Giombini 2008: 255) In fact in our experience:

-It is in the gap between individual maps, evidence of the lower threshold of learning and the expert map, evidence of the upper threshold of learning, that the central point of development of the faculty of thought of each child may be singled out, the point that Montessori calls the "sensitive period" and Vygotskij calls the "area of future development";

-In practice, we teachers can plan in a coherent way what each child can learn to do, what he can do with the help of the group, and what he would learn to do independently;

-It's in the ability of cognitive and shared reading first and in the tribute to the conceptual expert writing on CmapTools later, that the teacher has the possibility to indicate new aims and draw new routes and while doing that he/ she determines the exact area of the next disciplinary development of the whole group and of each single individual.

4   Research and projects

For the last 10 years, research into a relatively coherent system capable of work hypotheses of vast application (Dewey, 1929: 54) on the problem of the representation of knowledge is the challenge which forms the background to projects aimed at the acquisition of meaning systems.   Within a unitary frame represented by "theories for a new

knowledge model, the enquiries to links that are not casual between new technologies/acquisition of meaning systems/ development of the faculty of language and complex thought in children of school age, have led to experiments in ever younger children in writing systems which use conceptual maps and CmapTools (Giombini 2004, 2008).

At present the final experiment is coming to an end. Linked to the general theme, multi alphabetisation and development of complex thought maintaining at the heart of teaching activities drawing, conceptual maps and CmapTools (signs – writing- cognitive aims and hypertextual writing) a variable has been introduced: all the children have been given from the beginning of the first year of primary school a personal laptop to keep in their schoolbag, along with paper, pencils and colours (traditional supports and instruments for writing).

We have proposed once again the whole didactic route which places conceptual writing at the centre, described several times involving an entire class of 23 pupils with random access. There is a group of pupils (17 girls and 6 boys) included in an age bracket between 5-7 years (17 born in 2002, 5 born in 2003, 1 born in 2001). Upon arrival only 2 out of 23 could read; 6 showed linguistic immaturity, phonetic and or morphosyntactic), 1 serious behavioural difficulties (hyperactivity); 1 affected by Down's Syndrome. The learning route (multi alphabetization) was the same for all the children. At present they all read, write draw and use complex software (including the genetically handicapped child, even if in a simpler way than her classmates) and none show signs of dyslexia.

The examples, taken from normal classroom activities show stages in the transformational process of the acquisition of symbolic systems (in the context of U.G: spontaneous writing – grammatical consciousness of writing) in relation to the general faculty of language/thought in children, which is more natural to the development of the mind/brain (competence in linear, reticular and procedural thought) by writing systems which use conceptual maps and CmapTools.

4.1 Drawings and conceptual maps for "discovering writing"

The images illustrate a fundamental change: that of consciousness of one's own "proximal space".

As before, this group of children began with the representation of themselves, of their own affectionate relationships, of their own capabilities (what I can do, what I cannot do). Each child writes his own map (even without the use of the alphabet, they illustrate the concepts through drawings).
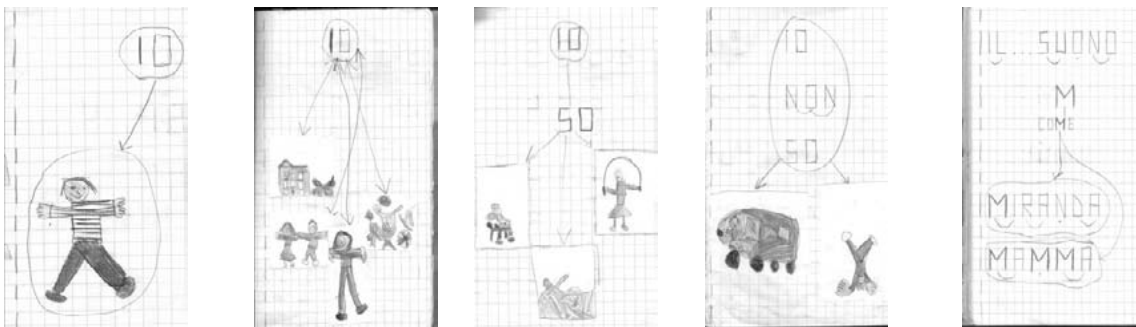

Figure 1. "I" (6 years)　　**Figure 2.** " I & …"　　**Figure 3.** "I CAN"　　**Figure 4.** "I CAN'T"　　**Figure 5.** "Sound and Grapheme M"

In the sequence chosen in the example Figures 1, 2, 3 and 4 the child in the drawings is talking about herself, her affections (she illustrates her family members and her dog), she tells of what she can do (horse riding) and what she cannot do. At the same time on the wall, an enormous collective map gathers the experiences of all the children. In the gap between the individual maps (what I can and cannot do), in the gap between individual maps and expert map there emerges the area of future development of every child and of the whole class. The written words are in order: I – I CAN (do) … I CAN'T (do). There are only 4 graphemes I O S N (vowels IO e consonants SN) but by combining them, new words are produced. By using writing to develop a natural ability, the learning mind is given the coordinates to use to advantage the principal of discreet infinity (and to bring automatically into the writing the principal which regulates life and matter in this universe). The map (Figure. 5) illustrate the stage of becoming conscious of the link between signs and meaning, in this case Sound and Grapheme M (as in Miranda, her name and Mamma --Mummy--).

The images that follow document the present level (second year, elementary school, month of April).
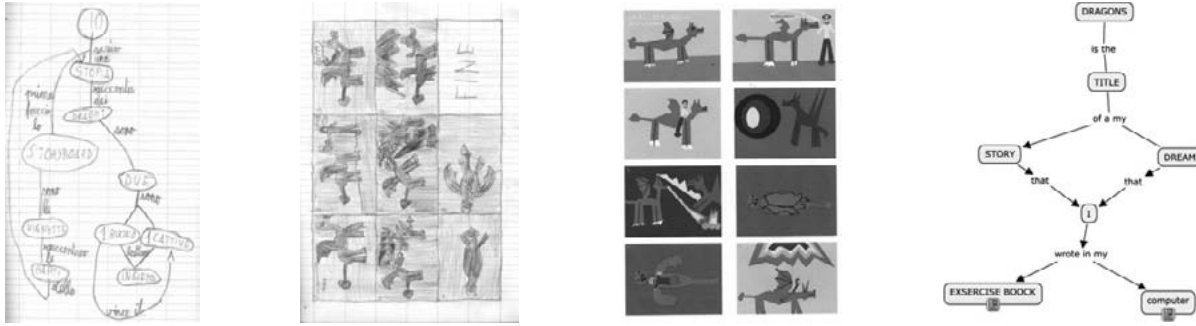

Figure 6. C. Map "A Story" **Figure 7.** Story board (Exercise Boock) **Figure 8.** Story Board (Computer) **Figure 9.** " C. Map Dragons" (CmapTools)

Figure 6, 7, 8, and 9 document the autonomous capacity for planning a story board, finalised with the achievement of an interactive reading subject on their own Laptop. Each image of the narrative sequence reproduced with Paint and CmapTools (Figures 8 and 9) will be the visual support to the story which each child will achieve on his computer. The final results will be exchanged and each child will have access to the work of all the others.

Figures 10 and 11, and 12 document the present level of the Down's Syndrome child reached in little more than 18 months from the beginning of her schooling. The images illustrate the stages of autonomous work of this child. They stand out from the other children's work by the immaturity of the drawing and simplicity of concept, but not in substance: her competence in writing on different materials: exercise book and computer, maps and CmapTools. The remarkable fact is that she has learned along with the others to read and write even if she is still behind in the verbal language articulation (serious phonetic difficulty, lack of articulation and incorrect repetition of sounds).
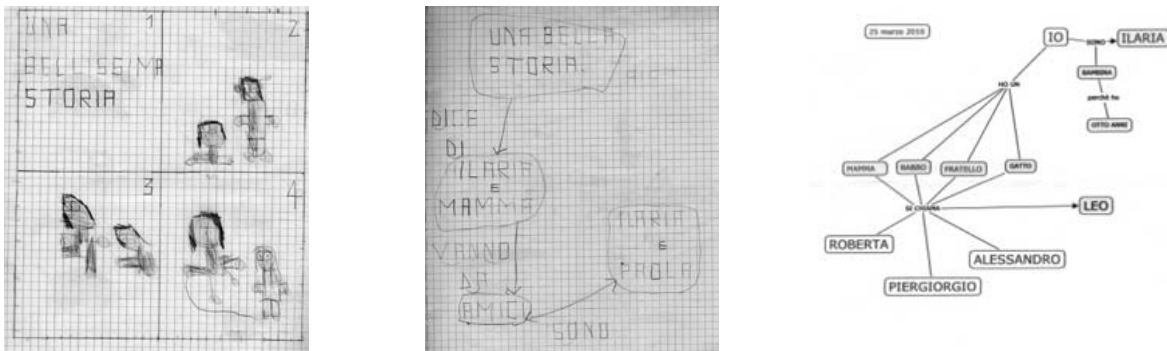

Figure 10. Storyboard. "A story" **Figure 11.** Conceptual Map "A story" **Figure 12.** Explosion of the concept "I" in CmapTools

5   Summary

The most relevant data that we can extract from our experience is that the concept maps reveal themselves as "Sources" and "Resources" for Education treated as a Science. In particular, the conviction that the new expressive modalities constitute the learning Reality, has forced us to investigate the learning modalities of writing in relation to the new technological supports and all this has forced us to research new models for analysing empirical situations and to determine within them a series of interactions, starting from which have been possible hypotheses of work of vast application. At present it is impossible to predict the final results of a route which has only just begun, but from these experiences, we know that they cannot be less than those reached by previous groups (which we have documented). We know however that by giving all the children a laptop and the principles and rules for writing conceptual maps it has been a happy choice from the first days of schooling.

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