VIDEO CLIPS AND CELL PHONES: VITALMATHS IN THE PALM OF YOUR HAND

Presenters: Duncan Samson & Marc Schäfer

FRF Mathematics Education Chair, Rhodes University, Grahamstown

d.samson@ru.ac.za m.schafer@ru.ac.za

The rapid growth in the South African cell phone market, coupled with widespread network coverage and support, has opened up the potential for new learning experiences and opportunities, as well as allowing access to educational resources well beyond those traditionally available. This workshop explores the use of VITALmaths video clips, viewed on a cell phone, to support the teaching of Mathematics. VITALmaths video clips are produced using a stop-motion animation technique. They are short in duration (1-3 minutes) and are visually and intellectually appealing. Each video clip develops a particular mathematical idea. The workshop will focus on two specific video clips, and will explore ways in which the clips can be used to support and enhance the classroom teaching of Mathematics. This workshop is suitable for GET and FET teachers.

Target audience: GET Senior Phase and FET teachers.

Motivation for the workshop

Cell phones are gaining popularity as an affordable, reliable and readily available alternative to more conventional forms of Information and Communication Technology (ICT) within the educational arena. The educational affordances offered by cell phones take on particular significance for rural or under-resourced schools which are typically characterized by poor ICT infrastructure and geographical remoteness. The South African cell phone saturation rate is close to 100%, and cell phone signals currently reach 99.97% of the South African population. This, viewed against a backdrop of slow and problematic ICT rollout in many South African schools, positions cell phones as being the “PC of Africa” (Ford, 2009).

This workshop explores how VITALmaths video clips can be used to support and enhance the teaching of Mathematics. VITALmaths is a multilingual collaborative research and development project (Linneweber-Lammerskitten, Schäfer & Samson, 2011; Samson & Ndafenongo, 2011) that produces and disseminates short video clips that can be viewed on a cell phone. Each video clip develops a particular mathematical theme or idea in a visually and intellectually appealing manner. These video clips can be freely downloaded from a growing databank of clips housed at www.ru.ac.za/VITALmaths. The use of VITALmaths video clips adds to the growing endeavour of utilizing cell phone technology to support the learning and teaching of mathematics, particularly in remote/rural or under-resourced contexts.

WORKSHOP CONTENT

The workshop will commence with a short introduction to the VITALmaths project. Thereafter, two video clips will be used to show how VITALmaths video clips can be used in the classroom setting to support the teaching and learning of mathematics. This workshop draws on research experiences gained through two M.Ed. research projects (Hyde, 2011; Ndafenongo, 2011) that investigated how teachers made use of VITALmaths video clips viewed on a cell phone to support and enhance their teaching of Mathematics.

Video 1 – Alex's proof of Pythagoras

The video begins with a proposal for a visual proof of the Theorem of Pythagoras. The question is raised as to whether or not this constitutes a *general* proof of the Pythagorean Theorem. The activity involves drawing a right-angled triangle with perpendicular sides in the ratio 1:2. A square is then added to (or drawn on) each of the perpendicular sides. The smaller square is cut out and the larger square is cut into 4 identical pieces as shown in the middle diagram of Figure 1. These 5 pieces are then re-arranged in order to show that together they equal the area of the squares on the hypotenuse of the right-angles triangle.

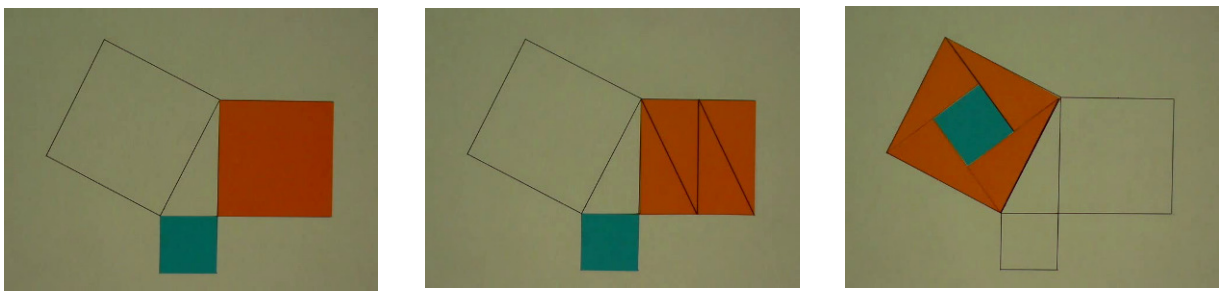

Figure 1: Alex's proof of Pythagoras

This proof of Pythagoras only works when the right-angled triangle's perpendicular sides are drawn in the ratio 1:2. The main idea behind the activity is to use the video clip to encourage hands-on exploration and debate by teasing out whether or not this constitutes a *general* proof of Pythagoras' Theorem. Workshop participants will have the opportunity to explore this particular proof using right-angled triangles with perpendicular sides in ratios other than 1:2 in order to explore the generality or otherwise of the proof.

Video 2 – Palindromic sums

This video clip explores palindromic sums such as 1+2+3+4+3+2+1 through interesting dynamic visualizations (see Figure 2).

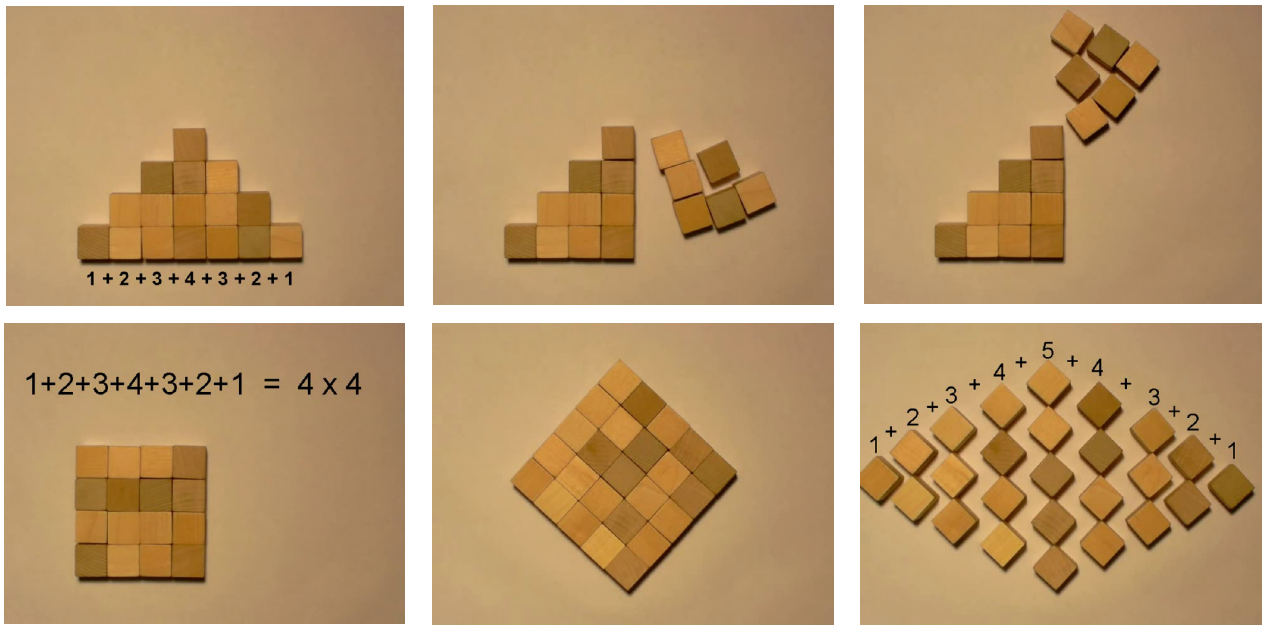

Figure 2: Palindromic sums

During the workshop the video clip will be used as a catalyst to investigate and explore palindromic sums – starting with the example shown in the video clip, and then moving on to other palindromic sums, for example those built from even numbers, odd numbers, multiples of a specific number etc.

This video clip “Palindromic Sums” is available in both English and isiXhosa (see Figure 3). It is envisaged that having certain video clips available in both English as well as indigenous South African languages will open up discussion and contribute to the discourse around the use of code-switching practices as well as the establishment of formal Mathematics registers in South African indigenous languages. These language issues will be briefly touched on in the workshop.

Figure 3: Screenshots from isiXhosa video clip

Summary of time allocation

Introduction to VITALmaths	5 minutes
Video 1 – exploration & discussion	25 minutes
Video 2 – exploration & discussion	25 minutes
Concluding comments	5 minutes

REFERENCES

Ford, M. (2009). Dr Math – A mobile tutoring platform for Africa? Presentation at the SAFIPA (South Africa - Finland knowledge partnership on ICT) conference, 8-10 June 2009, Pretoria, South Africa. Retrieved March 25, 2010, from http://mlearningafrica.net/wp-content/uploads/2009/06/drmath_safipa2009_merrylford.ppt

Hyde, J. C. (2011). An investigation into the use of Visual Technology for the Autonomous Learning of Mathematics (VITALmaths) video clips in the teaching of mathematics in selected South African grade 9 classes: A case study. Unpublished master's thesis. Rhodes University, Grahamstown.

Linneweber-Lammerskitten, H., Schäfer, M., & Samson, D. (2011). VITAL Maths: Visual Technology for the Autonomous Learning of Mathematics. In S. Chunawala & M. Kharatmal (Eds.), *Proceedings of epiSTEME 4 - International Conference to Review Research on Science, Technology and Mathematics Education* (pp. 353-357). Mumbai, India: Macmillan.

Ndafenongo, G. (2011). An investigation into how cell phones can be used in the teaching of mathematics using VITALmaths video clips: A case study of two schools in Grahamstown, South Africa. Unpublished master's thesis. Rhodes University, Grahamstown.

Samson, D. & Ndafenongo, G. (2011). How I teach with cellphones. In J. Sherman (Ed.), Mathematics in a Globalised World: Proceedings of the 17th National Congress of the Association for Mathematics Education of South Africa (AMESA) (pp. 118-122). Johannesburg, South Africa.