TSG Agenda

TSG62: Popularization of Mathematics

Class: B

**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.

Session 1 Tuesday 13th 19:30-21:00 UTC+8

1. Time: 19:30─19:50
    Title of the Paper: STUDENTS MAKE INTERACTIVE EXHIBITION EXPERI-MENTAL MATHEMATICS FOR THE MUSEUM OF ENTERTAINING SCIENCES
    Authors: **Maria Shabanova**, Mariia Pavlova
    Institution: Northern (Arctic) Federal University M. V. Lomonosov; Moscow Center for Educational Quality, Russia

    Abstract: *Museums of entertaining sciences is one of the most interesting forms of popularization of scientific knowledge and scientific activity. The first museum of entertaining sciences was opened in 1906 in Germany. Today, there are numerous similar museums in many countries. The main advantage of such museums is the interactive nature of exhibits: everyone may touch the exhibits and experiment with them. We suggest going further by giving students an opportunity to create an exhibition themselves. The purpose of this article is to present our experience of realization of this idea. Students of universities and secondary schools have made a holistic interactive exposition "Experimental Mathematics" for a museum of entertaining sciences in Archangels. The students wanted to present mathematics in a new, unusual perspective of "experimental science", to tell them about the role of experiments in mathematical discoveries, and to make them feel themselves like real researchers and experimental mathematicians.*

2. Time: 19:50-20:10

Title of the Paper: MATHCITYMAP - POPULARIZING MATHEMATICS AROUND THE GLOBE WITH MATHS TRAILS AND SMARTPHONE

Authors: Iwan Gurjanow, **Joerg Zender,** Matthias Ludwig

Institutions: Goethe University Frankfurt ; University of Applied Science Rhein Main, Germany

Abstract: *For already over 40 years mathematics trails have been used in order to improve the attitude towards mathematics. With the availability of mobile devices, a new approach came into sight for mathematics trails and thus the MathCityMap project was founded. The projects started by reconstructing the workflow to create and walk a maths trail but then moved on to use the potential of mobile devices to create a completely new maths trail experience by elements of gamification, automatic feedback and communication. This paper describes the efforts of the project, evaluations and continuous development along with the needs of its users. The experiences which are shared in the paper may be useful for other initiatives to popularize mathematics.*

3. Time: 20:10-20:30

Title of the Paper: BEYOND THE CLASSROOM AND CURRICULUM: THE ANNUAL MATHS CAMP AT BAHIR DAR UNIVERSITY, ETHIOPIA 2013 - 2019

Authors: **Abdu Mohammed Seid**, Yismaw Abera Wassie, Danny Parsons, Haile Yideg, Assaye Walelign

Institutions: Bahir Dar University, IDEMS International, Ethiopia

Abstract: *We share our experience of conducting an annual week-long mathematics camp for school students from grade 7 – 12 at Bahir Dar University, Ethiopia since 2013. The camp considers the teaching and learning of mathematics concepts outside of the school curriculum in an engaging way with a motto: "Learning mathematics through fun". The main aim of the camp is to develop students' interest towards mathematics, change their perceptions of mathematics as a difficult subject and show its applicable nature to the real world. Assessment of case studies and student feedback and evaluations has shown that the camp has had an effect on students' attitude beyond the camp when they return to school and in further studies.*

4. Time: 20:30-20:40

Title of the Paper: RECONSIDERING THE M IN STEM: LEADERS CONCEPTIONS OF MATHEMATICS TO EMPOWER GIRLS IN GEMS CLUBS

Authors: Rose Mbewe, Sue Ellen Richardson, **Lili Zhou**

Institutions: Purdue University, USA

Abstract: *Working with leaders of afterschool STEM clubs for girls, Girls Excelling in Math and Science (GEMS), two goals drive our study: to highlight mathematics in STEM activities and to reconceptualize views of mathematics in informal learning settings. We use Photovoice to investigate 20 leaders' conceptualization of mathematics. Building on leaders' mathematical conceptions, we will collaborate with the leaders to develop a mathematics toolkit that highlights mathematics in STEM activities and reconceptualizes mathematics as an activity of wonder and creativity. Our perspective values the mathematics embedded in everyday lives that can be leveraged to broaden leaders' views of what counts as mathematics.*

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Session 2 Friday 16th 21:30-23:00 UTC+8

5. Time: 21:30-21:50

    Title of the Paper: **Creating Access to Engaged Views of Mathematics and Teaching Through Informal Learning Spaces**

    Authors: **Lynn Liao Hodge,** Shande King, Qintong Hu

    Institution: University of Tennessee, USA ; Shandong University of Science and Technology, China

Abstract: *This paper examines an informal learning setting that created a hybrid space for families, preservice teachers, and teaching interns to come together to engage with mathematics and teaching. The data analyzed included surveys, reflections, and focus interviews. Data and attendance documentation indicate that this hybrid space afforded engaged views of mathematics and mathematics teaching and holds potential for the popularization of mathematics.*

6. Time: 21:50-22:00

Title of the Paper: **INCREASING MATH APPRECIATION USING THE UPPER LEVELS OF BLOOMS TAXONOMY**

Author: **Manmohan Kaur**

Institution: Benedictine University, Chicago, USA

Abstract: *Not everyone is a great artist, but we don't often hear, "I dislike art." Most people are able to appreciate visual arts, music and sports, without necessarily excelling in it themselves. On the other hand, the phrase "I dislike math" is widely prevalent. This is especially ironic in our current society, where mathematics affects our day-to-day activities in essential ways such as e-commerce and e-mail. This paper describes the opportunity to popularize mathematics by focusing on its fun and creative aspects, and illustrates this opportunity through a brief discussion of interdisciplinary topics that expose the beauty, elegance and value of mathematics within and beyond the typical K-FG curriculum. We share practical outreach methods inspired by real, fun mathematics, and our experience with a liberal arts 'math for poets' course which aims to develop math appreciation without losing its rigor or depth. While many of us are not comfortable doing live performances or podcasts, we all can use these methods to encourage a more positive mindset about mathematics in our communities.*

7. Time: 22:00-22:20

   Title of the Paper: **MATH+ORIGAMI+PUZZLES+MAGIC -> THE ODDS ARE ALWAYS IN FAVOR OF FUN**

   Author: **Violeta Vasilevska**

   Institution: Utah Valley University, USA

Abstract: *This presentation will highlight several hands-on math projects that the presenter has used in various outreach settings. First, the overview of the various outreach programs/activities will be given. Then demonstration of the math hands-on projects will be presented. These projects demonstrate to students and a more general audience that math is beautiful, fun, interesting, exciting, and extremely useful. In addition, the projects provide various applications and connections to other fields. Moreover, they increase students' self-confidence in their own math abilities. Some of the hands-on projects discussed will include math and Origami; different approaches to solve the Instant Insanity puzzle; and several magic tricks involving cards, magic squares, etc. Furthermore, survey data on how learning math concepts in these types of informal settings affected the participants' attitudes toward mathematics will be presented.*

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Session 3 Saturday 17th 14:30-16:30 UTC+8

8. Time: 14:30─14:40

Title of the Paper: **Some Suggestions on School-based Curriculum Construction of Mathematics Culture For Middle School**

Authors: Junfeng Ma, Yaqiang Yan

Institution: School of Mathematical Sciences, Soochow University, China

Abstract: *This paper provides the theory and framework of curriculum system for the school-based curriculum construction of mathematics culture for middle school. According to the basic theory of mathematics curriculum research, we suggest the principle, the idea, the objectives, the topic contents of the curriculum for middle schools, as well as the suggestions of its practice and evaluation.*

9. Time: 14:40-15:00

Title of the Paper: MATHEMATICAL DRAMA: A NEW FORM OF POPULARIZATION OF MATHEMATICS AT EAST CHINA NORMAL UNIVERSITY, CHINA, 2012 - 2019

Authors: Xinyu Liu, Pan Liu, Jiachen Zou

Institution: East China Normal University, China

Abstract: *Mathematical drama is one of the most interesting forms of popularization of mathematics and scientific activity. The purpose of this kind of exploration is to integrate mathematical culture with the art of drama, so that mathematical culture can better enter the life of students, help more students cultivate interest in mathematics learning. We will share our experience of conducting a series of mathematical drama at East China Norma University, China since 2012. Student feedback and evaluations has shown that the mathematical drama is a very interesting and effective form for popularization of mathematics and mathematical culture practice education. Moreover, if time permits, we may also share some clips from the mathematical dramas video.*

10. Time: 15:00-15:20

Title of the Paper: **Mutual Role of Mathematics and Culture**

Author: Abolfazl Rafiepour

Institution: Shahid Bahonar University of Kerman, Iran

Abstract: *Review of historical monuments such as ancestors' handicrafts, the investigation of physicians, astronomers, agriculturist, physicists and mathematics and so on are evidences to demonstrate the development of knowledge in the ancient Iran. Such knowledge can be observed in the origin and pure Iranian art namely Iranian carpet. The textures which are integrated with mathematical using at principles by worthy Iranian artists (crafts men and women) have developed Iran's academic standing both in art and mathematics. Therefore, we decided to elaborate mathematical science which used in our ancient culture. Thus, two of the math's effects, art and culture, were chosen to make mathematics more sweet for students, and this palatably can develop the general aims of mathematics education which is the popularization of mathematics in society. This view can help students to see mathematics as a different form of knowledge which will be oppose to common view in society which consider math as difficult and complicated knowledge. The results of several research show that the ways which our ancestors used math in their daily life activities are very interesting and even unique despite of having no formal academic education. So, introduction of such activities can have a significant impact on teaching and learning process in addition to the creating of interest and motivation in students.*

11. Time: 15:20-15:40

Title of the Paper: **KEEPING POPULARIZATION OF MATHEMATICS ON TRACK: FORMATIVE ASSESSMENT**

Authors: Elham Ebrahim Zadeh, Hasan Hoseinpoor, **Einollah Shokrpourrodbari,** Younes Karimi Fardinpour

Institution: Islamic Azad University, Ahar, Iran

Abstract: *The purpose of this study was to inform the effect of formative assessment on popularization of mathematics. Thirty students participated in the case of vector education in Panzdah Khordad female high school of Shahroud. In this study, as a port of the POA (Popularization Oriented Assessment) approach to popularize mathematics, it has been tried to keep popularization of mathematics on track by formative assessment. Proper usage of internet, computer software, mobile application, teamwork skills, the ability to solve problems out of the traditional exams' mood, to relate mathematics to the real life issue and using interesting and inspiring mathematics to motivate participant were*

among the features of this study. In addition, students' self-assessment highlighted the strengths and weaknesses of learning process. Observing students enjoyable engagement in vector education explored the connections between popularization and formative assessment.

12. Time: 15:40-16:00

Title of the Paper: **ON THE IMPACT OF POPULARIZATION ORIENTED ASSESSMENT: CREATING EXCITEMENT**

Author: **Younes Karimi Fardinpour,** Akram Bagheri Gheibi, Fahimeh Kolahdouz

Institution: Islamic Azad University; Farhangian University, Esfhan, Iran

Abstract: *The excitement behind this research report is to exhibit a few ideas regarding how the assessment may have a more full influence in really promoting popularization not simply in estimating the results of learning mathematics. Four presumptions are introduced and we accompany the end that assessment can affect popularization of mathematics. Then an approach, it's called Popularization Oriented Assessment, based on these assumptions is introduced. The benefits of the Popularization Oriented Assessment is presented. Additionally it's given illustrations to occasion of this approach in Iran. In this article, we will clarify how this Popularization Oriented Assessment gives an opportunity to coordinate assessment and popularization of mathematics.*

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