CONCEPT MAPS AND LEARNING DISORDERS

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Abstract. The challenge that characterizes the work of teachers consists in giving an effective answer to the educational needs of students. Teaching models and operating strategies are often put into crisis by the presence in the class of students with socialization and/or learning problems. After years of experimentation, a teaching model has been adopted, which promotes significant learning and uses cooperative learning and experimental teaching methods. In particular, a diffused use of concept maps has demonstrated an improvement in the performance of students and a reinforcement of their cognitive and metacognitive skills. Moreover, concept maps have allowed the taking of suitable actions against the diversity represented by immigrant students and students with specific learning disorders or disabilities. An example of this is the story of Fabio, a child with Asperger's syndrome who is achieving a positive growth at social and cognitive level thanks to the potential of concept maps used in an interactive collaborative teaching setting.

1   Introduction

After several years of investigation and experimentation aimed at improving student learning, a group of primary school teachers (6/11-year old children) have shared a teaching method that develops according to a cognitive, social and an interactive direction.

In the educational-teaching relationship, the cognitive dimension enhances the leading role of students who are able to build their knowledge according to the paradigms of social constructivism. Learning is an active process that generates new knowledge when it is structured, integrated and reconfigures the existing knowledge according to significant learning, from Ausubel (1978) to Novak & Gowin (1986) and Novak (2001). In particular, concept maps are essential tools to reinforce cognitive and metacognitive strategies and achieve stable conscious learning.

The social dimension promotes comparison, dialog and sharing of ideas and knowledge through cooperative learning. Peer collaboration activates efficacious strategies in order to acquire new knowledge, operating in Vygotsky's proximal development area.

The interactive dimension refers to contents and learning situations, mainly using laboratory teaching methods. Students interact with objects in real situations, are engaged in authentic tasks to solve problems or give an answer to questions. Doing and experimenting always go along with discussion, comparison, intermediation, negotiation with the ideas of others in order activate reflection, reasoning, analysis and synthesis through language.

In learning situations the three dimensions are always related and interdependent (Roletto 2005), achieving Novak's meaningful learning (Novak, 2010) that integrates thinking, feeling, acting, while reinforcing commitment and responsibility. Such an educational model is efficacious, improves the performance of students and contributes to the acquisition of competence. Students with learning disorders often put teaching practices into crisis, showing the need for remodulation based on special educational needs. This work demonstrates how to promote significant learning through the use of concept maps, also in case of evident relational and/or learning difficulties.

2   Difficulties in school: how to promote significant learning and social skills

Fabio attends the third class in a primary school. He is nine years old and attended kindergarten for four years in order to become more autonomous. He is affected by Asperger syndrome (AS). When he started primary school, socialization strategies had to be activated in order to promote inclusive behavior in school, reducing stereotypes and isolation. At the beginning, problems concerned three aspects: difficulties in social interaction; verbal communication characterized by fluctuating tone of voice, accompanied by echolalia and stereotypy; limited interests, lack of imagination, inflexibility of thought. The child did not recognize his schoolmates and teachers and activated stereotyped behaviors in terms of passive attitude and isolation. Three strategic choices were agreed upon by the teachers:
1.   The child was guided and stimulated to participate in all class activities.

2. Participation was mediated through cooperation in the small group where he was received and encouraged by one or two schoolmates.
3. The child was given the same educational opportunities as the class. Based on common objectives, individual planning provided intermediation and simplifications in order to allow for learning in line with personal potential.

According to the Weak Central Coherence Theory of Uta Frith from the University College London (Frith 1991), children affected by AS have a very concrete thought that exclusively pays attention to details. This often prevents them from understanding the complexity of situations, rejecting changes in their behavioral patterns. However, they can

1. conceptualize,
2. recognize causes and effects,
3. establish relations between objects, words and situations.

These connotations and thinking abilities have permitted teachers to use the same teaching choices as the class, thus avoiding that an excessive attention to individual educational needs would impair a significant inclusion in the class (Celi 200). Teachers mainly operated through:

1. laboratory activities in situations of cooperation and peer interaction.
2. concept maps to promote significant learning.

Along the teaching process, progress is alternated with difficult moments both at relational and cognitive level. In the various situations concept maps are always an efficacious tool to reinforce and consolidate knowledge, and overcome difficulties, since they use strong points, such as thinking by concepts and establishing relations.

2.1 Map of personalized teaching process

The personalized teaching process is designed with concept maps that must be updated on a periodical basis according to the student's progress or problems. Concept maps express the selection of goals, contents and activities according to different levels of difficulties.

The personalized planning map facilitates communication and sharing of goals and actions between teachers. At the same time, it improves communication with the family and with social-medical operators in order to agree on operating strategies for action.
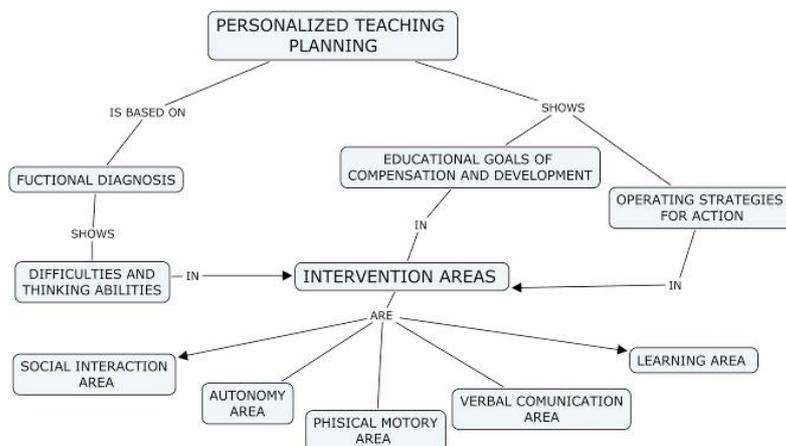

Figure 1. Planning matrix

2.2 Task situation: emotional climate, cognitive tension, acquired learning

Laboratory teaching, cooperative learning, cognitive reflection and concept maps characterize the task situation. The child is involved in the class activity structured in cooperative groups of three students. The exploration of a portion of lawn, defined by a circle, proves to be especially involving and motivating. The exploration activity is oriented by a guideline given by the teacher in order to build the eco-system concept. The cognitive tension, which was guided by informal learning schemes and existing knowledge of each student, is stimulated through dialog and exchange of opinions. The student is fully integrated and acts consciously, using his knowledge and thoughts.
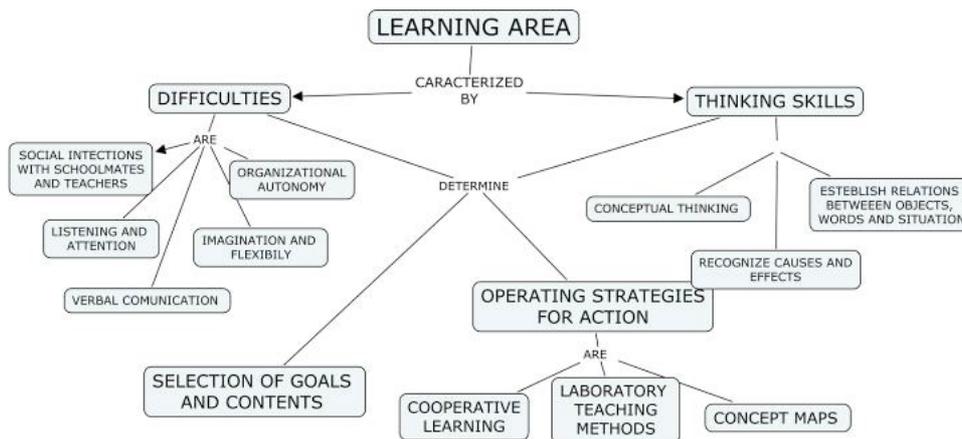
Figure 2. Planning extract about learning area. Another map defines goals and evaluation modes.

The activity continues in the class and Fabio must interact with his schoolmates in order to build a concept map to summarize what they have observed and put together. Through cooperation the student identifies some concepts that are initially represented with a drawing marked by the word-concept. Then, he builds the map.

The map helps him to go beyond details and operate a general vision where details are inserted. During the next socialization step between groups, the student reports the contents of the matter with a better modulation of voice. The graphic representation allows the first conceptual focus through a basic communication code (system), but full of meaning for the student who always expresses experiences, emotions and desires through drawings. Then, the words replace the drawings. This enables the pupil to advance towards a more mature communication system. CmapTools has not been proposed to the student yet, because the construction of maps on paper through icons and verbal codes allows the student to have a better integration with his schoolmates in making questions, reflecting, searching for answers and solving problems. However, a gradual approach to the software application is scheduled during the rest of the school year.
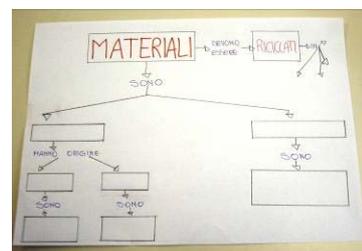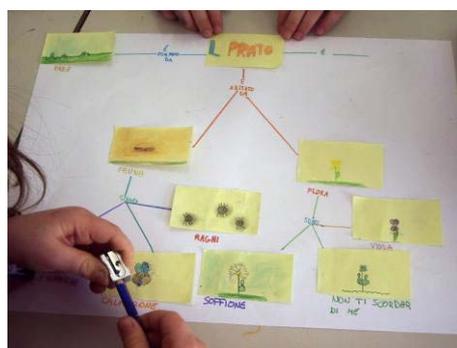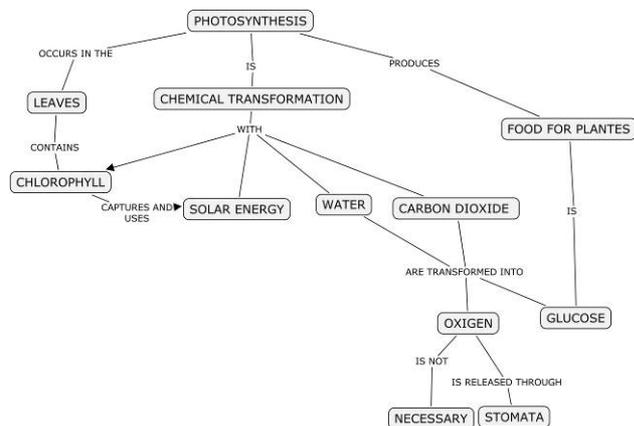
In other less involving situations, where the activity is an individual one and verbal communication or text reading is mainly used, the student tends to isolate and close himself in stereotyped behaviors. Also in such a case concept maps prove to be a resource. When making the map, the task takes on an operating aspect and the student works in a motivating, congenial way. Visual representation helps him to focus and manage different topics. Key concepts are extrapolated and expressed through an iconic or written representation and organized in network in the map chart.

For homework, the teacher often prepares a skeleton map, accompanied by the list of concepts about an argumentative text. By completing the map, the child studies the topic in further details. Maps on a specific topic, either made in a group or individually, are placed on posters that can be recovered in order to reiterate and consolidate the acquired concepts. The same work method is used by all the students in the class: they have to identify the key concepts of a text, organizing them in a hierarchical way through maps that focus and organize contents in a network of aware significant knowledge.

2.3 Maps and special educational needs of dyslexic students

Concept maps are normally used also by students with specific learning disorders, such as dyslexia and/or attention deficit. In these cases the use of the CmapTools software is supported, since the multiple potential features of this tool allows for implementing thinking strategies that are typical of dyslexic students: global, operating, visual learning.

PHOTOSYNTHESIS

OCCURS IN THE — LEAVES

IS — CHEMICAL TRANSFORMATION

PRODUCES — FOOD FOR PLANTES

CONTAINS — CHLOROPHYLL

WITH

CAPTURES AND USES — SOLAR ENERGY

WATER   CARBON DIOXIDE

IS

ARE TRANSFORMED INTO

GLUCOSE

OXIGEN

IS NOT — NECESSARY

IS RELEASED THROUGH — STOMATA

Tools as calculators and vocal reading software applications, which compensate the difficulties of sequential processing of language, perceptive discrimination and memory, are effectively used along with CmapTools. The processing of concept maps makes it easier to decode a text after listening to it, thus allowing for integrating more variable information in a non-sequential representation of a knowledge field.

Students make maps individually or in a group, they make maps on a specific topic, or they complete a template map using the same work method as that used by Fabio. This map refers to chlorophyll photosynthesis and was made by a 10-year old dyslexic student from the fifth class of primary school, with the collaboration of two schoolmates.

Maps become a learning tool that balances out the effort required to read and to control reading and writing. Maps facilitate the organization and retrieval of information with a graphic alterative to the written text. Maps can provide a framework for improving operational performance and enhance cognitive abilities in the presence of learning disorders promote significant learning also in the presence of special educational needs of dyslexic students.

3   References

Ausubel D. P. (1978), Educazione e processi cognitivi, Franco Angeli, Milano.

Celi F. (2000), Programmazione individualizzata e obiettivi della classe: come collegarli?, Ianes D. e Tortello M. (a cura di), La qualità dell'integrazione scolastica, Erickson, Trento.

Collins P. (2005), Nè giusto nè sbagliato: avventure nell'autismo, Adelphi, Milano.

Cornoldi C., De Beni R. (1995), Imparare a studiare, Erickson, Trento.

Frith U. (1991), Autism and Asperger Sydrome, Cambridge University Press.

Gelati M. (2004), Pedagogia speciale e integrazione, Carocci, Roma.

Ianes D. e Tortello M. (2000), La qualità dell'integrazione scolastica, Erickson, Trento.

Ianes D. (2005), Didattica speciale per l'integrazione, Erickson, Trento.

Johnson D. W. e Johnson R. T. (1998), Apprendimento cooperativo in classe,Erickson, Trento.

Novak, J. D. (2001), L'apprendimento significativo. Le mappe concettuali per creare ed usare la conoscenza, Erikson. Trento.

Novak, J. D., & Gowin, D. B. (1986), Imparando ad imparare, SEI. Torino.

Novak J. D. (2010), Apprendere, Creare, Usare la Conoscenza:l'utilizzo di Concept maps come Tool di semplificazione nelle scuole e nelle aziende. in J@-LKS Invited Papers. Vol. 6 n. 3 settembre 2010.

Roletto E. (2005), La scuola dell'apprendimento. Didattiche disciplinari, modelli e applicazioni operative, Erikson, Trento.

Topping K. (2000), Tutoring. L'insegnamento reciproco tra compagni, Erickson,Trento.

Vygotsky L. (1992), Pensiero e linguaggio, Laterza, Roma-Bari.