

## TR51 vol 16 no 1 of the Mathematics Teaching-Research Journal

Editorial from Malgorzata Marciniak, Managing Editor of MTRJ



The occurrence of the solar eclipse overlaps with the publication of the current journal issue and is equally exciting among certain enthusiasts. Hopefully this temporary yet relatively frequent alignment of the Earth, the Moon, and the Sun brings alignment to nature around us and within us. The trajectory of the papers begins with problem solving, then shifts to thinking, cognition and later to challenges of the pre-service teachers. Papers about thinking and cognition revolve around various aspects of the mind, and include hermeneutics phenomenological aspects, triad learning or analyzing students' errors in integration categorized according to the level of students understanding.

### **The Impact of Project-Based Learning on the Development of Statistical and Scientific Skills: A Study with Chilean University Students from the Faculty of Health Sciences**

Chuan Chih, Hsu, Chia Shih, Su, Kua I, Su, Chia Li, Su

The first paper, by Chuan Chih et al was written collaboratively by authors from Chile and Argentina, who discuss Project-Based Learning. Students of kinesiology in their statements praise PBL for the improvement in academic performance. The development of statistical and scientific skills among participants is confirmed in quantitative data analysis.

### **On a typology of errors in integral calculus in secondary school related to algebraic and graphical frames**

Anass El Guenyari, Mohamed Chergui, Bouazza El Wahbi

Repetitive errors in integration performed by Moroccan students are analyzed by El Guenyari et al. The authors create multiple subcategories for the three known categories of errors: conceptual, procedural, and technical. It seems that technical subcategories represent a major source of the erroneous productions of the students.

### **Investigation of Students' Mathematical Thinking Processes in Solving Non-routine Number Pattern Problems: A Hermeneutics Phenomenological Study**

Aiyub Aiyub, Didi Suryadi, Siti Fatimah, Kusnandi Kusnandi, Zainal Abidin

A hermeneutics phenomenological study is performed by Aiyub et al from Indonesia. The authors observe patterns in students' performance classifying and analyzing each category of performance. In addition, suggestions for supporting students' learning in each category are provided.

### **Socio-mathematical Norms Related to Problem Solving in a Gifted and Talented Mathematics Classroom**

Aslı Çakır, Hatice Akkoç

Aslı Çakır, Hatice Akkoç from Turkey discuss how gifted students create social norms for discussing different solutions. The authors give practical guidelines for developing classroom culture related to such discussions. Their work is motivated by the benefits of such discussions for both mathematical and human reasons.

### **The Thinking Process of Children in Algebra Problems: A Case Study in Junior High School Students**

Wa Ode Dahiana, Tatang Herman, Elah Nurlaelah

Dahiana Wa Ode, et al from Indonesia use the Harel's model to analyze thinking characteristics of students while solving algebra problems. After analyzing the data the authors conclude that only a few students display algebraic invariance thinking or proportional and deductive thinking while majority use non-referential symbolic thinking.

### **Overview of Student's Mathematics Reasoning Ability Based on Social Cognitive Learning and Mathematical Self-efficacy**

Habibi Ratu Perwira Negara, Farah Heniati Santosa, Muhammad Daut Siagian

Mathematical self-efficacy is discussed in the context of problem-based learning and social cognitive learning by Muhammad Daut Siagian, et al from Indonesia. According to the authors' work, in certain circumstances, one of those two kinds of learning is more impactful on students' mathematical reasoning abilities.

### **Designing Model of Mathematics Instruction Based on Computational Thinking and Mathematical Thinking for Elementary School Student**

Rina Dyah Rahmawati, Sugiman, Muhammad Nur Wangid, Yoppy Wahyu Purnomo

Rina Dyah Rahmawati, et al from Indonesia perform experiments to use integrated computational thinking and mathematical practical design thinking to enhance students' computational thinking

skills. The authors analyze the validation process, practicality, and effectiveness of such an approach.

### **Schema development in solving systems of linear equations using the triad framework**

Benjamin Tatira

The Triad Framework was used by Benjamin Tatira from South Africa for studying his students progress in learning linear equations. The author points out that identifying the challenges encountered by the students provides sufficient insight to the instructors for overcoming them.

### **Assessing the understanding of the slope concept in high school students**

José David Morante-Rodríguez, Martha Patricia Velasco-Romero, Geovani Daniel Nolasco-Negrete, María Eugenia Martínez-Merino, José Antonio Juárez-López

The concept of slope is the topic of research for José David Morante-Rodríguez, et al from Mexico. They analyze it within four dimensions: Skills, Properties, Uses and Representations using the SPUR model. And based on three conceptualizations: constant ratio, behavior indicator and trigonometric conception. According to the authors, most students master the procedural tasks of the slope: the constant ratio and trigonometric conception but miss the conceptual aspects.

### **Effects of Differentiated Instruction in Flipped Classrooms on Students' Mastery Level and Performance in Quadratic Equations**

Gilbert G. Baybayon, Minie Rose C. Lapinid

Gilbert G. Baybayon and Minie Rose C. Lapinid from the Philippines discuss methods of addressing students' non-compliance with assignments in a flipped classroom. They administer tiered worksheets based on students' readiness as reflected in pre-assessment results.

### **Case Studies: Pre-Service Mathematics Teachers' Integration of Technology into Instructional Activities Using a Cognitive Demand Perspective**

Ahmet Oğuz Akçay

Ahmet Oğuz Akçay from Turkey test pre-service teachers on classroom technology. In addition, the authors study cognitive demands of mathematical tasks when technology is used.

### **Examining Pre-service Mathematics Teachers' Pedagogical Content Knowledge (PCK) during a Professional Development Course: A Case Study**

Sunzuma Gladys, Zezekwa Nicholas, Chagwiza Conillius, Mutambara Tendai, L.

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In another paper about pre-service teachers, Sunzuma Gladys et al, from Zimbabwe assess pre-service teacher's pedagogical content knowledge as observed in their teaching. Lesson plans and class videos from four subjects are analyzed from the perspective of the knowledge about the subject content matter, knowledge of learners, understanding of instructional strategies and familiarity of context.

### **The Problem Corner**

Ivan Retamoso, BMCC, USA

The Problem Corner edited by Ivan Retamoso from BMCC, USA contains math problems and their solutions. This time solutions were submitted by Abdullah Kurudirek from Iraq and by Hosseinali Gholami from Malaysia who previously authored papers in MTRJ.

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