Adopting TI-Nspire CAS technology (handheld and software)

A campus-wide experience

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ABSTRACT

In September 2011, our engineering school has adopted the TI-Nspire CAS CX calculator (and software) for all new students entering bachelor level. Although we started to use this new device in the classroom, we will have a transition period where both the TI Voyage 200 and the new CX handheld calculators can be on the students' desks. In order to be prepared for the new academic year, we had to launch a new support website and needed to organize workshops and seminars during summer and fall of 2011. This talk will report on many of these activities and on the steps taken to achieve a smooth transition with a widespread acceptation by teachers.

We will discuss in details the advantages in regards with the previous technology (which was very well implemented) and describe why students are now getting more "bang for their money". Having a software-handheld bundle is also a big plus; we want the handheld in the classroom for teaching and exams but, we also need the software (with the same commands and possibilities) for them to better explore some aspects, graphics for example. But this comes at a price; we will show why teaching the use of a handheld calculator with a software is not always an easy task.

We will present our support website and the multiple workshops offered to teachers and instructors, thus gaining interest even with science teachers, economics and project management colleagues. After 11 years of using TI-92 Plus/Voyage200, we had to show the new avenues introduced by additional functionalities and graphical capabilities (spreadsheet, animation, dynamic geometry...) in order to convince them to move to this new technology. Classroom examples of its use will be presented with some advice on the do's and don'ts.

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Overview

- ◆ Who are we? Our experience with CAS
- ◆ Why change technology
- ◆ What's new with TI-Nspire
- ◆ Campus-wide experience, difficulties and problems
- ◆ Getting people to use it, the plus and minuses
- ◆ The do's and don'ts
- ◆ Conclusion

About ETS : École de technologie supérieure

➢ Engineering school in Montréal, Québec, Canada
➢ We hosted **TIME-2004** and **ACA 2009** (Applications of Computer Algebra) at our university
➢ Our students are mainly graduates from college technical programs
➢ More info: http://www-eng.etsmtl.ca/ets_in_numbers.html

About ETS : École de technologie supérieure

- Almost 1 out of 4 engineers in Québec comes from ÉTS
- More than 6300 students (80% at undergraduate level)
- 1500 new students each year
- All maths teachers and students have the same calculator and textbooks

About ETS : ours tools

- 1999:   TI-92 Plus CAS handheld
- CAS calculators are mandatory since 1999
- 2002 : TI Voyage 200
- Other software (Derive, Maple, Matlab, DPGraph, Geogebra) are used by some teachers.
- 2011 : TI-Nspire CAS CX

➢ Only CAS calculators are allowed during math and science exams (no laptop).

- From its introduction in 2006 up to 2011, the TI-Nspire CAS product lacked some essential tools for us

- Voyage 200 was very well integrated in our courses (see previous conferences of <u>Gilles</u> and/or <u>Michel</u>)

- Then, in 2011 came the CAS CX model with a color display, rechargeable batteries, an improved touchpad, a new OS and added functionalities

- In March 2011, the decision was made to move to CAS CX handheld and software combo for the fall trimester

What's new with TI-Nspire CX?

Compared to Voyage 200

- 2 platforms
- managing documents
- Spreadsheet
- faster processor
  (improved solving, Taylor, special functions, ...)
- improved touchpad, rechargeable
- some CAS improvements (3.2 summer 2012)
- new graphical capabilities
  - animations : powerfull tool to teach mathematics and science
  - geometry : « experiment with mathematics »
  - multiple 2D plot window
    (functions, parametric, scatter plot, etc.)
  - 3D
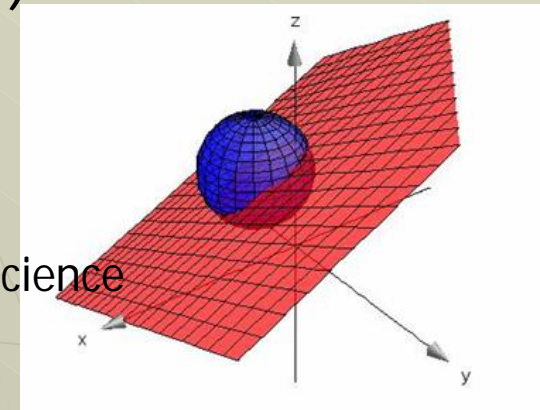
- Fall 2011: more than 1,200 new students started using TI-Nspire CAS CX
- 45 different groups, in math and science
- over 25 different teachers, lecturers and assistants, just for these new students in math and science courses
- 60 different classrooms where the software needed to be installed, as well as computer labs
- and this product finally came out only in mid-summer of 2011

- Logistic nightmare: get the technology in the hands of the teachers, show them how to use it, have the classrooms and the computer labs ready for september.

- We did have a significant aid from Texas Instruments, they gave us 15 Teacher bundles (hand-held and software)

- We also used the <u>Technology Reward Program</u> (TRP) of Texas Instruments

◆ With the TRP program from TI you can get one free Teacher Bundle for
- every 50 calculators bought by students at the High-School level
- for every 300 students enrolled in a course where the calculator is needed at college or university level

◆ This program got us 20 Teacher Bundles and 24 handheld devices

◆ We bought site licenses for the classrooms and the computer labs

Getting people to use it

◆ Give the technology to teachers

◆ Create a support web site: http://seg-apps.etsmtl.ca/nspire/

◆ Give seminars to teach them how to use it

◆ Explain to teachers that starting in the fall trimester, every math syllabus will have CAS-Tasks that students have to be able to perform with their TI-Nspire handheld

Getting people to use it

◆ Keep an updated list all the seminars given with the subjects covered

◆ Math teachers: show students how yo use TI-Nspire technology and better illustrate some math topics

◆ Science teachers: take advantage of the CAS to go further in their topics

◆ Difficulty for many teachers to learn this new technology, especially those who are heavy users of Voyage 200

Getting people to use it

- Look at an example of what student can now do using the software (devoir 1)

- But we still want to do exams with everyone having the same CAS calculator on their desks (no laptop allowed) and no communications between them

- In science and engineering, the sensors and probes you can hook up to the calculator gets a lot of interest at ÉTS

The pluses and minuses

◆ Getting use to having a software and a handheld with the same CAS or the same commands but with different interfaces, much easier with a keyboard and a mouse

◆ With the CX handheld, getting the right command often demands more digging, the CX calculates faster than Voyage 200 but can demand slower input

The pluses and minuses

- Voyage 200 was more a calculator in the usual sense
- TI-Nspire is more a computer software than a calculator: you create a document which contains problems in which you can put several type of pages (calculator, graphs, geometry, lists & spreadsheet, stat etc.). This gives us much more flexibility and we tend to save our work (if we resist using the Scratchpad)
- Another big advantage: working on the computer with the display in computer mode

The do's and don'ts

◆ Give the technology to teachers

◆ Show them how to use it (schedule a lot of time for this)

◆ If students have the handhelds in classe and you have the software version, you have a good advantage over them

◆ Handheld can be much slower than the computer

◆ Show the advantages of saving documents (one for math, one for physics, etc)

◆ Don't forget, the technology is an aid; you still need to teach math!

CONCLUSION

◆ After a year, we can say it has been a big success

◆ Many colleagues have contributed to this

◆ Compared to our experience with the previous models, we have done more in a year than we did over many years with Voyage 200

◆ Many colleagues found new interest in the technology, we have new followers

◆ Thank you!