Researchers agree that ‘metacognition’ conceptualises the kind of learning that fits our fast-changing, meta-modern world: An autonomous, lifelong learning which is adjustable to new learning tasks. Metacognitive active persons develop such learning because they are aware of their knowledge and, simultaneously, they can control further learning by activating strategies such as programming and evaluating. This paper argues that a research gap exists regarding the way metacognition can be developed in schools. A specific research design is suggested.

School age is crucial for the development of metacognition as the later is enacted and further developed during the first school years; metacognition improves as children get older and as it is more practised. Above all, metacognition appears to be necessary because it facilitates effective school learning. Nevertheless, the way metacognition is currently enhanced during everyday teaching has not yet been thoroughly examined. Several interventions managed to improve some metacognitive skills of children by applying certain teaching methods, but the sustainability of these positive results and the transferability of the methods into normal school life were not investigated. Little is known about the relation of metacognitive teaching with teachers’ characteristics, too. For instance, research in Israel (Zohar, 1999; Kramarski, 2008) showed that educators’ metacognition can be promoted during in-service programmes, but, the effect of this improvement on children was only examined via teachers’ self-reports.

Having these in mind, the research proposed aims to investigate a possible relation between teachers’ and students’ metacognition. Three research questions are addressed: a) Is there a relation between teachers’ metacognition and their teaching methodology? b) Can teachers promote their students’ metacognition during everyday teaching? and, c) If they can, in what specific ways? The proposed research will be conducted in Cypriot primary schools and will combine data collection from children and teachers via classroom observations and tests. Any possible relations found will be of great importance as they will indicate that students’ metacognition can be enhanced by promoting their teachers’ metacognition and by improving the teaching methods applied in an everyday classroom…
Introduction: The current world’s plea for adjustability

‘After all, education is not only for the present…Students will be living in a world different from the one they now occupy. Who among us can tell what the future look like? … The primary aim of education is to enable youngsters to learn how to invent themselves - to learn how to create their own minds…’

(Eisner, 2003, p. 6, 10)

There can be no doubt that the most permanent feature of our era is change. The current world (natural, technological and social) is rapidly changing in such an unpredictable way that there is a crucial need for an active, meta-modern citizen who is flexible in decision making and able to handle a growing package of information. Above all, persons need to have the skills to use new information so as to meet changing environmental needs and, also, to control any feelings that may interfere with correct decision-making in all aspects of their personal lives.

The question that logically follows the above consideration is “how can anyone be constantly adjustable to this changing meta-modern world?”

In the psychology area, researchers from two different schools tried to give an answer. Cognitive psychologists crystallised their theory to the idea of human “consciousness”, which they defined as a self-driven function of organising information that increases a person’s ability to deal with it (Demetriou, 2000). Relevant research began as early as the beginning of the twentieth century and the research results showed that persons with developed consciousness (or for some researchers with meta-consciousness i.e. with the ability to have consciousness of conscious procedures) are more flexible when reacting to environmental stimulates and have more self-control when instant reactions are required (Zelazo, 2004).

Developmental psychologists, on the other hand, focused their research on the development and function of “metacognition”. The term, introduced by Flavell in 1979, implies that a person has knowledge of his/her knowledge or ignorance, as well as the ability to control his/her own cognitive function. Metacognitive developed persons are flexible to any learning environment, they can monitor their learning and set their own learning goals; consequently, they can improve and guide their further cognitive development (Kluwe, 1982; Brown, 1987; Kuhn, 2000). The last twenty years, relevant research focused on how metacognition is developed, how it functions during human learning behaviour and under what circumstances it can be further enhanced.

Although it seems obvious from the pre-mentioned that cognitive and developmental psychologists had similar research interests and results, the two psychology areas had parallel courses for many years. It is only recently, and after the realisation that “consciousness/metacognition” has a crucial role in effective learning and flexible living, that attempts are made to merge research findings from the two research areas. One of the main purposes of this attempt is to narrow research gaps regarding the ways in which this meta-modern ability of flexible thinking, learning and living could be cultivated in future citizens. It is with this research trend that schools came under investigation.

The wider area of interest of this paper is effective school learning, in the sense that this learning occurs when students take the maximum of knowledge and learning skills they can in academic institutions, they are conscious of their learning progress and, finally, they can use and further develop this learning outside school, throughout their life span. More specifically, this paper deals with the presence and development of metacognition in schools, a metacognition that facilitates
the effective learning described above. Thus, the theoretical background presented below has developmental psychology as its main source.

**Metacognition under investigation:**

Thirty years of research about metacognition have produced an important insight into the inner mechanisms of human thought and cognition. Nevertheless, the need for extra research also became obvious as many definitions were added for several metacognitive phenomena (e.g. metacomprehension, self-regulation) and as there is still no common understanding among researchers regarding these phenomena (Veenman, Van Hout-Wolters & Afflerbach, 2006). In addition, more and more research questions are added: What are the factors influencing the development of metacognition in real life? What is metacognition’s development in elderly people? How can metacognition be taught from person to person, during everyday life? Etc.

The first definitions of metacognition were quite simple. Flavell (1979), the pioneer researcher of the area, aptly described metacognition as ‘cognition about cognition’ (1985, p.104). Flavell’s (1979) research yielded two key concepts: metacognitive knowledge and metacognitive experience. A person may have metacognitive knowledge of some factors that affect his/her learning (these factors may relate to beliefs about oneself as a learning creature, the learning task, or the strategies engaged to achieve the learning goal). Simultaneously, one may have metacognitive experiences that can be explained as conscious thoughts or feelings about the learning process the very moment this occurs.

Although the idea can be detected in Flavell’s work, Hacker (1998) comments that it was Kluwe in 1982 who first clarified the way in which individuals apply metacognition: they both monitor and control their own learning process. Metacognitive monitoring produces declarative knowledge (you say what you know) and control depends and produces procedural knowledge (you can direct your thought) (Kluwe, 1982). Several other researchers who furthered our thinking about metacognition similarly identified metacognition’s dual action of control and monitoring (e.g. Brown, 1987; Koutselini, 1995; Koutselini and Theofilides, 2001; Kuhn, 2000; Nelson and Narens, 1994).

As years passed, definitions became more specific but more complicated, too. For instance, Brown’s (1987) research contribution was important as she clarified that metacognitive knowledge could be furthered analysed into knowledge about what you know, as well as about how and when you learn more easily. Similarly, she defined five specific ways of applying metacognitive control (programming, handling information, monitoring, self-correcting and evaluation of action/ results). Many more definitions followed, always while seeking for metacognition’s exact function during human thought and other inner processes.

This non-stop, research work produced important conclusions about the importance of metacognition and about some factors affecting its development or appliance but, as pre-mentioned, research also underlined the need for clarification of these new ideas. It is characteristic that Flavell himself viewed his own first definitions as ‘limited’ in the sense that they did not include any reference to human feelings. Brown (1987) also commented that metacognition was seen by many as a ‘blanket term’ under which many cognitive and other non metacognitive phenomena could be hidden.

Regarding the importance of metacognition, Flavell (1985) argues that it plays a crucial role in many types of cognitive ability including oral communication of information, language acquisition,
reading, writing and comprehension, problem-solving etc. There is also ample evidence that metacognition can guide further cognitive development (Kuhn, 2000). On the other hand, it was concluded that some children’s inability to adopt thinking skills and strategies was due to their metacognitive insufficiencies. The meta-analysis of relevant research of Veenman, Van Hout-Walters & Afflebach, (2006) surprisingly revealed that metacognitive skills are responsible for the 17% of the students’ learning, while cognitive development affected only 10% of this learning. Zimmerman’s (1995 in Hartman, 2001) comment is noteworthy: Metacognition is essential but not enough for academic success as other factors may interfere, e.g. school stress. More importantly, metacognition appears to decidedly affect decision making and learning in everyday life. As Brown (1980) puts it, “one of the major justification for studying metacognitive skills is that they do appear to have “ecological validity”; that is, there are recognizable counter-parts in “real-world everyday life” situations” (p.454).

Very little is known about the factors influencing the development of metacognition. Age and practice are the only two, generally acceptable, factors.

Research dealing with metacognition in different ages showed that there are some signs of metacognitive behaviour, even from the early ages of 3-5, as the infants begin to have their theories of mind and show skills of programming or even reflection (Veenman, Van Hout-Wolters & Afflerbach, 2006; Whitebread, Coltman, Anderson, Mehta & Pasternak, 2005). But, metacognition actually develops while the child has learning experiences: metacognitive knowledge appears at early school age (Shneider & Pressley, 1989). One of the most frequent conclusions of the early and more recent research is that older children have better results than the younger ones in tasks concerning metacognitive skills (e.g. Kreutzer, Leonard & Flavell, 1975; Flavell, 1981; Alexander, Carr and Scwhanenflugel, 1995).

Research results about the development of metacognition in grown-ups are very limited. It is only the last five years that relevant research is conducted. Vukman- Bakracevic’s (2005) work is remarkable: She investigated four age groups (16 to 73 years old participants) that were asked to solve mathematical and everyday problems and reflect on the solving procedure. The results showed that while self-knowing is improved with age, self-reflection skills worsened after the age of 63. Similarly, in Mecacci & Richi (2006) research in which participants aged from 17-85, it was concluded that it was the elderly that had less ability to identify their cognitive mistakes.

Apart from age, practice appears to enhance certain metacognitive behaviours. A number of intervention programmes targeted students’ metacognitive skills in text comprehension, mathematical thinking or science (e.g. Cross and Paris, 1988’ Juliebo, Malicky and Norman, 1998’ Koutselini and Hadjiyanni, 1999’ Palinscar and Brown, 1984). These interventions showed that some metacognitive skills can be taught or improved with teaching and that some particular teaching methods were proved to be particularly effective. For example, modelling the way someone thinks proved to be one of these successful metacognitive methods (Palinscar & Brown, 1984). It was also shown that the more the learners were consciously engaged in the learning process by being informed about the learning tasks, the procedures and the value of the learning result, the better their metacognition was at the end of the intervention (Stipek, 1988’ Kuhn, 2000’ Loizidou & Koutselini, 2007).

Although the intervention programmes pre-mentioned are of great importance- as they are the first attempts to realise Flavell’s (1979) dream of transmitting in a systematic way metacognition- an important criticism can be made: Most of this research was conducted out of the “natural environment” of students, i.e., outside of everyday teaching routines. Thus, an important area of research still remains unexplored, namely, children’s current levels and potential development of
metacognition through everyday teaching (Juliebo, Malicky, & Norman, 1998). Moreover, very little is known about any relations between the development of children’s metacognition and their interaction with their teacher. In this vein, the proposed research focuses on the relations among the teacher, the teaching methods applied during everyday teaching and the children’s metacognition.

The aim of the research:

The primary aim of the proposed research is to detect correlation between:

i) The personal metacognitive level of teachers and their teaching methodology that is applied in lessons in order to enhance their students’ metacognition.

ii) The teaching methodology of teachers and the metacognitive development of their students.

The research questions:

The above aim was further analysed into three research questions:

i) Is there a relation between the personal, metacognitive level of teachers and their teaching methodology?

ii) Can teachers enhance the metacognition of their students during everyday teaching?

iii) Which model of teaching methodology correlates with the enhancement of the metacognitive behaviour of the students (metacognitive monitoring)?

Necessity of the coming research:

The research proposed is necessary as it aims to narrow the research gap in three ways:

First, as pre-mentioned, metacognition affects the effectiveness of cognition and the first school years are crucial for its development. Nevertheless, there is not a clear picture of what exactly happens during normal school life regarding metacognition’s enactment during some children’s learning behaviour. Having these in mind, the research was designed so as the students participating are young (8 year-old children) and the data are collected during their everyday life in classrooms.

Second, there are certain theoretical advices about teaching methods that appear to contribute to the improvement of certain metacognitive skills (e.g. the meta-comprehension of a text, the metacognitive monitoring), but these advices need to be tested in real school life, beyond the controlled environment of an intervention. Thus, the observations planned will focus on aspects of teachers’ methodology that have been related in previous research to metacognitive activity during learning. In this way, it may become obvious if these teaching suggestions can be materialised in classrooms and, simultaneously, if there is any relation to the metacognitive behaviour of the students that are taught in a certain way.

Finally, the third reason that necessitates the proposed research has to do with the teacher’s characteristics. There is evidence that a close relation exists between the cognitive level of the
teachers and the cognitive development of their students (Stigler & Heibert, 1999; Putnam & Borko, 2006). At the metacognitive level, the relevant research is still at the beginning. Kurtz & Shneider (1992), for example, collected data about the metacognitive behaviour of German and American students. Some differences in metacognitive thinking were spotted and these differences were explained on the basis of the teaching approaches applied in the classes by the teachers in the two countries. However, these approaches were investigated through the teachers’ self-reports. In the absence of real classroom observations, serious doubts about the reliability of the data may appear.

Recently, a serious attempt to investigate the relation between teachers’ and students’ metacognition takes place in Israel. The work of Zohar (1999), Mevarech and Kramarski (1997; Kramarski and Mevarech, 2003) is similar in the sense that they train teachers during in-service programmes to improve their own metacognition – in Maths and Science- and then, they investigate the results of this training on the metacognition of their students. Although the research showed an improvement in both teachers’ and students’ metacognitive skills and knowledge, again, one can question the fact that students’ improvement was only seen through their teacher’s eyes (self-reports).

Having this in mind, a research that examines the real classroom situation and tests the impacts of teaching on children’s metacognition via immediate observation and collection of raw data from the students is needed. Thus, the research designed combines data collection methods (observation, tests to teachers and tests to children, repeated data collection) and aims to gather information from teachers and students themselves, as well as from the class life without indirect reports.

**Importance of the research:**

Considering the possible results of the coming research, it could be argued that any relation that may appear between the teaching methodology and the children’s metacognition will be of great importance as this may offer extra explanations of the differences that appear among the children’s metacognitive behaviour. Students with metacognitive weaknesses may receive certain guidance with the appropriate teaching method and, at the same time, lessons could be better planned and conducted so as children’s metacognitive development is effectively supported by teachers.

It is also important to clarify any relation between the teachers’ metacognition and their teaching methodology. Any positive relation may give extra directions for the initial and in-service training offered to educators. Both forms of training should be designed so as to enable teachers to reflect on their own learning procedures and results and behave as learning models to their students. Simultaneously, teachers should be trained to use those teaching methods that offer their students the metacognitive autonomy desired.

In other words, if relations under investigation are proven, the metacognitive enhancement of a teacher may lead to an improvement of the teaching methodology applied in classrooms so as students’ metacognition to be enacted and further developed.

**Theoretical framework:**

Following Brown (1987), research about metacognition / consciousness can be classified into four groups: a) Research about metacognitive monitoring, b) Research for executive control of information, c) Research about self-regulation (Piagetian and meta-Piagetian school) and d)
Research that deals with other types of regulation (based on Vygotsky’s theory about social learning). The research proposed in this paper is more related to the first and last group of research works.

**Metacognitive monitoring:**

Metacognitive monitoring is applied when learners supervise their cognitive level and state what they know, what they do not understand and what they ignore (Miner and Reder, 1994). Wellman (1983) adds that this kind of monitoring also includes a prognosis of future success in cognitive tasks. Research indicates that metacognitive monitoring is present even at the age of 4-5 but it is actually consciously used some years later (Wellman, 1977; Markman, 1979).

Research about metacognitive monitoring was a turning-point. According to Schwartz and Perfect (2002), metacognition “came into the ‘modern’ era” (p.4) with Nelson and Narens’ (1990, 1994) work. These two researchers developed an interesting theoretical framework that distinguished metacognitive monitoring from metacognitive control and further defined monitoring in relation to four metacognitive phenomena. These are judgements that may occur before, during or/and after learning and refer to what is easy to be learned, what has it been learned and with which level of difficulty will this learning be used in the future.

It appears obvious that applying metacognitive control, that is, making conscious decisions about learning tasks and learning strategies, is highly important as it gives a person both learning autonomy and flexibility in relation to learning demands. A wealth of research evidence documents that metacognitive monitoring not only plays a key role in the effectiveness of the learning process, but it also facilitates this metacognitive control. Interestingly, it was revealed that the information acquired from checking the cognitive level (the state of knowledge) forms the basis on which decisions are made about the way the learning process will be changed, sustained, or further developed (Kluwe, 1982; Schneider, 1985).

According to Nelson and Narens (1994), during metacognitive monitoring the cognitive level informs the meta-level, thus activating metacognitive action. For instance, there is research evidence indicating that wrong judgments of what is known can result in ineffective methods of learning or in allocation of study time to learning tasks that have already been accomplished (Kelemen, 2000; Tobias and Everson, 1995; Vadham and Stauber, 1994). In contrast, those who reflect on their knowledge or ignorance can make better decisions on how to effectively control their learning process (e.g., as discussed in Miner and Reder [1994], they might decide to re-learn something they consider unknown).

This salient role of metacognitive monitoring was not initially conceptualised by researchers. The first relevant studies concentrated exclusively on the accuracy of metacognitive judgments rather than their usefulness (Miner and Reder, 1994). In 1965, Hart was the first to investigate individuals’ accuracy in monitoring their stored knowledge: he gave undergraduate students two tests, one in which they were to identify their incorrect answers from among many choices, and a second, where they had to identify their correct answers on a multiple-choice test. The results indicated that students’ judgments were relatively accurate indicators of their stored knowledge (in Hacker, 1998). Overall, these first studies showed that it is possible for some kindergarten age children to evaluate their knowledge correctly but, in general, children’s ability to do so increases with age (Hacker, 1998). Brown (1980), however, also points out that children’s weak metacognitive skills could be attributed to their lack of experience in a variety of learning situations rather than to their young age.
As mentioned earlier, studies since the 1980's have documented a clear correlation between metacognitive monitoring and metacognitive control. More recently, research interest has focused on metacognitive ability at tertiary level education. Nelson and Dunlosky (in Hacker, 1998) found in their 1991 study of college students that there is a negative relation between the time elapsed after learning and the accurate monitoring of the learned knowledge. A wealth of research reviewed in Hartman’s (2001) meta-analysis also indicates that high-achieving students in universities showed better metacognitive monitoring of knowledge when asked to predict their grades compared to low-achieving students who overestimated their abilities. Finally, of great importance are the two studies undertaken by Everson and Tobias (2001) in colleges, as they provided the research community with a reliable method of assessing students’ knowledge monitoring ability, known as ‘the KMA’ (Knowledge Monitoring Ability). The basic strategy of this method is to assess knowledge monitoring by evaluating the differences between students’ estimates of knowledge and their actual knowledge as indicated on a test.  

Metacognition as social learning:

In this category, Brown (1987) considers research works that view metacognition as a result of social learning. This way of thinking was influenced by Vygotsky’s theory according to which every psychological process is simultaneously social. A person – and especially a child- adopts these processes through socialization.  

Research in this area was developed at a very slower pace compared to the other three categories. Systematic attempts to teach metacognition in a controlled environment started in 1990’s. It was then indicated that metacognition can be taught or at least improved by practice (Flavell, 1985, 1987˙ Hartman, 2001). As mentioned above, however, these results could not be easily transferred into normal school life as the research results came from interventions that were applied out of the everyday routine life of a classroom.  

More particularly, teaching metacognition regarded meta-comprehension of a text (the ability to understand your understanding) (e.g. Palinscar & Brown, 1984˙ Cross & Paris, 1988˙ Juliebo, Malicky & Norman, 1998˙ Koutselini & Hadjiyanni, 1999), learning metacognitive skills to solve mathematical problems (e.g. Carr & Biddlecome, 1998˙ Davidson & Sternberg, 1998˙ Pappas et al., 2003) and, finally, using metacognitive monitoring (Loizidou & Koutselini, 2007).  

When school age children were involved in research it was indicated that their metacognitive skills were improved after these skills were modelled systematically by others. For instance, in a research work of Palinscar & Brown (1984), high school students with severe text comprehension problems were taught four strategies of understanding – summary, creating questions, clarifying and predicting- via reciprocal teaching: The child and the teacher exchanged roles and explained to each another the way they thought and the way they intended to work. Students’ improvement was significant. Yet, modelling metacognition is not always the solution. Carr & Biddlecome (1998) explain that indeed during an intervention metacognitive skills can be adapted when they are observed. But, in real classroom situations, other factors may interfere and reverse willing results, such as children’s problematic relations, motivation, stress etc.  

Some methodological principles for teaching metacognition can be mentioned. Veenman (1998 in Veenman, Van Hout-Wolters & Afflerbach (2006)) describes the «W.W.W. & H.» rule for teaching effectively metacognition: The teacher must inform the learner about what he is about to learn (What), why it is important to learn it (Why), when and how the new learning will be useful (When). This method also includes practicing the skill to transfer the new learning into new environments (How).
Similarly, the acronym IMPROVE (Introducing the new concepts, Metacognitive questioning, Practicing, Reviewing, Obtaining mastery, Verification and Enrichment and remediation) presents a methodological suggestion for teaching metacognitive skills in Mathematics (mathematical reasoning). The method was applied by Mevarech & Kramarski (1997, Kramarski & Mevarech, 2003) to high school students and in-service teachers and had positive effects on learners’ metacognition. The acronym implies that metacognition in Math can be enhanced when the teacher begins by introducing the new concepts. Then, ‘Metacognitive questioning’ follows during which the educator makes questions and helps the learner to understand the purpose of the coming learning. In this way, the learner is able to program, monitor and finally evaluate his/her learning procedure. Afterwards, practicing in problem solving takes place (individually or in groups) and, at the end, the teacher sums up the main points (reviewing) and asks clarifying questions to certify that no gaps or misconceptions exist (Obtaining mastery, Verification and Enrichment and remediation). Extra homework can be given to enrich the new learning.

Finally, it is worth mentioning that researchers came to the conclusion that practicing metacognition improves cognitive results. Metacognition and cognition appears to be so closely related that “the double curse” noted by Dunning et al. (2003) appears by rule: The students with low cognitive results are the ones with the most limited metacognitive skills. However, it is hopeful that in the interventions these students were the ones that have the greater improvement in both cognitive and metacognitive level (e.g. Loizidou & Koutselini, 2007).

**Basic research definitions:**

The research proposed has metacognition as the main concern, but more particularly, it focuses on three elements: teachers’ metacognition, students’ metacognitive monitoring and teaching methodology. The following definitions are adopted or given for the terms used in this research:

a) **Metacognition:** It includes metacognitive knowledge and metacognitive monitoring and control. Hacker’s (1998) definition is considered to sum up efficiently the core meaning of metacognition as viewed in this paper: “It is the knowledge of one’s knowledge, processes and cognitive and affective states; and the ability to consciously and deliberately monitor and regulate one’s knowledge, processes and cognitive and affective states” (p.11).

b) ‘Teachers’ personal level of metacognition’: Teachers as learners themselves develop metacognition as defined above. Nevertheless, effective educators must also posses the ‘Teachers’ Adaptive Metacognition’. The idea of a “special” teachers’ metacognition belongs to Lin,Scwhartz & Hatano (2005). The researchers emphasise that as teachers confront “highly variable situations” (p. 245), they must have the ability “to change oneself to one’s environment, in response to a wide range of classroom social and instructional variability” (p.245). In other words, teachers should be able to analyse the teaching environment, to recognise the needs of students, peers and parents and to find ways to effectively communicate and interact with people of different values, motives and reactions. A ‘routine’ metacognition applied to teaching situations has not effective results on students’ learning. Metacognitive adaptation on the other hand, creates an autonomous, effective educator who consciously develops skills and characteristics according to changeable teaching environments.

c) **Students’ metacognitive monitoring:** The research concentrates on the examination of students’ metacognitive monitoring for two reasons: First, metacognitive monitoring has a salient role in metacognitive control, as explained above. Second, due to time limitations, it is not possible to
examine all forms of metacognition in children participating. Thus, it was decided to focus on metacognitive monitoring in order to collect more detailed data and extract safer conclusions as this form of metacognition can easily be measured with Everson and Tobias’ (2001) method (see above). The model of Nelson and Naren’s (1994) is adopted, according to which metacognitive monitoring is applied with four types of metacognitive judgments:

- Ease-of-learning (EOL) judgments: These are predictions made prior to learning and refer to what is easy to learn or what strategies will make learning easier.
- Judgments of Learning (JOL): These are judgments that occur during or after acquisition of knowledge, and are predictions about future test performance on currently recallable items.
- Feeling of Knowing (FOK): These are judgments made during or after the acquisition of new learning, and refer to whether a currently non-recallable item is known and will be remembered on a subsequent test.
- Confidence: In contrast to the above, confidence relates to retrospective judgments as it concerns judgments about a response that has already been recalled.

d) Teaching methodology: With this term the teachers’ behaviour in a classroom is implied, a behaviour that is observable and noticeable. This behaviour may include actions, words, physical communication and feelings that can be noticed by an observer.

**Theoretical framework of the research:**

Following the above framework, the proposed research aims to investigate a correlation first between the teachers’ metacognitive level and the teaching methodology applied in class, and then, between this teaching methodology and the students’ metacognitive monitoring. As seen, the double arrows indicate that the expected relation will be vice-versa in the sense that it is hypothesised that the teachers with high, personal and adaptive metacognition will deliver children a “more metacognitive lesson”, but, at the same time, these teachers will reflect on the teaching environment developed during lessons and they will improve or sustain their personal way of thinking and teaching skills. Teachers’ characteristics are expected to affect both their metacognition and their teaching methods. It will be interesting to discover such an effect and
more importantly the nature of it: Are the younger teachers more metacognitively sensitive? Are the more educated more capable to deliver a more metacognitive lesson? ...

The double arrow between the teaching methodology and the students’ metacognitive monitoring, similarly implies that the methods applied during a lesson are expected to affect the way students are encouraged to monitor their learning procedure and results. Simultaneously, the students’ strengths and weaknesses in this metacognitive skill are expected to guide the teaching methods, as far as the teacher is capable to recognise this data, of course.

**General characteristics of the research:**

An attempt is made to combine advantages of qualitative and quantitative research. So, the proposed research is mainly quantitative since the main aim is to find general relations applied to the population under investigation. The sample is big and representative of the population of students in Cyprus. Tests and inventories/questionnaires will be used. In addition, observations of classrooms will be made. This qualitative method of data collection is used in order to collect more thorough information, to have a first hand experience and thus have a better understanding of the teaching methods applied in a classroom.

The research is also co-relational as it investigates possible relations, but not causal relations. Thus, experimental research is not applied in this case. Finally, it is important to clarify that this is a cohort research or a follow up study (Cohen & Manion, 1994, p.48) in the sense that during a school year there is repeated data collection from both the teachers and the students. Following Cohen and Manion (1994), this kind of research is preferable as it combines some advantages of cross sectional and longitudinal research and it restricts the respective disadvantages. More specifically, it is known that a longitudinal study is preferable in order to uncover changes in behaviour. However, it is time- and money-consuming. Also, participants may choose to leave research (‘sample mortality’, Cohen & Manion, 1994) or they may get used to the research procedure. On the other hand, in a cross sectional study changes may be spotted in a short period of time but these changes may be random as data collection occurs once. The repeated data collection in the follow up study ensures that any changes that may occur are real. The short period of time in which the research will be conducted allows a repeated research procedure, and at the same time this procedure is less tiring for both participants and researchers.

**Research population and sample:**

All the children that will be studying in the third-grade of the public primary schools of Cyprus in 2009-2010, as well as, their class teachers belong to the research population. Eight-year-old children were preferred as they are at an age they start developing their metacognitive skills. Also, these students have sufficiently developed their oral and written linguistic skills so they will also be able to give anonymous, written information in a test. Class teachers are considered to be the ones teaching Greek and Maths in a certain classroom. Those two lessons have more teaching time than the other subjects (13 of total 35 teaching periods of forty minutes each). Normally, a class teacher also teaches other subjects in a class. Consequently, this educator spends a lot of time with the same students and it is more possible to affect more drastically their way of metacognitive thinking.
Teachers that teach for the first time Maths to the students of a class will be preferred as their effect on pupils is expected to be more intense, rather than if they are teaching the same children for the second year.

Convenience sampling will be applied: Teachers that are near the school of the researcher will be preferred until a representative sample is made. According to Cohen & Manion (1994) this is an acceptable research procedure. Thirty teachers of the third grade classrooms will be chosen, with their students (approximately 500 children). Due to staff turnover in Cypriot schools the sampling will be completed in September 2010.

**Means of data collection:**

Due to the absence of instruments to collect the data needed for the purposes of the current research, it was decided to combine an existing inventory, a test and a questionnaire made by the researcher in order to measure teacher’s metacognition, to make a checklist for observing the lessons and finally, to use a Maths test in order to measure students’ metacognitive monitoring.

*Teacher's metacognition:*

More particularly, teachers’ metacognition will be measured with an instrument that will have four parts.

In the first and second part, teachers’ personal metacognition is measured. The first part is «The Metacognitive Awareness Inventory» (MAI) of Schraw & Dennison (1994) translated in Greek. This inventory is based on Brown’s (1984) theory about the three kinds of metacognitive knowledge and the five kinds of metacognitive control processes. It includes 52 self report statements like “I am good at remembering information”, “I make a summary of what I learn” etc. Participants are asked to evaluate themselves for each statement on a 100 point scale. The inner and external validity of this test was checked by the researchers in two ways: it was completed by 197 college students and it was investigated if their answers could be classified to the 8 kinds of metacognitive behaviour identified by Brown. Factor analysis of data did not make this possible, but it became obvious that the statements could be classified in two factors, metacognitive knowledge and control. Apart from this, the researchers checked if the MAI inventory had similar results with existing instruments for measuring metacognition in adults. It was found that indeed the results of their instruments were satisfactory, apart from metacognitive monitoring.

Having this in mind, for the current research, it was decided to include a second part in which the teachers’ metacognitive monitoring is checked. Everson and Tobias’ method (2001) is used for this purpose. Teachers will be given a list with 30 Greek words. First, the teachers will be asked to give marks to themselves (1-5) in order to indicate their feelings of how well they know each word. Then, in a second list, the teachers are going to choose the correct explanation for every word (four choices are given per word). Finally, next to the explanation they chose the educators are going to indicate their confidence for each answer they gave by marking themselves from 1-5 (1= do not know, 5= certain for the meaning). As the method of Everson and Tobias suggests, the differences between teacher’s judgments and real performance will indicate the level of their metacognitive monitoring (do they know their cognitive strengths?). It is important to notice that educators’ judgments made before they give their answers are their “FOK judgments” in Nelson and Narens (1994) model. Their judgments after they will choose an explanation of each word will reveal their “Confidence judgments”.

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In order to examine teachers’ ability to analyse and evaluate their teaching environment, thus examining their “Adaptive metacognition” (Lin, Schwartz & Hatano, 2005), two extra parts were included in the teachers’ instrument. In the third part, teachers will be asked to evaluate their students’ metacognition on a list of their students’ names. What each grade (from 1-4) represents for each child’s learning behaviour will be defined. This idea belongs to Sperling, Howard, Miller and Murphy (2002) who were the first to apply this method with educators. Finally, in the fourth part a checklist will be given to teachers. Educators will be asked to evaluate a lesson previously observed by the researcher. The checklist contains main points of the checklist used during the classroom observation.

As it will be explained below, the teachers are not going to complete the four parts of the instruments concurrently.

The teaching methodology:

The checklist for the classroom observations was mainly based on the theory of metacognition. During literature review, however, it was noticed that the theory for students’ motivation and classroom climate appeared to have many similarities with the effects of metacognition on learning. Thus, it was decided to include points to be checked from existing checklists for classroom observations that have to do with the way children are motivated or externally prompted to participate in their learning process so as to understand it, guide it and further develop it.

The checklist has four parts. In the first part, the observer concentrates on the way the teacher prepares students’ cognitive schemes and motivation in order to receive the new learning (knowledge or skills). A grade is given to each educator’s action, from 1 to 3 (1 is ‘not applicable’, 2 indicates ‘at a moderate range’ and 3 shows ‘applicable’). Statements like “the teacher presents the theme of the lesson”, “he makes connections with previous lessons” and “he stresses the usefulness of the new learning” are included in this part.

In the second part, the interaction between the teacher and students is investigated. This is a very important part as the new learning takes place. Also, for students’ metacognition it is essential to note if some of the teaching routines engage students effectively in the learning process, for instance, by motivating them to deal with their mistakes, to participate in lesson, to model their thinking etc. In order to notice the interaction that the teacher has with each student a version of the “Verbal Flow” method of Borich (2003) is adopted. According to this method, the observer has a sitting plan of the classroom with each desk indicated as two boxes together. The names of the students are written in the boxes. Every time the teacher addresses a question, the observer notes an arrow on the desk of the child the educator talks to. Similarly, every time a child answers, a reversed arrow is drawn on the desk. Below each arrow a number is noticed so as to count the questions and answers of the lesson. Thus, extra signs were added to the original method so as to note incidents like “the teacher prompts a child that doesn’t want to participate”, “a child gives a wrong answer and the teacher turns to another child for the correct answer” etc. Sign for modelling thinking skills was also included. The second part ends with some general statements about the behaviour of the educator during the lesson so as to get a more detailed picture of the interactions occurring. Once again, the observer uses a four-point scale to indicate the applicability of each behaviour of the teacher (statements like “the teacher helps students to set their personal goals”, “she informs students about the reasons of their mistakes”, “she helps students to connect new learning with existing knowledge” etc.)
Statements about the teacher’s behaviour at the end of the lesson are in the third part of the checklist. This part, as well as the fourth, are expected to be completed at the end or after the lesson is finished. The observer checks if a revision is made by the educator or the children, if clarifying questions are encouraged, and above all, if the teacher ensures that the learners reflect on their learning procedure.

Finally, in the fourth part, the observer looks at the teaching behaviours that relate to students’ motivation and the classroom climate. Some of the statements of this part were taken from various, existing checklists presented by Borich (2003) (e.g. “The classroom warmth instrument”, p.87) and others are based on the theory for learning motivation. Based on relevant theory, the effective teacher must concentrate on students’ effort than on their results, to allow students to make decisions about the way they are going to work and, in general, to create a learning environment where children would feel comfortable to express their worries and learning concerns. On the other hand, if the learners are prompted to concentrate merely on the learning results and not on the learning procedure, if they are afraid to make mistakes and try to succeed without learning, then ineffective and contemporary learning occurs. Some examples of the statements included in this final part are “the teacher promotes comparisons among children”, “she gives time to a child when he faces a difficulty”, “the teacher has eye contact with children”.

Students’ metacognitive monitoring

Two versions of a Maths test will be used to measure children’s metacognitive monitoring. The first version includes basic knowledge that the third-grade children have at the beginning of the year and the second version includes basic knowledge that the same children are supposed to have by June. In both versions, however, common exercises and problems are included so as to make the necessary comparisons. Everson and Tobias (2001) method will be applied so as students’ FOK and Confidence Judgements to be expressed: Each version is included in two booklets. In the first booklet, next to each exercise a table exists with five columns. At first, the child must indicate the “feeling of knowing” that the exercise creates before it is solved. This will be done by putting a tick in one of the five columns that are titled as follows: “I do not know this exercise”, “I will do more mistakes than correct actions”, “I will do some mistakes”, “I will do more correct actions than mistakes”, “I know how to solve this exercise”. Then, the children will take the second booklet and solve the same exercises. After they finish, they will turn back and again express their confidence by ticking in one of the five columns that accompany each exercise (the same titles as before but, in the past tense).

The research procedure:

The research proposed has two phases and it will be conducted in two years.

Phase I: The pilot study

This year, the pilot study is done. First, the “Metacognitive awareness inventory” (MAI) of Schraw and Dennison (1994) was translated into Greek by the researcher. A native English speaking helper translated again the Greek version into English and comparisons with the original version were made. No significant differences were noticed and this was a good indicator that the Greek version was presenting the ideas of the MAI. In order to check the validity of the translated MAI, as well as of the second part of the teachers’ test with the word explanations, it was decided to give these two parts to 200 primary school teachers that would not participate in the final sample of the
research. For this purpose, 350 tests were sent to schools which were out of the research region. 210 teachers returned the tests and simultaneously, some of them reported some comments to the persons that took the tests back. More particularly, they commented on the time they needed to fill in the test and the clarity of some instructions. These 210 tests will be analysed by September. Factor analysis will be applied to investigate if similar to the researchers’ results exist regarding the two factors of metacognitive knowledge and control.

During this academic year, the checklist intended for classroom observations was also used. The researcher observed five lessons of the same teacher to test the applicability of the checklist and the time limits. Some alterations were made as a result. Then, the researcher and the supervisor professor used the new checklist simultaneously as they observed a lesson. Later, they discussed the ways in which this instrument could be revised.

Finally, the two versions of the Maths test were given to the children of a second-grade class and a third-grade class so as to check any misunderstandings, the time limits and in general the applicability of the designed methodology. This happened at the end of the current school year so as the second grade children to represent the third grade children in September.

**Phase II: The main research**

The main research will be conducted in the following academic year (2009-2010). During September, sampling will take place. Then, in the first semester the children participating will take the first version of the Maths test, following the procedure presented above. In this way, data about the preliminary metacognitive monitoring of the students will be collected. At the same time, the teachers will fill in the first two parts of the instrument that was created to measure their “personal metacognition”. During the school year, each teacher will be observed three times, once per semester. Two observers will observe simultaneously so that a more objective data collection is ensured. In the absence of a second observer, lessons will be taped so that the data to be used later on to certify the remarks of the one observer. At the end of the school year, the second version of the Maths test will be given to children so as to spot any development in their metacognitive monitoring, compared with the one they owned in the first semester. Also, teachers will be asked to complete the last two parts of the instrument that evaluates their “adaptive metacognition”: To give grades to their students’ metacognition and to evaluate their last lesson observed.

The analysis of the data collected will be multi-level: classroom level, students’ and individual teachers’ (or groups of teachers if necessary) level. For quantitative data SPSS will be applied.

**Some final thoughts:**

The research proposed aims to narrow the relevant research gap regarding teachers’ and students’ metacognition. Some research limitations are recognised, however. First, time limitations must be noticed. The research will be conducted during one academic year. Although repeated data collection from the same participants will be applied, it is admitted that the information collected would have been more thorough if it was possible to extent the research beyond the one academic year.

Apart from this, it should be noted that, for the teachers’ metacognition, and in the absence of relevant instruments, a self–report questionnaire was selected, although some research dangers may exist: The educators may be lead by the questions or give subjective answers. The second part
of the teachers’ inventory where a word test is given aims to limit or even reveal via comparison with the first part, these dangers.

Finally, as pre-mentioned, data for students’ metacognition will be restricted to students’ metacognitive monitoring due to time and accessibility limitation. In other words, metacognitive monitoring is more easily spotted and the method used (Everson and Tobias, 2001) for its measurement is more applicable to primary school every day, class routine.

Obstacles to the research procedure are also possible. Teachers’ lessons, for instance, could be quite similar if a powerful teachers’ culture exists (Hargreaves, 1989). If this is the case, no differences may be noticed during observations to justify differences in metacognitive monitoring of children that belong to different classes. Then, it is expected that some teachers will be very sceptical or even negative to participate in this research. This will be a difficulty that will add extra time limitations.

Having this in mind, it seems reasonable to claim that the proposed research is a first attempt to examine metacognition spherically in real classroom situation. Limitations and obstacles are expected and will be analysed or dealt. The coming results may throw some light to answered questions regarding metacognition’s development and function, but they will surely be an extra reason for future research…

References:


