

**Tromsø, 4. september – 7. september 2017**



## **Abstracts for Paper Presentations**

Piata Allen & Bruce Taplin

University of Auckland

### **Tau Kē: Using ICT to encourage mathematical communication in Māori-medium mathematics/pāngarau classrooms to support language revitalization**

In order to communicate mathematically, students require knowledge of the mathematics language, that is, the register. This raises a pedagogical issue in Māori-medium education, where many students and teachers are second language (L2) learners of te reo Māori. Critically teachers need to be confident in modeling the specialized language of the pāngarau register. There is currently a paucity of literature that focuses on Māori-medium ICT pedagogy particularly in mathematics/pāngarau learning programmes. This paper explores the use of ICT in Māori-medium mathematics/pāngarau classrooms to capture students' mathematical communications so that conceptual difficulties and language issues can be identified and addressed.

Annica Andersson & David Wagner

NMS & University of New Brunswick

### **Balancing Acts: Numbers for truth and reconciliation**

Indigenous children were taken from their families and placed in residential schools since the 1870s and until 1996 in Canada with the aim to "kill the Indian in the child." A Truth and Reconciliation Commission (TRC) was formed in 2008 to provide victims of these schools the opportunity to recount their experiences in a safe and culturally appropriate manner. After five years of gathering these experiences, the TRC report summarizes what was heard, and identifies 94 calls to action. We will show how numbers are used and not used in two TRC documents. We identify the value of such analysis for school and university mathematics teachers as an example of a culturally situated use of number for rhetorical purposes, which relates to the ideas of culturally responsive teaching and critical mathematics education. Not only does this kind of learning address calls for democratic and critical citizenship, it belongs in Canada's new age of responsiveness to Indigenous experiences of colonialism.

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Cris Edmonds-Wathen

University of Melbourne

### **Responding to the mathematics curriculum with language and culture**

Indigenous language speaking students in Australia's Northern Territory are often taught mathematics in English. The mathematics curriculum is supported by a resource which provides language and cultural considerations and teaching strategies, some specific for Indigenous students. A critically oriented textual analysis shows that a discourse of developmental imperatives and incompletely articulated expectations leads to a focus on teaching English language and concepts, rather than on how students' prior knowledge might be used as a resource in a culturally responsive approach. Recommendations are given to improve the resource for Indigenous language speaking students and develop more culturally responsive mathematics teaching.

Jan Henry Keskitalo, Anne Birgitte Fyhn & Kristine Nystad

Sámi University of Applied Sciences, UiT- the Arctic University of Norway & Sámi University of Applied Sciences

### **Sámi Cultural Properties of the Numbers Three and Four**

This paper aims at contributing to the discussion of the need for a Sámi mathematics curriculum. The mathematics curriculum for Sámi students in Norway is just a mere translation of the national curriculum' text. Our contribution is to identify cultural properties of numbers in Sámi traditional knowledge. Traditional school mathematics and the national mathematics curriculum does not include numbers' cultural properties. Modern Sámi institutions aim at relating to traditional knowledge. We present former documents and the logo of two Sámi institutions for education and research. Our paper investigate these documents with respect to how the numbers three and four occur and we show cultural properties of these two numbers. We indicate that studies of other parts of Sámi traditional knowledge will reveal more cultural properties of the two numbers. We also indicate that investigations of other numbers will reveal more cultural properties. Thus, we conclude that there is a need for a Sámi mathematics curriculum that includes cultural properties of numbers.

Chris Matthews

ATSIMA

### **Using the Goompi Model: Culturally Responsive approach to Growing Patterns**

The Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA) is a not-for-profit organisation that has recently been established with the vision: *All Aboriginal and Torres Strait*

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*Islander learners will be successful in mathematics.* This paper will briefly overview ATSIMA, its current activities and then focus on a particular mathematics workshop that teaches linear equations using growing patterns. Growing patterns is a commonly used approach for teaching linear equations; however, this paper will outline how this approach can be transformed to be culturally responsive. This new approach to growing patterns was developed using the Goompi Model. The Goompi Model was created from exploring mathematics equations in my own Community on Minjerribah in the Quandamooka Nation. The model focuses on creativity and how students can create their own expressions of mathematics and, in this case, their own expressions of linear equations. This approach has been used in workshops with Aboriginal students across Australia and in professional development workshops with teachers. The paper will showcase students' work highlighting the potential learning outcomes from such an approach.

Tamsin Meaney, Tony Trinick, & Uenuku Fairhall

Western Norway University of Applied Sciences, University of Auckland & Kura Te Koutu

### **Language choice and ethnomathematics in the Pacific: Transforming education?**

This critical literature review explores the use of ethnomathematics and Indigenous languages in the teaching of mathematics in Polynesian language regions - Cook Islands, French Polynesia, Hawaii and Samoa. Across all the regions, concerns had been raised about the loss of language and culture. Although there have been some initiatives to revive both Indigenous languages and ethnomathematical practices, none have been sustained on a long term basis and few have been thoroughly evaluated. Although there is significant knowledge about ethnomathematical practices it seems to be the complicated nature of changing educational policy which restricts possibilities for using Indigenous culture and language as a basis for mathematics teaching.

Torgeir Onstad

University of Oslo

### **Is the mathematics we see the mathematics they do?**

This paper enters into the debates about foundations of, research methods in, and intentions with ethnomathematics. Questions are raised by setting out from several examples, partly from the literature, partly from my own research and experience. More questions than answers are provided. However, some lines of argument are indicated. I do not claim that the questions or arguments are new or original. Still, in my view they are important. They are about how *we* reflect on what *they* do, about concepts *we* identify in *their* activities, about knowledge *we* claim that *they* have. I find it

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difficult to draw conclusions about knowledge and concepts held by other people, especially when they belong to another culture and language group than mine.

Tod Shockey

University of Toledo

**Twenty-Five Years Later: Still Learning About Mathematics Education in Native Communities**

In 1991 Shockey accepted his first opportunity to work as a mathematics educator in a Tribal school in the United States. That experience immediately revealed that he was not prepared for working in a community of which he was not a member. Today he works in higher education with a focus on preparing secondary mathematics teachers, who too are not prepared to work in communities of which they are not a member. Shockey's presentation reveals his story of this professional journey as a mathematics educator privileged to work with Native friends.