

TSG Agenda

TSG 18: Students' Identity, Motivation, and Attitudes towards Mathematics and Its Study

Class: B (Class A for TSGs with odd numbers; Class B for TSGs with even numbers)

**Please prioritize the sessions in "core-time" (from 19:30-23:00, Beijing time, i.e. Session 2, 3 for Class A and session 1, 2 for Class B) as they are friendly to most of the time zones in the world.

The Organizing Team

- Chair: Maike Vollstedt, Germany, University of Bremen
- Cochair: Masitah Shahrill, Brunei Darussalam, University of Brunei Darussalam

Members:

- Bozena Maj-Tatsis, Poland, University of Rzeszow
- Karin Brodie, South Africa, University of Witwatersrand
- Donglin Chen, Hong Kong-China, The University of Hong Kong

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Session 1, 14:30-16:30 Beijing time, July 13th (Chair: Maike Vollstedt)

14:30-14:40 Maike VOLLSTEDT, Masitah Shahrill, Bozena Maj-Tatsis, Karin Brodie, Donglin Chen

Opening Session

Germany, University of Bremen; Brunei Darussalam, University of Brunei Darussalam; Poland, University of Rzeszow; South Africa, University of Witwatersrand; Hong Kong-China, The University of Hong Kong

In the Opening Session the organising team of TSG 18 will welcome the participants and will give a short introduction to the organisation of the TSG.

14:40-15:00 Kai Kow Joseph YEO

200: MATHEMATICS-ANXIETY STUDENTS REASONS AND FEELINGS WHEN CHOOSING TO SOLVE PARTICULAR PROBLEMS

National Institute of Education, Nanyang Technological University

From many research studies, it was observed that mathematics anxiety is a subset of mathematics attitudes (Schoenfeld, 1985). Mathematics anxiety, described as a fear or state of discomfort when faced with mathematics tasks/problems (Hembree, 1990; Hoffman, 2010), is widely accepted as an issue in mathematics education that can hinder the true ability of students. As part of a study on Mathematics Anxiety and Problem Solving this paper examines only one feature related to it; namely mathematics-anxiety students and their choice of problems to solve. Students were asked to rank the order in which they would choose to solve three given problems. They also had to state the reasons and describe their feelings that directed their ranking. Significant differences in feelings were noted with regards to the rank order of the problems they chose to solve.

15:00-15:10 Katrina Grace Q. Sumagit & Nympha B. Joaquin

400: Mathematical Problem-Solving Beliefs of Filipino Seventh Graders

Ateneo de Manila University, University of the Philippines Diliman

This study examined the mathematical problem-solving beliefs of seventh graders in the Philippines using mixed-methods research design, particularly, explanatory sequential design. A researcher-made self-report survey was administered to 464 students enrolled in 10 public high schools in an urban area. Descriptive statistics (i.e. composite mean and standard deviation), exploratory and confirmatory factor analyses as well as correlation analysis were used to analyze the data. Transcripts of interviews with selected students were used to substantiate findings. The results indicate that students hold availing and non-availing mathematical problem-solving beliefs. The

students believe that they should exert effort to develop or improve problem-solving skills. Likewise, the students believe that they should rely on steps or procedures when problem-solving and getting the correct answer is more important than understanding the problem.

15:10-15:20 Masitah Shahrill, Ai Len Gan, Haryani Haji Mohammad

1946: UNDERSTANDING THE INTENTIONS OF SHADOW EDUCATION IN BRUNEI DARUSSALAM

Sultan Hassanah Bolkuah Institute of Education, Universiti Brunei Darussalam; Sekolah Menengah Sayyidina Hasan, Ministry of Education, Brunei Darussalam

This study aims to understand the reasons behind why the need to take or not partake in mathematics tuition outside of the normal school hours. More than 800 surveys were disseminated to Years 7 to 11 in a secondary school in Brunei Darussalam. From the surveys collected, only 162 students responded that they receive mathematics tuition. Meanwhile, 654 students did not. The top two reasons for partaking in mathematics tuition are to improve the examination scores and to learn the mathematics subject better. Those who did not receive any mathematics tuition cited having no time and no money.

15:20-15:30 Changgen PEI & Jiancheng FAN

709: DEVELOPING AND VALIDATING A SCALE FOR MEASURING STUDENTS' CRITICAL THINKING DISPOSITION IN MATHEMATICS EDUCATION

Southwest China University & Teaching Research and Teacher Training Center for Primary and Middle Schools, Xindu District, Chengdu, China

Critical thinking is of great significance to students' mathematics learning and the development of creative thinking. In this study, the initial scale of the critical thinking disposition of mathematics was compiled with the reference of the California Critical Thinking Disposition Inventory (CCTDI) and the existing Chinese versions. 2850 primary school students were selected as the subject of investigation for validating the scale. The initial scale was analyzed through item analysis, validity analysis, and reliability analysis. The results show that the final scale has good validity and reliability, and can be used as an instrument to measure the mathematics critical thinking disposition of primary school students.

15:30-15:40 Beijia TAN, Jenee Love, Leigh M. Harrell-Williams, Christian E. Mueller

413: Exploration of Math Mindset Changes Over Time in an Urban Sample of Elementary and Secondary School Students in the United States

University of Memphis

Individuals hold varying beliefs about whether intelligence is relatively stable (fixed mindset) or can be changed with effort (growth mindset). In the present study, we examined growth trajectories of math mindset over the course of two academic years among urban elementary and secondary students in the United States, specifically focusing on how changes occurred as a function of age and gender. Multilevel growth modeling revealed that math mindset scores for elementary students decreased over time, but increased for secondary students. In addition, gender played a role in the change of math mindset score over time for older students but not for younger students.

15:40-15:45 Meng Guo, Xiang Hu

1385: CLASSROOM GOAL STRUCTURES, CHINESE STUDENTS' GOAL ORIENTATIONS AND MATHEMATICS ACHIEVEMENT

Faculty of Education, The University of Hong Kong, Hong Kong SAR, China; School of Education, Renmin University of China, China

This study explored the relationships among classroom goal structures, goal orientations and mathematics achievement in China. 211 Chinese Han students in primary school participated in this study. The results showed mastery and performance classroom goal structures positively predicted mastery and performance goal orientations respectively. Notably, Chinese students' mastery goal orientation was predicted by classroom performance goal structure.

15:45-15:50 Mun Yee Lai, Pauline Wong Wing Man Kohlhoff

791: Applying the Theory of Planned Behaviour to 2012 Australian PISA data

University of Technology Sydney, AU

This paper examines the applicability of the Theory of Planned Behaviour (TPB) for predicting the relationship between Australian students mathematical intentions, and their attitudes, subjective norms, and perceived control, using items created by PISA 2012 question designers to assess these TPB constructs.

15:50-16:00 Yang Rui, Wang Guangming, Li Shuang

2187: THE NON-INTELLECTUAL LEVEL OF EFFICIENT MATHEMATICS LEARNING OF JUNIOR HIGH SCHOOL STUDENTS AND THEIR INFLUENCE PATHWAYS ON MATHEMATICS LEARNING PERFORMANCE

Tianjin Normal University, China; Tianjin Economic-Technological Development Area International School, China

The purpose of this paper is to explore the differences in the non-intellectual levels of efficient mathematics learning between junior high school students and other students. A survey was conducted on 645 junior high school students using a questionnaire on their non-intellectual level of mathematics learning. The ANOVA showed that middle school students with high efficiency math learning were significantly higher than other students in terms of non-intellectual levels. The path analysis showed that motivation, will, emotion and attitude had both direct and indirect effects on the mathematics learning performance of middle school students with high efficiency mathematics learning, and the direct effect of motivation had the greatest effect.

16:00-16:10 Sheng Zhang, Guanming Wang

2135: DIFFERENT CONTRIBUTIONS OF PARENTAL EXPECTATIONS AND TEACHER'S BEHAVIORS TO STUDENTS' MATHEMATICS-RELATED BELIEFS

Tianjin Normal University, China

This study examined the relationships between variables related to parental education expectations, parental mathematics achievement expectations, mathematics teachers' praise and students' mathematics-related beliefs. The results suggest that teacher's praise as well as parental education expectations, but not parental specific achievement expectations in mathematics, foster more desirable mathematics-related beliefs. Moreover, teacher's praise and parental education expectations have different contributions to the subdomain of Chinese high school students' mathematics-related beliefs.

16:10-16:20 Mingxuan PANG, Xiaorui HUANG

1756: DOES PARENTS' ATTITUDE TOWARDS MATH MATTER TO YOUNG ADOLESCENTS' MATH ACHIEVEMENT IN CHINA? MEDITATING EFFECTS OF MATH ANXIETY

Institute of Curriculum and Instruction, East China Normal University, China

Structural equation modeling was employed to examine the transmission of parents' attitude towards math to their daughter and son's math attitudes and their effects on math achievement in a total of 1,651 7th and 8th grade students in Shanghai. The triads relations of father-mother-to-son, and father-mother-to-daughter were examined, respectively. The results showed that father's attitude towards math had improved daughter's math achievement by relieving their math anxiety. The interaction of mother and father's attitude towards math had also relieved their daughter's

math anxiety and improved math achievement. However, mother and father's attitude towards math had no effects on their son's math achievement and math anxiety. The applications will be discussed in the paper.

16:20-16:30 Wellington Munetsi Hokonya, Pamela Vale Mellony Graven

1826: MATHEMATICAL IDENTITIES OF A HIGH SCHOOL MATHEMATICS LEARNER IN LANDSCAPES OF MATHEMATICAL PRACTICE

Rhodes University, Grahamstown, ZA

This paper explores the mathematical identities of one high school learner who participated in an after-school mathematics club in primary school. What is captured here is the story of one learner's mathematical journey, written several years after his mathematics club participation, as a grade 10 learner. We foreground Martin's (2009) definition of mathematical identity as the dispositions and deeply held beliefs that individuals develop about their ability to participate and perform effectively in mathematics contexts and to use mathematics to change conditions of their lives. We also draw on Solomon (2009) who views one's mathematics identity as: beliefs about oneself as a mathematical learner; beliefs about the nature of mathematics; engagement in mathematics and perception of oneself as a potential participant in mathematics. The expanded paper provides additional theoretical detail and presents a more comprehensive analysis of the narrative from this learner.

Session 2: 19:30-21:00 Beijing time, July 13th (Chair: Bozena Maj-Tatsis)

19:30-19:50 Daniel Barton

861: MAKE A TUTORIAL! THE IMPACT OF A CLASSROOM VIDEO PROJECT ON EMOTIONS, MOTIVATION AND ACHIEVEMENT

Bielefeld University, Bielefeld, DE

The complex process of learning is influenced by many parameters. In addition to content knowledge affective variables have an impact on students learning processes and achievement. Based on the link of affect and achievement a study about a mathematical video project was implemented to investigate its impact on emotions, motivation and achievement. Six ninth grade classes (N=143; N(Intervention Group) = 65, N(Control Group) = 78; mean age = 14.6 years) of secondary schools in Germany participated in the project. The students worked at two project days in groups on a video tutorial about spatial geometry. The participants worked autonomous on the mathematical content, made a concept to implement this content in a film setting and produced the video tutorial. Results show that the participants experienced positive emotions while working in the project and indicate a positive shift in students' interest and motivation dealing with math.

19:50-20:00 Marta Saccoletto, Camilla Spagnolo

2218: PERCEIVED DIFFICULTY IN ANSWERING MATHEMATICAL TASK: REFLECTIONS ON METACOGNITIVE FACTORS.

University of Torino, Free University of Bolzano/Bozen

The paper shows the main results of a qualitative survey focusing on students' perceived difficulties after solving mathematical tasks (Grade 9 and 10 students). The aim is to identify factors that influence students' perceived difficulty. Although the factors that contribute to increasing or decreasing the difficulty of a task (in an absolute sense) are widely discussed in the literature, student perceived difficulty regarding a mathematical task is not. We believe that the analysis of the questionnaire and interviews conducted with students highlight some important reflections on the influence that metacognitive factors have on students.

20:00-20:10 Marios Ioannou

1829: AFFECTIVE ISSUES IN THE LEARNING OF ABSTRACT ALGEBRA

Alexander College, Canada

Abstract Algebra is considered by many novice undergraduate mathematics students as one of the most challenging courses in their curriculum. Their difficulty involves both cognitive and metacognitive aspects. This study is part of a larger qualitative study on the learning of Abstract

Algebra, and aims to investigate the affective responses of undergraduate mathematics students in their first encounter with course, using Goldin's Theoretical Framework of Affect. Data analysis suggests that there have emerged nine contributing factors influencing the affective responses of these students, namely the abstract nature of the particular course, the occasionally extensive time required to grasp the algebraic notions and be able to solve the mathematical tasks, the preparation of the coursework, the seminar system, the interaction with the lecturer and the student advisers, the collaboration with peers, any previous encounter with the course, their ability to visualise, and their command of English language.

20:10-20:30 Aarifah Gardee, Karin Brodie

1864: A FRAMEWORK FOR LEARNERS' MATHEMATICAL IDENTITIES

University of the Witwatersrand, South Africa

In recent years, many researchers have turned to the concept of identity to better understand learning in social contexts. Despite the proliferation of research on the concept of identity, there is a need to define identity more clearly, by drawing on established theoretical frameworks. We propose the use of critical realism as a theoretical framework to define and research learners' mathematical identities as they are constructed in classrooms. By employing critical realism, identity is defined as a social phenomenon, which exists in the real world and emerges from combinations of various generative mechanisms. We distinguish between three generative mechanisms: personal identity, social identity and agency, and we illustrate how these three generative mechanisms encompass subjective and social influences, which are responsible for the emergence of learners' mathematical identities. We then propose a framework and explore its explanatory power to understand how four secondary school learners constructed their mathematical identities through interactions with their mathematics teachers.

20:30 – 20:40 Lovejoy Comfort GWESHE, Karin Brodie

433: A CONCEPTUAL FRAMEWORK RELATING MATHEMATICS CLUBS AND MATHEMATICAL IDENTITIES

University of the Witwatersrand, Johannesburg-Braamfontein, ZW

Mathematical disengagement and disinterest are persistent problems in mathematics education, in spite of decades of research related to mathematics teaching and learning. Research into mathematical identities and mathematics clubs has tried to address these persistent problems. Researchers have investigated mathematical identities and after-school mathematics clubs separately, but studies in which clubs and identity are combined, are scarce. Guided by a social theory of learning, we put forward a framework that relates mathematical identities and mathematics clubs, hoping that it will assist in better understanding their relationships. Mathematics clubs that integrate identity messages are expected to shift learners' mathematical identities from largely fragile towards largely robust identities.

20:40-21:00 Farzaneh Saadati

**347: INFLUENCE OF COLLABORATIVE LEARNING ON STUDENT ATTITUDES
TOWARD MATHEMATICAL PROBLEM SOLVING**

Center for Advanced Research in Education, Institute of Education (IE), Universidad de Chile

This study attempts to explore, from the students' point of view, the evolution of student attitudes toward mathematics within a collaborative learning framework. A study of 65 primary school students who were taught under a collaborative learning approach for one year shows an overall stability of the group's attitudes and a strong connection of these attitudes to their views of mathematics problem solving. Moreover, the findings show that collaborative activities can shift students' perceptions of mathematics from static to more dynamic views. The results should be considered by policy-makers and teachers while designing a new teaching and learning approach.

Session 3: 21:30-23:00 Beijing time, July 16th (Chair: Karin Brodie)

21:30-21:50 Paul Regier, Miloš Savić, Houssein El Turkey

1458: A QUANTITATIVE ANALYSIS OF SIX ASPECTS OF STUDENT IDENTITY AND CREATIVITY-FOSTERING INSTRUCTION

University of Oklahoma, USA; University of New Haven, USA

Can fostering mathematical creativity explicitly in a calculus I course impact students' mathematical identity? As a part of a larger research project exploring this question, a quantitative research study was developed to explore six aspects of student mathematical identity along with student perception of creativity-fostering instructor behavior. Analysis of pre- and post-semester survey data indicated that the instruments measuring aspects of student identity had strong reliability and good structure validity. Correlational analysis of the six aspects of student identity provided evidence that students' views of mathematics as a creative endeavor impacted the formation of self-efficacy in mathematics. The instrument measuring creativity-fostering instruction demonstrated low reliability and internal inconsistencies. Methodological issues related to measuring creativity-fostering instruction and directions for future research studying creativity-fostering and student identity are discussed.

21:50-22:00 García-Cerdá, C. & Ferrando, I.

2118: DOES TYPE OF PROBLEM INFLUENCE ON INTEREST? A REPLICATION OF A GERMAN STUDY IN THE SPANISH CONTEXT

Departamento de Didáctica de la Matemática, Universitat de València, Spain

Interest plays an important role in mathematics learning. In this work we replicate part of the study developed in Germany by Rellensmann and Schukajlow (2017) in order to determine whether the type of problem affects students' interest and if there is a relationship between interest and student performance. In order to carry out this research, the questionnaire used in the German study has been adapted and, the results of the present study differ from those obtained in Germany, which confirms the interest of replicating research. According to the results of the Spanish study, students show a greater interest in verbal problems than in intramathematical problems, while no significant differences were found between modelling problems and others. Regarding students' performance, there is a significant relationship with interest that is particularly evident in modelling problems.

22:00-22:10 Claudia Vargas-Díaz & Victoria Núñez-Henríquez

742: ATTITUDES, BELIEFS AND EMOTIONS TOWARDS GRAPH THEORY

Universidad de Santiago de Chile, Liceo Bicentenario Italia

This article studies the relationship between attitudes, beliefs and emotions towards graph theory. The work with graph theory comes from the feasibility to develop it in classes to reduce students' rejection towards mathematics. An extra-programmatic workshop was implemented for 13 students of different grades of the Liceo Bicentenario Italia (LBI), where problems related to the development of graph theory were addressed. To obtain information of affective domain, before and after the execution of the workshop, a questionnaire was adapted and applied, showing favorable changes towards the affective domain when learning mathematics, especially in the assessment of problem solving. To better understand the reasons for these changes, interviews were designed and applied. The simplicity of graphs, together with the structure of challenging games are the main forces behind the changes

22:10-22:20 Jihyun Hwang, Kyong Mi Choi

390: Predicting College Major Choice in STEM with Students Data at Grades 9 and 11

University of Iowa, University of Virginia

Attitude toward mathematics has been considered as an important factor on students' choices of STEM majors at colleges. This study is to reexamine the importance of attitude toward mathematics using a supervised machine learning technique, namely a supportive vector machine (SVM). We collected the data of 5,260 students at grade 9 and 5,728 at grade 11 from the High School Longitudinal Study of 2009 (HSL:09). Using SVM, we predicted students' choice of STEM majors at colleges using the independent variables representing students' attitude toward mathematics, as well as their GPA at and some demographic information like socioeconomic status, ethnicity, gender, and parents' recent occupations at grades 9 and 11. Students' choice of STEM majors might be well predicted with attitude toward mathematics alone at grade 9, while it is recommended to include other variables such as background and course works for a better prediction at grade 11.

22:20-22:30 Shande King, Lynn Hodge, Qintong Hu

946: The Role of Interpersonal Discourse in Small-Group Collaboration in Developing Mathematical Arguments and Student Identity

The University of Tennessee, The University of Tennessee, Shandong University of Science and Technology

The development of proofs and argumentation remains a standard for mathematical practices in K-12 education. Further, the use of discourse is considered essential in the learning of mathematical concepts at these levels. However, K-12 educators continue to confound how to best utilize student

interpersonal discourse to advance mathematical argument development. This study examines the nature of student discourse, particularly in small-group interactions, as they create collective arguments based on mathematical evidence. In examining the patterns of discourse in small groups, we make conclusions on the effectiveness of various types of discourse in peer-to-peer interaction so that students develop more analytical thoughts in creating mathematical proofs and arguments. Further, we also draw major themes that provide deeper analysis into middle grade students' identities as doers of mathematics and constructors of mathematical proofs and arguments.

22:30-22:40 Amanda Meiners, Kyong Mi Choi & Dae Hong

1467: EXPLORING PRE-SERVICE TEACHERS PERSISTENCE THROUGH MULTIPLE STRATEGIES TASKS

University of Iowa, USA; University of Virginia, USA

This study explored influential factors that affect pre-service teachers' (PST) persistence on mathematics learning. The data includes quantitative measures on mindset and persistence, and qualitative audio session from professional development sessions to investigate how using Multiple-Strategy intervention affected PSTs' persistence. Relationships between persistence and MS are discussed.

22:40-22:50 Maike Vollstedt

1741: MEANINGFUL REASONS FOR LEARNING MATHEMATICS

University of Bremen, Bremen, Germany

The central question of this paper is how the reasons for learning mathematics given by students can be related to meaningful meaning. The study analyses reasons given by N = 133 students from Germany and Hong Kong to an open survey question. Data are coded drawing on a model of personal meaning and then analysed using Wilcoxon's rank sum test to compare the subsamples. Results show that personal meanings can well be used to code the reasons for learning mathematics although not all personal meanings were needed in this sample, and that differences can be found with respect to vocational precondition, marks, and basic knowledge between the subsamples.

22:50-22:00 Yewon Sung, Ana Stephens, Ranza Veltri Torres, Susanne Strachota, Karisma Morton, Maria Blanton, Angela Murphy Gardiner, Eric Knuth, Rena Stroud

995: Positive emotions in early algebra learning

University of Wisconsin-Madison; TERC, University of Texas-Austin; Merrimack College

This study aims to closely uncover how learners positive emotions are physiologically presented in learning of early algebra tasks by conducting naturalistic observations in three cases. Based on

results, there are two positive emotions which occurs within students accepting (or finding) new mathematical ideas: surprise and happiness.

Session 4: 14:30-16:30 Beijing time, July 17th (Chair: Masitah Shahrill)

14:30-14:50 Xiaorui HUANG, Bo DONG

1743: Stereotype on female's success boosts female's math learning

Institute of Curriculum and Instruction, East China Normal University, China

It is commonly seen that male's success and female's failure in math was attributed to born talent while female's success and male's failure in math was attributed to effort. This study examined math-male stereotype (MMS: math a male subject) and math-female stereotype (MFS, female's success in math was because of effort) influencing male's and female's math performance separately in a sample of 1,734 secondary students. Results from structure equation modeling showed that MFS boosted female's math performance and weakened the negative effects of MMS on females' math performance. MMS also boost male's performance; however, MFS had no significant effect on males' math performance. These findings give some suggestions about the improvement of the teaching math and math-related disciplines to female students.

14:50-15:00 Bozena Maj-Tatsis; Konstantinos Tatsis; Andreas Moutsios-Rentzos

1453: PEER PRESSURE EFFECT ON STUDENT TEACHERS' AFFECTIVE RELATIONSHIP WITH PROBLEM POSING

University of Rzeszow, Poland; University of Ioannina, Greece; University of the Aegean, Greece

In this paper, we investigate the effect of peer pressure on the affective relationship of student teachers with problem posing both as a learning task and as a teaching method. We report on the affective transformations about problem posing that occur during their interactions with their peers, attempting to identify potential factors that may facilitate the incorporation of problem posing in the future teaching practices repertoire.

15:00-15:10 Yoshinori FUJII & Koji Watanabe

521: QUESTIONNAIRE OF ATTITUDES TOWARD STATISTICS FOR JUNIOR HIGH SCHOOL STUDENTS IN JAPAN.

University of Miyazaki & Miyazaki International College

In Japan, Junior high school students have high ability of solving mathematical problem but low affective aspects for mathematics. So, developing students' affective aspect is one of the serious issues in mathematics education. Especially it is more important in statistics education because we need to continue learning after school in order to use statistics in our life. We developed a

questionnaire to evaluate the attitudes toward statistics for junior high school students in Japan. We constructed 3 models for the data and compared them by using the confirmatory factor analysis. Among them 3 correlated factors model with Interest, Value and Recognition was shown to be preferable.

15:10-15:20 Natanael Karjanto

26: “DEAR ‘KINGOS’, IT’S ALL RIGHT TO BE NOISY!” WHY IS IT SO HARD TO GET THEM TALKING?

Sungkyunkwan University, Suwon, KR

This paper discusses an effort to encourage student-instructor interactive engagement through active learning activities during class time. We do not only encouraged the Kingos to speak out when an opportunity arises but also required them to record their active participation in a student journal throughout the semester. In principle, any activities which constitute active learning can and should be recorded in the `Student Journal. These include, but not limited to, reading definition, theorem, problem, etc.; responding to questions and inquiries; asking questions; and pointing out some mistakes during class time. Despite an incentive for this participation, our experience teaching of different mathematics courses in several consecutive semesters indicates that many Kingos resist in speaking out publicly, submitting an empty journal at the end of the semester. Students feedback on teaching evaluation at the end of the semester reveals that many dislike and against the idea of active participation and recording it in a journal. This paper discusses the reason behind this resistance and provides some potential remedies to alleviate the situation.

15:20-15:30 Miho YAMAZAKI, Wee Tiong Seah

943: THE CHARACTER OF STUDENTS MATHEMATICAL VALUES IN LEARNING MATHEMATICS

Teikyo University, JP

The aim of this paper is to capture students' mathematical values in a mathematics learning situation. I had designed a questionnaire where respondents were asked to select from three hypothesised solutions that appear in a specific mathematics learning situation and got 245 valid students' valid data of which solution is the most mathematical one. As a result, I found that there were three different types of students' mathematical values and that students tend to pay no attention to a logical leap when they value a superficial form of the solutions. This shows that positive values do not always lead to good learning. To research students' mathematical values for better learning, the characters of mathematical values need to be explored in detail.

15:30-15:40 Tomoaki Shinobu

1130: A CASE STUDY OF MATHEMATICAL RESEARCH PRESENTATION IN A PUBLIC JUNIOR HIGH SCHOOL; FOCUS ON THE RELATIONSHIP OF ASSUMPTION OF OTHERS AND THE QUALITY OF LEARNING

Sakata First Junior High School, Sakata, JP

How do learning attitudes change when explaining knowledge to unfamiliar others? Based on this awareness, this paper discusses a public mathematics research presentation held at a junior high school, as well as a practical study conducted with the aim of verifying the aspect of learning activities while making assumptions about unfamiliar others. I focused on Student B, who presented about Oil Dividing problem, in which he tried to explain it in an easy to understand manner as if for "a person with a lower mathematics level than himself. This is the driving force behind Student B's deeper learning. In addition, I compare and classify the assumptions and learning attitudes of Students A and B from the previous study, and I clarify their relationship to Student B. This paper states that the difference in the learning attitude is caused by the assumptions made. Furthermore, I organize suggestions obtained about the characteristic of the learning posture by the Imaginative Others-consciousness.

15:40-15:50 Vanda SANTOS, Anabela Pereira, Teresa Neto, Margarida M. Pinheiro

865: MATHEMATICS ANXIETY: A PORTUGUESE STUDY IN HIGHER EDUCATION

CIDTFF—Research Centre on Didactics and Technology in the Education of Trainers, University of Aveiro, Portugal; Department of Education and Psychology, Portugal; Higher Institute of Accounting and Administration-University of Aveiro, Portugal

Anxiety is a present state at the students during their school path. Many of the educational failures relate not only to mathematics but also to personal difficulties in particular, at evaluation exams. Studies highlighting the importance of the anxiety (state and trait) at failure in school performance. This paper has a concern about mathematics anxiety, in higher education, because there are very few studies about this topic. The research instrument were answered by higher education students from different institutions in Portugal in the beginning of the academic year. The study results are being collected and conclusions are been working.

15:50-16:00 Sebastian Geisler

119: THE TRANSITION FROM SCHOOL TO UNIVERSITY MATHEMATICS: WHICH ROLE DO STUDENTS INTEREST AND BELIEFS PLAY?

Ruhr-Universitaet Bochum, DE

High dropout rates in mathematics - especially during the first year at university - illustrate that the transition from school to university mathematics is a challenging process for many students. In this contribution, the role of students' interest and beliefs for a successful transition is analyzed. The

results indicate that dynamic beliefs are related to interest in university mathematics while static beliefs go hand in hand with interest in school mathematics. Furthermore, static beliefs are associated with less achievement during the first term and dynamic beliefs correlate with students' satisfaction.

16:00-16:10 Jiraporn Wongkanya, Narumon Changsri, Kiat Sangaroon, Maitree Inprasitha

1330: EXPLORING 11TH GRADE STUDENTS' ATTITUDE TOWARDS MATHEMATICS

Master Program in Science and Technology Education, Faculty of Education, KKU, Thailand; Mathematics Education Program, Faculty of Education, KKU, Thailand; Center for Research in Mathematics Education, KKU, Thailand

This research aimed to explore 11th grade students' attitude towards mathematics. The target group was 105 eleventh-grade students in the 1st semester of 2019 academic years. The data was collected by using the Suken test level 3 and students' interview record form. Data were analyzed by using framework of attitude towards mathematics. The research results were as follows: 1) Most students felt that the content of problems in part one was at a medium level (68.57%) and easy level (21.90%). At the same time, the content of problems was at a medium in part two (51.43%) and then it was at a hard level (45.71%) respectively. 2) Most students like a problem of statistics the most (61.90%) and next, it was about probability (25.71%). 3) Most 11th grade students love mathematics (53.33%) and 4) The main objective of their examination was they want to know their math abilities (41.90%).

16:10-16:20 Shashidhar Belbase

15: HIGH SCHOOL STUDENTS IMAGES, ANXIETIES AND ATTITUDES TOWARD MATHEMATICS

United Arab Emirates University, Al Ain, AE

This study highlights high school students' images, anxieties, and attitudes toward mathematics. An Images-Anxieties-Attitudes scale (IAA-scale) was constructed and used to conduct a survey with 208 grade-ten students of 6 randomly selected high schools in Kathmandu, Nepal. The survey data was analyzed in SPSS-IBM26-New User Interface for correlations of images, anxieties, and attitudes toward mathematics, Mann-Whitney U test, and network of sub-constructs. It was found that a majority of sampled students had a weak image of mathematics with high anxiety, but a positive attitude toward mathematics. There was a moderate correlation ($r=0.598$) between students' images and anxieties, images and attitudes ($r=0.631$), but a strong correlation ($r=0.736$) between anxiety and attitudes toward mathematics. There was no statistically significant difference between students' images, anxieties, and attitudes toward mathematics at 0.05 significance level with gender, but their anxieties and attitudes were significantly different with school types (private and public).

16:20-16:30 Maike VOLLSTEDT, Masitah Shahrill, Bozena Maj-Tatsis, Karin Brodie, Donglin Chen

Closing Session

Germany, University of Bremen; Brunei Darussalam, University of Brunei Darussalam; Poland, University of Rzeszow; South Africa, University of Witwatersrand; Hong Kong-China, The University of Hong Kong

In the Closing Session, the organising team of TSG 18 will round up the TSG and wish the participants farewell.