Earli
European Association for Research on Learning and Instruction

Ioannina Greece

3rd

Biennial Meeting

of the EARLI Special Interest Group 16

Metacognition

8-10 May 2008

Laboratory of Educational Psychology Counselling and Research Department of Primary Education University of Ioannina

http://sig16.uoi.gr

**Program
&
Book of Abstracts**

EUROPEAN ASSOCIATION FOR RESEARCH ON LEARNING AND INSTRUCTION

3RD BIENNIAL MEETING

of the EARLI Special Interest Group 16
METACOGNITION

8 - 10 May, 2008 / Ioannina, Greece

Supported by the
**Laboratory of Educational Psychology, Counselling and Research, Department of Primary Education,
University of Ioannina, Greece**
and the
Psychological Society of Northern Greece

PROGRAM - ABSTRACTS

Editors:
Anastasia Efklides and Plousia Misailidi

ELLINIKA GRAMMATA

CONTENTS

PROLOGUE

It is our great pleasure to host the **3rd Biennial Meeting** of the EARLI Special Interest Group 16 **METACOGNITION**, which is held from **8** to **10 May, 2008,** in the city of Ioannina, Greece in collaboration with the *European Association for Research on Learning and Instruction (EARLI)*. The first meeting was held in 2004 in Amsterdam and the second in 2006 in Cambridge. Both meetings were highly successful in bringing together SIG members as well as researchers from all over the world. We aspire to continue this tradition. The 3rd Biennial Meeting is supported by the *Laboratory of Educational Psychology, Counselling and Research, Department of Primary Education, University of Ioannina, Greece* and the *Psychological Society of Northern Greece (PSNG).*

The aim of this meeting is to provide a forum for the presentation and exchange of research findings and expertise, relating to the processes, the ecological validity and the applications of metacognition. The relations of metacognition with learning and thinking from early childhood to old age in various settings will be highlighted. The meeting will include symposia, individual papers, and posters.

The scope of the previous meetings has typically been very broad, and we hope to draw together once again a wide range of researchers and experts in the field of Metacognition including:

- The facets of metacognition
- Metacognitive experiences
- Metacognitive knowledge
- Metacognitive skills
- Metamemory
- The measurement of metacognition
- Development of metacognition
- The cognitive underpinnings of metacognition
- Theory of mind
- Epistemological thinking
- Self-regulation and metacognition
- Executive processes and metacognition
- Metacognition and learning
- Social processes in metacognition

We hope that Ioannina's atmosphere and lakeside location will make it a welcoming venue for all participants and that the meeting will be an enjoyable and enriching experience in scientific, personal and social respects.

The Presidents of the Organizing Committee

Anastasia Efklides and Plousia Misailidi

ORGANIZING COMMITTEE

Anastasia Efklides and Plousia Misailidi	Presidents
Fotini Bonoti	Secretary
Andreas Brouzos	Treasurer
Anastasios Emvalotis	Member
Evangelia Karagiannopoulou	Member
Vassilis Kroustallis	Member
Nikiforos Papachristos	Member
Alexandra Touroutoglou	Member
Agni Tsirka	Member

SCIENTIFIC COMMITTEE

Annemie Desoete
Anastasia Efklides
Lucia Mason
Zemira R. Mevarech
Panayiota Metallidou
Plousia Misailidi
Marcel V. J. Veenman
David Whitebread

SECRETARIAT

Alexandra-Maria Ameladioti
Kakia Andreou
Giannoula Dikaiou
Antigoni Lamprou
Efthalia Mazaraki
Kalliopi Moshou
Eleftherios Pandis
Thanos Papaioannou
Vassiliki Papandreou
Maria Paraforou
Eleni Pistioli
Rania Solomonidou
Elissavet Stratiotou
Thomas Toulis
Konstantina Trevlopoulou
Anastasia Voulgari
Christina Zissi

INVITED SPEAKERS

Josef Perner
University of Salzburg, Austria
The metacognition of identity

Beate Sodian
Ludwig-Maximilians-University, Munich, Germany
Understanding the nature of scientific knowledge from childhood to adulthood

Marcel V. J. Veenman
Leiden University, The Netherlands
Metacognitive skills: Where are we now?

INVITED SYMPOSIA

Annemie Desoete
Ghent University, Belgium
Metacognition and arithmetic

Zemira R. Mevarech
Bar-Ilan University, Ramat-Gan, Israel
Meta-cognitive Instruction: How does it work and what are its effects on schooling outcomes?

David Whitebread
University of Cambridge, United Kingdom
Individual differences in metacognition in young children

SPONSORS

Greek Ministry of National Education and Religious Affairs
The Psychological Society of Northern Greece
Publisher ELLINIKA GRAMMATA, Athens, Greece

GENERAL INFORMATION

MEETING VENUE
The Meeting will take place at the **Epirus Palace Hotel** (***** deluxe), 7th km National Road Ioannina-Athens, Egnatia Interchange, 45500 Ioannina, Greece.
For more information please visit: **http://www.epiruspalace.gr/**

REGISTRATION OFFICE - SECRETARIAT
The registration Office and the Secretariat during the meeting will be hosted at the Epirus Palace Hotel.
It will be open from Thursday, 8 May 2008 to Sunday, 11 May 2008 from 8:00 till 20:00 during the first two days and from 9:00 till 13:00 the last two day.

REGISTRATION FEES

	Early Registration (till 15/1/2008)	Late Registration (16/1-15/4/2008)	On Site (16/4-10/5/2008)
EARLI Members	€300	€350	€400
Non-Members	€330	€380	€430
Students or EARLI SIG members from Non-EU Eastern European Countries	€120	€170	€220
Social event (Excursion-Dinner)	€ 50 (pp)	€ 50 (pp)	n.a.

The registration fee includes: (a) meeting registration, (b) programme and abstract book, (c) two coffee breaks - per meeting day and (d) one light lunch meal - per meeting day.

Please note that a "Receipt of Payment" will be sent by e-mail message to each participant upon receipt of the registration fee. **This is the only receipt that will be issued.**

SOCIAL EVENTS
On Saturday evening, May 10, 2008, at 18:00-20:00 there will be a tour in the isle of Ioannina's lake.
On Saturday evening, May 10, 2008, at 21:00 the dinner party with food and wine will take place.
On Sunday, May 11th 2008, at 8:15-12:45, a visit by bus to the Zagori and Vikos Gorge will take place.

INTERNET FACILITIES
Two wired internet access points will be available at the meeting venue.

INFORMATION
For information about the Meeting please contact:
Dr. Plousia Misailidi, Department of Primary Education, University of Ioannina, University Campus, 451 10 Ioannina, Greece. E-mail: info@sig16.uoi.gr

PROGRAM OVERVIEW

Thursday, 8 May 2008	Friday, 9 May 2008	Saturday, 10 May 2008
08:00 - 20:00 **Secretariat / Registration**	08:00 - 20:00 **Secretariat / Registration**	09:00 - 13:00 **Secretariat / Registration**
09:00 - 10:30 Paper Session 1, 2	09:00 - 10:30 Symposium 3, 4	09:00 - 10:30 Paper Session, 11, 12
10:30 - 12:00 Paper Session 3, 4	10:30 - 12:00 Symposium 5, 6	10:30 - 12:00 Paper Session 13
12:00 - 12:30 Coffee	12:00 - 12:30 Coffee	12:00 - 12:30 Coffee
12:30 - 13:30 Keynote Speaker	12:30 - 13:30 Keynote Speaker	12:30 - 13:30 Keynote Speaker
13:30 - 14:00 Opening **Ceremony**	13:30 - 14:00 **SIG Meeting**	13:30 - 14:00 **Awards**
14:00 - 15:00 Lunch	14:00 - 15:00 Lunch	14:00 - 15:00 Lunch
15:00 - 16:30 Symposium 1, 2	15:00 - 16:30 Paper Session 7, 8	15:00 - 16:30 Symposium 7, 8
16:30 - 18:00 Paper Session 5, 6	16:30 - 18:00 Paper Session 9, 10	16:30 - 18:00 Symposium 9, 10
18:00 - 18:30 Coffee	18:00 - 18:30 Coffee	18:00 - 20:00 Isle Tour
18:30 - 20:30 Poster Session 1, 2	18:30 - 20:30 **Plenary Session**	21:00 Dinner
Sunday, 11 May, 2008	09:00 - 13:00 **Secretariat**	
Sunday, 11 May, 2008	8:15 – 12:45 **Visit to Vikos Gorge**	

THURSDAY 8 MAY 2008

Thursday 08:00 - 20:00	SECRETARIAT / REGISTRATION

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Thursday 09:00 - 10:30	Paper Session 1	Room: ELECTRA

SELF-REGULATION IN COMPUTER-SUPPORTED LEARNING

Chair: **Irini Dermitzaki**

1. METACOGNITION AND E-LEARNING: SELF-REGULATION AND ACHIEVEMENT GOAL IN UNIVERSITY STUDENTS

Ottavia Albanese, Stefano Cacciamani, Donatella Cesareni, Barbara De Marco, Caterina Fiorilli, & Francesca Martini

2. SELF-REGULATED LEARNING THROUGH WRITING ON COMPUTERS: CONSEQUENCES FOR READING COMPREHENSION

Anne-Mari Folkesson & Lena Swalander

3. COMPUTER SUPPORTED SELF-REGULATED LEARNING IN PRIMARY SCHOOL: AN OBSERVATIONAL STUDY

Anne-Mari Folkesson & Lena Swalander

4. COLLABORATIVE TIME MANAGEMENT REGULATION DURING COMPUTER SUPPORTED COLLABORATIVE LEARNING ACTIVITIES

Margarida Romero

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Thursday 09:00 - 10:30	Paper Session 2	Room: ALKYONI

METACOGNITIVE SKILLS AND SCHOOL PERFORMANCE

Chair: **Csaba Csíkos**

1. WHAT IS THE IMPACT OF METACOGNITIVE SKILLFULNESS ON SCHOOL PERFORMANCE?

Annemieke Jacobse & Michelle Helms-Lorenz

2. METACOGNITION AND MATHEMATICS LITERACY: COMPARING HIGHER AND LOWER ACHIEVING COUNTRIES

Zemira R. Mevarech & Nogah Amar

3. COMPREHENSION MONITORING AS SIGNIFICANT PREDICTOR OF RE-READING – BUT NOT AS PREDICTOR OF SUCCESS!

Stephanie Pieschl, Elmar Stahl, & Rainer Bromme

4. READING COMPREHENSION UNDER SEVERE TIME CONSTRAINT: RESULTS OF A READING COMPREHENSION TEST ONE YEAR AFTER A METACOGNITION-BASED DEVELOPMENT PROGRAM

János Steklács & Csaba Csíkos

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Thursday 10:30 - 12:00	Paper Session 3	Room: ELECTRA

ASSESMENT OF METACOGNITION

Chair: **Carl Martin Allwood**

1. A LARGE SCALE 3-YEAR LONGITUDINAL STUDY ON JACOBS AND PARIS' IRA QUESTIONNAIRE AMONG 3rd-5th GRADE STUDENTS
  Csaba Csíkos
2. METACOGNITIVE FEELINGS IN A SITUATION OF IMPLICIT LEARNING: HOW CAN THEY BE MEASURED AND ARE THEY SUBJECT TO INDIVIDUAL DIFFERENCES?
  Elisabeth Norman & Mark C. Price
3. BLANK IN THE MIND: A METACOGNITIVE EXPERIENCE IN PROSPECTIVE MEMORY
  Anastasia Efklides & Alexandra Touroutoglou
4. DEVELOPMENTAL CHANGES IN CHILDREN'S EVALUATIONS OF EVERYDAY REASONING PROCESSES AND THEIR SUBSEQUENT FEELINGS OF CONFIDENCE
  Panayiota Metallidou, Eleni Diamantidou, Eleni Konstantinopoulou, & Kalliopi Megari

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Thursday 10:30 - 12:00	Paper Session 4	Room: ALKYONI

THEORY OF MIND

Chair: **Plousia Misailidi**

1. THE IMPORTANCE OF PARENTS' COGNITIVE TALK FOR METAMEMORY DEVELOPMENT IN PRESCHOOL CHILDREN
  Susanne Ebert & Sabine Weinert
2. THEORY OF MIND AND METACOGNITIVE KNOWING: HAVE WE BEEN INVESTIGATING SIMILAR CONSTRUCTS WITHOUT REALISING IT?
  Demetra Demetriou & David Whitebread
3. THE PRIORITY OF THE MENTAL IN CHILDREN'S EXPLANATION OF BEHAVIOR
  Vassilis Kroustallis
4. THEORY OF MIND AND AGING: WHICH RELATIONSHIP?
  Sara Bottiroli, Elena Cavallini, Serena Lecce, & Paola Palladino

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Thursday 12:00 - 12:30	**Coffee Break**	

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Thursday 12:30 - 13:30	**KEYNOTE ADDRESS**	Room: ELECTRA

METACOGNITIVE SKILLS: WHERE ARE WE NOW?
Marcel V. J. Veenman

Leiden University, The Netherlands

Chair: **Zemira R. Mevarech**

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Thursday 13:30 - 14:00	**OPENING CEREMONY**	Room: ELECTRA

Chair: **Anastasia Efklides**

1. Zemira R. Mevarech	Co-Coordinator of the EARLI SIG 16: METACOGNITION
2. Stephanie Pieschl	Co-Coordinator of the EARLI SIG 16: METACOGNITION
3. Anastasia Efklides	Co-President of the 3rd Biennial Meeting: METACOGNITION
4. Plousia Misailidi	Co-President of the 3rd Biennial Meeting: METACOGNITION

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Thursday 14:00 - 15:00	**Lunch Break**	

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Thursday 15:00 - 16:30	Symposium 1 (invited)	Room: ELECTRA

METACOGNITIVE INSTRUCTION: HOW DOES IT WORK AND WHAT ARE ITS EFFECTS ON SCHOOLING OUTCOMES?

Organizer/Chair: **Zemira R. Mevarech**
Discussant: **Anastasia Efklides**

1. THE PATENT: USING META-COGNITION INSTRUCTIONAL METHOD IN THE TECHNOLOGICAL CLASSROOM
     Cilla Choresh & Moti Frank
2. HOW CAN WE PROMOTE TRANSFER IN LEARNING BY DIFFERENT TYPES OF METACOGNITIVE TRAINING?
     Itzhak Weiss, Bracha Kramarsky, & Sarit Sharon
3. PROVIDING METACOGNITIVE INSTRUCTION IN DIFFERENT LEARNING PHASES
     Zemira R. Mevarech, Tova Michalsky, & Liora Haibi
4. THE EFFECTS OF METACOGNITIVE GUIDANCE ON STUDENTS' ACHIEVEMENT IN A FULLY ONLINE COURSE
     Sigal Eden & Gila Kurtz

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Thursday 15:00 - 16:30	Symposium 2	Room: ALKYONI

EPISTEMOLOGICAL BELIEFS AND METACOGNITIONS – RECENT ADVANCES AND NEW DIRECTIONS

Organizer/Chair: **Stephanie Pieschl**
Discussant: **Beate Sodian**

1. THE RELATION OF EPISTEMOLOGICAL BELIEFS AND METACOGNITION AND THEIR ROLE IN HYPERMEDIA LEARNING.
     Maria Opfermann & Peter Gerjets
2. THE IMPACT OF AN EPISTEMOLOGICAL SENSITIZATION ON COGNITIVE AND METACOGNITIVE PROCESSES DURING HYPERMEDIA LEARNING
     Stephanie Pieschl, Rainer Bromme, & Elmar Stahl
3. SPONTANEOUS ACTIVATION OF EPISTEMIC METACOGNITION DURING WEB SEARCHING AND INDIVIDUAL DIFFERENCES
     Lucia Mason, Nicola Ariasi, & Angela Boldrin
4. HOW DO ELEMENTARY SCHOOL CHILDREN UNDERSTAND QUESTIONNAIRE ITEMS?
     Barbara Moschner, Andrea Anschütz, & Stephan Wernke

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Thursday 16:30 - 18:00	Paper Session 5	Room: ELECTRA

METACOGNITIVE EXPERIENCES

Chair: **Panayiota Metallidou**

1. FEELING OF DIFFICULTY AND SURPRISE AS MANIFESTATIONS OF COGNITIVE INTERRUPTION
Alexandra Touroutoglou & Anastasia Efklides

2. INVESTIGATING THE TAXONOMIC CONSTRAINT FOR THE UNDERSTANDING OF WORD MEANINGS: THE ROLE OF METHODOLOGY AND CROSS-LINGUISTIC DATA
Assimina M. Ralli & Julie Docrell

3. AFFECTS IN MONITORING AND REGULATING COMPREHENSION WHILE READING SHORT TEXTS
Marja Vauras, Riitta Kinnunen, Pekka Salonen, & Erno Lehtinen

4. THE IMPACT OF REFLECTION ON METACOGNITIVE KNOWLEDGE AND EXPERIENCES IN THE DOMAIN OF PHYSICS
Ioannis Soulios, Eleftheria N. Gonida, & Dimitris Psillos

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Thursday 16:30 - 18:00	Paper Session 6	Room: ALKYONI

SELF-REGULATED LEARNING

Chair: **Mary Ainley**

1. THE IMPACT OF MODELING ON PUPILS' SELF-REPRESENTATION ABOUT THE SELF-REGULATORY BEHAVIOR AT MATHEMATICS
Areti Panaoura, Andreas Demetriou, & Athanasios Gagatsis

2. THE ASSOCIATION OF KINDERGARTEN STUDENTS' FEELINGS ABOUT THEIR TEACHERS WITH THEIR LEARNING MOTIVATION AND COMPETENCE BELIEFS IN MATHEMATICS AND LITERACY
Georgia Stephanou & Efthalia Konstantinidou

3. THE LEARNER IN THE EXAMINATION SITUATION: QUALITATIVE DIFFERENCES
Evangelia Karagiannopoulou

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Thursday 18:00 - 18:30	**Coffee Break**	

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Thursday 18:30 - 20:30	Poster Session 1	Room: ELECTRA

METACOGNITIVE SKILLS AND SELF-REGULATED LEARNING

Chair: **Roger Azevedo**

1. BENEFITS AND LIMITATIONS OF A STANDARDIZED LEARNING DIARY - ANALYZING METACOGNITIVE SKILLS IN AN ELEMENTARY CLASSROOM
Tanja Kraemer

2. THE RELATION BETWEEN METACOGNITIVE SKILLS AND THE NETWORK OF WORD MEANINGS IN CHILDREN
Dimitra Georgogianni, Eirini Kordera, & Marcel V. J. Veenman
3. ACTION ORIENTATION AND SELF-REGULATION IN SCHOOL
Mathieu Roy, Carole Vezeau, & Thérèse Bouffard
4. THE EFFECT OF METACOGNITIVE INTERVENTION ON SELF-QUESTIONING, STORY COMPREHENSION, AND SELF-DIRECTED LEARNING OF KINDERGARTEN CHILDREN
Rivka Glaubman, Hananyah Glaubman, & Leah Ofir
5. PROFILING POOR AND AVERAGE ACHIEVERS: THE ROLE OF COGNITIVE METACOGNITIVE AND MOTIVATIONAL FACTORS
Varvara A. Iosifidou & Eleftheria N. Gonida
6. ACADEMIC PERFORMANCE PROFILE AND THE UTILIZATION OF STUDY STRATEGIES: AN EXPLORATORY SURVEY OF A GROUP OF SENIOR HIGH SCHOOL STUDENTS
Simona De Stasio, Carlo Di Chiacchio, & Maria D'Alessio
7. A DEPICTION OF THE TAXONOMY OF METACOGNITION
Pina Tarricone

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Thursday 18:30 - 20:30	Poster Session 2	Room: Room: ALKYONI

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METACOGNITION AND THEORY OF MIND

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Chair: **Alessandro Antonietti**

8. METACOGNITION AND DECISION MAKING: A STUDY ABOUT PEOPLE'S CONCEPTIONS
Paola Iannnello, Barbara Colombo, & Alessandro Antonietti
9. YOUNG CHILDREN'S THEORY OF MIND AND RELATED FACTORS
Eleonora P. Louca & Niki Thoma
10. MIND WHAT TEACHERS SAY: PRESCHOOL TEACHERS' MENTAL STATE REFERENCES DURING A PICTURE-STORY NARRATION TASK
Plousia Misailidi & Despina Papoudi
11. THE RELATIONSHIP BETWEEN CHILDREN'S SECOND-ORDER BELIEF UNDERSTANDING AND THEIR ABILITY TO ATTRIBUTE 'INTERNAL' AND 'EXTERNAL' SHAME
Vassiliki Katsarou & Plousia Misailidi
12. CHILDREN'S MEMORY MONITORING DURING DUAL TASKING
Thomas Roderer & Claudia Maria Roebers
13. THE EFFECTS OF MUSIC TRAINING AND MUSIC BACKGROUND ON READING COMPREHENSION, METACOGNITIVE EXPERIENCES, AND AFFECT
Antonis Theofilidis & Anastasia Efklides
14. CAPT (COGNITIVE ASSESSMENT PSYCHOLOGICAL TESTS): THEORETICAL FOUNDATIONS AND ORGANIZATION
Helena Bilimória & Leandro S. Almeida
15. SOLVING PROBLEMS IN GEOMETRY
Amaryllis-Chryssi Malegiannaki & Anastasia Efklides

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FRIDAY 9 MAY 2008

Friday 08:00 - 20:00	SECRETARIAT / REGISTRATION

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Friday 09:00 - 10:30	Symposium 3	Room: ELECTRA

THE EFFECTIVENESS OF COMPUTER-BASED LEARNING ENVIRONMENTS AS METACOGNITIVE TOOLS

Organizer/Chair: **Roger Azevedo & Bracha Kramarski**
Discussant: **Marcel V. J. Veenman & Arthur Graesser**

1. METACOGNITIVE PROCESSES DURING SELF-REGULATED LEARNING WITH HYPERMEDIA: A DEVELOPMENTAL COMPARISON
Roger Azevedo, Daniel C. Moos, & Jeffrey A. Greene
2. EFFECTS OF ONLINE METACOGNITIVE ENGAGEMENT ON PRE-SERVICE TEACHERS' SELF-REGULATED LEARNING IN PEDAGOGICAL CONTEXT
Bracha Kramarski & Tova Michalsky
3. DESIGN AND EFFECTS OF METACOGNITIVE PROMPTING WHEN LEARNING WITH HYPERMEDIA
Maria Bannert & Christoph Mengelkamp
4. EFFECTS OF METACOGNITIVE PROMPTS ON LEARNING STRATEGIES AND LEARNING OUTCOMES IN INTERACTIVE COMPUTER-BASED LEARNING ENVIRONMENTS
Jill Gößling, Hubertina Thillmann, Jessica Marschner, Joachim Wirth, & Detlev Leutner
5. METACOGNITIVE KNOWLEDGE, ACHIEVEMENT GOALS AND HELP-SEEKING IN A WEB-BASED STATISTICS LEARNING
Noury Fabrice, Nathalie Huet, Christian Escribe, & Susanne Narciss

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Friday 09:00 - 10:30	Symposium 4 (invited)	Room: ALKYONI

METACOGNITION OF IGNORANCE

Organizer/Chair: **Josef Perner**
Discussant: **Johannes Brandl**

1. METACOGNITION IN NON-HUMANS: METHODOLOGICAL AND THEORETICAL ISSUES
Michael J. Beran, J. David Smith, & Joelle Proust
2. AWARENESS OF OWN IGNORANCE IN CHILDREN
Daniela Kloo, Josef Perner, Thomas Giritzer, & Michael Rohwer
3. GAMBLING, SELF-CONFIDENCE, TWO WAYS OF SELF-KNOWLEDGE, AND AGENCY
Zoltan Dienes & Tillmann Vierkant

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Friday 10:30 - 12:00	Symposium 5	Room: ELECTRA

METACOGNITION VIA THE CALIBRATION PARADIGM

Organizer/Chair: **Sabina Kleitman**
Discussant: **Pauline Howie**

1. BIAS SCORE REVISITED: AN INSTANCE OF SYSTEMATIC IRRATIONALITY ON A METACOGNIVE LEVEL?
Sabina Kleitman & Lazar Stankov
2. ACADEMIC ACHIEVEMENTS AND SELF-CONFIDENCE IN SCHOOL-AGED CHILDREN AND THEIR LINKS TO PARENTAL RARING STYLES
Tanya Moscrop & Sabina Kleitman
3. CHILDREN'S AND ADULTS' REALISM IN THEIR EVENT-RECALL CONFIDENCE IN RESPONSES TO FREE RECALL AND FOCUSED QUESTIONS AS MEASURED BY CALIBRATION METHODOLOGY
Carl Martin Allwood, Ese Innes-Ker, Jessica Holmgren, & Gunilla Fredin
4. YOUNG CHILDREN'S REALISM: MISLED BY LEADING QUESTIONS?
Kristina Fritz & Pauline Howie
5. CONFIDENCE TRICKS: THE IMPACT OF FEEDBACK AND ITS INVALIDATION ON THE CONFIDENCE OF CHILDREN AND ADULTS IN THEIR EVENT RECALL
Pauline Howie & Petria Rowe

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Friday 10:30 - 12:00	Symposium 6 (invited)	Room: ALKYONI

METACOGNITION AND ARITHMETIC

Organizer/Chair: **Annemie Desoete**
Discussant: **Roger Azevedo**

1. SUPPORTING MATHEMATICAL LEARNING OF HIGHER AND LOWER YOUNG ACHIEVERS WITH SELF-METACOGNITIVE QUESTIONING: COGNITIVE AND AFFECTIVE FACTORS
Bracha Kramarski, Izik Weisse, & Inbal Kolsher
2. SOCIALLY SHARED METACOGNITION IN ARITHMETIC PROBLEM SOLVING
Tarja-Riitta Hurme, Kaarina Merenluoto, Pekka Salonen, & Sanna Järvelä
3. THE ROLE OF SELF-PERCEIVED METACOGNITIVE KNOWLEDGE, SKILLS, AND ATTITUDES, IN LEARNING MATHEMATICS
Dirk Tempelaar
4. THE ROLE OF METACOGNITIVE STRATEGIES AND METACOGNITIVE SUPPORT IN LEARNING COMBINATORICS WITH HYPERMEDIA
Maria Opfermann, Peter Gerjets, & Katharina Scheiter
5. WHEN DOES A STATISTICAL TASK EVOKE METACOGNITIVE EXPERIENCES AND EMOTIONS?
Anneke Vrugt, Wouter Hijlkema, & Rustin Polat

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Friday 12:00 - 12:30	**Coffee Break**	

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Friday 12:30 - 13:30	**KEYNOTE ADDRESS**	Room: ELECTRA

UNDERSTANDING THE NATURE OF SCIENTIFIC KNOWLEDGE FROM CHILDHOOD TO ADULTHOOD
Beate Sodian

Ludwig-Maximilians-University, Munich, Germany

Chair: **Lucia Mason**

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Friday 13:30 - 14:00	**SIG MEETING**	Room: ELECTRA

Chair: **Zemira R. Mevarech and Stephanie Pieschl**

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Friday 14:00 - 15:00	**Lunch Break**	

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Friday 15:00 - 16:30	Paper Session 7	Room: ELECTRA

TEACHERS' AND STUDENTS' METACOGNITIVE KNOWLEDGE

Chair: **Tiina Annevirta**

1. DEVELOPMENT OF CHILDREN'S METACOGNITIVE KNOWLEDGE AS A FUNCTION OF TEACHERSHIP IN THE PRIMARY GRADES
>	*Tiina Annevirta & Marja Vauras*

2. UNIVERSITY TEACHERS' UNDERSTANDING OF THEIR OWN LEARNING
>	*Kathryn M. Bartimote-Aufflick & Angela Brew*

3. TEACHERS' USE OF METACOGNITIVE AND SELF-REGULATORY STRATEGIES IN MATHEMATICS INSTRUCTION: RELATIONS TO INDIVIDUAL MOTIVATIONAL AND AFFECTIVE FACTORS
>	*Mariza Chatzistamatiou & Irini Dermitzaki*

4. STUDENTS' SELF-REGULATION THROUGH META-DISCURSIVE REFLECTION IN MATHEMATICS
>	*Petros Chaviaris & Sonia Kafoussi*

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Friday 15:00 - 16:30	Paper Session 8	Room: ALKYONI

SUPPORTING STUDENTS' METACOGNITIVE SKILLS

Chair: **Arthur Graesser**

1. FADING-IN SOLUTION STEPS WHILE PROMPTING STRATEGIC LEARNING BEHAVIOR
>	*Florian Schmidt-Weigand, Simone Blum, & Martin Hänze*

2. ACCOMPANIMENT THROUGH A METACOGNITIVE SELF-QUESTIONING STRATEGY TO ENHANCE REFLECTIVE ANALYSIS AMONG INTERN STUDENTS IN PRIMARY TEACHER TRAINING PROGRAM
>	*Sylvie Viola & Robert David*

3. 'WALK TO A BETTER WORLD': DEVELOPING YOUNG CHILDREN'S METACOGNITIVE SKILLS THROUGH CREATIVE ACTIVITY
>	*Dorothy Faulkner & Mathilda Joubert*

4. IMPACT OF A METACOGNITIVE PROGRAM TO HELP MOTHERS TO ENHANCE THEIR YOUNG CHILDREN'S CRITICAL THINKING

Julia Suleeman Chandra

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| **Friday 16:30 - 18:00** | Paper Session 9 | Room: ELECTRA |

METACOGNITIVE KNOWLEDGE AND AGE

Chair: **David Whitebread**

1. THE DEVELOPMENT AND THE ROLE OF PHONOLOGICAL AWARENESS IN READING AND SPELLING GREEK
　　Nataly Loizidou Ieridou
2. READERS DIFFERING IN READING COMPREHENSION LEVEL: METACOGNITIVE KNOWLEDGE, SUMMARIZATION SKILL AND ACADEMIC ACHIEVEMENT
　　Svjetlana Kolic-Vehovec, Barbara Roncevic, & Igor Bajsanski
3. METACOMPREHENSION AND MOTIVATION OF 5ᵗʰ AND 6ᵗʰ GRADERS WITH AND WITHOUT READING DISABILITIES IN GREECE: DATA IN SUPPORT OF BORKOWSKI'S MODEL
　　George Botsas & Susana Padeliadu
4. THE IMPACT OF THE TEACHING-LEARNING ENVIRONMENT ON APPROACHES TO STUDYING IN GREEK UNIVERSITY STUDENTS
　　Evangelia Karagiannopoulou & Pavlos Christodoulides

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| **Friday 16:30 - 18:00** | Paper Session 10 | Room: ALKYONI |

METACOGNITIVE EXPERIENCES AND AGE

Chair: **Anastasia Efklides**

1. PRESCHOOLERS INTROSPECT ON SUBJECTIVE CERTAINTY: METACOGNITIVE DEVELOPMENT IN EARLY CHILDHOOD
　　Kristen Lyons & Simona Ghetti
2. METAMEMORY ASSESSMENT, SELF-ESTEEM AND ACADEMIC PERFORMANCE IN HIGH-SCHOOL STUDENTS
　　Vasiliki Lymperopoulou & Fotini Polychroni
3. META-MEMORY AND MEMORY PERFORMANCE OF ELDERLY PEOPLE
　　Mats Dahl, Carl Martin Allwood, & Bo Hagberg
4. CHILDREN'S STRATEGIC REGULATION SKILLS IN THE CONTEXT OF AN ACHIEVEMENT TEST: THE ROLE OF METACOGNITIVE MONITORING PROCESSES AND WORKING MEMORY CAPACITY
　　Claudia M. Roebers

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| **Friday 18:00 - 18:30** | **Coffee Break** | |

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| **Friday 18:30 - 20:30** | **PLENARY SESSION** | Room: ELECTRA |

PROSPECTS IN METACOGNITION RESEARCH

Chair: **Josef Perner**

**OPPORTUNITIES AT THE EUROPEAN SCIENCE FOUNDATION FOR METACOGNITION
RESEARCH**
Eva Hoogland
European Science Foundation-ESF Representative, Strasbourg, France

Discussants: **Zemira R. Mevarech** (EARLI SIG 16 Co-coordinator)
                 Anastasia Efklides (Co-president of the Meeting)
                 Joelle Proust
                 Beate Sodian

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SATURDAY 10 MAY 2008	

Saturday 09:00 - 13:00	**SECRETARIAT / REGISTRATION**

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Saturday 09:00 - 10:30	Paper Session 11	Room: ELECTRA

METACOGNITIVE SKILLS AND EXECUTIVE FUNCTIONS

Chair: **Marcel V. J. Veenman**

1. INVESTIGATING THE RELATIONSHIP BETWEEN METACOGNITIVE SKILLS AND EXECUTIVE FUNCTIONS
Donna Bryce & David Whitebread
2. KNOWING WHAT IS IMPORTANT: AN INVESTIGATION OF METACOGNITIVE PROCESSING IN STUDENTS' PLANNING AND NOTE-TAKING SKILLS
Mary Ainley & Chris Perry
3. PREDICTION OF READING COMPREHENSION LEVELS BASED ON DIFFERENT COGNITIVE AND METACOGNITIVE STRATEGIES
Faye Antoniou & Georgios Botsas
4. WHEN DO OLDER ADULTS SPONTANEOUSLY SELF-TEST WHILE PREPARING FOR A MEMORY TEST?
Sara Bottiroli, John Dunlonsky, & Kate Guerini

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Saturday 09:00 - 10:30	Paper Session 12	Room: ALKYONI

SOCIAL METACOGNITION

Chair: **Marja Vauras**

1. AN ACTIVITY THEORY PERSPECTIVE ON METACOGNITION: DEVELOPING METACOGNITION IN A YEAR 11 CHEMISTRY CLASSROOM
Gregory P. Thomas
2. METACOGNITIVE KNOWLEDGE ABOUT CREATIVITY
Barbara Colombo, Alessandro Antonietti, & Alice Colombo
3. THE ROLE OF SOCIAL METACOGNITION IN FACILITATING COGNITIVE FLEXIBILITY
Pina Tarricone & Alison F. Garton
4. "BIG FIVE" PERSONALITY TRAITS AND ACADEMIC ACHIEVEMENTS: STRATEGIC ACTIVITY AS A MEDIATOR
Ewa Czerniawska

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Saturday 10:30 - 12:00	Paper Session 13	Room: ELECTRA

METACOGNITION, MOTIVATION, AND EMOTIONS

Chair: **Thérèse Bouffard**

1. THE ROLE OF GOAL ORIENTATIONS, GOAL INSTRUCTIONS AND FEEDBACK ON STUDENTS' PROCESS-RELATED AND OUTCOME-RELATED METACOGNITIVE EXPERIENCES
> *Fotini Dina & Anastasia Efklides*

2. STATE AFFECT AS PREDICTOR OF LEARNING STRATEGY USE AND ACADEMIC ACHIEVEMENT
> *Georgia Papantoniou, Despina Moraitou, Magda Dinou, & Effie Katsadima*

3. EFFECTS OF INTUITIVE AND ATTRIBUTIONAL APPRAISALS OF TEACHING ON KINDERGARTEN TEACHERS' EMOTIONAL EXPERIENCE IN CLASSES
> *Georgia Stephanou & Maria Mastora*

4. SELF-REGULATED LEARNING, METACOGNITION AND LEARNING-RELATED EMOTIONS
> *Anneke Vrugt & Frans J. Oort*

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Saturday 12:00 - 12:30	Coffee Break	

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Saturday 12:30 - 13:30	KEYNOTE ADDRESS	Room: ELECTRA

THE METACOGNITION OF IDENTITY
Josef Perner
University of Salzburg, Austria

Chair: **Plousia Misailidi**

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Saturday 13:30 - 14:00	AWARDS	Room: ELECTRA

Chair: **Marcel V. J. Veenman and Zemira R. Mevarech**

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Saturday 14:00 - 15:00	Lunch Break	

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Saturday 15:00 - 16:30	Symposium 7 (invited)	Room: ELECTRA

INDIVIDUAL DIFFERENCES IN METACOGNITION IN YOUNG CHILDREN

Organizer/Chair: **David Whitebread**
Discussant: **Anastasia Efklides**

1. THE MEASUREMENT OF METACOGNITION AND SELF-REGULATION IN YOUNG CHILDREN
> *David Whitebread*

2. SELF-EXPLANATION IN CHILDREN WITH LEARNING DIFFICULTIES: DIFFERENCES IN AGE, ABILITY AND ACADEMIC ACHIEVEMENT
> *Qais Almeqdad*

3. IN THE CROSSROAD OF SELF REGULATED LEARNING (SRL) AND CONCEPTUAL UNDERSTANDING: TO WHAT EXTENT DOES IT EXPLAIN INDIVIDUAL DIFFERENCES IN LEARNING AND DEVELOPMENT?
> *Valeska Grau*

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Saturday 15:00 - 16:30	Symposium 8	Room: ALKYONI

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METACOGNITION AND SELF-REGULATION

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Organizer/Chair: **Meike Landmann & Michaela Schmidt**
Discussant: **Roger Azevedo**

1. DEVELOPMENT IN THE RELATION BETWEEN METACOGNITIVE SKILLFULNESS AND INTELLECTUAL ABILITY IN YOUNG STUDENTS PERFORMING TASKS IN DIFFERENT DOMAINS
    Manita van der Stel & Marcel V. J. Veenman
2. THE QUALITY OF STUDENT TEACHERS' SELF-REGULATED LEARNING IN A DUAL LEARNING ENVIRONMENT
    Maaike Endedijk, Mieke Brekelmans, Jan Vermunt, & Nico Verloop
3. SCAFFOLDING SELF-REGULATED LEARNING OF MATHEMATICAL PROBLEM SOLVING AND MODELLING
    Bastian Benz & Bernhard Schmitz
4. TRAINING PROGRAM FOR YOUNG SCIENTISTS TO IMPROVE SELF-REGULATION COMPETENCIES
    Michaela Schmidt & Bernhard Schmitz

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Saturday 16:30 - 18:00	Symposium 9	Room: ELECTRA

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SELF-EVALUATION AND METACOGNITIVE JUDGMENTS: CO-EXAMINING COGNITIVE AND MOTIVATIONAL FACTORS

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Organizers: **Thérèse Bouffard & Eleftheria N. Gonida**
Chair: **Eleftheria N. Gonida**
Discussant: **Susanne Narciss**

1. ACCURACY OF MONITORING: STABILITY IN THE LEARNING PROCESS AND PREDICTIVE VALIDITY ON LEARNING OUTCOME
    Christoph Mengelkamp & Maria Bannert
2. CONFIDENCE JUDGMENTS ABOUT THE SOLUTION TO A TASK: THE ROLE OF TASK-RELATED FACTORS AND ACCURACY IN REGARD TO PERFORMANCE
    Eleftheria N. Gonida
3. THE DEVELOPMENT OF A RELATION BETWEEN SELF-EFFICACY JUDGEMENTS AND PERFORMANCE: THE ROLE OF AGE, STRATEGIC KNOWLEDGE AND EXTERNAL FEEDBACK
    Thérèse Bouffard, Carole Vezeau, & Anne Levasseur
4. INFLUENCE OF SELF-EFFICACY AND PERCEPTION OF COMPETENCE BELIEFS ON LEARNERS' CONFIDENCE JUDGMENTS DURING PROBLEM SOLVING IN A WEB-BASED LEARNING ENVIRONMENT
    Noury Fabrice, Nathalie Huet, Caroline Dupeyrat, & Christian Escribe

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Saturday 16:30 - 18:00	Symposium 10	Room: ALKYONI

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METACOGNITION IN SOCIAL INTERACTION

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Organizer/Chair: **Tuike Iiskala & Inge Molenaar**
Discussant: **Marcel V. J. Veenman**

1. METACOGNITION AND COLLABORATIVE GROUP WORK IN YOUNG CHILDREN: VERBAL AND NON-VERBAL INDICATORS
David Whitebread & Valeska Grau
2. MEASURING THE USE OF METACOGNITIVE SKILLS WHILE LEARNING TO SOLVE PROBLEMS IN A SIMULATION GAME
Noor Christoph, Jacobijn Sandberg, & Bob Wielinga
3. SCAFFOLDING METACOGNITION IN COLLABORATIVE LEARNING WITH A VIRTUAL AGENT
Inge Molenaar, Carla van Boxtel, & Peter Sleegers
4. SOCIALLY-SHARED METACOGNITION DURING A STUDENT PAIR'S COLLABORATIVE MATHEMATICAL WORD PROBLEM SOLVING
Tuike Iiskala, Marja Vauras, Erno Lehtinen, & Pekka Salonen

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Saturday 18:00 - 20:00	Isle Tour

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Saturday 21:00	Dinner

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SUNDAY 11 MAY 2008

Sunday 09:00 - 13:00	SECRETARIAT

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Sunday 8:15 – 12:45	Visit to Vicos Gorge

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ABSTRACTS

Thursday 09:00 - 10:30	Paper Session 1	Room: ELECTRA

METACOGNITION AND E-LEARNING:
SELF-REGULATION AND ACHIEVEMENT GOAL IN UNIVERSITY STUDENTS
Ottavia Albanese, Stefano Cacciamani, Donatella Cesareni, Barbara De Marco, Caterina Fiorilli, &
Francesca Martini
Univeristà Milano Bicocca, Italia

This study explores metacognitive knowledge, learning strategies and reflective factors involved in a web-forum discussion in blended learning (combined presence and distance learning). We conducted a study on 153 students attending three different Universities in Italy. In each University students participated in a blended course. Students of the three courses were divided in two groups: only one group participated in a metacognitive reflection activity guided by the teacher. We asked all the students to fill in two different questionnaires at the beginning and at the end of their course: QA (Self-regulation Questionnaire; Moè & De Beni, 2000) QOA (Achievement Goals Questionnaire; Elliot & McGregor, 2001). First results indicate that e-learning activity and metacognitive reflection activity do not affect metacognitive skills as measured by questionnaires. There is a relationship between social interaction level in web-forum discussions and self regulation abilities.

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Thursday 09:00 - 10:30	Paper Session 1	Room: ELECTRA

SELF-REGULATED LEARNING THROUGH WRITING ON COMPUTERS:
CONSEQUENCES FOR READING COMPREHENSION
Anne-Mari Folkesson & Lena Swalander
Kalmar Universitity, Sweden

The overall aim for the present study was to analyze the consequences for reading ability among the children of a computer supported self-regulated learning environment in grade two. By means of a quasi-experimental design in a natural setting, an experimental group (n = 39) was compared to a control group from a national sample (n = 3,475) on reading comprehension. The statistical analyses showed that the experimental group achieved better on reading comprehension both as a group (p < .001) as well as girls (p < .001) and boys (p < .05) separately. The proportion of high achievers was higher, and the proportion of low achievers was lower in the experimental group. In order to explain the level of reading comprehension in the experimental group Structural Equation Modelling was used. The main explanatory factor for reading comprehension was writing with β = .44. As a tentative conclusion it was suggested that the extended writing in combination with the self-regulated learning environment, which enhances the children's metacognition, can promote reading comprehension in grade two, whereas home literacy had no impact on reading comprehension in this context.

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Thursday 09:00 - 10:30	Paper Session 1	Room: ELECTRA

COMPUTER SUPPORTED SELF-REGULATED LEARNING IN PRIMARY SCHOOL:
AN OBSERVATIONAL STUDY
Anne-Mari Folkesson & Lena Swalander
Kalmar University, Sweden

The objective of the present study was to describe and analyze the learning environment in a computer project and in what ways the computer use was related to self-regulated learning (SRL)? The focus was on three main aspects of SRL, namely metacognition, motivation and behaviour. The data was collected within a three year ethnographic study of a computer project in a primary school. A content analysis of the data revealed 10 sub-categories; the sub-categories for metacognition were awareness of the learning process, awareness of the working process, and

awareness of the relation between different learning aspects. For motivation the sub-categories were fun factor, stimuli for new tasks, work eagerness, and the computer per se. Finally, for behaviour the sub-categories were helpfulness, involvement, and responsibility. The sub-categories were discussed in relation to computer use and theories of SRL and motivation.

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Thursday 09:00 - 10:30	Paper Session 1	Room: ELECTRA

COLLABORATIVE TIME MANAGEMENT REGULATION DURING COMPUTER SUPPORTED COLLABORATIVE LEARNING ACTIVITIES

Margarida Romero

Université de Toulouse Le Mirail, France & Universitat Autonoma de Barcelona, Spain

Computer Supporter Collaborative Learning (CSCL) systems allows to work and learn collaboratively within different times and spaces. However, this capacity needs more self regulation, group regulation and group awareness competencies in order to achieve academic and work goals (Houssman, 1991). When co-workers or co-learners are not co-located (in the same place, at the same time), project deadlines slip, miscommunication is more common and optional projects never get carried out (Kraut & Egido, 1988). In this context, students express collaborative work as a major difficulty achieving distance learning programs, and more specifically time management within their project partners (Romero, 2006). Time management problems are addressed by the students as a problem caused by other student's time allocation; but not directly linked to self study time allocation and time availability. In this distance computer supported context some students regulate adequately, and others have several difficulties to regulate their study time and collaborative work involvement. We can considerate several variables making possible to explain these individual differences: experience in time management, past studies, or even experience in computer mediated studies. In this work, we propose a task-embedded assessment methodology, based on Time Management Strategic Episodes (TMSE). By means of this methodology we have studied the way students plan and regulate a synchronous activity (Chat), aiming to identify self-regulation strategies throughout an authentic collaborative task. After the task, students made an independent assessment knowledge test, aiming to verify the relation between self and group regulation and students' learning outcomes.

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Thursday 09:00 - 10:30	Paper Session 2	Room: ALKYONI

WHAT IS THE IMPACT OF METACOGNITIVE SKILLFULNESS ON SCHOOL PERFORMANCE?

Annemieke Jacobse & Michelle Helms-Lorenz

University of Groningen, The Netherlands

Contemporary education shows the tendency of insisting on more and more metacognitive skills of students to facilitate their own learning. Students come to depend highly on their own cognitive and metacognitive skills in learning processes. This study seeks to provide deeper insight in the relationship between metacognitive skills and schoolperformance. In the first study the theoretical relationship between metacognitive skillfulness and schoolperformance was assessed in order to estimate the magnitude of the effect of metacognitive influence on schoolperformance when controlling for intelligence. This was performed using a sample of 105 elementary school children in the Netherlands (average age ≈ 12 years). Results indicate that metacognitive skillfulness has a positive effect on performance for both native as well as migrant children. The aim of the second study was to determine whether such benefits can be stimulated by a short training of metacognitive skills in the domain of mathematics. A quasi-experimental design was used on a sample of native and migrant pupils of grade 6 (average age ≈ 9 years). A total of 67 children of schools from different parts of the Netherlands participated. The training consists of 10 lessons containing instruction on metacognitive skills which are seen as characteristic for metacognitive skillfulness. The training is based on the key-elements: embeddedness in the cognitive content of the mathematics domain, informed training, and extended training. Results show some effects of the training on metacognitive knowledge and skills, but for most groups of children transfer of benefits towards schoolperformance is less obvious than expected.

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| **Thursday 09:00 - 10:30** | Paper Session 2 | Room: ALKYONI |

METACOGNITION AND MATHEMATICS LITERACY:
COMPARING HIGHER AND LOWER ACHIEVING COUNTRIES
Zemira R. Mevarech & Nogah Amar
Bar-Ilan University, Ramat-Gan, Israel

The purpose of the present study is to investigate the relationships between meta-cognition and mathematics literacy in higher and lower achieving countries (Hong Kong and Israel, respectively). Participants were 2483 and 2438 Israeli and Hong Kong students, respectively, randomly selected from 165 and 140 schools, respectively. The study applied HLM analyses on PISA 2002 data, on which Hong Kong was rated as the best achieving country in mathematics, whereas Israel was rated as 31 out of 42 participating countries. HLM was applied for each country separately, on the school level and the student level. (The study focused on PISA 2002 data because Israel did not participate in PISA 2003, whereas in 2002 both countries participated as non-OECD countries.) The HLM analysis was based on the following variables: Student Level – gender, class size, class level, socio-economic status, student sense of belonging, and learning strategies (controlling the learning processes, use of elaboration strategies and memorization strategies). School Level – school size, school type, school resources, school policies and practices, classroom practices, and principals' perception of teachers' morale and commitment. The findings indicate that the most significant difference between these two countries is student use of learning strategies. Whereas in Hong Kong the best contributor to mathematics literacy was activation of control strategies, in Israel the best contributor was memorizing strategy. This finding may explain the essential difference in the teaching of mathematics between the higher and lower achieving countries. The implications of the findings will be discussed in the conference.

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| **Thursday 09:00 - 10:30** | Paper Session 2 | Room: ALKYONI |

COMPREHENSION MONITORING AS SIGNIFICANT PREDICTOR OF RE-READING
– BUT NOT AS PREDICTOR OF SUCCESS!
Stephanie Pieschl, Elmar Stahl, & Rainer Bromme
University of Muenster, Germany

Re-reading is considered an effective comprehension strategy of skilled readers (Brown & Pressley, 1994). However, potential problems might hinder perfect execution and will be explored in this study: learners might not execute this strategy (successfully) at all; they might not be aware of relevant cues which signal need for re-reading and thus might not systematically adapt their re-reading to these internal (comprehension) and external cues (task difficulty, text comprehension). Furthermore, we explore if systematic adaptation of re-reading to these cues leads to better performance. Students without prior knowledge in biology ($\underline{n}$ = 29) read 13 hypertext nodes about "genetic fingerprinting" in order to answer subsequent questions. During this learning phase students evaluated their comprehension of each hypertext node. Afterwards students answered 13 multiple-choice questions, each specific to one node. Students were randomly assigned to two conditions: (A) students in the memory group (MG) had to answer questions from memory and (B) students in the re-reading group (RRG) were allowed to re-access hypertext nodes to answer questions. Results indicate that students in the RRG frequently used re-reading and significantly outperformed students in the MG condition. Additionally, students in the RRG indeed adapted their re-reading significantly and systematically to all scrutinized internal and external cues. For example, they more often re-read nodes that they considered less comprehensible. However, this adaptation was not associated with better performance. Even one detrimental effect was detected: Students who strongly adapted their re-reading to text complexity performed worse. Implications for instructional support will be discussed.

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Thursday 09:00 - 10:30	Paper Session 2	Room: ALKYONI

READING COMPREHENSION UNDER SEVERE TIME CONSTRAINT: RESULTS OF A READING COMPREHENSION TEST ONE YEAR AFTER A METACOGNITION-BASED DEVELOPMENT PROGRAM
János Steklács & Csaba Csíkos
Kecskemét College, Kecskemét, Hungary & University of Szeged, Hungary

Reading under time constraint is the phenomenon that refers to conditions when there is less time allocated for reading than the average required time. Our research questions focus on two aspects of reading under severe time pressure: (1) We would like to know whether there is a long time effect of a metacognition-based training program one year after the experiment, and (2) we would like to know whether there is any significant gender difference in reading comprehension. Students who participated in our training program in April-May 2006 were re-tested in May, 2007. There were 9 classes involved: 5 experimental and 4 control with 94 and 64 students, respectively. In May, 2007, we could re-test 80 and 46 students. The reading comprehension test consisted of three texts (two of them were expository, and one was narrative), and each text was followed by open-ended and closed question format items forming three consecutive sub-tests. The difference between the experimental and the control group's results proved to be significant in the whole test ($p = .029$), and on the "Number of tasks" variable (Welch-test, $p = .038$). The difference between boys and girls proved to be significant in the whole test ($p = .006$) and in the first subtest ($p < .001$). The results suggest that the effect of the former training program is conspicuous one year later as well.

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Thursday 10:30 - 12:00	Paper Session 3	Room: ELECTRA

A LARGE SCALE 3-YEAR LONGITUDINAL STUDY ON JACOBS AND PARIS' IRA QUESTIONNAIRE AMONG 3RD-5TH GRADE STUDENTS
Csaba Csíkos
University of Szeged, Hungary

This longitudinal investigation focuses on 3rd, 4th and 5th grade students' answers on Jacobs and Paris' (1978) IRA questionnaire on reading awareness. The IRA is an accepted measure of some aspects of metacognition in reading. The starting sample consisted of 4663 3rd grade pupils who formed a representative sample of the population of Hungarian 3rd graders. This population is measured in November of three consecutive years from 2005 to 2007. We analyze the reliability of the questionnaire and its subscales. The analysis of means and standard deviations suggests that elementary school students have strikingly marked beliefs about their reading process and about the phenomenon how one can be a good reader. These beliefs in many cases are different from mature readers' knowledge about reading and reading processes.

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Thursday 10:30 – 12:00	Paper Session 3	Room: ELECTRA

METACOGNITIVE FEELINGS IN A SITUATION OF IMPLICIT LEARNING: HOW CAN THEY BE MEASURED AND ARE THEY SUBJECT TO INDIVIDUAL DIFFERENCES?
Elisabeth Norman & Mark C. Price
University of Bergen, Norway

The serial reaction time (SRT) task (Nissen & Bullemer, 1987) is a sequence learning experiment often referred to as a prototypical implicit learning task. However, the extent to which participants are truly unaware of what they learn on this task has been subject to much controversy. For example, the response stimulus interval (RSI) between successive targets has shown to influence the objectively measured degree of conscious awareness in some studies but not in others. A possible explanation is that in the context of relatively inaccessible sequence knowledge,

certain participants respond on the basis of metacognitive feelings which are neither fully conscious nor fully unconscious, but which correspond to fringe consciousness (Mangan, 1993, 2001). We report two experimental studies which explore fringe consciousness in the SRT task. Experiment 1 (Norman, Price, & Duff, 2006) used a traditional SRT task. The degree of learning and awareness was positively related to the individual's score on the Openness to Feelings subscale of the NEO-PI-R personality inventory (Costa & McCrae, 1992), but the effect only occurred in the RSI condition traditionally associated with more implicit learning. The results were interpreted as reflecting an influence of individual differences in the sensitivity to fringe consciousness in this condition. Experiment 2 (Norman, Price, Duff, & Mentzoni, in press) provides an example of how fringe consciousness can be identified on the basis of behavioural data alone. Using a modified SRT task we identified a subgroup of participants whose behavioral pattern corresponded to the operational criteria for fringe consciousness.

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| Thursday 10:30 - 12:00 | Paper Session 3 | Room: ELECTRA |

BLANK IN THE MIND:
A METACOGNITIVE EXPERIENCE IN PROSPECTIVE MEMORY

Anastasia Efklides & Alexandra Touroutoglou
Aristotle University of Thessaloniki, Greece

A metacognitive experience that has not received attention in metamemory research is the "blank in the mind" (BIM) experience. It is the person's experience of having lost track of an intention that initiated his/her action. It is a momentary experience that represents a gap in the flow of consciousness and denotes a failure of prospective memory (PM). The present study tested the hypothesis that BIM experience will be related to PM failure, and PM failure will be affected by the type of PM task. The participants were 59 university students (44 females and 15 males). Their mean age was 21.05 years (SD = 3.34). A computerized PM task with an external or an internal cue for the PM action was administered to the participants who had to press a specific key (i.e., SPACE) in order to answer a question on a previously presented text. The PM task was embedded in a secondary task consisting of simple arithmetic operations. In the PM-external cue group, participants pressed SPACE as soon as they had come across a predefined number (external cue); in the PM-internal cue group, participants pressed SPACE after solving a number of arithmetic operations (e.g., after the 5th stimulus, internal cue). After the completion of the PM task, the participants responded to a set of questions tapping metacognitive awareness of PM failures, BIM, and tip-of-the-tongue (TOT) metacognitive experiences. The results showed that participants were aware of PM failures and of BIM experience. Moreover, the presence of an external cue enhanced the PM performance. Also, the BIM experience correlated positively with PM errors and response time on the PM task. Finally, BIM self-reports were not correlated with those of TOT. The implications of the above findings for metacognition are discussed.

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| Thursday 10:30 – 12:00 | Paper Session 3 | Room: ELECTRA |

DEVELOPMENTAL CHANGES IN CHILDREN'S EVALUATIONS OF EVERYDAY REASONING PROCESSES AND THEIR SUBSEQUENT FEELINGS OF CONFIDENCE

Panayiota Metallidou, Eleni Diamantidou, Eleni Konstantinopoulou, & Kalliopi Megari
Aristotle University of Thessaloniki, Greece

The aim of the present study was to investigate possible developmental changes in 3rd, 5th, and 7th grade children's ability to distinguish "good" from "bad" reasoning processes in everyday thinking scenarios, to evaluate the quality of the thinking processes involved, and to report their feelings of confidence regarding their evaluations. It was followed a methodology developed by Amsterlaw (2006). A total of 116 children participated in the study from third, fifth, and seventh grades. Children were examined individually in their schools. They were given 14 scenarios describing four types of good and bad reasoning processes in everyday situations. The children were also assigned randomly in two conditions, that is, no outcome condition and mismatch condition (information was added regarding the outcome of the specific reasoning process but the outcome was in opposition with the reasoning process). Children were asked, first, to say if the actor used a "good" or a "bad" thinking process, second,

to rate on a fourth-point scale whether this way of thinking is very bad (0) to very good (3), <u>third</u>, to explain why she/he thinks this (depending from the answer gave in the scale), and <u>fourth</u>, to give on a fourth-point scale (1-4) her/his feeling of confidence as regards the correctness of the answer. The results confirmed Amsterlaw's evidence at a large extent. Moreover, they suggest a possible developmental change at 7th grade, in cases of evaluating thinking processes that are followed by mismatched outcomes. No corresponding developmental pattern was found for the feelings of confidence.

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| Thursday 10:30 - 12:00 | Paper Session 4 | Room: ALKYONI |

THE IMPORTANCE OF PARENTS' COGNITIVE TALK FOR METAMEMORY DEVELOPMENT IN PRESCHOOL CHILDREN
Susanne Ebert & Sabine Weinert
University Bamberg, Germany

Assuming that there is a conceptual overlap between theory of mind and metamemory as both investigate the development of children's knowledge and cognition about mental phenomena, our first aim is to examine whether parents' cognitive talk is important for the development of metamemory as it seems to be in theory of mind development. Our second purpose is to analyse the interrelationship between socioeconomic background, cognitive talk and metamemory development. The study is part of a more comprehensive German longitudinal study following 547 children from preschool to second grade and aims to investigate educational processes and competence development. Measurement points were in half year intervals. To answer the present questions a subsample of 67 children (<u>M</u> = 4;5 years, <u>SD</u> = 3,8 month) was selected. Besides a battery of different cognitive and verbal competence tests children received a set of four metamemory tasks. Furthermore a parent-child picture book reading task was conducted to record parents'cognitive talk. In addition it was asked for social economic background. Altogether cognitive talk seems to play an important role in metamemory development. However, the relationship between cognitive talk and metamemory appears to be stronger at the same measurement point than the relationship between cognitive talk and later metamemory. Furthermore there are also influences of age and socioeconomic background. In particular there seems to be a gap in metamemory development between children of different socioeconomic background. Cognitive talk is discussed as a possible mediator between socioeconomic status and metamemory development.

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| Thursday 10:30 - 12:00 | Paper Session 4 | Room: ALKYONI |

THEORY OF MIND AND METACOGNITIVE KNOWING:
HAVE WE BEEN INVESTIGATING SIMILAR CONSTRUCTS WITHOUT REALISING IT?
Demetra Demetriou & David Whitebread
Cambridge University, United Kingdom

The present paper's aim is to combine aspects of research on Theory of Mind (ToM) and Metacognition since both areas broadly share the objective of investigating the development of children's knowledge and cognition about mental phenomena. As it will be argued through a review of research literature the ability of mentalizing, the ability to understand what one's own knowledge consists of, and the regulation of one's own behaviour seem to be related skills and crucial to a successful mental life. In addition, this paper will present preliminary findings of a broader longitudinal research project conducted in Cyprus in an attempt to provide: (a) a more comprehensive idea of the cognitive skills that are related to the success in classic false-belief tasks, and (b) empirical data regarding the possible relationship between ToM and Metacognition. Preliminary analysis showed that false belief understanding correlated significantly with the ability to create mental representations, inhibition control, working memory, language ability and source memory (which is considered to be an important aspect of metacognitive knowing). It will be noted that source memory correlated more strongly at the second stage of data collection with ToM than any of the other assessed abilities. What is more, executive functioning (inhibition control and working memory) correlated highly with both false belief understanding and source memory. This paper will also refer to the

importance of these findings and will discuss ideas for further research studies in the domain.

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| **Thursday 10:30 - 12:00** | Paper Session 4 | Room: ALKYONI |

THE PRIORITY OF THE MENTAL IN CHILDREN'S EXPLANATION OF BEHAVIOR
Vassilis Kroustallis
Hellenic Open University, Patras, Greece

Preschool children seem to regard mental states as distinct and more fundamental than bodily states in their explanation of other agents' behavior, and this has been regarded as common sense dualism (Bloom, 2004; Bering, 2006). The paper argues against this interpretation, and examines two sources of relevant findings: (a) children's statements that mental states continue to exist after death, (b) associated responses that the brain is not exclusively responsible for all behavior, but mental states (desires, feelings) also intervene. In the first case, it is objected that the explanation for the continuity of mental states (children are unable to simulate a total absence of mental states) may easily be applied to bodily states, even though children do not consider bodily states to exist after death. In the second case, the explanatory priority of the mental phenomena over the brain may be the result of a general preference for unobservable (e.g. mental) over observable causes of behavior (brain states), and not the result of a dualist attitude. The paper proposes relevant experiments, where other, non-mental unobservable entities, such as mathematical operations interfere in a non-familiar way with other agents (e.g. by being inserted into the empty head of an animal). It is predicted that children will attribute an animal's resulting mathematical competence to these causes, in exactly the same way as they would do with the relevant thought-insertion, and that unobservability is the main factor of the mental priority over the physical.

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| **Thursday 10:30 - 12:00** | Paper Session 4 | Room: ALKYONI |

THEORY OF MIND AND AGING:
WHICH RELATIONSHIP?
Sara Bottiroli, Elena Cavallini, Serena Lecce, & Paola Palladino
University of Pavia, Italy

Theory of Mind (ToM) is defined as the ability to infer others' mental states such as beliefs, desires, and intentions (e.g., Astington, Harris & Olson, 1988). Most previous studies assessed ToM in preschoolers, and much less attention has been paid to later life. The main goal of this study was to explore ToM in a normal adult sample, controlling for both fluid and crystallized abilities. To this end, 48 young adults (aged 20-30, $\underline{M}$ = 23.40), 27 young-old (aged 59-70, $\underline{M}$ = 64.93) and 29 old-old age groups (aged 71-82, $\underline{M}$ = 75) were recruited. Subjects were compared on the Strange Stories task (Happè, 1994) that comprised two different kinds of stories: (a) ToM stories, that required a mentalistic understanding, and (b) control stories, presented in order to assess participants' understanding of physical events. In addition we collected measures of fluid and crystallized abilities, using the vocabulary and word fluency PMA subtests and a working memory test. Data showed that the young group outperformed both the young-old and old-old group on the ToM stories but not on control stories. This pattern of results remained significant after controlling for fluid and crystallized abilities. Overall, these results indicate age-related deficits in referring to mental states in order to understand others' behaviour. Interestingly, this decline seems to be independent of changes in fluid and crystallized abilities.

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| **Thursday 12:30 - 13:30** | Keynote Speaker | Room: ELECTRA |

METACOGNITIVE SKILLS:

WHERE ARE WE NOW?
Marcel V. J. Veenman
Leiden University, The Netherlands

In the past twenty years, I have been involved in research establishing the nature of metacognitive skillfulness, the development of metacognitive skills, and the assessment of those skills. I will talk about my research, showing that metacognitive skills have their own contribution to learning, partly independent from intellectual ability. Moreover, I will discuss the development of metacognitive skills in relation to intellectual ability. A third issue is whether metacognitive skills are domain-general or very much domain-specific. In spite of ideas about the domain-specific nature of metacognition, there is firm evidence that metacognitive skills are at least partly general by nature (surpassing tasks and domains). This finding bears relevance to the instruction of metacognitive skills in schools: Metacognitive instruction should be instructed in a coordinated way across school domains (much like Pressley and his colleagues proposed in their article in Metacognition and Learning, 2006). Finally, I will address the difficulties in the assessment of metacognitive skills. Especially, the divergence in off-line vs. on-line measures will be discussed from the perspective of their construct, internal, and external validity.

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Thursday 15:00 - 16:30	Symposium 1 (invited)	Room: ELECTRA

METACOGNITIVE INSTRUCTION:
HOW DOES IT WORK AND WHAT ARE ITS EFFECTS ON SCHOOLING OUTCOMES?

Organizer/Chair: **Zemira R. Mevarech**, *Bar-Ilan University, Ramat-Gan, Israel*
Discussant: **Anastasia Efklides**, *Aristotle University of Thessaloniki, Greece*

Although great deal of research has focused on describing metacognitive processes and how they are activated at different age groups, relatively less is known on meta-cognitive instructional methods, how they work, and what are their effects on schooling outcomes. The purpose of the present symposium is therefore twofold: (a) to describe different kinds of metacognitive instructional methods; and (b) to discuss the effects of these methods on students' performance. The symposium focuses on students from elementary schools, junior-high schools, and university. It presents quasi-experimental studies in science, mathematics, and technology, involving individualized, cooperative, and fully online settings. All contributions describe innovative metacognitive instructional methods, and provide quantitative data showing its effectiveness. Choresh and Frank describe a metacognitive instructional method, called PATENT that aims at developing students' argumentation and technological literacy. They found that students exposed to PATENT outperformed the comparison groups on technological literacy and argumentation. Weiss et al compare the effects of two metacognitive methods: General and Domain specific. They found differential effects of the methods on near and far transfer tasks and on metacognitive awareness. An even more refine way of implementing meta-cognitive instruction is examined by Mevarech et al. Investigating in which phase of reading scientific text it is best to implement metacognitive instruction, they found that being exposed to metacognitive instruction after the reading had the most positive impact on scientific literacy. Finally, Eden and Kurtz describe the effects of metacognitive instruction embedded within a fully online course in information searching. Prof. Efklides will be the discussant.

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Thursday 15:00 - 16:30	Symposium 1 (invited) / Paper 1	Room: ELECTRA

THE PATENT:
USING META-COGNITION INSTRUCTIONAL METHOD IN THE TECHNOLOGICAL CLASSROOM
Cilla Choresh & Moti Frank
Bar-Ilan University, Ramat-Gan, Israel & Holon Institute of Technology, Israel

Research has indicated that argumentation exerts positive effects on students' technological literacy. Yet, little is known at present on how to enhance students' ability to construct "good" argumentation. The purpose of the

present study is, therefore, twofold: (a) to design an instructional method that has the potential to enhance students' argumentation; and (b) to examine its effects on students' technological literacy. To attain this goal, we designed an innovative metacognitive instructional method called PATENT. The PATENT is a series of six self-addressed metacognitive questions that students use while dealing with technological problem solving. The acronym of these questions creates PATENT. Participants were 285 seventh grade Israeli students who studied technology in 18 classrooms. All students were pre- and post-tested on technological literacy and argumentation ability. Seventy six students were exposed to PATENT, the metacognitive instructional method, 102 students studied technology while enhancing argumentation in a free way, without any further instruction, whereas all the others (N=107) studied technology in a "traditional" way, without being exposed neither to free argumentation nor to meta-cognitive instruction. The findings indicate that learning in the PATENT environment significantly contributes to the development of students' technological literacy and argumentation ability. PATENT students significantly outperformed their counterparts in the other two groups on technological literacy and argumentation test. One implication of this study is that using argumentation outlines the linkage between "minds on" and "hands on".

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Thursday 15:00 - 16:30	Symposium 1 (invited) / Paper 2	Room: ELECTRA

HOW CAN WE PROMOTE TRANSFER IN LEARNING BY DIFFERENT TYPES OF METACOGNITIVE TRAINING?
Itzhak Weiss, Bracha Kramarsky, & Sarit Sharon
Bar-Ilan University, Ramat-Gan, Israel

The purpose of the present study is threefold: (a) To compare the effects of specific metacognitive training, general metacognitive training, and a control group, on mathematics achievements in substitution of Algebraic expressions; (b) to investigate the effects of these methods on transfer tasks; and (c) to study the changes in metacognitive awareness as a result of the training. Participants were 105 seventh grade students who studied in three classrooms. Three experimental groups were implemented: Specific meta-cognitive training by modeling, general meta-cognitive training, and a control. The specific metacognitive training by modeling is based on Meta Strategic Knowledge in which explicit knowledge of cognitive procedure is activated by specific examples (Zohar & Peled, 2005). The general-elaborative metacognitive training is schema-based instruction in which generalized examples and rules are embedded within metacognitive instruction (Fucks et al., 2004). Both metacognitive training methods are adopted from IMPORVE (Mevarech & Kramarski, 1997). All students were pre- and post-tested on mathematics domain specific knowledge, transfer tasks, and metacognitive awareness. The findings showed that the specific meta-cognitive training exerted the highest positive effects on the domain specific achievement test, whereas the general metacognitive training exerted the highest positive effects on the transfer tasks. In addition, the specific metacognitive students significantly outperformed the other groups on both components of metacognitive awareness: Knowledge about cognition and regulation of cognition. These findings are in line with Veenman et al (2006) who analyzed the strengths of specific and general metacognitive instruction with regard to near and far transfer, respectively.

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Thursday 15:00 - 16:30	Symposium 1 (invited) / Paper 3	Room: ELECTRA

PROVIDING METACOGNITIVE INSTRUCTION IN DIFFERENT LEARNING PHASES
Zemira R. Mevarech, Tova Michalsky, & Liora Haibi
Bar-Ilan University, Ramat-Gan, Israel

The purpose of the present study was to investigate the effects of metacognitive instruction provided during different phases of reading science texts on science achievement of elementary school children. Participants were 108 fourth grade Israeli students who studied in four science classrooms. Intact classrooms were randomly assigned into one of four treatment groups: being exposed to metacognitive instruction before reading, during reading, after reading, and no metacognitive instruction. All students were pre- and post-tested on general scientific literacy, domain–specific knowledge, and metacognitive awareness. The metacognitive instruction was provided by a series

of self-addressed questions referring to comprehending the scientific problem, constructing connections between the new knowledge and previous knowledge, using enquiry activities to solve the problem, and reflecting. Results indicated that although no significant differences were found between the four groups prior to the beginning of the study, significant differences were found at the end of the study on all three variables, as follows: the group exposed to metacognitive guidance AFTER reading the scientific texts significantly outperformed all other groups, the group exposed to metacognitive instruction prior to reading the scientific text outperformed their counterparts who were exposed to the metacognitive instruction during the reading, and the group who did not receive metacognitive instruction attained the lowest mean scores. The theoretical and practical implications will be discussed at the conference.

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Thursday 15:00 - 16:30	Symposium 1 (invited) / Paper 4	Room: ELECTRA

THE EFFECTS OF METACOGNITIVE GUIDANCE ON STUDENTS' ACHIEVEMENT IN A FULLY ONLINE COURSE
Sigal Eden & Gila Kurtz
Bar-Ilan University, Ramat-Gan, Israel

Online learning, especially fully online learning, requires high levels of metacognition. Recent research has indicated that the more metacognitive processes students activate during the learning period, the better the learning outcomes. The purpose of the present study is to examine the effects of metacognitive guidance provided in fully online course on students' achievements. Participants were 115 graduate students majoring in education who took a course in information searching. About half of the students (N=64) were exposed to metacognitive instruction and the others ($\underline{N}$ = 51) studied in a "traditional" way with no metacognitive instruction. The later served as a control group. The metacognitive instruction was based on the IMPROVE method in which students are trained to use a series of self-addressed questions referring to comprehending the problem, constructing connections, using strategies, and reflecting. All students were pre- and post- tested. In addition, all students were administered the Metacognitive Awareness Inventory adopted from Schraw and Dennison (1994). Results indicated that at the end of the study, the metacognitive group significantly outperformed the control group on the achievement test. Furthermore, according to the data from the online system, the metacognitive group was more active than the control group: an average of 2.6 messages per student was sent in the metacognitive group compared to an average of 1.4 messages per student in the control group. Yet, no significant differences between the groups were found on the total MAI scores, but significant differences were found on several MAI subcomponents, mostly those regarding to knowledge about cognition.

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Thursday 15:00 - 16:30	Symposium 2	Room: ALKYONI

EPISTEMOLOGICAL BELIEFS AND METACOGNITIONS
– RECENT ADVANCES AND NEW DIRECTIONS

Organizer/Chair: **Stephanie Pieschl**, *University of Muenster, Germany*
Discussant: **Beate Sodian**, *Ludwig-Maximilians University, Munich, Germany*

Although the close relationship between epistemological beliefs, i.e. beliefs about knowledge and knowing, and metacognitions has long been acknowledged and advocated theoretically (e.g., Hofer, 2004), empirical studies on this topic are rare except studies where epistemological beliefs as well as the learning processes are assessed by questionnaires. All contributions within this symposium go beyond that and reflect current advances and directions in the field of epistemological beliefs: First, presenters not only concentrated on product data but also captured students' online learning processes in detail. While Opfermann and Pieschl assessed students' concurrent metacognitive processes, Mason additionally tapped online epistemic metacognitions. Second, most contributions focused on complex real-life tasks in new media settings (Opfermann, Pieschl, Mason). Only for such complex tasks a significant impact of epistemological beliefs can be expected and new media settings are not only especially

well-suited to investigate such learning processes, but are also ecologically valid as they play an increasingly important role in today's education. Fourth, studies range from strictly experimental studies (Opfermann) to almost real-life internet search scenarios (Mason). Fifth, the contributions represent a representative sample of current methods to capture epistemological beliefs: questionnaires (Opfermann, Moschner, Pieschl), interviews (Moschner), online epistemic metacognitions (Mason), and an experimental manipulation of epistemological beliefs (Pieschl). Especially Moschner's contribution will be able to stimulate the critical discussion regarding adequate assessment of epistemological beliefs as she compared questionnaire and interview data in young children. These and additional issues will be reflected critically by our expert discussant (Sodian).

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Thursday 15:00 - 16:30	Symposium 2 / Paper 1	Room: ALKYONI

THE RELATION OF EPISTEMOLOGICAL BELIEFS AND METACOGNITION AND THEIR ROLE IN HYPERMEDIA LEARNING.
Maria Opfermann & Peter Gerjets
University of Muenster, Germany

Epistemological beliefs are assumed to be closely related to metacognition in some cognitive models (Kuhn, 1999). Additionally, both are related to learner activities especially in the context of ill-defined problems, whereas there is only a minor influence when well-defined problems are presented. Hypermedia environments, especially those offering a high degree of learner control, share several features with ill-defined problem structures. Authors like Bendixen & Hartley (2003) thus assume that a high amount of learner control will be especially beneficial for learners with sophisticated beliefs and a higher level of metacognitive awareness. Our studies investigate the relationship between general and domain specific epistemological beliefs and metacognition and their influence in a hypermedia learning environment on probability theory. Participants learned about basic principles of probability theory by means of worked examples. Those could be retrieved nonlinearly and in different representational formats. Additionally, by using a 2*2 design varying the factors metacognitive modelling (yes/no) and representational prompting (yes/no), we wanted to find out whether learners differing on these dimensions benefit differently from two forms of instructional support. Metacognition and epistemological beliefs were assessed by means of questionnaires. As expected, the constructs correlate with each other, and several dimensions have a significant impact on learning behaviour and learning outcomes. Contrary to our expectations, the benefits of additional instructional support appeared to be rather small and even detrimental for learners with sophisticated metacognitive strategies and activities. These results and their implications for further hypermedia design and research will be presented and discussed at the symposium.

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Thursday 15:00 - 16:30	Symposium 2 / Paper 2	Room: ALKYONI

THE IMPACT OF AN EPISTEMOLOGICAL SENSITIZATION ON COGNITIVE AND METACOGNITIVE PROCESSES DURING HYPERMEDIA LEARNING
Stephanie Pieschl, Rainer Bromme, & Elmar Stahl
University of Muenster, Germany

Previous research demonstrates that in the *planning* stages of learning students (1) discriminate between tasks of different complexity, adapt their cognitive and metacognitive strategies to task complexity and (2) that this process is significantly related to students' epistemologies (Stahl, Pieschl, & Bromme, 2006). It is an open issue if the subsequent enactment stages of learning yield similar results. Furthermore, it is questionable if these correlational results can be corroborated in an experiment. In this study, two matched sub-samples of biology students ($\underline{n}$ = 14) and humanities students ($\underline{n}$ = 21) were subjected to an epistemological sensitization (i.e., they read either a neutral introduction or an epistemological introduction which raised students' awareness of epistemological issues by inserted comments). Subsequently, students had to solve five tasks of different complexity according to Bloom's revised taxonomy (Anderson et al., 2001) with a hypertext on "genetic fingerprinting". Students' concurrent actions were captured by logfiles, their concurrent thoughts were elicited by prompts, and they were interviewed. Results

indicate that students' cognitive and metacognitive strategies were systematically related to task complexity (1) and that the epistemological introduction significantly enhanced adaptivity during learning (2), e.g. students engaged more frequently in "planning" for complex tasks but no difference for simple tasks was detected. Counterintuitively, the epistemological sensitization was detrimental for performance. The discussion will focus on the differences between the planning and enactment stages of learning, on the success of the epistemological sensitization to foster more "sophisticated" epistemological beliefs and to enhance processing, and on potential implications for education.

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| Thursday 15:00 - 16:30 | Symposium 2 / Paper 3 | Room: ALKYONI |

SPONTANEOUS ACTIVATION OF EPISTEMIC METACOGNITION DURING WEB SEARCHING AND INDIVIDUAL DIFFERENCES
Lucia Mason, Nicola Ariasi, and Angela Boldrin
University of Padua, Italy

This study deals with epistemic thinking as a metacognitive activity in a context. We were interested in examining spontaneous reflections about knowledge and knowing during the search of information on the Web (Hofer, 2004; Nuckles & Bromme, 2002; Tsai, 2004). In the past the difficult task of controlling the accuracy and relevance of information was carried out by editors and publication companies. In the Internet era this task is transferred to the students themselves, who must identify, compare, and evaluate the information accessed on the Web (Bråten, Strømso, & Samuelstuen, 2005). The aims of the study were to see whether seventy-nine 8th graders (1) spontaneously activate epistemic metacognition during the search of information about the scientifically controversial topic of dinosaur extinction; (2) there is evidence of reflections about the four epistemic dimensions identified in literature (Hofer, 2000); (3) individual differences, such as general beliefs about scientific knowledge, topic interest, interest in online information searching, need for cognition, and study approach, are related to the spontaneous activation of epistemic metacognition. Both qualitative and quantitative analyses have been performed. Results about the verbal protocols of thinking aloud show that most of the students spontaneously reflected epistemically, in particular about the justification and the nature of knowledge, although at different levels of sophistication. Overall, students with a higher need for cognition were more active epistemically, especially to evaluate the source of knowledge. In addition, study approach and general beliefs about scientific knowledge were related to the activation of epistemic beliefs during Web searching.

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| Thursday 15:00 - 16:30 | Symposium 2 / Paper 4 | Room: ALKYONI |

HOW DO ELEMENTARY SCHOOL CHILDREN UNDERSTAND QUESTIONNAIRE ITEMS?
Barbara Moschner, Andrea Anschütz, & Stephan Wernke
Carl von Ossietzky Universität Oldenburg, Germany

Questionnaires are a popular research method in the field of educational psychology. Since they are easy to administer to large populations questionnaires are also a predominant method in research with children. Scales and items that have been designed for teenagers and adults are often only slightly altered before being applied to younger children although difficulties in the understanding of questionnaire items and underlying concepts can be expected when questionnaires are used in this age group. To investigate children's understanding of questionnaire items, we administered a questionnaire of self-regulated learning to 179 elementary school students (age: $\underline{M}$ = 9.4 years) and a questionnaire of epistemic beliefs to 145 3rd and 4th graders. The questionnaires were answered in the regular school setting. In a second step we conducted interviews with 59 children. 32 students were interviewed about the questionnaire of epistemic beliefs; 27 children were questioned about the items of our self-regulated learning instrument. Children were asked to describe their understanding of the items and tell problems of grasping words or phrases. One important result of our study is that children are able to verbalize their thoughts about epistemic beliefs and learning strategies. They understood most of the items in the field of learning strategies, but they had severe difficulties to understand some of the items concerning epistemic beliefs. Merits and shortcomings

of research with questionnaires with young children are discussed in the light of our findings. We address developmental prerequisites and methodological problems concerning research in this age group.

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Thursday 16:30 - 18:00	Paper Session 5	Room: ELECTRA

FEELING OF DIFFICULTY AND SURPRISE AS MANIFESTATIONS OF COGNITIVE INTERRUPTION

Alexandra Touroutoglou & Anastasia Efklides
Aristotle University of Thessaloniki, Greece

The metacognitive experience frequently manifested in problem solving is feeling of difficulty (FOD). In general, FOD denotes lack of fluency in processing, presumably due to interruption of cognitive processing. A cognitive interruption occurs whenever the current cognitive schema fails to handle task requirements. Because cognitive interruptions are by definition unexpected, they may also trigger surprise, which is the response to unexpected and/or implausible events. Three experiments were carried out to test the hypothesis that cognitive interruption is associated with feeling of difficulty and surprise. A total of 49 high school students, 16 years old (28 boys and 21 girls) participated in the study. An inductive reasoning task was used. It consisted of six-number sequences in which the numbers were used to induce processing schemas and discrepancies. Experiment 1 examined three types of interruption: No interruption; interruption due to repetition of a number in the sequence; and interruption due to an intervening number which was not related to the number sequence. Experiments 2 and 3 further examined an interruption due to a change of numerical rule within the first three numbers of the sequence and last three numbers of the sequence, respectively. Participants used a 7-point scale to rate surprise and FOD. Accuracy of response and reaction time (RT) were recorded. Results showed that cognitive interruption elicited both FOD and surprise. RT measures correlated with FOD and surprise. Finally, FOD correlated positively and highly with surprise. Yet, surprise was associated with implausible interruptions only, unlike FOD that was associated to any interruption.

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Thursday 16:30 - 18:00	Paper Session 5	Room: ELECTRA

INVESTIGATING THE TAXONOMIC CONSTRAINT FOR THE UNDERSTANDING OF WORD MEANINGS:
THE ROLE OF METHODOLOGY AND CROSS-LINGUISTIC DATA

Assimina M. Ralli & Julie Docrell
Technological Institution of Athens, Greece & University of London, United Kingdom

The ways in which children isolate the word forms of their language to infer potential meanings, so as to map the correct meaning on to the new form is still a matter of debate. Two contrasting hypotheses have been suggested. A large body of work supports the view that initial mappings are supported by a range of congnitive constraints which restrict the class of possible meanings for a new term. More recently, the importance of pragmatic factors and social constraints as a mechanism of word learning has been emphasized. The purpose of the present study was to investigate and extend Markman's and Hutchinson's (1984) study that children constrain the meanings of nouns to refer mainly to taxonomic relations. Paricularly, the study tested whether the strategies identified are generalised to other languages, e.g. Greek, and whether the role of the social context in which the child encounters the new term constrains word meanings. These claims were examined by extending the original procedure and including cross-linguistic data. A set of three experiments were administered to 4.5- and 5.6- year olds children. The data suggest that rather than working with fixed cognitive constraints, children's inferences about word meanings are highly sensitive to the task demands. Moreover, children use a variety of sources of information including the context in order to infer the meanings of the words. The above findings support a view where both "cognitive" and "social scaffolding" contribute to word learning. The above results have theoretical implications for the viability of constraints framework as a general account of lexical acquisition. These results have potential practical consequences for education in both teaching style and assessment.

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| **Thursday 16:30 - 18:00** | Paper Session 5 | Room: ELECTRA |

AFFECTS IN MONITORING AND REGULATING COMPREHENSION WHILE READING SHORT TEXTS

Marja Vauras, Riitta Kinnunen, Pekka Salonen, & Erno Lehtinen
University of Turku, Finland

Monitoring one's comprehension involves metacognitive acts by which the level of comprehension is evaluated and regulated by readers. Awareness of comprehension failure may launch metacognitive experiences (e.g. of difficulty or uncertainty) and negative affects. This paper aims at examining (a) the efficiency of comprehension monitoring in reading, and (b) relation of comprehension monitoring, metacognitive experiences and affects in context. Participants are ten-year-old fourth grade elementary school students with ($\underline{n}$ = 30) and without ($\underline{n}$ = 30) reading comprehension problems. Main methods include a <u>Series of Comprehension Monitoring (CM) Tasks</u> and <u>prompted interviews</u>. Metacognitive knowledge measure is used as a covariant. CM Tasks include short texts, with or without intended comprehension obstacles. The students' strategic behavior in reading is investigated by a combined system of Tobii Eye Tracker 1750 and Noldus Observer XT. The system allows synchronized data collection of the eye movements on the text and the video recording of the face (with voice) of the reader. The two different sources enable on-line information of the students' affective reactions, and make it possible to relate them exactly and dynamically to the contents being read and the comprehension strategies being used.

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| **Thursday 16:30 - 18:00** | Paper Session 5 | Room: ELECTRA |

THE IMPACT OF REFLECTION ON METACOGNITIVE KNOWLEDGE AND EXPERIENCES IN THE DOMAIN OF PHYSICS

Ioannis Soulios, Eleftheria Gonida, & Dimitris Psillos
Aristotle University of Thessaloniki, Greece

The aim of the present research was to investigate how reflection might affect the accuracy of metacognitive experiences, such as feeling of difficulty and feeling of confidence about the solution provided to a physics task, in relation to actual cognitive performance. In an initial phase, a random sample of 202 sixth grade students classified in 4 groups according to their conceptions about electrical circuits: monopolar and others, clashing currents, attenuation, and scientific. Fifteen students from each of the above groups (N=60) were selected for the present study; they were asked to solve 2 tasks with simple electrical circuits of different difficulty level and to estimate the feeling of difficulty and the feeling of confidence about the solution provided to each task. Right after they had provided their solution, they were individually asked to reflect on the procedure of problem solving through prompting and to estimate again their feeling of difficulty and their feeling of confidence about their solutions. Protocol analysis indicated the impact of reflection on students' metacognitive knowledge about task demands and solving procedures as well as on the accuracy of their feeling of difficulty and of feeling of confidence in relation to their actual performance. However, the type of dominant model adopted by the students to solve the tasks affected both the form of meta-statements produced during reflection and the degree of the impact of reflection. These results are of particular importance for science teaching, in order to be able to build powerful learning environments that would promote and sustain metacognitive skills, and/or organize training programs focused on students' metacognitive awareness.

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| **Thursday 16:30 - 18:00** | Paper Session 6 | Room: ALKYONI |

THE IMPACT OF MODELING ON PUPILS' SELF-REPRESENTATION ABOUT THE SELF-REGULATORY BEHAVIOR AT MATHEMATICS

Areti Panaoura[1], Andreas Demetriou[2], & Athanasios Gagatsis[2]
[1]*Frederick University, Limasol, Cyprus & [2]University of Cyprus, Nicosia, Cyprus*

The aim of the present study was to connect self-representation with self-regulation, by investigating the improvement of pupils' self-representation about their self-regulatory strategies. We hypothesized that pupils should have an accurate self-representation about their strengths and limitations in using self-regulatory strategies in order to encounter difficulties during problem solving. The present paper aims to discuss the impact of the use of the mathematical model of Verschaffel, Greer and De Corte (2000) on the development of pupils' self-representation about their self-regulatory behavior at mathematics. At the first phase of the research (as a part of a project) three materials were developed for pre and posttest and administered at 255 11th years old pupils (for mathematical performance, self-representation and use of self-regulatory strategies for problem solving). Then constructing a web page developed an intervention program. The page was visited individually by each pupil of the experimental group (107 pupils) during 20 meetings and the use of the abovementioned model was proposed. Results confirmed that providing pupils with the opportunity to self-monitor their learning behavior in the case of encountering obstacles in problem solving through the use of modeling is one possible way to enhance pupils' self-representation about the self-regulatory strategies they use in mathematics and consequently their mathematical performance. The program created a powerful learning environment in which pupils were inspired in their own experiences. Although the program improved their cognitive and metacognitive performance, it reproduced the metacognitive differences among pupils. Those with high self-representation about their mathematical abilities in the initial phase were at the same time pupils with the most self-regulatory strategies after the impact of the intervention program.

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Thursday 16:30 - 18:00	Paper Session 6	Room: ALKYONI

THE ASSOCIATION OF KINDERGARTEN STUDENTS' FEELINGS ABOUT THEIR TEACHERS WITH THEIR LEARNING MOTIVATION AND COMPETENCE BELIEFS IN MATHEMATICS AND LITERACY
Georgia Stephanou & Efthalia Konstantinidou
University of Western Macedonia, Florina, Greece

Based on effectance motivation theory (see Spinath & Spinath, 2005; Wigfield & Eccles, 2000), learning progress comes from engaging in enjoyable and interest tasks, and learning motivation is connected to students' competence beliefs. This study aimed to examine (a) kindergarten students' feelings about their teachers, (b) the association of students' perceptions of their competence in mathematics and literacy with their learning motivation (intrinsic interest, and goals) in the same school subjects, and (c) the role of students' feelings about their teachers in the formation of their competence beliefs and learning motivation in the same school subjects, and in the impact of competence beliefs on learning motivation. The participants were 200 kindergarten pupils, of both genders, who randomly came from 30 classrooms. All the participants individually responded to scales at the middle of a school year. The results showed that (a) children experienced moderate to high positive feelings for their teachers, (b) students' feelings for their teachers were moderately associated with their learning motivation and competence beliefs, (c) students' feelings for their teachers, and, mainly, their competence beliefs influenced their learning motivation, and (d) the observed correlations among the variables varied by school subject. The findings are discussed with respect to their applications in education, emphasizing the association of metacognitive awareness with regulated learning, and future research.

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Thursday 16:30 - 18:00	Paper Session 6	Room: ALKYONI

THE LEARNER IN THE EXAMINATION SITUATION: QUALITATIVE DIFFERENCES
Evangelia Karagiannopoulou
University of Ioannina, Greece

Previous research has shown that different forms of examinations encourage different levels of answer which indicate differences in quality of learning. These are related to studying approaches through which students regulate and monitor their learning. In this essentially exploratory study, in-depth interviews were conducted with twenty final year psychology students. The students were asked about the revision strategies they had adopted and their attempts to develop understanding when revising for open-book and closed-book essay type examinations. The interviews were transcribed and analysed to identify categories of description. The findings indicate differences in the (a) intention of studying, (b) forms of understanding, (c) role of the classroom experience of learning in understanding (d) learning as personalised experience. The study suggests that most of the students reported a deep-holistic and a surface-atomistic approach to study when revising for the open and closed-book essay-type examinations, respectively. Different forms of visualisation were reported in preparation for both of the two types of examinations. Imaginary conversations, imaginary scenarios, examples and explanations of real world situations revealed learning as a self-engagement process and indicated the role of imagery in developing understanding and links between experience and knowledge. The study indicated the tutor and the students as emotional passionate beings contributing to the process of learning. Emotions appear to charge positively the learning experiences only in preparation for open book examinations. Findings are discussed in relation to recent literature.

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| Thursday 18:30 - 20:30 | Poster Session 1 | Room: ELECTRA |

BENEFITS AND LIMITATIONS OF A STANDARDIZED LEARNING DIARY- ANALYZING METACOGNITIVE SKILLS IN AN ELEMENTARY CLASSROOM
Tanja Kraemer
University of Potsdam, Germany

Empirical research was conducted in order to better understand how self-regulated learning processes could be investigated through the use of standardized learning diaries in an elementary classroom. Keeping learning diaries was intended as a longitudinal approach to foster and measure metacognitive skills. The sample includes 33 students from an elementary school in Berlin aged 9 to 13 who kept a diary for 14 weeks. In this paper we focus on analyzing diaries including student's reflection on the behavioral level during the learning phases. Furthermore self-reports were used to assess metacognitive skills before and after the intervention. Related contextual variables like the difficulty and the task requirements have been assessed respectively. We measured context-sensitive variables such as task culture via semi-structured teacher interviews. The qualititative analysis of the learning diaries showed, that students were able to task specifically document and analyze their learning process. Results regarding the process analysis of the diaries showed significant results for the congruence between statements in the planing, performance and reflection phase. On the contrary when looking at the results of the self-reports no intervention effects could be found.

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| Thursday 18:30 - 20:30 | Poster Session 1 | Room: ELECTRA |

THE RELATION BETWEEN METACOGNITIVE SKILLS AND THE NETWORK OF WORD MEANINGS IN CHILDREN
Dimitra Georgogianni, Eirini Kordera, & Marcel V. J. Veenman
University of Leiden, The Netherlands

Aim: The present study investigates vocabulary development in Greek children, by testing whether or not the network of word meanings and their contextual information expand more rapidly in high verbal children, relative to low verbal ones. Moreover, our goal is to examine the hypothesis that the more developed the children's metacognitive skills, the broader the network of word meanings they have. **Method:** The design of the study is cross-sectional. The participants are 61 High School students, 25 males and 36 females, with mean age 13.2 years, from several different areas in Greece. The instrument that was used in order to assess participants' verbal

competence is the vocabulary part of WISC-III. Moreover, analysis of thinking aloud protocols was conducted. **Results:** The data have been collected, but results are yet to be analyzed.

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| Thursday 18:30 - 20:30 | Poster Session 1 | Room: ELECTRA |

ACTION ORIENTATION AND SELF-REGULATION IN SCHOOL
Mathieu Roy, Carole Vezeau, & Thérèse Bouffard
Université Du Québec à Montréal, Canada

According to Kuhl and Beckmann (1994), a person who is engaged in a purpose-driven activity needs to deal with intrusions that can derail motivational and self-regulatory processes. These intrusions can short-circuit the attentional system either before the task begins or during its course. The Action Control Theory was developed by Kuhl and Beckmann to better illustrate and understand why certain people tend to remain task-focused, while others become self-focused. The present research wanted to examine the link between a person's action-orientation and self-regulated learning assesses through use of planning/ organization strategies, engagement, perseverance and attempts to improve understanding. It is proposed that the more a person is action-oriented, the more he/she will be adept at these different self-regulatory actions. A second objective was to examined whether the links between self-regulatory actions differ according to the two time-sensitive components of action-orientation: hesitation and preoccupation. As a third objective, differences regarding gender on action-orientation and self-regulated learning will be examined. 2219 students (mean age of 16 years, 10 months), who agreed to participate, were met to fill out questionnaires about action-orientation and self-regulated learning. Results show that although student's levels of action-orientation were significantly linked to every aspects of self-regulated learning different measures ($p <$ 0.001), the strongest links appeared with the decision-related action-orientation sub-scale. Gender differences were found in both action-orientation and self-regulated learning. The discussion will focus on these results and how the action-orientation construct can contribute to metacognitition and self-regulation research.

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| Thursday 18:30 - 20:30 | Poster Session 1 | Room: ELECTRA |

THE EFFECT OF METACOGNITIVE INTERVENTION ON SELF-QUESTIONING, STORY COMPREHENSION, AND SELF-DIRECTED LEARNING OF KINDERGARTEN CHILDREN
Rivka Glaubman, Hananyah Glaubman, & Leah Ofir
Bar-Ilan University, Ramat Gan, Israel, Israel

This study tests the effect of children's questioning at the kindergarten level, using two theory-based intervention methods, active processing and metacognitive, compared to conventional control group, in facilitating questioning. Theory-based intervention was hypothesized to enhance achievements in quality of questioning, story comprehension and self-directed learning, in short- and in long-term testing, when the metacognitive results would surpass those of active processing. 93 children from 7 kindergartens were randomly assigned to the above 3 groups. Results show general efficacy of theory-based training, with superiority of metacognitive-based method, especially in generating quality questions and in self-directed learning.

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| Thursday 18:30 - 20:30 | Poster Session 1 | Room: ELECTRA |

PROFILING POOR AND AVERAGE ACHIEVERS: THE ROLE OF COGNITIVE METACOGNITIVE AND MOTIVATIONAL FACTORS
Varvara A. Iosifidou & Eleftheria N. Gonida
Aristotle University of Thessaloniki, Greece

The aim of the present study was to co-examine the role of cognitive, metacognitive and motivational factors on academic outcomes. More specifically, it aimed to compare the profile of poor achievers to the profile of average achievers in terms of their cognitive performance in language and math, metacognitive processes (metacognitive knowledge, metacognitive skills, and metacognitive experiences) and various motivational variables such as self-efficacy about language and math, academic self-concept, self-esteem, and causal attributions. A sample of 283 fourth graders (150 girls and 133 boys) and their school teachers participated in the study. A set of self-report questionnaires were administered to the students and teachers were asked to assess the general academic performance and the metacognitive skills for every student of their class. Preliminary data analyses indicated that, first, the profile of low achievers is different from the profile of average achievers in regard to a number of variables under examination (e.g., cognitive variables, metacognitive variables as measured by the teachers' assessments but not by the students themselves), and, second, the differences between the two groups in regard to their motivational profile were not so clear. The results, which are still in progress, will be discussed in regard to our better understanding of students' school difficulties and poor academic outcomes as well as to the development of instructional approaches and/or intervention programs that promote academic success.

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| Thursday 18:30 - 20:30 | Poster Session 1 | Room: ELECTRA |

ACADEMIC PERFORMANCE PROFILE AND THE UTILIZATION OF STUDY STRATEGIES: AN EXPLORATORY SURVEY OF A GROUP OF SENIOR HIGH SCHOOL STUDENTS
Simona De Stasio, Carlo Di Chiacchio, & Maria D'Alessio
University of Movement and Sport Sciences, Roma, Italy

In the present study the relation of study strategies to academic achievement was explored. Research objective were: (a) to highlight the presence of homogeneous subgroups of students on metacognitive and emotional motivational functioning and (b) to test group differences on scholastic performance. Learning Strategies Questionnaire (LSQ)(Pellerey,1996) was administered to assess the cognitive and affective and motivational components of learning. The LSQ is a self-evaluation diagnostic instrument that tests 14 factors: 7 cognitive factors and 7 affective and motivational factors. Cluster analysis was used to identify groups of students with similar patterns of study strategies.Within a cohort of 647 students three types of students in using learning strategies were identified.In order to better analyse the differences between the identified clusters, a Multivaried Variance Analysis (MANOVA) was carried out. The three groups showed, as expected, significant differences in their academic achievement. Findings are discusses in theoretical and applicative terms.

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| Thursday 18:30 - 20:30 | Poster Session 1 | Room: ELECTRA |

A DEPICTION OF THE TAXONOMY OF METACOGNITION
Pina Tarricone
Edith Cowan University, Perth, Australia

Metacognition is a complex, multifaceted and important psychological construct which is fundamental to learning in all contexts. Researchers have bemoaned its complexity and obscurity. This has resulted in calls from the academic community for the demystification and reconceptualisation of metacognition to provide comprehensive theoretical frameworks to clarify the construct. Outcomes from the resulting theoretical research include a Taxonomy of Metacognition and a Conceptual Framework of Metacognition. A comprehensive depiction and discussion of the Taxonomy of Metacognition is the focus of this paper. The Taxonomy of Metacognition represents all of the major theoretical contributions to metacognition. It draws together these contributions from theorists such as Flavell, Brown, Borkowski, Pressley, Pintrich, Kuhn, Moshman, and Efklides, to name a few. The conceptual analysis of significant theoretical and empirical contributions to the construct of metacognition informed the development of the taxonomy. The Taxonomy of Metacognition developed through a discussion of the relationship between reflection and metacognition, metamemory and metacognition. Its detail is necessary to reflect the breadth and depth of the considerable theoretical and conceptual literature on metacognition. It is

intended that the Taxonomy of Metacognition will be used as a guide for future metacognitive research and provide the academic research community with a complex and inclusive, but not prescriptive, view of metacognition. Metacognition, like many other theoretical constructs, is evolving and the future may bring new and exciting contributions to the theory and therefore to the taxonomy.

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| **Thursday 18:30 - 20:30** | Poster Session 2 | Room: ALKYONI |

METACOGNITION AND DECISION MAKING:
A STUDY ABOUT PEOPLE'S CONCEPTIONS
Paola Iannnello, Barbara Colombo, & Alessandro Antonietti
Catholic University of the Sacred Heart, Milano, Italy

A relationship between metacognition and decision-making performance has been proved, showing that regulation of cognition appear to have a greater impact on decision making than did knowledge of cognition (Batha and Carroll, 2007). Lee (2004) suggested that the role of naive conceptions in judgments linked to decision making processes could be more extended that believed to be. Hence, the importance of exploring the link between metacognition and decision making appears to be fundamental. A new field of investigation could be the analysis of possible differences among different professions and different expertise levels. This study intends to examine relationship that can be observed in people's naive conceptions about decision making, and metacognitive awareness referred to the personal modality of decision making. Such differences will be compared within different professional categories and different expertise levels. We devised a questionnaire aimed at researching into the naïve conceptions about decision-making, beliefs about one's own decision-making processes and reported decision-making competence. Statistical analysis of the collected data is still being performed. We believe that if the different dimensions considered in the study will be proved to be linked together, this can be taken as an indirect but sonorous prove of the role of metacognitive awareness in decision making process. Specifically, we expect that higher levels of expertise will be connected with a more adequate mental model of the decision making process and with a more developed self awareness, which, in turns, will improve the efficacy of the decision making process.

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| **Thursday 18:30 - 20:30** | Poster Session 2 | Room: ALKYONI |

YOUNG CHILDREN'S THEORY OF MIND AND RELATED FACTORS
Eleonora P. Louca & Niki Thoma
European University Cyprus, Nicosia, Cyprus

Previous research (Astington 1998) has shown that theory of mind as measured by false belief tasks positively correlates with school achievement and verbal development in children. The present research investigated in young children of 3 to 5 years of age the correlation between theory of mind scores as measured by false belief tests according to J. W. Astington and J. M. Jenkins (1999) on the one hand and on the second: (a) The verbal development of these children as measured by picture- vocabulary and Mean Length of Utterance, (b) Non verbal intelligence measured by two subtests of WPPSI test of intelligence and the composite score of verbal and non verbal abilities, and (c) School achievement as given by teachers' grading. More measurements are also made of the content of the children's output and correlated with theory of mind.

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| **Thursday 18:30 - 20:30** | Poster Session 2 | Room: ALKYONI |

MIND WHAT TEACHERS SAY:

PRESCHOOL TEACHERS' MENTAL STATE REFERENCES DURING A PICTURE-STORY NARRATION TASK
Plousia Misailidi & Despina Papoudi
University of Ioannina, Greece & University of Athens, Greece

The aims of the study were two-fold: (i) to investigate preschool teachers' tendency to make references to mental states during a picture-story narration task and (ii) to assess whether the nature of the picture-story affects the frequency with which teachers use mental state language. A total of 30 preschool teachers took part in the study. Participants were asked to narrate three types of picture-stories to their students: mentalistic, behavioural and causal-mechanical stories. The stories were modelled after those developed by Baron-Cohen, Leslie and Frith (1986). Teachers' narrations were audiotaped and later transcribed. References to cognitive, volitional and feeling states were coded according to Bartsch and Wellman's (1995) criteria for genuine mental state references. The results are currently being analysed and will be discussed in relation to recent studies investigating the impact of the linguistic input on children's developing understanding of the mind.

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| **Thursday 18:30 - 20:30** | Poster Session 2 | Room: ALKYONI |

THE RELATIONSHIP BETWEEN CHILDREN'S SECOND-ORDER BELIEF UNDERSTANDING AND THEIR ABILITY TO ATTRIBUTE 'INTERNAL' AND 'EXTERNAL' SHAME
Vassiliki Katsarou & Plousia Misailidi
University of Ioannina, Greece

In his analysis of the concept of shame, Gilbert (2003) distinguished between 'internal' and 'external' shame. The former is associated with one's negative appraisal of the self, whereas the latter is the result of what one thinks others think of the self. This distinction is important in order to evaluate the role of theory of mind in young children's understanding of this concept. We report the results of a study that assessed the relationship between children's understanding of second-order beliefs with their ability to attribute internal and external shame to others. Fifty three 4- to 6-year-old children took part in the study. Children were tested on a task that required them to judge the emotion of story-protagonists who had violated social/conventional or moral-rules and additionally completed a task that assessed their ability to understand second-order false beliefs. As predicted, second-order belief understanding was significantly related with children's ability to attribute external shame but not with their ability to attribute internal shame.

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| **Thursday 18:30 - 20:30** | Poster Session 2 | Room: ALKYONI |

CHILDREN'S MEMORY MONITORING DURING DUAL TASKING
Thomas Roderer & Claudia Maria Roebers
University of Bern, Switzerland

The aim of this study was to explore whether available cognitive resources fuel developmental progression in procedural metacognitive monitoring. In a cognitive-motor dual task paradigm, 8- and 10-year olds completed a paired-association task and gave confidence judgments after recall. In one condition (control), children were required to only remember paired associations and give confidence judgements for their answers without any additional task load. In the contrasting condition, children were required to recall and give confidence judgments while balancing at the same time on one leg (dual task). Thus, we wanted to find out if concurrent mastering of postural control and metacognitive monitoring draw from the same pool of cognitive resources. Following up on this line of argumentation, we explored whether an age-related increase of experience with postural control would lead to a decrease of cognitive demands, thus freeing up cognitive resources for the metamemorial judgement task. Alternatively, progression in metamemorial monitoring may also stem from continuous practice of these higher order processes through schooling. Therefore, children fulfilled two trials of the same task and recall performance and monitoring were compared across trials. Results revealed developmental differences in memory monitoring

between the two age groups, but no detrimental effect of the dual task on recall and monitoring. Instead, there proved to be an increase both in recall and memory monitoring between the first and second trial indicating that the experience with a specific task can improve elementary school children's metacognitive monitoring within only two trials.

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| Thursday 18:30 - 20:30 | Poster Session 2 | Room: ALKYONI |

THE EFFECTS OF MUSIC TRAINING AND MUSIC BACKGROUND ON READING COMPREHENSION, METACOGNITIVE EXPERIENCES, AND AFFECT
Antonis Theofilidis & Anastasia Efklides
Aristotle University of Thessaloniki, Greece

Research on the effects of music training on verbal abilities and text comprehension has come up with contradictory results. The same regards the use of music as background during studying. Our research aimed at investigating the possible interaction of these two factors on text comprehension using tasks differing in difficulty. A 2(music training) x 2(music background) design was implemented. Age and gender were also included. The participants were 172 students of both genders, aged 9-14 years. Of them 98 had musical training ($\underline{M}$ = 3 years). All students were first tested with a working memory test battery (WM). A series of MANCOVAS with WM as covariate were performed on text comprehension performance, on metacognitive experiences (ME) before and after reading the texts, and on text- related positive and negative emotions. The results showed that music training did not have a significant effect on text comprehension but there was an interaction of music training with music background, in favour of the non- trained participants with music background. There were also positive effects of music background on positive affect (joy) and on feeling of difficulty of the difficult text, but not on other ME. There was no effect of WM on ME or affect. Task difficulty had an effect both on text comprehension and ME. Gender but not age had also an effect on feeling of difficulty and interest in favour of girls.

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| Thursday 18:30 - 20:30 | Poster Session 2 | Room: ALKYONI |

CAPT (COGNITIVE ASSESSMENT PSYCHOLOGICAL TESTS): THEORETICAL FOUNDATIONS AND ORGANIZATION
Helena Bilimória & Leandro S. Almeida
Universidade do Minho, Braga, Portugal

The aim of this communication is to present a battery of cognitive assessment tests, its' theoretical foundations and its' organization. The battery (PPAC) is composed of four tests, each one assessing one of the following cognitive processes: attention, memory, comprehension and divergent thinking. For each test, two aspects of metacognition (Flavell, 1979; Efklides & Vauras, 1999) are also evaluated: i) metacognitive skills or regulation and, ii) metacognitive experiences, namely, the *feeling of difficulty*. The assessment of the attention process comprises tasks of visual divided attention, based upon the Multiple Resource Model (Wickens, 1980; 1984; 2002). The memory task includes a list of ordinary words to be retained once and recovered twice: one, straight after, and another, after a distraction task of 15 minutes duration. The theoretical model for the task was the two level of processing approach (Craik & Lockart, 1972; Lockart & Craik, 1990) and the encoding specificity principle (Craik & Tulving, 1975). The comprehension task involves the matching between a series of verbal statements items and the equivalent items of another series, this one composed of verbal inferential statements, figurative and arithmetical expressions. This task took as theoretic basis the construction–integration model (Kintsch, 1998). At last, the assessment of the divergent thinking consists of a problem finding task, focused on the proposal of consequences to a given situation; Fluency, flexibility, originality and elaboration, as on the SOI model (Guilford, 1986) are the criteria to evaluate this process. These processes were chosen given the relations and interdependence among them through the information processing.

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Thursday 18:30 - 20:30	Poster Session 2	Room: ALKYONI

SOLVING PROBLEMS IN GEOMETRY
Amaryllis-Chryssi Malegiannaki & Anastasia Efklides
Aristotle University of Thessaloniki, Greece

The aim of the present study was to investigate (a) the effect of direction of studies (theoretical, positive, technological), educational level (senior high vs. university) and gender on performance on geometry problems, and (b) on metacognitive experiences, namely feeling of difficulty, estimate of effort, estimate of solution correctness, and confidence. The participants were 111 students of senior high school and 202 students of Aristotle University of Thessaloniki of both genders. They were asked to solve three isomorphic geometry problems that differed in their wording. Half of the participants were provided with the mathematical formula that was needed for the solution of the problems. Before and after each problem they were asked to report on their metacognitive experiences. The analyses revealed a main effect of task as well as interactions of task with direction of studies, educational level, gender and mathematical formula both in performance and metacognitive experiences. The presence of formula interacted with task and affected the reported feeling of difficulty before solving the problems but not estimate of effort. After problem solving there was only the main effect of task significant.

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Friday 09:00 - 10:30	Symposium 3	Room: ELECTRA

THE EFFECTIVENESS OF COMPUTER-BASED LEARNING ENVIRONMENTS AS METACOGNITIVE TOOLS

Organizer/Chair: **Roger Azevedo & Bracha Kramarski,** *University of Memphis, TN, USA & Bar-Ilan University, Ramat Gan, Israel*

Discussant: **Marcel V. J. Veenman & Arthur Graesser,** *Leiden University, The Netherlands & University of Memphis, USA*

The papers appearing in this symposium reflect a growing interest by researchers from various fields in examining the use of computers as metacognitive tools for enhancing learning. This topic has become increasingly important as computer-based learning environments (CBLEs) become ubiquitous and students use them extensively both in and out of school to learn about conceptually-rich domains (Azevedo, 2005, Biswas et al., 2005; de Jong, 2006; Graesser et al., 2005; Kramarski & Gutman, 2006; Veenman & Elshout, 1993). It is argued that the effectiveness of these environments will only be achieved if learners regulate their learning—that is, if they deploy the metacognitive and self-regulatory processes necessary to effectively learn about the relevant topics (Azevedo & Hadwin, 2005; Azevedo, et al., in press; Bannert, 2006; Biswas et al., 2001; de Jong, 2005; Kramarski & Mizrachi, 2006; Kramarski & Mevarech, 2003; Shapiro & Neiderhauser, 2004; Zumbach & Bannert, 2006). Using computer environments to learn about conceptually-rich domains involves a set of complex interactions between cognitive, motivational, affective, and social processes (e.g., Collins, Brown, & Newman, 1989; Jonassen & Reeves, 1996; Lajoie, 2000; Lajoie & Azevedo, 2006; Pea, 1985; Shute & Psotka, 1996; White & Frederiksen, 2005). Current research on learning with CBLEs from the fields of cognitive science, learning sciences, psychology, education, and artificial intelligence (AI) in education provides evidence that learners of all ages experience certain difficulties when learning about conceptually-rich domains such as science, math, and social studies. This research indicates that learning about these domains with computer environments is particularly difficult because it requires students to regulated their learning—i.e., to analyze the learning situation, set meaningful learning goals and determine which strategies to use, assess whether the strategies are effective in meeting the learning goals, and evaluate their emerging understanding of the topic. Learners also need to deploy several metacognitive processes to determine whether they understand what they are learning, and modify their plans, goals, strategies, and effort as necessary, all in response to changing contextual conditions (e.g., their cognitive states, motivational level, and social support). Further, depending on the learning situation, they may need to reflect on their learning and modify aspects of the learning context. The papers in this symposium represent novel and innovative ways of researching the role of SRL and metacognition when learning with CBLEs. The goal of this symposium is to bring together cognitive

scientists, educational and cognitive psychologists, and educational researchers to present cutting-edge research on the effectiveness of CBLEs as MetaCognitive tools to enhance learning. **Symposium Format:** This symposium will be presented in a panel discussion format targeted at addressing the issues related the use of computers as metacognitive tools for enhancing learning (see Azevedo, 2005, in press). First, the co-chairs of the session will spend 5 minutes introducing the importance of the theme as an emerging area of in the field of the learning sciences, educational computing, and educational research. The presenters then will be given 15 minutes each to present their papers. The discussants will speak for 10 minutes each and moderate a 20-minute interactive discussion between the audience members and the panel.

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Friday 09:00 - 10:30	Symposium 3 / Paper 1	Room: ELECTRA

METACOGNITIVE PROCESSES DURING SELF-REGULATED LEARNING WITH HYPERMEDIA: A DEVELOPMENTAL COMPARISON
Roger Azevedo[1], Daniel C. Moos[2], & Jeffrey A. Greene[3]
[1]University of Memphis, TN, USA, [2]Gustavus Adolphus College, USA, & [3]University of North Carolina, Chapel Hill, USA

In this quasi-experimental study, we analyzed 99 adolescents' and college students' ability to self-regulate their learning of the circulatory system while using a hypermedia environment during a 40-minute experimental session. We used a mixed methodology approach that included converging pretest-posttest product data of students' declarative knowledge gains and mental model shifts with process data from concurrent think-aloud protocols to examine the role of self-regulatory processes during learning with hypermedia. Regression analysis results indicated that middle-school students gained statistically significantly less declarative knowledge than high-school and college students. The analysis also indicated that students across developmental levels who used self-regulatory processes related to metacognitive monitoring and planning during learning were more likely to have a more accurate and sophisticated mental model at posttest. The results of this study demonstrate the importance of developmental level, and metacognitive and planning processes when using hypermedia to learn about complex science topics. Our results have implications for the design of scaffolds to support students using hypermedia environments that offer minimal guidance.

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Friday 09:00 - 10:30	Symposium 3 / Paper 2	Room: ELECTRA

EFFECTS OF ONLINE METACOGNITIVE ENGAGEMENT ON PRE-SERVICE TEACHERS' SELF-REGULATED LEARNING IN PEDAGOGICAL CONTEXT
Bracha Kramarski & Tova Michalsky
Bar-Ilan University, Ramat Gan, Israel

Standards in teachers' education recommend to prepare pre-service teachers for SRL in pedagogical context (NCATE, 2002). It is argued, that the more teachers understand about their own SRL, the better they can perceive the value of SRL, and teach SRL to their students. However, research indicates that in all age learners need support to identify effective ways to be engaged in regulation of their learning. This study compares the effects of metacognitive engagement under two conditions: Online metacognitive engagement (OME), and face-to-face metacognitive engagement (FME) on self-regulated learning (SRL) skills, reflection ability and pedagogical knowledge. Ninety-five pre-service teachers were compared. Both groups reflected on IMPROVE metacognitive self-questions (Kramarski & Mevarech, 2003) that serve as cues for SRL skills, and answered on them by writing. Mixed quantitative and qualitative analyses indicated that at the end of the study the OME students outperformed the FME students on SRL skills measured by a questionnaire (Schraw & Dennison, 1994). Moreover, on the reflection process, the OME students used various metacognitive skills as planning, monitoring, debugging and evaluation, which was associated positively to pedagogical knowledge in their planning lesson. Implications of preparing and assessing pre-service teachers SRL online will be discussed at the conference.

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| **Friday 09:00 - 10:30** | Symposium 3 / Paper 3 | Room: ELECTRA |

DESIGN AND EFFECTS OF METACOGNITIVE PROMPTING WHEN LEARNING WITH HYPERMEDIA

Maria Bannert[1] & Christoph Mengelkamp[2]
[1]Chemnitz University of Technology, Germany & [2]University of Landau, Germany

Recent research in hypermedia-learning points out that many students have difficulties in strategic and metacognitive learning behaviour. Thus, the aim of this presentation is to discuss appropriate scaffolding for metacognitive reflection when learning with modern computer-based learning environments. It is assumed that prompting students for metacognitive reflection will affect the learning process by engaging students in more metacognitive behaviour leading to better learning performance. In this presentation the design and effects of three kinds of metacognitive prompting measures will be compared and discussed. Design and main results of three experiments where students of the experimental groups were supported by one of the metacognitive prompting measure whereas the control groups were not supported will be presented. In sum, results of learning process and learning outcome confirm the positive effects of all three metacognitive prompting measures, however their specific influence are significantly varying in degree. Based on this research implications for the design of metacognitive support to improve self-regulated learning with computer-based learning environments will be discussed.

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| **Friday 09:00 - 10:30** | Symposium 3 / Paper 4 | Room: ELECTRA |

EFFECTS OF METACOGNITIVE PROMPTS ON LEARNING STRATEGIES AND LEARNING OUTCOMES IN INTERACTIVE COMPUTER-BASED LEARNING ENVIRONMENTS

Jill Gößling, Hubertina Thillmann, Jessica Marschner, Joachim Wirth, & Detlev Leutner
Duisburg-Essen University, Germany

Based on models of discovery learning (Klahr & Dunbar, 1988) and models of self-regulated learning (SRL; e.g. Winne & Hadwin, 1998) we assume two basic requirements of learning in interactive computer-based learning environments (CBLE): First, learners must generate new information (e.g., by running experiments). Afterwards, they must integrate information into their knowledge (e.g., by visualizing). We investigated whether metacognitive prompts directed at generating or integrating information foster strategy use and learning in interactive CBLEs. Additionally, we examined whether the effect of these metacognitive prompts depends on their point of time of presentation. 95 students learning in a CBLE were randomly assigned to three groups. Group 1 received generation prompts first and integration prompts afterwards. Group 2 received the same prompts the other way round. Group 3 received all prompts before learning. Results revealed that prompts affected the quality of strategy use, with groups 1 and 2 outperforming group 3. Furthermore, learning outcome in group 1 was higher than in group 2, which in turn was higher than in group 3. Results support our assumption that learners need strategies for both, generating and integrating information. Furthermore, they show that presenting metacognitive prompts at the right time fosters strategy use and learning.

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| **Friday 09:00 - 10:30** | Symposium 3 / Paper 5 | Room: ELECTRA |

METACOGNITIVE KNOWLEDGE, ACHIEVEMENT GOALS AND HELP-SEEKING IN A WEB-BASED STATISTICS LEARNING

Noury Fabrice[1], Nathalie Huet[1], Christian Escribe[1], & Susanne Narciss[2]
[1]Université Toulouse, France & [2]Psychologie des Lehrens & Lernens, Germany

Learning in computer-based learning environments requires that learners regulate their own learning (Azevedo, 2004). Self-regulation of learning includes seeking for help if learning tasks are not mastered successfully. Yet, prior research revealed that learners' help-seeking is rather often not appropriate (Aleven et al., 2003). According to some authors (e.g., Nelson-Le-Gall, 1981) metacognitive knowledge (i.e. perception of the utility and cost of help seeking) and achievement goals (i.e. perception individuals have of the purpose of their achievement) influence help-seeking (Noury, Escribe & Huet, 2007). In this study, the relationships between metacognitive knowledge, achievement goals and help-seeking are explored in a web-based learning environment on statistics. Forty-two psychology students had to solve statistics problems on a web-site designed for their course and could use various types of help components (worked-out problems, glossary, online course). Achievement goals (mastery, performance-approach and performance avoidance goals) and metacognitive knowledge were assessed by questionnaire. Significant results indicated that (1) perceptions of the utility of helps were positively associated with their use; (2) mastery goals were positively associated with the perception of the utility of helps whereas both performance goals were negatively associated with it; performance avoidance goals were positively related to the perception of cost for using helps; (3) mastery goals were positively associated with the use of helps, both performance goals were negatively associated with the use of helps. The implications of these results on learning will be discussed.

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Friday 09:00 - 10:30	Symposium 4 (invited)	Room: ALKYONI

METACOGNITION OF IGNORANCE

Organizer/Chair: **Josef Perner**, *University of Salzburg, Austria*
Discussant: **Johannes Brandl**, *University of Salzburg, Austria*

"Meta-cognition" is commonly defined as "cognition about cognition". This definition leaves open how much the metacogniser has to understand about the cognitive nature of the object-level cognition. A strong form requires that the cognitive act be understood as representational, which makes the metacognitive act a case of metarepresentation. Proust (Mind & Language, in press) has argued that this is too strong a requirement to account for apparent metacognitive acts of self-regulation. The basic question remains: what is required of some mental act to qualify as meta- and not just as a complex cognitive act and how can one empirically detect such acts. The discussion is strongly influenced by experimental paradigms in animal research for demonstrating metacognition in primates. Beran and Smith work with macacqes and capuccin monkeys who have to learn to use a special opt-out response key when they are uncertain about the correct response in order to avoid negative feedback. Kloo is adopting a child-friendly version of this paradigm to investigate preschool children's awareness of their own ignorance, for which extant evidence is sparse and inconsistent. Dienes discusses the—in some respects inverse--case of unconscious knowledge in implicit learning, where participants think they are ignorant. Vierkant provides an interesting philosophical angle on Dienes' data by using Moran's distinction between theoretical and deliberative stance of having self-knowledge. Brandl will discuss the impact of the presentations in answering the basic question whether the presented studies do in fact provide evidence of meta- processes.

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Friday 09:00 - 10:30	Symposium 4 (invited) / Paper 1	Room: ALKYONI

METACOGNITION IN NON-HUMANS:
METHODOLOGICAL AND THEORETICAL ISSUES
Michael J. Beran[1], J. David Smith[2], & Joelle Proust[3]
[1]Georgia State University, Decatur, USA, [2]University of Buffalo / State University of New York, USA, &
[3]Institut Jean-Nicod (EHESS-ENS), Ecole Normale Supérieure, Paris, France

To test metacognitive abilities in non-human animals, researchers have used three kinds of methods. In the "opt out" paradigm, animals can choose to perform a task of varying difficulty, or to execute a simpler task instead for a

lesser gain. In the retrospective confidence judgment paradigm, animals have to provide a low or high confidence response following a first-order task. In the "search for information" behavioral paradigm, animals sometimes need to look for missing information in order to complete a task. Studies of metacognition in non-humans based on these paradigms show that animals can evaluate their meta-perceptual uncertainty in a variety of tasks. Several methodological and theoretical objections have been raised against the possibility for non-speaking animals to be attributed metacognitive abilities. Animal subjects might be using associative mechanisms between exteroceptive stimuli rather than basing their judgments on evaluations of their own uncertainty. More specifically, they might develop an aversive attitude towards error-causing stimuli based on feedback signals. Finally, animals cannot represent metacognitive tasks because they do not have a theory of mind, which implies that they have no access to their own mental uncertainty. These various arguments will be discussed. We will show how to prevent animals from basing their evaluations on external regularities, by making stimuli unpredictable, and by using transfer tests. On the theory side, we will show that appreciating or predicting one's own competence based on endogeneous signals does not necessarily engage a theory of mind, and that metacognitive judgments do not require metarepresentations.

<p style="text-align:center">*</p>

Friday 09:00 - 10:30	Symposium 4 (invited) / Paper 2	Room: ALKYONI

AWARENESS OF OWN IGNORANCE IN CHILDREN
Daniela Kloo
University of Salzburg. Austria

Our understanding of states of knowing is one important part of metacogniton. Research on children's understanding of knowing has mostly focused on children's understanding of sources of knowledge (e.g., O'Neill, Astington, & Flavell, 1992; Wimmer, Hogrefe, & Perner, 1988). In contrast, there is little evidence on when children do explicitly understand whether they know something or not. Usually, it has just been taken for granted that 3-year olds have no problem with that. However, recent data by Tardif, Wellman, Fung, Liu, and Fang (2005) showed that between 39% (Exp. 1) and 55% (Exp. 2) of 3-year-old children claim to know what is inside a drawer, although they haven't been exposed to the content. In this paper, we will review the existing evidence regarding children's understanding of their own ignorance or uncertainty. We will also present data from experiments systematically investigating children's understanding of their own ignorance, of the modality-specificity of knowledge acquisition, and of their own uncertainty (using a child-friendly version of Michael Beran's paradigm for assessing metacogniton in animals).

<p style="text-align:center">*</p>

Friday 09:00 - 10:30	Symposium 4 (invited) / Paper 3	Room: ALKYONI

GAMBLING, SELF-CONFIDENCE, TWO WAYS OF SELF-KNOWLEDGE, AND AGENCY
Zoltan Dienes & Tillmann Vierkant
University of Sussex, UK & University of Edinburgh, UK

In the empirical part of the paper we will look at several experiments exploring the use of two different subjective measures of unconscious knowledge: wagering and confidence reports. Both methods have been used to measure the conscious status of mental states on the assumption that a conscious state is a state one is aware of being in. Using the artificial grammar learning paradigm, experiment one shows that people could to some degree discriminate between states of knowledge with verbal confidence ratings, but not with wagers. In both cases, subjects could know without apparently knowing they knew. In the conceptual part of the paper, we will examine a distinction by Moran which might help to understand these experiments better and allow us to use them for a claim about free agency. Moran distinguishes between two ways in which we can have self-knowledge. Moran calls these two ways the theoretical stance and the deliberative stance. In the theoretical stance, we perceive our mental states as objects in the world, whereas in the deliberative stance, they are constitutive of our subjective point of view. According to Moran, there is a constitutive link with agency in the deliberative stance. Accepting Moran's distinction, the paper argues that there is indeed a special link between the deliberative stance and some forms of

agency, but that this is only part of the picture. Drawing on our empirical results, the paper argues that the distinctly human capacity to act freely crucially requires the ability to deploy the theoretical stance.

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Friday 10:30 - 12:00	Symposium 5	Room: ELECTRA

METACOGNITION VIA THE CALIBRATION PARADIGM

Organizer/Chair: **Sabina Kleitman**, *The University of Sydney, Australia*
Discussant: **Pauline Howie,** *The University of Sydney, Australia*

The construct of Metacognition is well-established and widely researched yet much is still unknown. Many methods exist to assess different facets of metacognitive knowledge and skills. One method that is receiving well-deserved popularity is using objective confidence ratings assigned immediately after a decision-making act and comparing these ratings with the actual accuracy of the decision: the so-called "calibration method". Confidence ratings have been shown to have excellent psychometric properties: they separate clearly from personality measures using factor analytic techniques, they have high reliability estimates and show exceptional factorial stability. Calibration provides a powerful window into metacognition with many new findings available for both child and adult populations. The findings demonstrate the flexibility of the paradigm and its ability to address a range of questions related to personality and other correlates of metacognitive performance in a variety of contexts, as well as examining the development of metacognitive abilities across the lifespan/across childhood. The aim of this symposium is to deliver the results from five papers that used the calibration paradigm to study metacognition. The Kleitman and Stankov paper will report results of several studies on the nature of over/underconfidence bias on cognitive tests. The paper links the bias to the systematic tendency towards irrationality on a metacognitive level. The Moscrop and Kleitman paper examines the links between the Self-confidence factor in school children and their school achievements and the effect that parental rearing techniques have on both constructs. The notable finding is a positive relationship between the Self-confidence construct and Academic Achievements that exists after controlling for Fluid Intelligence, gender and age. Three papers will address the development of confidence judgments about event recall across childhood and into adulthood using responses to questions asked in various formats about brief videos. The Allwood, Innes-Ker, Holmgren, and Fredin paper examines the relationship between confidence and accuracy in young children's event recall. This study's notable contribution was to examine the development of accuracy of confidence judgments across early and middle childhood. The Fritz and Howie paper also reports on the development of realism across childhood, providing data for the first time on confidence judgments in response to a standardized test of suggestibility in children as young as 6 years. The Howie and Rowe paper examines developmental differences in the sensitivity of confidence judgements to different types of feedback.

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Friday 10:30 - 12:00	Symposium 5 / Paper 1	Room: ELECTRA

BIAS SCORE REVISITED:
AN INSTANCE OF SYSTEMATIC IRRATIONALITY ON A METACOGNIVE LEVEL?
Sabina Kleitman & Lazar Stankov
The University of Sydney, Australia & ETS, Princeton, New Jersey, USA

There are well-excepted normative models of probability that supposedly underlie human decision-making processes. One of these models is the additivity postulate which prescribes that subjective probabilities attached to a set of alternatives in multiple-choice tests must add up to 100%. That is, if people are asked to assign probability judgments that each answer on a multiple-choice question is correct, the sum of these judgments will add up to 100. This paper explores whether over/underconfidence bias is a psychological tendency towards irrationality on a metacognitive level or a result of ecological factors. Several studies were designed to investigate this matter and a new cognitive task—Verbal Reasoning Test—was designed to simulate different degrees of uncertainty. The test allowed the assessment of ways in which people attach subjective confidence weights for each of the multiple-

choice alternatives to be a correct answer. A large proportion of the participants violated the 'additivity' postulate of probability theory. In particular, across all three studies there appeared to be a robust tendency towards under- or over-additivity. The test-retest reliability estimates for the measures reflective of this tendency ranged between .64 and .69. The manner in which participants violated the 'additivity' principle was predictive of over/underconfidence bias on other tests. Importantly, the nature of this systematic overlap suggested the possibility of systematic tendencies at the metacognitive level.

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Friday 10:30 - 12:00	Symposium 5 / Paper 2	Room: ELECTRA

ACADEMIC ACHIEVEMENTS AND SELF-CONFIDENCE IN SCHOOL-AGED CHILDREN AND THEIR LINKS TO PARENTAL RARING STYLES
Tanya Moscrop & Sabina Kleitman
The University of Sydney, Australia

Prior research into the area of metacognition has demonstrated evidence of the stable and reliable construct of Self-confidence in adult populations. Few studies however, have demonstrated evidence of this construct among children. The current study investigated the Self-confidence construct of school-aged children ($\underline{N}$ = 183) aged 9 to 12 years across several cognitive tests. The students also completed the brief-current form of the Parental Bonding Instrument to assess their perceptions of the level of paternal, and maternal, care and overprotection, within the parent-child relationship. Finally, school grades were collected from the students' class teachers which reflected individual achievement within the current school year. The results from this study were three-fold. Firstly they demonstrated that self-confidence is a stable and a reliable construct in children aged 9-12. Secondly, the results strongly indicate that higher levels of Self-confidence predict greater school achievement, irrespective of a student's fluid cognitive ability, age and gender. Finally, family dynamics, particularly, parental warmth and care was found to predict positively both school achievement and children's level of Self-confidence. Such results support the existence of the Self-confidence construct and the importance of it for school achievement. The results also suggest that paternal and maternal care have an important influence within this relationship.

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Friday 10:30 - 12:00	Symposium 5 / Paper 3	Room: ELECTRA

CHILDREN'S AND ADULTS' REALISM IN THEIR EVENT-RECALL CONFIDENCE IN RESPONSES TO FREE RECALL AND FOCUSED QUESTIONS AS MEASURED BY CALIBRATION METHODOLOGY
Carl Martin Allwood, Ese Innes-Ker, Jessica Holmgren, & Gunilla Fredin
Lund University, Sweden

Two experiments examined the realism in the confidence of 8-9 year olds, 12-13 year olds and adults in their free recall and answers to focused questions after viewing a short video clip. A different video clip was shown in each experiment and the focused questions differed in difficulty. In both experiments the youngest age group showed perfect realism (e.g., no overconfidence) in their confidence judgments for the free recall. The free recall results also showed, as expected, that the youngest group had lower completeness but similar accuracy as the adults. All age groups showed poorer realism for the focused questions. When questions with content already mentioned in the free recall were excluded from the analyses of the focused questions in Experiment 1 the differences in question format were accentuated. The study shows the importance of question format when evaluating the credibility of the confidence shown by 8-9 year old children in their own testimony. The within-subject standard deviation for the confidence judgments did not differ between the 8-9 year olds and adults, thus indicating that the task was appropriate also for the youngest age group.

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Friday 10:30 - 12:00	Symposium 5 / Paper 4	Room: ELECTRA

YOUNG CHILDREN'S REALISM:
MISLED BY LEADING QUESTIONS?
Kristina Fritz & Pauline Howie
The University of Sydney, Australia

To date, there has been limited metacognitive research on the development of children's ability to make accurate confidence judgments about event memory, with the focus thus far on adults and older children and using a limited range of event stimuli and question formats. The present study aimed to extend these findings by examining the development of accurate confidence judgments across early and middle childhood, when asked leading event recall questions. The Video Suggestibility Scale for Children (VSSC; Scullin & Ceci, 2001) has been widely used to measure children's suggestibility, but to date there has been no examination of confidence using this scale. Approximately 200 6-, 8- and 10-year old children were shown the standard VSSC video and interviewed a week later using free recall followed by 18 structured yes-no questions about the video, 14 of which suggested an incorrect answer. Groups of questions were repeated after children had been given mild negative feedback about the accuracy of their initial responses. Children then provided confidence judgments for each repeated question. Overconfidence was found at all ages but was greater in the younger children. The correlation between free recall memory and overconfidence was negative as expected, but did not reach significance. Forensic implications are discussed.

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Friday 10:30 - 12:00	Symposium 5 / Paper 5	Room: ELECTRA

CONFIDENCE TRICKS:
THE IMPACT OF FEEDBACK AND ITS INVALIDATION ON THE CONFIDENCE OF CHILDREN
AND ADULTS IN THEIR EVENT RECALL
Pauline Howie & Petria Rowe
The University of Sydney, Australia

Research on the effects on confidence judgments of feedback and its invalidation has largely focused on line-up identifications in adults. In the broader area of event recall, there has been little research on feedback effects on children, and none on feedback invalidation. Recent research has suggested that adults and children may be differentially sensitive to disconfirmatory and confirmatory feedback, but the source of the feedback was anonymous and processing may not have been optimal. This study aimed to directly compare adults and children in a context which optimised the salience and level of processing of feedback. Adults and 10-12-year-olds were shown a video of a theft, then asked 40 forced-choice recall questions about the video. A week later they received feedback in the form of responses of a known "co-witness" to the same questions. The feedback confirmed half of each participant's correct and incorrect responses, and disconfirmed the remaining responses. A control group received no feedback. Feedback was then invalidated for half of the participants: they were told that the feedback had been random and should be ignored. Finally, participants rated their confidence in their responses. Overconfidence occurred in all conditions and age groups, and was further inflated by confirmatory feedback and reduced by disconfirmatory feedback. In general, age differences were not found in the direction or extent of the impact of feedback. Invalidation somewhat reduced the effects of confirmatory feedback, but did not reduce the effects of disconfirmatory feedback. Theoretical and practical implications are considered.

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Friday 10:30 - 12:00	Symposium 6 (invited)	Room: ALKYONI

METACOGNITION AND ARITHMETIC

Organizer/Chair: **Annemie Desoete**, *Ghent University & Artevelde hogeschool, Ghent, Belgium*

Discussant: **Roger Azevedo**, *University of Memphis, TN, USA*

This symposium focuses on the challenges and potentials of metacognition in aritmetics. In a first presentation Bracha Kramarski, Izik Weisse, and Inbal Kolsher analyse the cognitive and affective factors in supporting mathematical learning of higher and lower Young achievers with self-metacognitive questioning. They discuss the effects of using explicit metacognitive support with higher order questions in reducing the information processing demands of learning tasks and in decreasing anxiety for anxious individuals. In the next presentation Tarja-Riitta Hurme; Kaarina Merenluoto, Pekka Salonen, and Sanna Järvelä elaborate on socially shared metacognition in arithmetic problem solving. Their study brings up the interplay between individual and joint regulation at metacognitive level in networked problem solving which mechanism requires further studies. In addition Dirk Tempelaar analyses the role of self-percieved metacognitive knowledge, skills and attitudes in learning mathematics. Both the theoretical and practical implications of this study will be discussed at the conference. Moreover, Maria Opfermann and colleagues investigates the role of metacognitive strategies and metacognitive support in learning combinatorics with hypermedica. They revealed that for learners with no metacognitive strategies or less sophisticated metacognitive abilities, instructional support might provide them with ideas of how to structure and regulate their learning. Finally Anneke Vrught, Wouter Hijlkema, and Rustin Polat elaborate on statistical tasks evoking metacognive experiences and emotions. The results of this study may give a decisive answer to the question whether male students overestimate or female students underestimate their self-efficacy and metacognitive awareness concerning math-related tasks.

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Friday 10:30 - 12:00	Symposium 6 / Paper 1	Room: ALKYONI

SUPPORTING MATHEMATICAL LEARNING OF HIGHER AND LOWER YOUNG ACHIEVERS WITH SELF-METACOGNITIVE QUESTIONING: COGNITIVE AND AFFECTIVE FACTORS

Bracha Kramarski, Izik Weisse, & Inbal Kolsher
Bar-Ilan University, Ramat Gan, Israel

The aim of the present study is threefold: (a) to investigate the effects of self-metacognitive questioning training on primary school students' mathematical achievement with regard to problem solving of procedural and transfer tasks; (b) to examine the effects of self-metacognitive questioning on mathematical anxiety; and (c) to observe the effects of such training on achievement and anxiety of mathematics of higher and lower achievers'. Participants were 139 third-grade Israeli students who studied arithmetic in four classes. Two classes received metacognitive training (MT) and the other two classes served as control groups (CG). The metacognitive training was based on the IMPROVE self-questioning method (Kramarski & Mevarech, 2003). Three measures were used to assess students' mathematical achievement: a pretest, a post-test, and a transfer post-test. In addition, students' anxiety of mathematics was assessed. Findings indicated that the MT students gained more with MT than the CG students in mathematical problem solving of procedural and transfer tasks. In addition, the MT students demonstrated a greater ability to reduce their math anxiety than the CG students. In particular, these findings were demonstrated by the lower MT achievers. Both the theoretical and practical implications of this study will be discussed at the conference.

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Friday 10:30 - 12:00	Symposium 6 / Paper 2	Room: ALKYONI

SOCIALLY SHARED METACOGNITION IN ARITHMETIC PROBLEM SOLVING

Tarja-Riitta Hurme[1], Kaarina Merenluoto[2], Pekka Salonen[2], & Sanna Järvelä[1]
[1]University of Oulu, Finland & [2]University of Turku, Finland

The aim of this exploratory study was to examine socially shared metacognition in eight triads of pre-service teachers' (N = 24) arithmetic problem solving supported by an asynchronous Workmates (WM) learning environment. Metacognition was considered as socially shared if a discussion forum message intended to regulate

the groups' on-going problem solving at metacognitive level by interrupting, changing or promoting the progression of joint problem solving acknowledged and applied by peers. To be considered as metacognitive, the message should include an explicit explanation which depth in domain specific knowledge was described with micro-, macro and situation model levels. The triads worked either in WM, or they were working with WM having a stimulated recall group interview immediately after the joint problem solving. The data consists of the computer notes contributed to the WM and the video-recorded stimulated recall group interviews. The transcripts of video data were used to explore whether the participants were aware of that there appeared metacognitive regulation in the group. Mathematical problem solving and metacognitive regulation points of views were used in the qualitative content analysis of the computer notes having a message as the unit of the analysis. The results suggest that, there appeared to be socially shared metacognition especially in the problem solving situations, when the group had difficulties to find a solution method and situations when they tried to verify the joint problem solving process and reanalyzed the prerequisites of the problem. Further, the explicit explanations in metacognitive regulation messages were mainly at the micro and macro levels.

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Friday 10:30 - 12:00	Symposium 6 / Paper 3	Room: ALKYONI

THE ROLE OF SELF-PERCEIVED METACOGNITIVE KNOWLEDGE, SKILLS, AND ATTITUDES, IN LEARNING MATHEMATICS
Dirk Tempelaar
Maastricht University, The Netherlands

In this empirical study, we investigate the relationships between self-perceived effort in learning, measured effort in learning, and learning outcomes at the one side, and a range of self-report measures related to achievement motivation, implicit theories about intelligence, and metacognition, at the other side, of university students learning mathematics and statistics. The prime focuses of the study are the investigation of both the dependency of metacgontive self-perceptions on implicit theories, as well as the explanatory power of metacognition for subject specific achievement motivations, which in their turn explain effort and performance. Implicit theories are meaning systems about personal attributes as e.g. intelligence (Dweck, 2000). Prototypical examples are the concept of entity theory, that assumes intelligence to be a fixed, nonmalleable traitlike entity, and the concept of incremental theory, where intelligence is portrayed as something that can be increased through one's efforts. Students' metacognitive abilities are operationalised by the recently developed self-report instrument Awareness of Independent Learning Inventory (Elshout-Mohr et al., 2005; Tempelaar, 2006), that presumes metacognition to be a three dimensional construct, comprising knowledge, skills, and attitudes. Expectancy-value models form the basis of an instrument measuring achievement motivations and self-perceived effort (Schau et al., 1995; Tempelaar et al., 2007). Schau's expectancy-value model distinguishes two expectancy factors dealing with students' beliefs about their own ability and perceived task difficulty, a construct expressing subjective task-value, an affective task-related attitude, and the constructs interest and effort. Both achievement motivations and self-perceived effort are measured ex ante and ex post, in order to be able to observe developments during the learning episode. The relationships are investigated using structural equation modelling. Subjects in this study are 1500 first year students in an economics or business program, participating in an introductory course mathematics and statistics.

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Friday 10:30 - 12:00	Symposium 6 / Paper 4	Room: ALKYONI

THE ROLE OF METACOGNITIVE STRATEGIES AND METACOGNITIVE SUPPORT IN LEARNING COMBINATORICS WITH HYPERMEDIA
Maria Opfermann, Peter Gerjets, & Katharina Scheiter
Knowledge Media Research Center, Tuebingen, Germany

Prior studies on hypermedia learning show that not all learners benefit from the high amount of learner control that is offered in such environments. We assume that one possible reason might be that many learners lack metacognitive knowledge on how to regulate their learning in these environments. Thus, they may struggle more

with navigational and representational options that hypermedia environments offer which in turn leads to disorientation and cognitive overload. Against this background, we conducted a study that aimed at testing whether hypermedia learning can be enhanced by providing learners with metacognitive support. Students learned about principles of probability theory by means of worked examples that could be retrieved in several representational formats. As the first independent variable, we varied the availability of metacognitive support by showing half of the students a video that modelled sophisticated metacognitive learning behaviour. As the second independent variable, we varied the provision of prompts to foster students' representational awareness by giving them additional information on advantages and disadvantages of each representational format before choosing one. We found that all learners had significant knowledge gains which, contrary to our expectations however, were highest for the condition <u>without</u> instructional support and lowest for the condition with <u>both</u> forms of support. Further analyses showed that this effect was due to an interaction with learners' metacognitive abilities as both support measures appeared to be highly detrimental for learners with sophisticated metacognitive strategies. The findings and implications for instructional design and further studies will be discussed at the symposium.

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Friday 10:30 - 12:00	Symposium 6 / Paper 5	Room: ALKYONI

WHEN DOES A STATISTICAL TASK EVOKE METACOGNITIVE EXPERIENCES AND EMOTIONS?
Anneke Vrugt, Wouter Hijlkema, & Rustin Polat
University of Amsterdam, The Netherlands

The starting point of this study is that students judge their skills and metacognitive awareness in relation to specific task characteristics. A statistical task of medium difficulty was introduced to first-year psychology students as a difficult task, a task of medium difficulty or an easy task. Students who expect to solve difficult problems will have weaker self-efficacy beliefs, less metacognitive awareness and lower outcome expectancies than students who expect to solve problems of medium difficulty, or easy problems. Students who expect to solve easy problems will have stronger self-efficacy beliefs, more metacognitive awareness and higher outcome expectancies than the students who expect to solve problems of medium difficulty. During the task performance students with low and high outcome expectancies will notice that their rate of progress toward the goal - good achievement - is higher or lower than expected. The higher rate of progress evokes positive emotions and positive metacognitive experiences. The slower rate of progress evokes negative emotions and metacognitive experiences. Various studies showed that male students do not differ from female students in mathematical achievement, but that they differ in math self-efficacy. The results in the condition with a task of medium difficulty may clarify the meaning of this difference. When male students overestimate their self-efficacy and metacognitive awareness at the beginning of the task they will report more negative emotions and metacognitive experiences during the task performance. When female students underestimate their self-efficacy and metacognive awareness, they will report more positive emotions and metacognitive experiences.

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Friday 12:30 - 13:30	Keynote Speaker	Room: ELECTRA

UNDERSTANDING THE NATURE OF SCIENTIFIC KNOWLEDGE FROM CHILDHOOD TO ADULTHOOD
Beate Sodian
Ludwig-Maximilians-University, Munich, Germany

There is an apparent contradiction between research on children's early developing Theories of Mind, and research on adolescent's and even adults' deficient epistemologies of science. Since an understanding of the nature of scientific knowledge is an important element of science learning in school, the question of whether and to what extent elementary and secondary school students can acquire a constructivist understanding of science is a key issue in Cognitive Developmental research in Science Education. In the present talk, I report on a series of interview studies on developmental change in Nature of Science Understanding from 4th grade to adulthood. The

findings are consistent with the Theory of Mind literature in indicating that even elementary school students possess a basic understanding of knowledge construction in the human mind, but they are also consistent with the Science Education literature in indicating a lack of explicit awareness of the theory-evidence relation even in adults. Secondly, a series of curricular intervention studies in 4th grade classrooms is reported, showing that elementary school students can acquire a basic understanding of key elements of the scientific inquiry process even through short term instruction. The potential benefits of such metacognitive instruction for science learning are discussed.

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Friday 15:00 - 16:30	Paper Session 7	Room: ELECTRA

DEVELOPMENT OF CHILDREN'S METACOGNITIVE KNOWLEDGE AS A FUNCTION OF TEACHERSHIP IN THE PRIMARY GRADES
Tiina Annevirta & Marja Vauras
University of Turku, Finland

In the present study we explored the influence of different teaching and instruction practices, i.e., teachership, on the development of primary school children's (6-8 years) metacognitive knowledge (MCK) from preschool to the 2nd grade. Theoretical basis for our study came from the idea that teachers of young learners, particularly, should be aware of the important role of the teacher in actuating learners' awareness of their own learning and its cognitive processes (e.g., Bransford, Brown & Cocking, 2000; Gaskins, 1996; Pressley & Gaskins, 2006). The longitudinal sample included 222 children who were tested three times from preschool spring to the spring term of the 2nd grade using the Metacognitive Knowledge Test. Primary school teachers' ($N = 11$) teaching practices were constructed on the basis of teacher interviews which were carried out in the spring term of the 1st and the 2nd grade. The preliminary results showed that the MCK of children with initially low MCK developed a lot during the first two school years in all classrooms, but there were remarkable differences between these classes concerning the increase of MCK in children with initially <u>high</u> or <u>average</u> knowledge. In five classrooms with more modern style of teachership, the differences between groups with <u>low</u>, <u>average</u> or <u>high</u> MCK decreased whereas, in other six classes with more <u>traditional</u> style of teachership, the differences between the child groups remained the same over the first two school years. More detailed results and the method will be described in the presentation.

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Friday 15:00 - 16:30	Paper Session 7	Room: ELECTRA

UNIVERSITY TEACHERS' UNDERSTANDING OF THEIR OWN LEARNING
Kathryn M. Bartimote-Aufflick & Angela Brew
The University of Sydney, Australia

This presentation will detail the application of metacognitive theory to the learning of university teachers about their teaching and their students' learning. It aims to explore a problem which limits the extent of metacognitive learning by students – that of teachers not being able to teach metacognitive skills because they do not employ them in their own learning. The research is examining the extent to which teachers employ metacognition and self-regulation to improve their learning (about their teaching and their students' learning) and whether it ultimately results in improved student learning experiences. We have called this process 'studentship'. Studentship is conceptualised as the recognition of oneself as a learner. For a university teacher this learning may take place via formal courses, through personal interest, and/or by ongoing study, investigation or thoughtful examination of one's life and work. Preliminary findings suggest that there is a relationship between the capacity of the teacher to engage in metacognitive thinking, the extent of their learning about teaching and the quality of students' learning experiences. In the paper, these will be discussed in the context of an exploration of the methodological conundrums that such research poses. We hypothesise that it is this active, intentional and conscious metacognition (see Paris & Paris, 2001 for a discussion of consciousness) employed in the service of learning about teaching that

provides an impetus for ongoing learning throughout a lifetime, and also an improvement in teaching achievements. If this is so, it is important to understand more about these relationships.

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| **Friday 15:00 - 16:30** | Paper Session 7 | Room: ELECTRA |

TEACHERS' USE OF METACOGNITIVE AND SELF-REGULATORY STRATEGIES IN MATHEMATICS INSTRUCTION: RELATIONS TO INDIVIDUAL MOTIVATIONAL AND   AFFECTIVE FACTORS

Mariza Chatzistamatiou & Irini Dermitzaki
University of Thessaly, Volos, Greece

The aim of this study was to investigate the relationships of metacognitive and self-regulatory strategies teachers use during mathematics instruction with teachers' motivational and affective factors. Primary school teachers (N=292) were asked to report the strategies they use: a. to self-regulate their mathematics instruction, and b. to activate and develop their students' metacognition and self-regulated learning. Teachers also reported their self-efficacy in teaching mathematics, the value they attribute to mathematics, their enjoyment of teaching mathematics, and their commitment to teaching. The results showed that teachers' use of metacognitive and self-regulatory strategies were significantly related to the individual motivational and affective factors examined, more strongly to teaching self-efficacy. However, different groups of metacognitive and self-regulatory strategies teachers report using were differentially related to the individual variables examined. Teaching self-efficacy was significantly related to teachers' reported enjoyment from mathematics instruction, to the value they attribute to mathematics, and to teachers' commitment to their profession. The complex network of relations revealed will be discussed within the frame of self-regulated teaching and learning.

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| **Friday 15:00 - 16:30** | Paper Session 7 | Room: ELECTRA |

STUDENTS' SELF-REGULATION THROUGH META-DISCURSIVE REFLECTION IN MATHEMATICS

Petros Chaviaris & Sonia Kafoussi
University of the Aegean, Rhodes, Greece

Metacognition could be studied through a meta-discursive process that is pupils' reflection on their own and their interlocutors' actions, beliefs and intentions about their interaction. As Zimmerman (1995) mentioned, the interpretation of pupils' self-regulation has to be treated as a complex interactive process influenced by pupils' self beliefs-system. In the case of mathematics education this influence is very strong because of the dominated belief that learning mathematics is a private process and that the social interaction does not play significant role in it. This article addresses the issue of how 10-11 year old students regulated their behavior during their mathematical activity as they reflected on their small-group interaction by observing and discussing on their video-recorded cooperation. More specifically, the social factors that influence students' self regulation in mathematics are discussed and the opportunities that students' meta-discursive reflection offered to their self-regulation are presented. The participants, in this research program, were 18 students who worked in pairs in a mathematics classroom. The study is focused on different cases of pairs that concerned with different students' self beliefs-systems. The students' observations and discussions on their videotaped cooperation allowed the students to become aware of multiple social aspects of their mathematical activity. Composing the findings the consideration that the students' self regulation depends not only on their self-efficacy, but also on the interaction between their own and the others intentions and expectations as well, is strengthened.

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| **Friday 15:00 - 16:30** | Paper Session 8 | Room: ALKYONI |

FADING-IN SOLUTION STEPS WHILE PROMPTING STRATEGIC LEARNING BEHAVIOR
Florian Schmidt-Weigand, Simone Blum, & Martin Hänze
University of Kassel, Germany

How can conventional worked examples be further enhanced to promote learning? $\underline{N}$ = 92 students of the 8th grade attended in pairs to a physics problem. Problem solving was supported by a worked example given as (a) a conventional worked example, (b) an incremental worked example, or (c) an incremental worked example with strategic prompts. The incremental worked example was obtained by segmenting the conventional worked example into solution steps. In groups (b) and (c) students self-regulated when to attend to the next solution step. In group (c) each solution step was preceded by a prompt that suggested strategic learning behavior (e.g. note taking, sketching, communicating with the learning partner, etc.). Prompts and solution steps were given on separate sheets. The study revealed that learning from worked examples was enhanced when the incremental solution steps were preceded by prompts while incrementally fading-in solution steps alone did not significantly alter learning experience (basic needs, attributions) and learning success (retention, transfer). Only if strategic learning behavior was prompted students felt more competent, remembered the solution more correctly, and reproduced more solution steps.

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Friday 15:00 - 16:30	Paper Session 8	Room: ALKYONI

ACCOMPANIMENT THROUGH A METACOGNITIVE SELF-QUESTIONING STRATEGY TO ENHANCE REFLECTIVE ANALYSIS AMONG INTERN STUDENTS IN PRIMARY TEACHER TRAINING PROGRAM
Sylvie Viola & Robert David
University of Quebec in Montreal, Canada

Students enrolled in teacher training program should in the course of their practical training report on their achievements through a reflective analysis. This particular kind of activity is required by all supervisors internship for students in our program during the four years of training. It plays a central role in training since this was the only written evidence of everyday thinking, one that allows self-regulation in the classroom. In its present form, it is an activity whose approach and objects are predefined. In its current form, this activity is qualified by our graduating students of redundant, inefficient, devoid of interest and very far from their training needs. What's more, according to these results, the requirements relating to this kind of activity seems to be more institutional than pedagogical. Accordingly, those reflective analysis activities are often carried out in an automatic, mechanical and impersonal way. To enhance the meaning of an authentic reflective practice and justify the relevance of it in our context of training, some research suggests bringing students to formulate their own questions to guide their reflexive analysis. These issues are related to real needs to understand what is happening and to readjust their teaching. As part of an experiment, we have taught our students to self-questioning in a metacognitive way throughout the stage and write the answers in a logbook, which has become a lot more meaning for them. By comparing the types of questions before and after the probationary period, we find that the analysis conducted from a conscious of self-questioning are more effective in several way than the traditional activities proposed initially.

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Friday 15:00 - 16:30	Paper Session 8	Room: ALKYONI

'WALK TO A BETTER WORLD':
DEVELOPING YOUNG CHILDREN'S METACOGNITIVE SKILLS THROUGH CREATIVE ACTIVITY
Dorothy Faulkner & Mathilda Joubert
The Open University, Milton Keynes, United Kingdom

This paper draws on the findings of a study of a series of related creative activities carried out by 7 -8 year old children in an English primary school. The research was conducted as part of a larger, whole-school evaluation of the impact of a formal programme of creativity training on teaching and learning. Video recordings of classroom interactions between pupils and their teacher were carried out at three points during the school year. These focused on an extended class project to produce a short animated film about pollution and the environment. Children were taught to use particular creative thinking tools and communication strategies to structure the idea generation processes involved in developing and producing the film. The analysis of transcripts of the talk that took place during these sessions demonstrated that the creative thinking programme was also effective in developing the children's metacognitive skills. The training programme offers children an explicit vocabulary and set of rules that can be used to manage the social processes involved in collaborative project work such as building on and making connections between each other's ideas. It will be argued that the creativity training programme provided a set of tools that enabled children to regulate their thinking in a disciplined way, that offered them ways of documenting and expressing their ideas overtly and that offered a set of rich metacognitive experiences that encouraged them to evaluate the strengths and weaknesses of their own thinking processes.

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| Friday 15:00 - 16:30 | Paper Session 8 | Room: ALKYONI |

IMPACT OF A METACOGNITIVE PROGRAM TO HELP MOTHERS TO ENHANCE THEIR YOUNG CHILDREN'S CRITICAL THINKING
Julia Suleeman Chandra
Murdoch University, Western Australia, and University of Indonesia, Jawa Barat, Indonesia

Critical thinking programs usually are targeted for students of high schools and above. It is not until the last decade critical thinking in young children started to receive attention. This paper, as part of a doctoral research, discusses the impact of a metacognitive program to help mothers enhance the development of critical thinking in their young children of 4- and 5-year olds. The effectiveness of the program was evaluated through two different but complementary assessments of critical thinking in the children, using a pre- and post-test control group design. The first assessment was a traditional quantitative individual measure called Precursors of Critical Thinking for Children (PCTAC). The second assessment was an interactive qualitative measure called Mother-Child Interactions (MCI) which assessed children's critical thinking as they were interacting with their mothers. The MCI measure and the metacognitive program used with mothers were inspired by Vygotsky's Zone of Proximal Development perspective. The metacognitive program with mothers covered issues such as understanding the child's inquiry nature, creating a home of inquiry, and being sensitive toward the child's developmental needs. While both groups of children improved over the intervention period that lasted 10 months, the improvement of the experimental group was greater, and involved more variables compared to the control group.

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| Friday 16:30 - 18:00 | Paper Session 9 | Room: ELECTRA |

THE DEVELOPMENT AND THE ROLE OF PHONOLOGICAL AWARENESS IN READING AND SPELLING GREEK
Nataly Loizidou Ieridou
Frederick Univeristy Cyprus, Limasol, Cyprus

In order for children to become proficient readers and spellers, they need to firstly understand that letters correspond to different sounds and vice versa. Hence, mastery in reading and spelling requires some degree of meta-linguistic awareness that words are a blend of sub-lexical segments-phonological awareness (Liberman, 1973). The present study investigates development of phonological awareness and its role in literacy development in Greek. 150 Greek-Cypriot primary school children (first–fifth grade) took part in the study. A set of phonological awareness measures was used to assess children's phoneme and syllable awareness. Additionally, reading and spelling performance was assessed using word reading and spelling and non-word reading tasks. The findings suggested that children's performance on the phonological awareness tasks was very high even in the

youngest children. Nevertheless, children's performance on the phonological awareness tasks is improving from the first to the third grade and to the fourth and fifth grade where children's performance on the tasks was almost perfect. As far as the relation between phonological awareness and learning to read and spell is concerned, the results of the study are thought to indicate that, phonological awareness is clearly related with performance in the reading and spelling of Greek and this relationship is not present only to the first stages of reading and spelling acquisition but also continues into later stages. Implications are made about the assessment of phonological awareness skills of children learning to read a transparent language, namely Greek as well as the importance of phonological awareness training.

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Friday 16:30 - 18:00	Paper Session 9	Room: ELECTRA

READERS DIFFERING IN READING COMPREHENSION LEVEL:
METACOGNITIVE KNOWLEDGE, SUMMARIZATION SKILL AND ACADEMIC ACHIEVEMENT
Svjetlana Kolic-Vehovec, Barbara Roncevic, & Igor Bajsanski
University of Rijeka, Croatia

The aim of this study was to examine differences in metacognitive knowledge and summarization skill between elementary school students with different levels of reading comprehension and to identify subgroups of readers with specific metacognitive profile within each level of reading comprehension. Participants were fourth-grade and eighth-grade students from three elementary schools. Text comprehension and perception of text difficulty was assessed using narrative and expository texts. Metacognitive knowledge questionnaire was also applied. Summarization skill was assessed on three short expository texts. In order to establish groups differing in level of text comprehension cluster analysis was applied. In the sample of fourth-grade students analysis revealed three clusters that include high, average and low comprehenders of both, narrative and expository text. In the sample of eighth-grade students analysis revealed four clusters: high comprehension of both texts, high comprehension of expository and low comprehension of narrative, high comprehension of narrative and low comprehension of expository, and low comprehension of both. In each group different metacognitive profiles were recognized. All poor comprehenders in both grades had poor metacognitive knowledge and summarization skill. All good fourth-grade comprehenders had adequate metacognitive knowledge, but those who perceived text as easier showed better summarization skill. In the eighth-graders metacognitive knowledge and summarization skill were more relevant for the comprehension of expository text than for the comprehension of narrative text. All eighth-grade good comprehenders had good metacognitive knowledge, but those who perceived text as more difficult had better summarization skill.

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Friday 16:30 - 18:00	Paper Session 9	Room: ELECTRA

METACOMPREHENSION AND MOTIVATION OF 5th AND 6th GRADERS WITH AND WITHOUT READING DISABILITIES IN GREECE:
DATA IN SUPPORT OF BORKOWSKI'S MODEL
George Botsas & Susana Padeliadu
University of Thessaly, Volos, Greece

One hundred and thirty four 5th and 6th graders from schools of urban, semi – urban and agricultural regions of Greece, took part in the study. Half of them were diagnosed as having severe reading disabilities (RD), while the rest were very skilled readers (ND), attending the same mainstream classes with RD students. The major goal of the study was to evaluate the validity of a model presenting the interactions between metacognition, motivation and reading comprehension performance, for students with and without reading disabilities. The specific research questions were: a) whether reading disabled (RD) and non – reading disabled (ND) students actually differ in metacomprehension, motivation and reading comprehension performance and b) whether the Borkowski's model (Borkowski, Estrada, Milstead & Hale, 1989) is valid for both reading ability groups (RD and ND). Two scales for motivation, one for goal orientation and one for self-efficacy, one scale for affect and one for metacognitive

knowledge were used. A "think – aloud" procedure was set up in order to assess regulation of cognition. A narrative text of 168 words was created and various inconsistencies were inserted. Reading comprehension performance was assessed using "pause – units" methodology in students' text recall. "Quality" of recall and the type of reading comprehension, were considered. Data supporting the Borkowski's model for both reading ability groups were found and discussed in the context of learning disabilities understanding and every day teaching practice.

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| **Friday 16:30 - 18:00** | Paper Session 9 | Room: ELECTRA |

THE IMPACT OF THE TEACHING-LEARNING ENVIRONMENT ON APPROACHES TO STUDYING IN GREEK UNIVERSITY STUDENTS
Evangelia Karagiannopoulou & Pavlos Christodoulides
University of Ioannina, Greece

Approaches to learning emphasize three inextricably mixed aspects: what the learner is trying to achieve; how the learner is carrying out the learning task; and, how the learner monitors his/her learning processes (Entwistle & McCune, 2004). It has recently been shown that students' approaches to learning, namely deep, surface and strategic, are influenced by the teaching-learning environment involving a number of interrelated components such as the teaching method and assessment, course structure, workload, and teacher effectiveness. The present study investigates relations between the Approaches and Study Skills Inventory for Students (ASSIST) and the Experiences of Teaching and Learning Questionnaire (ETLQ). The questionnaires were completed by 360 students across four academic years in the Department of Philosophy, Education and Psychology. Analyses of the questionnaire data reported in this paper were intended to provide initial insights into Greek students' approaches to studying and their experiences of their teaching-learning environment. Factor analysis of the inventories revealed slight differences when compared to the initial factors of the questionnaires. The findings also show an improvement in the quality of learning in the course of studying, particularly evident in the third year students. Further suggestions concern the mediating role of metacognition and how students monitor, regulate and reflect on their learning. The findings are discussed in the context of the recent literature.

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| **Friday 16:30 - 18:00** | Paper Session 10 | Room: ALKYONI |

PRESCHOOLERS INTROSPECT ON SUBJECTIVE CERTAINTY: METACOGNITIVE DEVELOPMENT IN EARLY CHILDHOOD
Kristen Lyons & Simona Ghetti
University of California, Davis, USA

Although it has been suggested that children may not develop subjective awareness of their thinking until middle childhood, there are several reasons to expect that the capacity to introspect on subjective uncertainty (i.e., evaluating, 'how sure am I that this is the correct response?') may emerge in early childhood. The current study tested this hypothesis. Participants ($\underline{n}$ = 48) included 3-, 4-, and 5-year-old children who were trained to use a simple 2-point picture-based confidence scale. Children used this scale to rate their confidence in responses on a perceptual identification task and an object naming task. These tasks were included to test the hypothesis that children's ability to monitor their certainty may differ depending on the type of mental representation being evaluated. Specifically, we predicted that monitoring of vivid mental representations (i.e., percepts) may emerge earlier than monitoring of mental representations that include less visual information (i.e., words). As predicted, participants across age groups reported higher confidence for correct vs. incorrect responses on the perceptual identification task. However, only 4- and 5-year-olds were more confident in correct vs. incorrect responses on the object naming task. These results suggest that children may be able to monitor their thinking at earlier ages than previously detected, but that this skill may depend on the type of thinking to be monitored: The vividness of the mental representation being evaluated may play an important role in the developmental trajectories of certainty monitoring across cognitive domains. Additional factors that may underlie this dissociation will be discussed.

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METAMEMORY ASSESSMENT, SELF-ESTEEM AND ACADEMIC PERFORMANCE IN HIGH-SCHOOL STUDENTS

Vasiliki Lymperopoulou & Fotini Polychroni
University of Athens, Greece

In the context of self-regulating learning process, metacognitive knowledge and metacognitive skills are critical for active seeking and processing of information. The study investigated the accuracy of the metacognitive skill of Judgments of Learning (JOLs) in high school students as a function of their academic performance and academic and general self-esteem. The accuracy of JOLs in a small number of students with dyslexia was also examined. Ninety three high school students participated in the study (seven students with dyslexia also participated in the study). The students completed a self esteem self-report measure and made JOLs after studying paired associates in two conditions -immediate JOL group condition and delayed JOL group condition. They were asked to give an accuracy estimate of JOL in a scale of 0%-100%. After the JOL, the participants completed a written memory test and informed the experimenter about the specific memory techniques they used. The findings show an effect on JOL in terms of academic performance. In the delayed JOL condition, high achievers were more accurate in their judgments, while average and low achievers tended to overestimate their item by item ability of material recall. In the delayed JOL condition, the "Rehearsal" technique produced more accurate JOLs, while in the immediate JOL condition students who used "Sentence construction" were more accurate in their judgments. Moreover, initial findings showed that the students with dyslexia tended to have low accuracy in their judgments of learning. Implications for practice, particularly for low achievers, will be discussed.

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META-MEMORY AND MEMORY PERFORMANCE OF ELDERLY PEOPLE

Mats Dahl[1], Carl Martin Allwood[2], & Bo Hagberg[2,3]
[1]Kristianstad University, Sweden, [2]Lund University, Sweden, & [3]Competence Center County Council Blekinge, Sweden

The aim of the study was to investigate the accuracy (i.e., realism) of elderly persons' confidence judgments of their answers to general knowledge questions. Two aspects of realism were studied, calibration and ability to discriminate between correct and incorrect answers by means of confidence judgments. 9 birth cohorts from 1910 and 1943 were examined at 60 (n = 191), 66 (n = 206), 72 (n = 177), 78 (n = 166), 81 (n = 155), 84 (n = 200), 87 (n = 150), 90 (n = 99), 93 (n = 40) years age. The results showed that there were no age differences between the ages of 60 and 93 years old with respect to calibration but that there was an age related decrease in discrimination ability. However, the 93 year olds clearly showed poorer calibration and to some extent higher overconfidence than the younger age groups, including the 90 year olds. Our results also showed that the males demonstrated more overconfidence than the women (p > .055) and that there were no correlations between the participants' opinion about the extent that their memory capacity in general was impaired with increasing age and their meta-memory ability as measured in the present study.

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CHILDREN'S STRATEGIC REGULATION SKILLS IN THE CONTEXT OF AN ACHIEVEMENT TEST:

THE ROLE OF METACOGNITIVE MONITORING PROCESSES AND WORKING MEMORY CAPACITY
Claudia Maria Roebers
University of Bern, Switzerland

Koriat and Goldsmith (1996) have outlined a theoretical framework for the strategic regulation of memory accuracy: Whenever individuals can decide to volunteer or withhold information, for example, in an interview or test situation, complex metacognitive processes are involved evaluating the retrieved information, monitoring its certainty and controlling whether this information should be provided or not given the specific task demands (accuracy motivation, incentives). The paper uses this model as theoretical background and investigates children's ability to strategically regulate memory performance in an achievement test by contrasting 7- and 9-y-ear-olds' response behavior and confidence judgments across different scoring systems and test trials. Individual differences in working memory were used to explain differences in test performance and monitoring. Results revealed that children had a relative conservative response criterion even in the control condition. Anticipating penalties for incorrect answers augmented children's threshold to provide answers, while the monitoring processes for given answers were not affected by the scoring system. For working memory capacity, there was a tendency of a closer relationship to recall and monitoring in the 7- than in the 9-year-olds.

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Friday 18:30 - 20:30	PLENARY SESSION	Room: ELECTRA

OPPORTUNITIES AT THE EUROPEAN SCIENCE FOUNDATION FOR METACOGNITION RESEARCH
Eva Hoogland
European Science Foundation-ESF Representative, Strasbourg, France

The European Science Foundation (ESF), with offices in Strasbourg, Brussels and Ostend, is the European association of 78 major national research funding and performing organisations and academies in 30 countries devoted to excellence in scientific research. Since we were established in 1974, we have coordinated a wide range of pan-European scientific initiatives. Each ESF activity is designed from the perspective of the research community. Each is carefully tailor-made to provide an opportunity for researchers to break the barriers of international borders and to come together for the benefit of European science as a whole, be it from a long-term or short term perspective, forward looking or applying synergy or management, opening new horizons or delving deeper into existing knowledge banks. Each year, the ESF announces a series of calls for proposals which will give the opportunity to propose and launch research projects and collaborative activities with a European dimension. In the presentation, the various calls will be presented and opportunities for Metacognition research will be highlighted.

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Saturday 09:00 - 10:30	Paper Session 11	Room: ELECTRA

INVESTIGATING THE RELATIONSHIP BETWEEN METACOGNITIVE SKILLS AND EXECUTIVE FUNCTIONS
Donna Bryce & David Whitebread
University of Cambridge, United Kingdom

Research literatures regarding metacognitive skills and executive functioning have developed relatively independent of one another. However, they seem to be theoretically connected skills. This paper reports the findings of an experimental study that assessed how the two areas relate to one another in a sample of 43 children. Children were given a typical executive functioning task assessing conceptual inhibition, and two problem solving tasks during which their behaviour was coded for metacognitive skills. Findings support the assimilation of these two literatures and support a theoretical framework adapted from Nelson and Narens (1990). It is hoped that further

investigation into the intricate relationships among various executive functions and all facets of metacognition will result in shared knowledge which will enhance research into early monitoring and control processes.

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| **Saturday 09:00 - 10:30** | Paper Session 11 | Room: ELECTRA |

KNOWING WHAT IS IMPORTANT:
AN INVESTIGATION OF METACOGNITIVE PROCESSING IN STUDENTS' PLANNING AND NOTE-TAKING SKILLS
Mary Ainley & Chris Perry
University of Melbourne, Victoria, 3010, Australia

Metacognition involves active monitoring and regulation of thinking processes. Research indicates that students who apply metacognitive skills in their learning have stronger learning outcomes. Effective metacognition involves developing a task plan, monitoring on-task activity, and when the task is completed, reflecting on and evaluating the outcome. This paper will present selected findings from a large collaborative project involving over 300 upper primary (elementary) students, both boys and girls, from four schools in Victoria, Australia. The project employed innovative online software to investigate how students went about applying thinking skills to a novel problem. The findings concentrate on two aspects of students' activity; planning prior to commencing the task, and note-taking as students worked on the task. At the planning level students were prompted to record questions they needed to answer to be able to solve the problem. While working on the task students had access to an electronic notepad to record information that might be important when they came to construct their answer. The degree to which students demonstrated metacognitive awareness in their planning was explored through an examination of responses to the planning question. The influence of metacognitive awareness on strategic behaviour was assessed through analysis of the structure of the notes students recorded as they worked through the problem. Snapshots of student responses to both the planning question and their notes demonstrate the degree to which the students were aware of what the problem actually required them to do and how this influenced their processing of task information.

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| **Saturday 09:00 - 10:30** | Paper Session 11 | Room: ELECTRA |

PREDICTION OF READING COMPREHENSION LEVELS BASED ON DIFFERENT COGNITIVE AND METACOGNITIVE STRATEGIES
Faye Antoniou & Georgios Botsas
University of Thessaly, Volos, Greece

The aim of this study was to find out what kind of cognitive and metacognitive strategies do Greek students with and without Special Educational Needs (SEN) use in order to achieve different levels of reading comprehension. Participants were 327 typical, 36 Learning Disabled (LD) and 15 Mild Mentally Retarded (MMR) 3rd to 9th graders who were assessed in diverse levels of reading comprehension (textually explicit, textually implicit, scriptually implicit) with a newly developed Greek reading test (Test Anagnosis; Padeliadu & Antoniou, in press). The cognitive and metacognitive strategies that students used were reported by their educators who completed the sub-scale of reasoning of the Greek inventory for Learning Disabilities screening (Anichnefsi Mathisiakon Diskolion apo Ekpaideftikous, Padeliadu & Sideridis, in press). Results present the kind of strategies that students with and without SEN use across all grades and the level of reading comprehension they can achieve. The linear combination of reasoning predicted various amounts of the variance in different types of reading comprehension with organization skills (metacognitive strategy) emerging as a significant predictor for typical and LD students. However, none of the strategies that students with MMR used seemed to predict significantly different types of reading comprehension. Based on this study's findings, it was documented that metacognitive strategy usage represents a major difficulty for students with SEN across all grades, while the adoption of specific metacognitive strategies (i.e. organization) leads to the enhancement of reading comprehension.

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| **Saturday 09:00 - 10:30** | Paper Session 11 | Room: ELECTRA |

WHEN DO OLDER ADULTS SPONTANEOUSLY SELF-TEST WHILE PREPARING FOR A MEMORY TEST?

Sara Bottiroli[1], John Dunlonsky[2], & Kate Guerini[2]

[1]University of Pavia, Italy & [2]Kent State University, Ohio, USA

Self-testing refers to a strategy for regulating learning while preparing for a memory task. Findings about this type of monitoring in aging are mixed. Murphy et al. (1987) reported that older adults do not self test themselves spontaneously while studying as they prepared for a criterion test. In recent research, however, we have found that quite a few older adults do self test (Roth, Dunlosky & Hertzog, 2007). A main difference between these two studies is related to materials: Murphy et al. (1987) used list of single items attached to a board, while Roth et al. (2007) used paired words on index cards. In the present study, we explored these differences by examining how kind of memory task and stimulus presentation could moderate self testing in aging. In particular, 48 young adults and 48 older adults paced their study of either 20 single words or 20 paired words, which were either presented on a board in front of participants or on individual cards that participants held during study. Several measures of self-testing were assessed for each stimulus presentation of memory tasks. The kind of item studied had the largest effect, with people of all ages spontaneously self-testing more often studying paired words than when they studied single words. More important, our outcomes seem to explain both Murphy et al. (1987) and Roth et al.'s (2007) findings, suggesting that older adults do self-test spontaneously while preparing for a memory task, but they are more sensitive to the environmental support.

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| **Saturday 09:00 - 10:30** | Paper Session 12 | Room: ALKYONI |

AN ACTIVITY THEORY PERSPECTIVE ON METACOGNITION: DEVELOPING METACOGNITION IN A YEAR 11 CHEMISTRY CLASSROOM

Gregory P. Thomas

The University of Alberta, Edmonton, Canada

Concerns regarding students' learning and reasoning in chemistry classrooms are well documented. This paper emanates from a two year study investigating the teaching and learning of chemistry in two high school classrooms in Brisbane, Australia, both taught by the same teacher. The goal was to develop students' metacognition in relation to their conscious consideration of experimental phenomena at macroscopic, atomic/molecular and symbolic levels. Activity theory is employed as the framework for interpreting the consequences of an intervention developed with the teacher. Activity Theory focuses on the activity system, an ongoing, object related, historically conditioned, tool-mediated human interaction, as the unit of analysis. We focus in particular on the rules/customs and tools of the activity system. We considered students' reasoning as a consequence of the customs and rules of the community within which they were situated, rather than as a deficit reflecting their learning potential/s and we considered their metacognition to be socially mediated. An interpretive methodology utilizing multiple data sources was employed. We spent 12 weeks (one six week period in each of two years) with the teacher and her students working to develop their reasoning strategies and metacognition. Key elements of students' emerging metacognitive knowledge consisted of, (a) learning is a social endeavor involving others' views and opinions, (b) what counts as viable knowledge can be contestable, (d) prior knowledge is important for considering new ideas. These assertions are further elaborated in the paper.

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| **Saturday 09:00 - 10:30** | Paper Session 12 | Room: ALKYONI |

METACOGNITIVE KNOWLEDGE ABOUT CREATIVITY

Barbara Colombo, Alessandro Antonietti, & Alice Colombo

Catholic University of the Sacred Heart, Milano, Italy

Even if creativity has been studied by psychologists from different points of view and with disparate methodologies, up to now it is scarcely known how it is conceived by lay persons. To explore the naive conceptions and epistemological beliefs about creativity a questionnaire concerning the nature and the educatibility of creativity was created. It consisted of three main sections, characterised by the use of different codes (verbal, visual, and auditory). The first section – based on verbal questions – was aimed to investigate the concept of creativity itself (What creativity is? Is it innate? Can it be taught?), and its relationship with intelligence. Furthermore, the personality traits of the creative person were considered in this part. The visual and auditory sections of the questionnaire were intended to explore the difference of considering a product as creative with reference to visual art and music. Pictures and musical pieces have been selected to analyse creativity traits. A pilot study had showed that non-experts were able to recognise such traits in the artistic works presented during the administration of the questionnaire. Fifty-one participants joined the research. Results showed that creativity is conceived as a cognitive process and as an innate faculty that everyone possesses (even if to a different extent), it is influenced by the social and educative environment, and that can be trained. Moreover, creativity is a general attitude that participants believed to be widespread in everyday life. No overlap between creativity and intelligence was recognised.

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Saturday 09:00 - 10:30	Paper Session 12	Room: ALKYONI

THE ROLE OF SOCIAL METACOGNITION IN FACILITATING COGNITIVE FLEXIBILITY
Pina Tarricone & Alison F. Garton
Edith Cowan University, Perth, Australia

This paper discusses social metacognition and its role in facilitating the development of self-knowledge and cognitive flexibility through collaborative problem solving, with a focus on children's learning. Vygotsky's zone of proximal development, language and the social aspects of metacognition, such as knowledge of intra- and inter-individual functioning, are discussed as important facilitators of the learning process as it moves from a predominately social cognitive process to a metacognitive process. The terms "social metacognition", "intersubjectivity", and "co-construction of meaning" describe this process within the context of collaborative problem solving. Intersubjectivity provides the vehicle for the shift from inter- to intra-individual functioning through the establishment and co-construction of context and task knowledge to meet task demands (Garton & Pratt, 2001). This process also relies on and leads to cognitive flexibility. Being cognitively flexible requires knowledge of strategy transferability and adaptability to changing task demands. The interrelationships between these constructs provide a theoretical framework for understanding the importance of social metacognition in facilitating cognitive flexibility. The goal of developing this theoretical framework is to describe classroom learning as well as for examining teachers' knowledge about students' capacity to benefit from collaboration.

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Saturday 09:00 - 10:30	Paper Session 12	Room: ALKYONI

"BIG FIVE" PERSONALITY TRAITS AND ACADEMIC ACHIEVEMENTS:
STRATEGIC ACTIVITY AS A MEDIATOR
Ewa Czerniawska
University of Warsaw, Poland

Two main lines of research might be traced, as far as the relations between the „Big Five" personality traits and learning are concerned. In the first one, researchers are looking for direct links between personality traits and school/academic achievements. In the second line, the strategic activity is perceived as a mediator between personality traits and achievements. Own empirical work took into account the latter perspective. Two hundred students from junior and senior high schools were the subjects. The following methods were employed: NEO-FFI, the "Strategic Flexibility Questionnaire" and "Learning from Textbook Questionnaire". Demographic data and

school achievements were also collected. The so obtained data were analyzed by means of regression and path analyses. It appeared that indeed the model assuming the mediation of the strategic activity in the influence of personality on learning achievements best described the data.

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| Saturday 10:30 - 12:00 | Paper Session 13 | Room: ELECTRA |

THE ROLE OF GOAL ORIENTATIONS, GOAL INSTRUCTIONS AND FEEDBACK ON STUDENTS' PROCESS-RELATED AND OUTCOME-RELATED METACOGNITIVE EXPERIENCES
Fotini Dina & Anastasia Efklides
Aristotle University of Thessaloniki, Greece

The present study explored how personality characteristics and personality factors, such as goal orientation instructions and extrinsic feedback affect metacognitive experiences (ME). Participants were 870 students of 7th and 9th grade of both genders. Students completed questionnaires tapping their personal goal orientations, maths self-concept, attitudes towards maths and test anxiety. Mathematics ability was also tested. Students were divided into 7 sub-groups according to goal-orientation instructions (mastery vs. performance) provided before solving three mathematics problems and the valence of extrinsic feedback (EF) (positive, negative, no feedback provided) after the solving of the problems. The 7 groups were the following: Mastery-Positive EF, Mastery-Negative EF, Mastery-No EF, Performance-Positive EF, Performance-Negative EF, Performance-No EF, and the Control Group (no instructions, no EF). Before and after solving each one of the 3 maths problems, students answered questions on their metacognitive experiences. After a period of two weeks the same problems were administered for a second time. A series of analyses of variance showed that the Mastery-No EF group and the negative EF groups reported higher estimate of effort, than positive EF and Performance-No EF groups wich had best performance on the tasks. Hierarchical regression analyses showed that ME were differential affected by the experimental conditions and personality characteristics.

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| Saturday 10:30 - 12:00 | Paper Session 13 | Room: ELECTRA |

STATE AFFECT AS PREDICTOR OF LEARNING STRATEGY USE AND ACADEMIC ACHIEVEMENT
Georgia Papantoniou, Despina Moraitou, Magda Dinou, & Effie Katsadima
University of ioannina, Greece

The purpose of the present study was to analyze the relationship between state affect, learning strategy use and academic achievement. A total of 275 undergraduate students at School of Education with a mean of 20.4 years participated in this study. Data were collected after the final examination in a psychology course. The participants were asked to respond to two questionnaires tapping state affect during the exam period: (i) cognitive interference (state test anxiety), and (ii) positive and negative affect as states. They were also asked to report their possible use of self-regulatory, critical thinking, cognitive, and resource management learning strategies during their study for the examination. Examination grades were used as the measure of academic achievement. Path analysis revealed that state affect was related to the use of learning strategies and academic achievement. Positive affect and test anxiety influenced positively both self-regulation and critical thinking, and positive affect influenced positively the use of resource management strategies as well. On the contrary, negative affect and test anxiety affected negatively the use of resource management strategies. Moreover, use of self-regulation and resource management strategies found to predict academic achievement. Therefore, the three state affect variables found to have indirect effects on achievement via regulating the use of self-regulation and resource management strategies. Positive affect unexpectedly was the only state affect variable found to be directly and negatively related to academic achievement.

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Saturday 10:30 - 12:00	Paper Session 13	Room: ELECTRA

EFFECTS OF INTUITIVE AND ATTRIBUTIONAL APPRAISALS OF TEACHING ON KINDERGARTEN TEACHERS' EMOTIONAL EXPERIENCE IN CLASSES
Georgia Stephanou & Maria Mastora
University of Western Macedonia, Florina, Greece

In any teaching situation a teacher has to regulate his/her cognitive, emotional and motivational processes. This study, based on Pekrun's (2002) socio-cognitive model of academic emotions, Weiner's (2001) attribution theory of achievement behaviour, and Jesus and Lens' (2005) integrated model for teacher motivation, aimed to investigate (a) kindergarten teachers' emotions which they usually experience in classes through the school year, (b) teachers' attributions for their perceived successful and unsuccessful teaching through the school year, (c) the role of teachers' perceived quality of their own teaching, and of attributions for it, in the generation of teachers' emotions and expectations for future teaching. Kindergarten teachers (n= 180), mainly females, from a variety of Greek state schools, participated in this study. The participants completed the scales at the middle of a school year. The results showed that (a) teachers experienced a variety, and a variation of intensity, of emotions (mainly, task-, other- and context- related) in their classes, (b) teachers, particularly the teachers who perceived their teaching as successful, experienced positive emotions in their classes, (c) teachers attributed their perceived successful teaching to internal, personal controllable, and, mainly stable factors, whereas they attributed their perceived unsuccessful teaching to external, personal uncontrollable, and, mainly unstable factors, (d) the attributional (particularly, stability) appraisal and, mainly, the intuitive appraisal influenced the formation of teachers' experienced emotions in classes, and (e) attributions (predominately, stability) for teaching was positively related to expectations for future teaching performance. Discussion focuses on application of the findings in education and future research.

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Saturday 10:30 - 12:00	Paper Session 13	Room: ELECTRA

SELF-REGULATED LEARNING, METACOGNITION AND LEARNING-RELATED EMOTIONS
Anneke Vrugt & Frans J. Oort
University of Amsterdam, The Netherlands

There is consensus among theorists that self-regulated learning involves goal setting, metacognition and the use of (meta)cognitive strategies. However, little is known regarding the correspondence between achievement goals, strategy use, metacognition, and academic emotions. The conceptual foundation of the causal model tested in this study is a synthesis of previous work. We tested the predictions of a model that explains the impact of achievement goals on learning-related emotions, of learning related-emotions on metacognition and effort, of metacognition on study strategies, and of metacognitive strategies on academic achievement. This model did not have a good fit. The model was adapted, the adapted model proved to have a good fit. The results show among other things that positive learning-related emotions had a positive effect on student's engagement in metacognitive activities, negative learning-related emotions had a negative effect on student's engagement in metacognitive activities, and mastery-approach goals had a positive effect on student's engagement in metacognitive activities. Positive learning-related emotions had a direct effect on the use of metacognitive strategies, and an indirect effect, through student's engagement in metacognitive activities and effort investment. The use of metacognitive strategies predicted academic achievement.

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Saturday 12:30 - 13:30	Keynote Speaker	Room: ELECTRA

THE METACOGNITION OF IDENTITY
Josef Perner
University of Salzburg, Austria

Processing identity statements, e.g., "The Roman senator Tully was the same person as the poet Cicero," requires some metacognitive sensitivity, i.e., an appreciation that what was thought of as two "intentional" entities is actually only one real entity. Data from children's versions of such identity statements show that children acquire this sensitivity by about 4 years of age. Acquisition of this "metacognitive sensitivity" may consist of a mere procedural change in how information about entities is processed (implicit understanding) or it may require an explicit metarepresentational understanding of how intentional entities relate to real entities. Children's problems coordinating the relationship between intentional and real entities can also shed new light on children's reluctance, akin to the mutual exclusivity heuristic, to admit that one and the same entity can have several labels (e.g., something can be a rabbit and an animal). I also try to show that problems of identity pervade children's belief-desire reasoning, explaining why some "implicit" understanding of false beliefs can be demonstrated much earlier than the explicit understanding around 4 years.

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| Saturday 15:00 - 16:30 | Symposium 7 (invited) | Room: ELECTRA |

INDIVIDUAL DIFFERENCES IN METACOGNITION IN YOUNG CHILDREN

Organizer/Chair: **David Whitebread**, *University of Cambridge, United Kingdom*
Discussant: **Anastasia Efklides**, *Aristotle University of Thessaloniki, Greece*

This symposium is concerned with the measurement and identification of individual differences in metacognition in young children in a range of contexts. Given the well-established evidence of the significance of metacognition and self-regulation for educational achievement, the understanding of the nature of individual differences in these abilities in young children is likely to be of important educational benefit. The first paper reports on the development of two approaches to the measurement of metacognition and self-regulation in the 3-5 age group. The first of these consists of a detailed observational coding framework developed from the analysis of metacognitive 'events' recorded in naturalistic educational settings in the UK. The second consists of an observational instrument, the CHILD 3-5, developed to enable early years teachers to measure emotional, social, cognitive and motivational self-regulation in the children in their classes. The second paper explores the metacognitive and self-regulatory abilities of Canadian 7-9 yr olds who do and do not experience motor learning difficulties, in relation to motor skill tasks, and their differential responses to a self-regulation based intervention. The third paper investigates self-explanation, an ability which appears to be closely related to metacognitive development, among Jordanian children aged 7-11 years who experience Learning Difficulties in mathematics. It explores patterns of self-explanation generated by these children when they were engaged in activities requiring them to explain their reasoning and an adult's reasoning in relation to mathematical tasks. The final paper reports a study of individual differences in metacognition and conceptual development in biological science among 8-9 year old Chilean children. The results reveal the complex nature of self-regulation, and its relationship to learning, illustrated by the different metacognitive strategies used by the children and their interaction with emotional and motivational factors.

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| Saturday 15:00 - 16:30 | Symposium 7 (invited) / Paper 1 | Room: ELECTRA |

THE MEASUREMENT OF METACOGNITION AND SELF-REGULATION IN YOUNG CHILDREN
David Whitebread
University of Cambridge, United Kingdom

Research on metacognition has predominantly adopted methodologies relying on the verbal abilities of participants or on their declarative metacognitive knowledge. These methodologies are now generally accepted to under-estimate the metacognitive capabilities of young children (Winne & Perry, 2000; Whitebread et al, 2005). This paper reports on observational approaches to the identification and assessment of metacognition and self-regulation in young children in the 3-5 year age range. These approaches were developed within a 2 year study exploring the development of self-regulatory and metacognitive abilities in young children (aged 3-5 years) in educational settings in the UK (English

Nursery and Reception classrooms). 32 early years teachers collected evidence of metacognitive abilities evidenced by children in their classes during learning activities which were constructed to be 'meaningful' for the children and in other ways most likely to provoke metacognitive or self-regulatory behaviours. The first approach to assessing these behaviours consisted of the construction of an observational coding scheme, which has been developed in a 'grounded' manner within the project, and which identifies verbal and non-verbal behaviours which are indicative of self-regulatory and metacognitive abilities. The second approach has involved the development of an observational instrument, the CHILD 3-5, which could be used by the teachers to assess the emotional, social, cognitive and motivational self-regulation of the children in their class. The data from the project suggested that this scale can be used reliably by teachers, that it has external validity and a high level of internal consistency. Further work is proceeding to develop the thorough validation of this instrument in 4 European countries.

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Saturday 15:00 - 16:30	Symposium 7 (invited) / Paper 3	Room: ELECTRA

SELF-EXPLANATION IN CHILDREN WITH LEARNING DIFFICULTIES: DIFFERENCES IN AGE, ABILITY AND ACADEMIC ACHIEVEMENT

Qais Almeqdad

University of Cambridge, United Kingdom

This study investigated self-explanation among children who experience Learning Difficulties (LDs). It aimed to explore patterns of self-explanation generated by these children when they were engaged in activities of explaining their reasoning and an adult's reasoning. Three resource rooms' teachers encouraged 20 children (3 with normal ability, 14 with Mild LDs, and 3 with Moderate LDs) to explain their reasoning and an adult's reasoning when they learnt addition and subtraction. The study applied a multiple case study methodology and used 4 methods of data collection: Video Observation, Individual Instructional Plan (IIP) including a developed self-explanation scale, Informal discussions with teachers and Teacher's Reflective Dialogue. It also applied a mixed methods analysis approach. Preliminary findings showed that the children were capable of using self-explanation strategies. However, there were significant differences between the age of the children and the generation of self-explanation. The older children were found to generate more explanation than the younger children. Although the children of higher ability generated more explanations than the children of lower ability, findings illustrated that the differences were not significant in relation to the ability variable. Children with normal ability and with Mild LDs were rated by their teachers as high explainers. Asking more questions by the teachers encouraged the children to produce high rates of explanations. The Children who made high progress in their post achievement test were found to be most frequent in explaining their own reasoning. The teachers reflected on variables that influenced the children's use of self-explanation. These were related to school and family, teacher's practice, and the child's ability and learning characteristics. Teachers' practices were, in turn, greatly affected by their views of the children's learning difficulties. The study produced a raptor of questions from the authentic setting which teachers can use to encourage children with LDs to engage in various activities of self-explanation. Such activities, I argue, are essential for constructive learning for children with LDs.

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Saturday 15:00 - 16:30	Symposium 7 (invited) / Paper 4	Room: ELECTRA

IN THE CROSSROAD OF SELF REGULATED LEARNING (SRL) AND CONCEPTUAL UNDERSTANDING: TO WHAT EXTENT DOES IT EXPLAIN INDIVIDUAL DIFFERENCES IN LEARNING AND DEVELOPMENT?

Valeska Grau

University of Cambridge, United Kingdom

Several models of self-regulated learning (SRL) have been proposed in the last two decades in order to explain the relationship between cognitive capacities and performance in academic tasks. While some models emphasise the influence of metacognitive skills as a general capacity, others highlight epistemological beliefs, motivational

orientation, personal goals, domain knowledge and contextual factors as the principal mediators. The research presented in this paper aims to shed light on some of the issues through an observational study of 12 children of 3rd grade primary school regarding their SRL skills and conceptual development in biology. The main objectives were to document types of SRL skills and advances in biological conceptual understanding occurring during one academic semester, and the interaction between them. Children were asked to solve a sorting task involving the classification of living things 4 times during the academic semester, and afterwards they were briefly interviewed with regards to the processes used to solve the task. All these episodes were videotaped and a grained analysis was conducted to capture verbal and non-verbal indicators of their SRL and conceptual understanding. The results reveal the complex nature of SRL, illustrated by the different metacognitive strategies used by children in order to plan, monitor, regulate and reflect in relation to the task. Moreover, the interaction between SRL skills and evidence of learning biological categories show interesting patterns of development, reflecting the influence of metacognitive, motivational, emotional and individual characteristics and contextual issues. An analysis of the potential explanation of the individual differences found in children's development of performance and skills will be discussed, together with theoretical implications regarding the multidimensional nature of the concept of SRL.

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| **Saturday 15:00 - 16:30** | Symposium 8 | Room: ALKYONI |

METACOGNITION AND SELF-REGULATION

Organizer/Chair: **Meike Landmann & Michaela Schmidt,** *Technische Universität Darmstadt,Germany*
Discussant: **Roger Azevedo**, *University of Memphis, TN, USA*

Self-regulation and metacognition are important competencies for people, differ in age and situations. Flavell (1979) define that metacognition includes any psychological rather than only cognitive experiences. In this regard metacognition is closely linked to self-regulation. Self-regulation strategies help to deal with constantly changing environments (Zimmerman, 2000). Because of the great relevance of metacognitive skilfulness and self-regulation strategies in several domains over the whole life span this symposium deals with the improvement of self-regulation skills in different fields of application as well as the view to general metacognitive and self-regulation models. First of all, the relation between metacognitive skillfulness and intellectual ability in performing tasks of young students is discussed. In addition, the quality of student teachers' self-regulated learning in innovative learning programmes is presented. The improvement of metacognitive and self-regulation skills is another focus of the symposium. First, scaffolds are used to foster metacognitive processes while working on a mathematical task of seventh grade students. Second, a training program for young scientists to improve self-regulation metacognitiv competencies is presented. And finally, the fostering of Individual Reference Norm as a specific aspect of metacognition is discussed. Within the different studies a variety of methodological approaches is presented (e.g. longitudinal study, qualitative content analysis, process-analysis, and variance analyses). The purpose of the symposium is to present and discuss needs and possibilities fostering metacognitive skilfulness and self-regulation strategies.

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| **Saturday 15:00 - 16:30** | Symposium 8 / Paper 1 | Room: ALKYONI |

DEVELOPMENT IN THE RELATION BETWEEN METACOGNITIVE SKILLFULNESS AND INTELLECTUAL ABILITY IN YOUNG STUDENTS PERFORMING TASKS IN DIFFERENT DOMAINS

Manita van der Stel & Marcel V. J. Veenman
Leiden University, The Netherlands

This study shows the results of the first two years in a longitudinal study where the same participants are followed for three consecutive years as they enter secondary school (aged 12 to 15 years). The first objective of this study was to establish whether the development of metacognitive skillfulness is intelligence-related or relatively intelligence-independent. As a second objective the development of both the quantity and the quality of

metacognitive activities was investigated. Furthermore, the generality vs. domain-specificity of developing metacognitive skillfulness was investigated. In the first year 32 first-year secondary-school students participated in this study. In the second year 28 of them were left. While thinking aloud, they performed two different tasks representing two different domains: A text-studying task for history and a problem-solving task for mathematics. Each year participants were given new tasks, suitable for their age. Participants' intelligence, metacognitive skillfulness and learning performance were assessed. Results of both years show that metacognitive skillfulness contributed to learning performance (partly) independent of intellectual ability. A parallel development of metacognitive and intellectual ability as predictors of learning performance was found. Furthermore, a significant age effect was found for the quantitative and the qualitative metacognitive scores in both tasks. Results also show that metacognitive skills predominantly appear to be general. Domain-specific metacognitive skills, however, played a substantial, but minor role as well in both years.

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| Saturday 15:00 - 16:30 | Symposium 8 / Paper 2 | Room: ALKYONI |

THE QUALITY OF STUDENT TEACHERS' SELF-REGULATED LEARNING IN A DUAL LEARNING ENVIRONMENT
Maaike Endedijk, Mieke Brekelmans, Jan Vermunt, & Nico Verloop
Utrecht University, The Netherlands

Teacher education is more and more organized in dual learning programmes in which two types of learning environments are combined: studying at the university and learning from practice in schools. These programmes call upon a high degree of self-regulated learning (SRL) in student teachers. However, it is unclear whether student teachers are willing and able enough to regulate their learning processes to this extent, as well as how educational institutes can stimulate the development of this way of learning. This study examined the quality of student teachers' SRL. Twenty-eight students of a post-graduate academic teacher education programme participated. To measure the quality of self-regulation student teachers were interviewed about their learning and regulation conceptions and they were asked to describe six learning experiences and corresponding regulation activities in an open question log. Phenomenographically informed content analysis of 133 learning experiences identified a set of categories of description of the reported regulation activities. These descriptions differed significantly from the accounts of SRL found in academic student learning contexts. Homogeneity analysis and cluster analysis revealed four qualitatively different approaches to SRL to teach. These were described in a model, which could be helpful in teacher education for diagnosing student teachers' quality of self-regulated learning. The results showed that combining learning from experience with learning from university courses put special demands on the nature and quality of self-regulated learning that students were not used to cope with. Possibilities to improve the development of student teachers' SRL will be discussed.

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| Saturday 15:00 - 16:30 | Symposium 8 / Paper 3 | Room: ALKYONI |

SCAFFOLDING SELF-REGULATED LEARNING OF MATHEMATICAL PROBLEM SOLVING AND MODELLING,
Bastian Benz & Bernhard Schmitz
Technische Universität Darmstadt, Germany

The following study is carried out within an interdisciplinary project aiming at developing an e-learning software for self-regulated learning of mathematical problem solving and modelling for seventh grade students. It is focused on the design and evaluation of software integrated adaptive learner support (scaffolds), aiming at assuring a successful completion of the learning task, as well as, promoting the learners' competence to self-regulate his learning. Following Bannert (2002) learners lacking metacognitve competence (mediation deficit) should be directly instructed (Friedrich & Mandl, 1992), whereas learners already possessing the skill, but unable to apply it spontaneously (production deficit), are in need of indirect guidance. In e-learning direct or indirect scaffolds (Narciss et al., 2007) can be presented in an embedded or non-ebedded manner (Clarebout & Elen, 2004).

Regarding those approaches, processes taking place in the three systems (Boekaerts, 1999) and the three phases of self-regulatory learning (Schmitz, 2006; Zimmerman, 2000) are supported in the software-project. In this study five (in)direct scaffolds to foster metacognitive processes while working on a mathematical task (micro-level), integrated in an embedded manner, are evaluated on a sample consisting of seventh grade students. An experimental group was exposed to the scaffolds while working on the task for approximately one hour, whereas a control group learned without external support. Results indicate that scaffolding the learning processes through metacognitive guidance fostered the performance in the mathematical task. Based on the results of the study, guidelines for the design of scaffolds are proposed.

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Saturday 15:00 - 16:30	Symposium 8 / Paper 4	Room: ALKYONI

TRAINING PROGRAM FOR YOUNG SCIENTISTS TO IMPROVE SELF-REGULATION COMPETENCIES
Michaela Schmidt & Bernhard Schmitz
Technische Universität Darmstadt, Germany

The aim of the study was the evaluation of a training of young scientists' self-regulation competencies. Therefore, the study refers to self-regulation theory (e.g. Schmitz & Wiese, 2006) and the training contents based on a process model of adults' self-regulation which aimed at the enhancement of scientists' self-regulation in dealing with daily requirements. Young scientists (faculties: science/mathematics, technics/engineering, and humanities/social sciences) between the ages of 24 and 39 (41.8% female) participated in three training groups: combined group (training and diary; $n = 17$), training group (only training; $n = 17$), and control group (no training, no diary; $n = 14$). The training was evaluated longitudinal with pretest-posttest comparisons. Therefore, the participants completed a questionnaire which assessed the level of self-regulation competencies before and after the intervention. The participants of the combined group also filled out a diary three times a week over a period of ten weeks (30 data sets) to support the training process. Data were also collected of peer/supervisor-ratings. We conducted multivariate analysis of variance with time as a repeated measurement factor. Results indicate that the training could improve the overall scale self-regulation significantly, $F(6, 41) = 3.33$, $p < .01$). The results of the subscales of the overall self-regulation scale support these results to a large extent, e.g, "planning", $F(2, 45) = 6.59$, $p < .00$.

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Saturday 16:30 - 18:00	Symposium 9	Room: ELECTRA

SELF-EVALUATION AND METACOGNITIVE JUDGMENTS: CO-EXAMINING COGNITIVE AND MOTIVATIONAL FACTORS

Organizers:	**Thérèse Bouffard & Eleftheria N. Gonida**, *Université du Québec à Montréal, Canada & Aristotle University of Thessaloniki, Greece*
Chair:	**Eleftheria N. Gonida,** *Aristotle University of Thessaloniki, Greece*
Discussant:	**Susanne Narciss,** *Technische Universitat Dresden, Germany*

It is generally acknowledged that one learns better when one knows how to learn but also learns better when is motivated to learn. The way a person goes about learning, how she succeeds and her judgments about performance depend on the task, the demands posed by the task, and her knowledge and strategies relevant to the task. However, self-assessments such as perceived competence and self-efficacy may interfere and serve as lens to further assessments about the task, the knowledge and strategies necessary for its completion, whether one has the requisite repertoire or confidence that one has achieved the goal. The issue of compatibility between oneself and the task in producing performance and metacognitive judgments about performance will be addressed in this symposium providing data from both the metacognitive and the motivational line of research. A number of self- and task-related factors will be discussed in regard to performance and confidence judgments. Four studies from four countries, Germany, Greece, Quebec, and France, will address the following issues: (a) accuracy of monitoring, its stability over learning, and its predictive validity on performance; (b) how the content of the task and task demands

affect confidence judgments and their accuracy; (c) how personal (e.g., strategic knowledge) and contextual factors (e.g., external feedback) affect the accuracy of self-efficacy judgments; and (d) how self-efficacy and perceived competence affect confidence judgments and performance. Furthermore, the studies will present data representing different age groups ranging from elementary to high school children and to university students, providing evidence about the phenomena under examination in different age periods.

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Saturday 16:30 - 18:00	Symposium 9 / Paper 1	Room: ELECTRA

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ACCURACY OF MONITORING:
STABILITY IN THE LEARNING PROCESS AND PREDICTIVE VALIDITY ON LEARNING OUTCOME
Christoph Mengelkamp & Maria Bannert
University of Koblenz-Landau, Germany & Chemnitz University of Technology, Germany

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One aspect of metacognition is knowledge and comprehension monitoring taken place during learning. Often, accuracy of monitoring is found to be correlated with learning outcome. In most of the studies the within person correlation gamma – calculated as measure of accuracy of monitoring – is correlated with the learning outcome obtained by the same test the gammas are derived from. That is, in most studies accuracy is calculated only at one point in time. Thus, the questions of the study at hand are, if accuracy is stable over learning time at all, and moreover, if it predicts learning outcome at the end of study time. In order to answer these questions a study was conducted in which university students ($\underline{N} = 113$) learned for 30 minutes about the basic concepts of operant conditioning. Retrospective judgments of confidence were used to calculate gammas as measures of monitoring accuracy obtained three times: before learning, after 10 minutes and at the end of the learning session. Results show, that accuracy of monitoring measured at the different points in time were not correlated among themselves. Thus, accuracy was not stable during learning. Further, accuracy predicted learning outcome only with the second time measure. However, accuracy as predictor is no longer significant if the knowledge obtained at the same point of time is included into the regression analysis. The results are discussed with regard to research about comprehension monitoring and self-regulated learning.

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Saturday 16:30 - 18:00	Symposium 9 / Paper 2	Room: ELECTRA

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CONFIDENCE JUDGMENTS ABOUT THE SOLUTION TO A TASK:
THE ROLE OF TASK-RELATED FACTORS AND ACCURACY IN REGARD TO PERFORMANCE
Eleftheria N. Gonida
Aristotle University of Thessaloniki, Greece

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Confidence judgments reflect the feelings that somebody experiences in regard to how certain s/he feels compared to her/his performance at a particular task. A number of cognitive task-related variables that might have an affect on how confidence judgments are formulated were examined in the present study. In particular, the content of the task, task difficulty, and the type of solution required by the participants to provide were under examination. Furthermore, age and gender were also examined. A total of 429 students attending 5th, 7th, 9th, and 11th grade participated in the study. A set of propositional arguments (conditional inferences) and causal tasks (to conduct an experiment) differing in terms of their difficulty level were administered to the participants. Participants were also asked to state their degree of confidence about their answer on a 4-point scale ranging from no confidence to absolute confidence. Preliminary data analysis indicated significant results for age, gender, task content, and task difficulty in regard to both cognitive performance and confidence judgments about it. Non-significant results were found for the type of the solution required. Significant correlations were also found between performance and confidence judgments, but not for all tasks and not within all three conditions. Despite, however, the significant correlations between performance and confidence judgments, confidence judgments were in general high compared to respective performance. In general, the results indicate that, first, non-accurate confidence judgments result from relatively limited awareness in regard to performance, and, second, factors related to self and self-evaluation

mechanisms should be co-examined with task-related and subject variables.

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THE DEVELOPMENT OF A RELATION BETWEEN SELF-EFFICACY JUDGEMENTS AND PERFORMANCE:
THE ROLE OF AGE, STRATEGIC KNOWLEDGE AND EXTERNAL FEEDBACK

Thérèse Bouffard, Carole Vezeau, & Anne Levasseur
Université du Québec à Montréal, Canada

This study examined whether personal and contextual factors interact in children's ability to produce judgments of self-efficacy related to their performance. An unusual memory task comprising four problems was used and presented on a portable computer. Each problem consisted of twelve successive screens showing a 3X4 matrix on which twelve drawings were arranged randomly. Solving a problem requires to choose one out of the drawings by clicking on it each time a new screen appeared, and to remember the drawings previously chosen in order not to choose them again on subsequent screens. 193 children from elementary and high school participated. At each school level, an equal number of children were assigned to an external feedback group or to a control group. All were advised that they would be allowed two attempts for each problem. The same procedure was used for each trial. Prior to executing a trial, children stated their self-efficacy by specifying how many different items they thought being able to obtain and their degree of certainty as to that prediction. Following each performance, for those assigned to the feedback group, a computer screen appeared informing them of their performance. Results support the idea of an interactive effect of personal and contextual factors on accuracy of self-efficacy judgments. Providing children with an external feedback on previous attempts may help them make more accurate self-efficacy judgments on subsequent attempts; however, age and level of strategic knowledge relevant to the task are among the requisite conditions to do so.

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INFLUENCE OF SELF-EFFICACY AND PERCEPTION OF COMPETENCE BELIEFS ON LEARNERS' CONFIDENCE JUDGMENTS DURING PROBLEM SOLVING IN A WEB-BASED LEARNING ENVIRONMENT

Noury Fabrice, Nathalie Huet, Caroline Dupeyrat, & Christian Escribe
University of Toulouse 2, France

Metacognitive judgements (such as judgments of learning or confidence judgements) reflect learners' ability to monitor and control their skills and thus have important implications in the regulation of learning. An important, albeit understudied, question pertains to the conditions eliciting these judgments. According to Koriat (2006) metacognitive judgments, in particular retrospective assessments of people about their performance (e.g., confidence judgements) are partly determined by their preconceptions on their skills (such as self-efficacy beliefs or perceived competence). Thus the purpose of the present study was to investigate the relationships among self-efficacy, perceived competence, confidence judgments, and performance in an academic learning setting. Forty-two psychology students had to solve statistics problems on a web site designed for their course. Learners' perceived competence in statistics was assessed at the beginning of the web site, self efficacy was assessed following the reading of each exercise and confidence judgment was assessed after resolving the exercise. The results of regression analyses revealed that (1) self-efficacy and perceived competence were highly positively correlated, (2) both perceived competence and self-efficacy were positive predictors of confidence judgements, accuracy of confidence judgements and performance, (3) direct effects of self efficacy on performance was fully mediated by the confidence judgement, (4) no significant mediation effects of confidence judgments were found in the relation between perceived competence and performance. Implications of these results on learning will be discussed.

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Saturday 16:30 - 18:00	Symposium 10	Room: ALKYONI

METACOGNITION IN SOCIAL INTERACTION

Organizer/Chair: **Tuike Iiskala & Inge Molenaar,** *University of Turku, Finland, & University of Amsterdam, The Netherlands*

Discussant: **Marcel V. J. Veenman,** *University of Leiden, The Netherlands*

This symposium aims to consider metacognition in social interaction which is an emerging topic of metacognition research. Metacognition has typically been described and measured as an individual construct but there is a growing consensus that metacognition should also be considered in social context, e.g. in a collaboration (see e.g. Iiskala, Vauras, & Lehtinen, 2004) which differs from individual's working alone side-by-side (Salomon & Globerson, 1989). In this symposium, four papers will be presented that deal with studies on metacognition in social interaction. In the first presentation, David Whitebread and Valeska Grau (University of Cambridge) investigate metacognitive self-, co- and shared-regulation during collaborative group work and illustrate both verbal and non-verbal indicators of metacognition. Next, Noor Christoph, Jacobijn Sandberg and Bob Wielinga (University of Amsterdam) examine measurement of metacognition in a simulation game setting through analysing chat protocols when learners collaboratively manage knowledge. The third presentation by Inge Molenaar, Carla van Boxtel, and Peter Sleegers (University of Amsterdam) focuses on a study in which metacognition in traids is scaffolded by a virtual agent. They use verbal protocols to analyse the metacognitive activities in different conditions of scaffolding. Finally, Tuike Iiskala, Marja Vauras, Erno Lehtinen, and Pekka Salonen (University of Turku) explore, in particular, socially-shared metacognition, i.e. metacognition at the dyadic level when a student pair is seen and analysed as an entity during collaboration. The discussant (Marcel Veenman, University of Leiden) will provide comments on the papers and will take a view of this line of research.

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Saturday 16:30 - 18:00	Symposium 10 / Paper 1	Room: ALKYONI

METACOGNITION AND COLLABORATIVE GROUP WORK IN YOUNG CHILDREN: VERBAL AND NON-VERBAL INDICATORS
David Whitebread & Valeska Grau
University of Cambridge, United Kingdom

New developments have emerged from the study of Self-regulated learning (SRL) in classroom contexts, suggesting that metacognitive activity presents special characteristics when it is observed during interactions with others. Moreover, it has been argued that an important part of metacognitive regulation is social in nature (Iiskala, Vauras, & Lehtinen, 2004). These findings broaden our horizons regarding the research of SRL and metacognitive skills in terms of individual capacities and shared processes when two or more children are working together. Most of the studies in this field have used discourse analysis or verbal data in order to investigate student's metacognition in individual and social situations. However, previous research in SRL indicates that especially in the case of young children metacognitive skills can be easily underestimated if non-verbal indicators are not taken into account (Whitebread et al., in press). Considering these issues, this paper presents an analytical framework to analyse children's interactions in the classroom, focusing on the different levels of metacognition and regulation of learning in interactive activities: self-regulation, co-regulation and shared regulation. At the same time, it includes verbal and non-verbal indicators of SRL activity. Through a socio-constructivist general approach and using observation as the main strategy of data collection, 2 studies are presented illustrating verbal and non-verbal indicators of SRL and metacognition during group work activities in the classroom, considering 2 different age groups: preschoolers and primary education children in 3rd grade. Issues regarding assessment of personal and social aspects of metacognition and SRL in the classroom, together with implications for teaching and learning throughout different developmental stages will be discussed.

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MEASURING THE USE OF METACOGNITIVE SKILLS WHILE LEARNING TO SOLVE PROBLEMS IN A SIMULATION GAME

Noor Christoph, Jacobijn Sandberg, & Bob Wielinga
University of Amsterdam, The Netherlands

KM Quest is a simulation game for the domain of knowledge management. Learners collaboratively manage the knowledge household of a fictitious company. The problem solving process is guided by the Knowledge Management model (KM model) which prescribes on *the task level* how to solve the ill-defined KM problems. One of the assumptions is that because of the model, students need to use their metacognitive skills to a lesser extent since the model has partly taken over regulation of learning in a new domain. This is investigated by using two conditions: a no-model versus a model condition. Meaningful learning is measured in a pre- post-test design. The use of metacognitive skills was measured concurrently by performing protocol analysis on communication protocols. The results indicate that in the no-model condition, the use of metacognitive skills is related to knowledge acquisition. Moreover the results indicate that without the KM model students still significantly acquire KM model specific procedural knowledge. In conclusion, when no task model is available, the meta level regulates learning at the object level and learners may develop their own intuitive task model. When the KM model is included in the learning environment, students make more group related task and metacognitive contributions than their peers. Furthermore the amount of metacognitive contributions is <u>not</u> related to knowledge acquisition. This suggests that the inclusion of the KM model changes the nature of the regulation. The KM model may require process regulation whereas without a KM model students may be more inclined to regulate domain activities.

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| **Saturday 16:30 - 18:00** | Symposium 10 / Paper 3 | Room: ALKYONI |

SCAFFOLDING METACOGNITION IN COLLABORATIVE LEARNING WITH A VIRTUAL AGENT

Inge Molenaar, Carla van Boxtel, & Peter Sleegers
University of Amsterdam, The Netherlands

The measurement of metacognitive activities in a collaborative learning setting is an emerging topic. This study focuses on measuring metacognitive activities in a collaborative learning setting within two experimental conditions and a control group. Groups of three students aged 10 to 12 years old work together behind one computer on a research task. The metacognitive activities of the students are supported in two different experimental conditions with scaffolds provided by a virtual agent. In the first condition the metacognitive activities of the group are supported with directive scaffolds in the form of prompts. In the second condition the metacognitive activities are supported by initiating scaffolds, in the form of question prompts. The two conditions are compared to the control group without scaffolding of the virtual agent. We expect that in the initiative scaffolding condition the metacognitive activities are more frequently observed and more elaborated then in the supporting condition. The control condition provides us insights into regular metacognitive process within small groups of students. The metacognitive activities are measured by analyzing the verbal protocols of the group discussions. The analysis instrument has been especially established for the analysis of metacognition in group discussions of younger children and are based upon the thinking aloud analyses instruments of Meijer, Veenman, and Wolters (in press) and Azevedo, Cromley, and Seibert (2004) and an analysis of data gathered in a pilot study. This presentation will focus on the measurement method and the application of the instrument in the above described study.

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| **Saturday 16:30 - 18:00** | Symposium 10 / Paper 4 | Room: ALKYONI |

SOCIALLY-SHARED METACOGNITION DURING A STUDENT PAIR'S COLLABORATIVE MATHEMATICAL WORD PROBLEM SOLVING

Tuike Iiskala, Marja Vauras, Erno Lehtinen, & Pekka Salonen
University of Turku, Finland

The aims of this study are (1) to explore individual's metacognition, other-regulation and, in particular, socially-shared metacognition during a student pair's collaborative mathematical word problem solving, and (2) to elaborate methods for analysing socially-shared metacognition. Although recently more attention has been shifted to social aspects of metacognition rather than merely understanding it from the perspective of an individual, empirical evidence is still scarce. Metacognition has not either clearly been studied at the dyadic level in a way where the pair is seen as an entity which is not traceable only to the individuals, i.e. as a socially-shared metacognition (see Iiskala et al., 2004). Four high-achieving pairs, eight students aged ten, participated in this study. The pairs solved with the help of the computer-supported mathematical learning game altogether 285 problems of different difficulty levels during 64 hours. All working sessions were videotaped, and a stimulated recall interview was conducted. The verbal communication during all sessions was transcribed, and nonverbal communication was written down. An interaction analysis was used. Our preliminary results indicate that metacognition does not necessarily be implied only the person's own (individual's metacognition) or not only support the other student's cognitive processes (other-regulation) but also indicate socially-shared metacognition during the collaborative problem solving. Furthermore, the data will be quantified, and the applicability of the used analyses in studying socially-shared metacognition will be discussed. To conclude, we regard the extension of metacognition research on the dyadic and the group level as important because it differs from individual's metacognition.

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