Essential Questions and their use in developing metacognition in pre-primary and primary aged children

Le *Domande Essenziali*: uso e tecnica per lo sviluppo della metacognizione. Un'esperienza con i   bambini della scuola dell'infanzia e della scuola primaria

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This article deals with the introduction of Essential Question techniques in pre-primary and primary schools based on a study carried out in the United States from K-12 .This technique consists of using certain kinds of questions which focus on a deeper reflection on the content of study. All questions (non-EQs) used in Italian pre-primary and primary schools focus on the content of the curriculum being taught, and EQs are not used. The article describes how EQs differ from non-EQs and how the former can change the dynamic of learning at the pre-primary and primary level. The article goes on to describe the phases of a study on the introduction of EQs into the daily activities in a pre-primary and a primary school in Italy, where EQs had not been previously used. The research involves two second grade classes in primary school and two pre-primary school classes made up of children aged five. In children of this age, the use of Essential Questions (EQs) may stimulate metacognition processes. These processes may lead to higher level thinking while maintaining a higher degree of motivation, which continues to be an issue as well for children with special needs.

Key-words: metacognition, didactics, higher level thinking, pre-primary and primary curriculum, significant learning, special needs, inclusive education

abstract
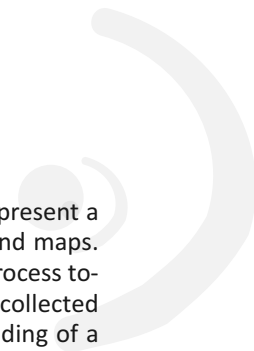
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Introduction

Essential Questions may be considered a technique to promote meaningful learning. These kinds of questions are part of a strategy to achieve what is considered "significant learning". This means a process of learning that can be supported by previous knowledge (Ausubel, 1980) in order to facilitate the elaboration of new information. This technique can be an important aid for students with learning disorders and for those who are affected by intellectual disabilities. These students find difficulties in processing information and producing logical connections in their thinking process. Essential Questions, thanks to their focus on creating a logical sequence of ideas and guiding the expression of critical thinking, can facilitate the process of learning for students with learning disorders and with intellectual disabilities.

Recently, other authors (McTighe &Wiggins, 2004; Mangieri & Block, 2007) have re-evaluated the idea of significant learning to focus on how the students can use what they have learned in school outside the classroom. Nowadays, significant learning is therefore linked to the idea of presenting authentic and relevant contexts in the classroom thus allowing the students to transfer what they learn inside the classroom into the real world. Students with special needs as mentioned above may often be excluded from participating in classroom experiences which propel them into authentic contexts. Teachers often have lower expectations for these types of students, and teachers may choose to avoid presenting challenges that may frustrate students with learning difficulties. A relevant context could be when a teacher asks students to comment on several poems studied in the course directing their comments not to the teacher, but to a publisher who is interested in publishing a book of poems for young people of their age. The publisher is actually not a real person, but the students do not know this, and so, this becomes an authentic situation for them. In addition, the poems would be directed at young people, which is relevant for the students in the class. In a didactical situation as above, inclusion for all the students is assured.

The importance of motivating students while reinforcing critical thinking are two main aspects of current inclusive didactics (Cottini, 2016; Cornoldi, Gruppo MT & De Beni 2016; Caponi, Cornoldi, Falco, Focchiatti & Lucangeli, 2012; Brophy, 1996). With this aim in mind, using essential questions as a strategy when teaching creates motivation in the students and promotes critical thinking, the main characteristics of significant learning.

1. Essential Questions

Essential Questions (EQs) are relatively simple questions with the aim of gaining a deeper understanding of the problem presented and/or of scholastic content. The main characteristic of these questions is the opportunity that they offer to learners to go beyond the scope of information towards a deeper and higher vision of the problem or of the content itself. The problem is investigated in all its aspects by examining different points of view. The content is not the main focus of the students' study, but rather, it represents a means to understanding every-

day life. For students with Learning Disorders, the use of EQs may represent a method to tackle the content of study and find a way to produce mind maps. The exercise that EQs allows learners to do is to guide their thinking process towards closer observation and toward an active consideration of the collected data. EQs stimulate the search for meaning, leading to an understanding of a possible transfer of knowledge to the students' everyday lives.

Using EQs should not be optional but required in a curriculum, as it makes students understand that learning must be active and not passive. In addition, there are other important reasons for using EQs:

– Questioning leads to meaningful learning
– Learning units become intellectually engaging for students
– Teachers are helped to prioritize standards
– Increased transparency for students
– Metacognition is promoted and enhanced
– Intra- and interdisciplinary connections are enabled
– Differentiation among students is supported.

The systematic use of EQs with students with intellectual disabilities can represent a method to guide the process of thinking and the consequent expression of thought.

1.1 Meanings of "Essential"

In reflecting on the word "essential", we can distinguish three overlapping meanings.

The first is "essential" as something important and timeless. This means that what students learn through the use of essential questions becomes natural and recurrent throughout their lives. For example, "What is justice?" or "What is the relationship between science and faith?" are questions that will be asked over and over in the course of a person's life, but the answers will change. Different experiences, personal reflections on life events and changing points of view influence how we think, and consequently, how we answer essential questions.

The second meaning for "essential" is "elemental" or "foundational", as essential questions reflect the most significant arguments in the field of inquiry both historically and currently.

For example, a question like "How can a history writer avoid influencing the readers with his personal point of view on the facts he talks about?" illustrates this point.

The third meaning of "essential" refers to what is necessary for personal understanding. Essential questions help students to understand how to connect seemingly unrelated and abstract information,

traditionally the province of experts, and how to apply this knowledge to their own needs. For example, in sports, students can learn how to create scoring opportunities by answering a question like "What strategy can we use to enhance our offense?" In other words, these Essential Questions can be applied to physical skills as well as non-physical ones.

2. Questioning leads to meaningful learning

One of the main reasons to support the use of EQs is that these can lead to a deeper understanding of the concepts and of the process of learning so that students can transfer their learning to outside the classroom (McTighe, Wiggins, 2004; Wiggins, McTighe, 2005, 2007, 2011, 2012). For students with intellectual disabilities, even simple tasks, such as purchasing a snack, can be a challenge. EQs can guide these students to plan the necessary actions to function in the real world.

Starting from goals, the teacher can unpack these in order to direct students' attention to each component of the original goals, and students will have clear steps to follow in order to achieve them. The unpacking of the original goals involves the use of essential questions. For example, a primary teacher can unpack the aim of understanding the impact of geography, climate and natural resources on the lifestyle of the people living in a determined area by creating an EQ such as "How does the place where we live influence how we live?".
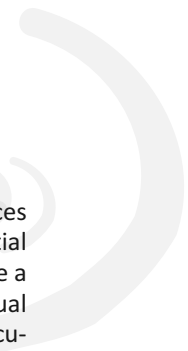
Thanks to the use of essential questions, students can acquire expert knowledge as the result of inquiry, argument and difference of opinion. EQs are a way for the students to delve into concepts and explore them. At a practical level, students can start from understanding issues and, through EQs, students can transfer their knowledge to their real lives and vice-versa. Essential Questions lead to targeted understanding. For example, if students are studying the main characteristics of the territory where they live (climate, geography and natural resources) and how these influence the lifestyle of the people living there, then, an Essential Question might be: "How do these characteristics influence your lifestyle?". Another example might be while students are studying the nutritional elements found in food (fats, proteins, carbohydrates, etc.), the Essential Question could be: "If a person eats a sandwich for lunch every day, how will his health be affected by the combination of the nutritional elements contained in the sandwich?".

3. The importance of teacher's intent

Questions starting with "how" or "why", while apparently leading to open-ended thought, may actually be asking for factual answers. Likewise, questions beginning with "what" or "who", while apparently asking for factual answers, may encourage thinking and discussion. For example, the question: "Why did the French Revolution start?" can be answered in a single answer by looking it up in the textbook, while the question: "What makes a great leader?" leads to discussion and open-ended answers. Before formulating the essential questions which can lead to a higher order of thinking, the teacher should consider the purpose, the audience, the context and the impact of the questions.

Teachers who have children with special needs in their classes can formulate EQs that are suitable to the issues these students face, such as having to prepare a meal or making a Mother's Day gift.

If we look at the question itself, we cannot decide if the question is essential or not without first considering the purpose behind the question. If the question

posed allows the students to express what they already know and then forces the students to question this knowledge, we can consider this to be an essential question. For example, "Is the water in the world running out?" "Can we have a map of the area where we live by using geometry"? "Can we talk about a virtual world existing next to the real world?" These kinds of questions may spark curiosity and evoke deeper thinking and discussion. These questions do not elicit only yes-no answers, but they provide stimuli for further thinking processes. Moreover, this technique may be useful in stimulating children with disabilities who do not spontaneously participate in class discussion.

A question cannot be considered essential or non-essential merely on the basis of how it is worded. A teacher may pose a question that seems to be open-ended, but he is looking for a pat answer and, similarly, he may pose a question that appears to require a pat answer, but he is actually trying to evoke thoughtful analysis on the part of the students. For example, the teacher can count objects in multiples of two's and then ask the children to continue counting. At the end of the activity the question could be: "What are we doing here and why?" This question seems to require a pat answer, but the teacher can use the same question to ask for further reasoning allowing students to reflect and become aware of their thinking (metacognition). In other words, whether a question is essential or not depends on the teacher's purpose in asking it. This reflection underlines how important the teacher's goals are and how he tries to accomplish these goals.

3.1 Topical and overarching EQs

Some EQs can be limited to a specific discipline or area of interest. For example, if we take the question: "What can we learn from our nation's war of independence?", the answer is open-ended, but it is not perpetual. On the other hand, an overarching EQ transfers across different disciplines and links them beyond the particular topic. For example, the EQ "What can and can we not learn from our nation's past?" is both open-ended and perpetual, as it bears being asked over and over again.

Overarching EQs are useful in planning a cross-curriculum, focusing on soft skills that involve different disciplines, but these questions can also be applied to a long-term curriculum, from kindergarten through secondary school. For example, questions like: "How can water be important to our lives?" or "How can a tree contribute to the quality of our lives?" can be asked of students in any grade. Questions like these can be further unpacked for children with special needs to individualize the learning process. Obviously, when dealing with children in kindergarten, the answers will reflect their limited experience. However, these children can still reach a first level of understanding of the cycle of water or of the relationship between trees and breathable air. As Bruner said, teachers can "come back" to the same topics through the years like spirals: every time the students attempt to answer the questions, they will gain a deeper knowledge and comprehension of the topics.

4. Metacognitive and reflective Questions

The examples presented so far are linked to academic disciplines. There are other kinds of EQs dealing with the metacognitive and reflective dimensions of our personality, which can refer to the world outside the classroom. These are questions linked to the awareness of the personal process of learning and understanding. Questions like: "How can I remember the passage of the book that I have just read?" or "How can I manage my anxiety?" or "How can I improve my learning style in order to perform better?" are particularly useful to focus on personal development. These questions empower the metacognitive process of learning with the positive result of overcoming learning disorders such as dyslexia, dysgraphia, dysorthography and discalculia. (Cornoldi, 2017; Cornoldi, Zaccaria,2015; Stella, 2017, 2016; Stella, Savelli, 2011; Frith, 1985).

Furthermore, metacognitive and reflective questions are fruitful toward forming reflective and thoughtful individuals. These questions can be posed in school as well as outside of school during one's daily life.

4.1 Non-essential Questions

In schools, as in any other educative context, teachers and educators use many non-essential questions, which continue to be useful. Mc Tighe and Wiggins classify these questions as questions that lead, questions that guide and questions that hook (Mc Tighe, Wiggins, 2015).

Questions that lead are questions that require only one correct answer, such as:

– What is the capital of China?
– What is the chemical symbol for water?
– Who was the president of Italy in 1978?
– How much is twenty and thirty-five?

Leading questions help the teacher to check the learner's specific knowledge and thereby reinforce the student's knowledge of facts. These questions can also be defined as rhetorical, which means that they point to specific facts with the aim of directing the students' attention to these facts. They do not stimulate discussion, however.

Guiding questions are broader than leading questions, but they are not open-ended. They guide the students toward a definite answer through inference rather than recall. For example:

– Can you state Pithagoras' theorem in your own words?
– What were the main causes of the French Revolution?
– When is a number considered "prime"?

These kinds of questions are useful as they allow teachers to achieve learning outcomes, however, these questions are not meant for long term inquiry and will not be revisited over time.

Although questions that hook are not considered essential, these questions serve to capture students' attention and pique their interest. It may be useful to start a lesson or a didactic unit of a course with questions like "Is what you are eating making you fat?" as an opening question in a nutrition class, or "Are you the same height in Italy as you are in Australia?" as an opening question in a math class. Questions used in teaching can be classified into two types: those that are essential for the teacher to hook and guide versus "essential questions", which allow students to examine ideas and processes that lead to a deeper understanding as part of continuous learning.

With children with intellectual disabilities, non – essential questions are commonly used to elicit an answer more efficiently, but this kind of question may not prove to be motivating for most students. To increase motivation, the teacher can transform a non – EQ into an EQ. For example, a child draws an apple and the teacher asks what colour it is. If the child answers "red", the teacher can introduce a series of EQs such as "Have you ever seen apples in the market?", "Let's find some photos of apples on the computer", "What colour are these apples?", "Can we draw an orange apple?" and "Why?" or "Why not"?

According to the different answers the child gives, the teacher may produce new questions to help the child to reflect on his experience. This use of EQs increases students' motivation when doing even a routine classroom task.

4.2 Methodological Tips

When a teacher wants to apply the EQ method, he should plan a long-term learning goal, as Essential Questions need to be revisited throughout the curriculum. The teacher can start with a unit to present the EQ by giving the students the opportunity of discussing, reflecting, and analysing. Only one EQ should be presented per unit and it may require many units of study before students are prepared to answer it.

Sometimes, the same question can be presented either as a guiding question or as an essential question. Everything depends on the teacher's intent. If the teacher is looking for a final answer, even after discussion, reflection and analysis, we are dealing with a guiding question.

If the teacher is looking for a continuous revisiting of the content stimulated by the question, we are dealing with an essential question.

Looking at what has been presented so far, we may ask ourselves if EQs are truly important in a syllabus. There are different reasons to use EQs, among which the most important one, in our opinion, is to produce thoughtful learning and engaged learners.

There are other important reasons for using EQs in didactics, such as:

– they signal that inquiry is a key goal in education;
– they make the learning units more intellectually engaging;
– they help teachers to clarify the main standard;
– they help students to become aware of educative goals;
– they provide interdisciplinary connections;

- they encourage metacognition;
- they support a meaningful thought process (McTighe, Wiggins, 2015).

Signalling inquiry as a key goal is fundamental in making students active learners, constantly in search of new meanings without being stalled by the evidence of the situation they encounter. If we take the example of Socrates in Plato's Dialogues, we can appreciate how important it is to develop the habit of thinking rather than accepting what others say without question. Other examples that illustrate how important it is to develop one's critical thinking are the fable of "The Emperor's New Clothes" and the adventures of *Winnie the Pooh.* Once the thinking habit is ingrained, a person is no longer susceptible to those who try to influence or convince him to accept without thinking.

The ultimate aim of education and teaching is to make students better questioners, especially considering the fact that information and knowledge in the modern world is constantly changing and rapidly becoming obsolete. We need to prepare students to keep on using high level thinking skills in order to be able to question the complex challenges of today's society. While this seems like an obvious choice, the majority of teachers use leading questions based on factual knowledge, which results in lower-level thinking (Pagliaro, 2011, p. 13).
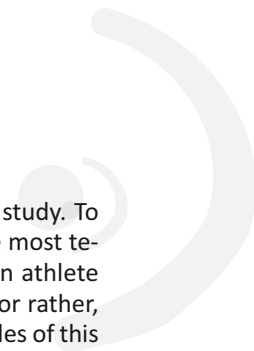
More recently, further research has been conducted suggesting that the majority of questions asked by the teachers from primary school through university (Albergaria Almeida, 2010) generate lower-level thinking (Wragg, Brown, 2001; Bentham, 2004; Wilen, 2004).

The frequency of the questions in the classroom is extremely high, ranging from 300 to 400 a day (Levin & Long, 1981). For example, in a third grade class, a question is asked every 43 seconds and in a junior high school class every 10 to 15 seconds (Gambrel, 2015).

Recently, Wiggins and McTighe visited classrooms and observed that, while there was an essential question on the board, inquiry was not sustained during the discussion, but there continued to be a focus on content (Wiggins, McTighe, 2016). They go on to say that according to their method of Understanding by Design, essential questions are placed in stage 1 in the course plan as the unit aim. This means that the aim focuses on inquiring and deepening understanding rather than acquiring content as a long term goal. Developing a deeper understanding comes over a period of time and cannot be arrived at by the mere transmission of information. Essential questions engage students so that they are able to construct knowledge and find meaning for themselves (Wiggins, McTighe, 2011, 2012).

The way to make learning proactive and engaging is to organize units starting with thought-provoking questions. In this context, the content to be presented becomes the tool with which the students can answer the questions. The best thought-provoking questions are EQs because, as we said, they are those which awaken, heighten and challenge the thinking process. This is particularly important for students with special needs.

Planning units based on thought-provoking questions has two main pedagogical aims. The first is to encourage students to pursue an inquiry without being satisfied with the obvious, superficial answers. The second aim is to motivate students to learn content in order to support inquiry. When these aims are

achieved, there is a high level of intrinsic and extrinsic motivation to study. To use an example of an athlete, his motivation helps to endure even the most tedious and exhausting training. Using EQs in a sport context, where an athlete needs to perform well and ultimately win, helps to "think the sport", or rather, to have an awareness of the challenges posed by the EQs. Some examples of this type of question might be: "What do we need to do to improve our performance and win?" and "What can we do to reduce the effectiveness of our opponent?"

Another example of the effectiveness of EQs is in student writing. Questions like: "What is your purpose?" and "Who is your audience?" are asked of the writers before peer review. In turn, reviewers are asked questions like: "To what extent does the writer achieve his purpose?" and "What are the most interesting and least interesting aspects of the writing?"

Teachers and students interviewed after a writing experience where EQs were used to evaluate the students' writing produced some interesting comments. The use of EQs allowed the teacher to take advantage of teachable moments to focus on aspects of student writing, such as idea development, organization, word choice and mechanics, and by doing so, the teacher was responsive to what was relevant to the students in terms of their writing.

5. Essential Questions and Modelling Metacognition

The function of EQs is not only to focus on learning. Through their use, EQs also serve as a model for students to learn how to formulate EQs and then to call upon these questions during independent thought. For this reason, only the expert (teacher) knows how to produce the model. The students are normally encouraged to pose their own questions, but the best EQs reflect the expert's insights on the discipline. There is a seminal work by George Polya (1967) in which teachers' questions become students' EQs, thus allowing the students to face the challenges of problem solving.

It is important to point out that the EQs framed by Polya not only involved abstract thought: issues, values, themes and concepts, but also in processes and strategies. EQs are essential in skill areas such as maths, world languages and even athletics and the performing arts. Success in any field depends on the ability to ask the right expert questions about strategies and attitudes, and then to apply the results. However, teaching through the use of EQs is useless if students are not faced with challenging problems. Skills are a means and not an end, even when dealing with students with disabilities. Teachers need to set up situations that stimulate the curiosity of students in order that they start to ask questions. Some of these questions can be transformed into EQs by the experts, who can then use these questions to support the process of learning. Thanks to these questions, students become aware of what they learn, and this metacognitive knowledge allows them to choose the right strategies to address and solve challenging problems.

Another important consideration about metacognition modelling is represented by meaningful differentiation, which is based on students being different. Students have different learning styles, different skill levels and different experiences, but the use of the EQs should be the same for all the students in the class.

The focus of learning is on the thought not on the content. Essential questions should facilitate the thinking process and help the students to become aware of their personal learning mode. Carol Ann Tomlinson, one of the leading experts in differentiated instruction, recommends that teachers express maximum respect for the skills of each student (Tomlinson & McTighe, 2006). Using the same EQs in the class means that the teacher respects each student's individual intelligence and capacity to think. The most important task for a teacher is to enhance learning and not to cover content (McTighe, Wiggins, 2013). The teacher should uncover the leading ideas and the processes generated by the content so that the students can make useful connections among concepts and are equipped to transfer what they learn to other meaningful contexts. This process of learning produces metacognitive knowledge and develops metacognitive processes in the students.

The use of EQs seems to be useful even in the preparation of students for standardized tests. Several studies in the United States have demonstrated that the students that have been educated through EQs are more capable in coping with standardized tests (Marzano, Pickering & Pollock, 2001; Newmann, 1991).

6. Essential Questions: an experience in an Italian pre-primary and primary school

The following notes describe the project of introducing Essential Questions in the curriculum of a pre-primary and primary school. The method described the hypothesis, the sampling, the research tools, some of the activities introduced in the daily syllabus of a pre-primary and primary school and the result of this experience.
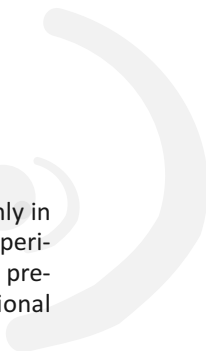
The hypothesis of the research
First, the strategy of using Essential Questions in the classroom is not yet very common, and therefore, this experiment has been one of the first to be carried out in Italy. The hypothesis of the research is that with the use of EQs, metacognitive thinking processes are developed and enhanced in the primary and pre-primary classrooms[1].

The sampling
The research involves two second grade classes, eighteen and twenty-three pupils respectively aged seven, eight males and ten females in one class and twelve females and thirteen males in the other class of the primary school. Also taking part in the study were two pre-primary classes, composed of twenty children each, aged five, nine males and eleven females in one class and seven males

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1   The terms of pre-primary and primary schools were chosen to indicate respectively the last yearofpre-school and elementary school according to theuse of these terms in the official documents of the European Agency for Special Needs and Inclusive Education (European Agency for Special Needs and Inclusive Education, 2017).

and thirteen females in the other class. The sampling was taken randomly in the same school[2], based on teachers' willingness to participate in the experiment. The EQs were used in one of the two classes (one primary and one pre-primary) while the other two classes were control groups where traditional methodology was used.

Research Tools
In order to investigate school and pre-school age metacognitive processes, both the metacognitive reading questionnaire and the metacognitive writing questionnaire, elaborated by Friso, Drusi & Cornoldi research group (2016), were administered to primary and pre-primary experimental and control groups for pre-treatment and prescribing skills.

In order to evaluate meta-memory, Wellmann and Yussen tables (Yussen & Bird, 1979) were used, adapted for Italy by Mazzoni and Tressoldi (1988) as well as the meta-memory tests (Cornoldi & Caponi, 2011).

The results of the tests administered showed that the results of the metacognitive questionnaires were well correlated with the other measures. Consequently, the teachers and the researchers were able to have a description of the initial levels of metacognitive thinking skills of each child in the primary and pre-primary groups.

At the end of the experimental experience, researchers produced a re-test using the metacognitive reading questionnaire and the metacognitive writing questionnaire as well as the meta-memory test.

Primary school
At the beginning of the study, the teachers of both groups carried out diagnostics (Friso, Drusi & Cornoldi, 2016) to determine the level of metacognitive thinking skills. The results of these tests were almost the same for both groups. At this point, EQs were introduced in one of the groups. Teachers conducted the class in the usual fashion: introducing new content, explaining this content, allowing children to get hands-on experience, talking together about what they had done, the difference being that a section of each class activity included the use of EQs.

Before introducing scientific concepts, the math and science teacher, for example, prepared some EQs, such as: "How can our bodies continue to live?" When the students answered: "Because we eat food", the teacher formulated the next EQ: "How can food make our bodies work?" After this, all the children expressed their own ideas. According to the children's answers, the teacher continued to formulate EQs to motivate the children to think independently and eventually become autonomous learners . If the children were unable to give the answer, they were encouraged to look up the information in their books or computers, or ask their peers. Some examples of EQs used by the teacher to introduce arithmetic activities were: "What is a number?" and "How can numbers help us outside the school?" The teacher continued to elaborate EQs on the basis

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2   The schools involved in the research are: Istituto comprensivo "Vibio Mariano" – Roma, where the two pre-primary classes were located, and Istituto comprensivo "D.R.Chiodi" where the two primary classes were located.

of children's output. The importance of using these questions is not in the answers to the questions themselves, but rather in the exercise of thinking. This exercise of thinking allows pupils to become more critical and more aware of their ideas, thereby helping them to create links among different concepts. In doing so, children develop metacognitive knowledge to help them to plan their actions and predict the outcomes of these actions.

The style of teaching in this class was characterized by focusing on the thinking process rather than on the content of the different subjects. The same approach was not followed in the control group, where the focus of teaching was on content only. The Essential Question technique was continued in the experimental group even when teaching other school subjects.

During the experiment using the EQs, teachers noted down their observations on students' responses and contribution to the talks. Both teachers and researchers discussed these notes to look for any improvement in the use of metacognitive thinking skills.

After two months, the experimental group and the control group were compared as to their abilities to carry on a group discussion on everyday topics. Direct observation and video observation on conversation in the classroom were recorded, and the teachers filled in a check list about children's behaviour during the conversation based on EQs. For example, students were asked how to solve the problem regarding the use of the school gym, which was under repair. Pupils had to suggest ways to continue with their physical education without the use of the gym. Children presented their solutions and commented on the different solutions while the teachers observed and recorded their behaviours. Children in the control group were able to give only limited suggestions such as: "We can wait until the gym is ready" and "We can stop PE" or "We can use the classroom for PE". Children from the experimental group were more creative in the search for a solution: "Why don't we ask one of the high schools nearby to let us use their gym until our gym is ready?" and "We can use the hallways without disturbing the students that are in class" or "On sunny days we can use the school courtyard when it is not full of students".

During the experimentation, it was clear that those children exposed to the EQ technique were inclined to find solutions which explored the problem in more depth, thus demonstrating more autonomous thought. On the contrary, children from the control group needed to be continuously guided by the teacher's prompts before being able to come up with new solutions. These results were made clear in the observation log and in the video, as well as in the checklist, which included items such as "initiating conversation", "keeping the conversation going through the use of follow-up questions and comments", and "contributing new ideas relating to the initial topic".

Pre-primary school
Similar to the procedure used in the primary school, the experimental group and the control group in the pre-primary school were tested using metacognition questionnaires (Friso, Drusi & Cornoldi, 2016) and meta-memory (Cornoldi & Caponi, 2011) to measure the level of metacognitive thinking skills. The results did not show significant differences between the two groups.

For the next two months, the didactical activities in the experimental group

focused on the use of EQs while the control group continued with traditional didactics focused on content. Teachers in the experimental group presented each activity using EQs before focusing on the content. For example, the teacher presented the cycle of water starting with EQs such as: "Where does rain come from?", "Where does sea water come from?" and "Why do clouds move in the sky?" Children's answers were compared in order to determine similarities and differences, on the basis of which the teacher produced new EQs. Children were then guided to ask for further information they needed to understand the cycle of water. They looked for different images and they were able to find links among the images by asking the teacher questions for understanding. Subsequently, the children were able to describe the cycle of water by linking together the different phases of the process and were autonomous in the elaboration of the content.

On the contrary, in the control group, the teacher introduced the activity by focusing children's attention directly on the content. The teacher showed the cycle of water using images and telling the story of the water drop and then asked children to repeat the different phases of the cycle using images. During the experiment, the children were observed and filmed.

By using EQs, the teacher stimulated the children to come up with and to produce new ideas. In addition, these children were able to continue a discussion without further stimulus from the teacher. In the control group, the children were able to answer content questions but were unable to come up with any independent ideas. Consequently, they were unable to create a discussion based on their own questions, as happened in the experimental group.

As in the primary school experiment, direct observation, video observation and a checklist were used to compile and document the results.

Results
After the two-month period of experimentation, the children in both groups (experimental and control) in the primary and the pre-primary schools were re-tested (Friso, Drudi & Cornoldi, 2016; Cornoldi & Caponi 2011). In addition, children from pre-primary school were also tested with the 4-5 School Readiness Test (Zanetti & Cavioni, 2014). This test was administered in order to have a clearer picture of the overall development of the cognitive aspects of each child's personality. This test was not used in primary school as it is an indicator only for children aged five.

The outcomes of all the tests in both primary and pre-primary school indicated that the experimental group and the control group improved their performance in metacognitive aptitudes. The score for the experimental group in pre-primary was slightly higher (25%) than that of the control group. Similarly, the score for the experimental group in primary was also slightly higher (15%) than that of the control group.

This suggests that the use of EQS can enhance the development of higher level thinking, however, further experimentation needs to be carried out to validate this claim.

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Conclusion

According to the results which came out of this study, an argument can be made for the use of EQs in the curriculum of pre-primary and primary school. Considering the data collected so far, we are led to believe that the systematic use of EQs can stimulate metacognitive processes and facilitate the development of higher level thinking, and subsequently, enhance critical thinking in pre-primary and primary aged children. It has already been established that stimulating metacognitive processes is an important strategy to help children with learning disabilities (Cornoldi, 2017; Stella, 2016; Lucangeli, 2012).

Additional research should be carried out in Italy using a wider sampling and focusing on children with learning disabilities or those with potential learning disorders to determine how the use of EQs may benefit these types of learners. EQs involve and engage all types of learners, thus creating an inclusive atmosphere. Furthermore, EQs help to maintain a higher degree of motivation, which continues to be an issue for children with special educational needs.

In the future, EQs could be introduced into the pre-primary and primary curricula as a standard technique for all subjects, once teachers have been trained in their use.

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