GIS interventions that work at secondary level education (High School) in South Africa – some recent success stories

by Bridget Fleming, AfriSpatial

Abstract

There have been a number of recent successful GIS interventions aimed at secondary school level, ranging from teacher training to GIS camps to classroom visits and GIS resource development. A number of GIS and remote sensing teacher training interventions in the Metro South district in the Western Cape contributed to a 6% improvement in Geography results. Similar programs are being rolled out in other provinces. These and the need for capacity building will be presented. Publishers are producing interactive atlases and the success of these is yet to be determined but it is encouraging that more resources are being made available. Various case studies will be discussed. A series of “power GIS” lessons at schools have resulted in learners actively engaging in GIS and producing maps using local data sets. Their feedback has been very encouraging and the merits of this model will be discussed. Ways in which the geospatial industry can get involved will be expanded on.

The geo-science industry is an up and coming employer and pupils must be made aware of the opportunities available to them as possible careers, and what they need to study at tertiary level to pursue them.

Keywords

CAPS (Curriculum Assessment Policy Statements), NASCA (National Senior Certificate for Adults), ISASA (Independent School Association of SA), SACE (SA Council for Education), CPD (Continued Professional Development), SAGTA, (South African Geography Teachers Association), AAG (American Association of Geographers), power lessons

Introduction

“Adults in education need to take note and recognise the more lasting value of a broader, more holistic education rather than the mechanical, here-and-now obsession with academic performance; it simply does not work for children.” Prof. Jonathan Jansen, Great South African teachers.

GIS interventions at secondary level education are the type of “holistic enrichment” that Prof. Jansen refers to. These interventions can be broadly divided into two types – those geared towards educators and those targeting learners. A summary of the interventions studied over the last two years is shown in the flow chart in Fig. 1.

![Interventions flow chart](image)

**Fig. 1: Interventions achieved over the past two years.**
Educator interventions

When GIS was introduced in the grade 10 to 12 Geography curriculum in 2013, most educators were ill-equipped to teach this section. The 2014 Paper 2 (map skills) results show that the GIS questions were often left out i.e. not attempted by learners. My involvement as an IEB examiner revealed that teachers taught GIS theory and only what was required for the final Grade 12 assessment. Seldom were learners exposed to practical GIS lessons. Tertiary institutions, the private sector and publishing houses have developed workshops to help educators to up-skill. The inclusion of GIS in the new NASCA Human and Social Sciences curriculum is also encouraging. Here, adults will be able to enter the labour market with a good understanding of GIS concepts.

The WC Department of Education secured some funding and required teachers to attend two-day workshops. The feedback from these workshops was very positive and the general consensus is that one of the biggest hurdles to GIS practical lessons in the classroom is access to IT labs. ISASA (private) schools pay for teachers to attend similar courses (see Figs 2a and 2b). Awarding SACE and CPD points has helped incentivise teachers to up-skill.

Other than training, teachers frequently request software and data. More specifically, they request access to local data sets. Although data sets are readily available from National Geospatial Information (NGI), it remains inaccessible to teachers who are often overwhelmed with different data formats and the large size of the data. School data projects for QGIS (http://qgis.org) have been very successfully rolled out into a number of schools. Small manageable projects and lessons are more palatable for both teachers and learners who do not have sufficient IT skills. The rule of thumb is that the easier it is for teachers to use, the more likely practical GIS will happen.

Funding for teacher intervention projects remains a hurdle. The South African Geography Teachers Association (SAGTA) was formed a year ago to help fund training and pay for material development. A number of providers have developed teacher and learner resources. Examples include ESRI’s Funda Lula, Macmillan’s Secondary map skills book that included a disk with QGIS and local data sets and Pearson’s Interactive Atlas. Afrispatial has developed school GIS data packs. SAGTA’s inaugural conferences to be held late August will provide an opportunity for all providers to show case these resources.

Learner interventions

GISSA Western Cape has hosted a number of successful GIS weeks for learners at the University of the Western Cape. The format here is to have a few days where teachers can bring learners to an exhibition of displays and practical sessions. Schools generally have a two-hour rotation. This initiative exposes learners to possible careers in GIS. SAGTA has produced a digital presentation of careers in GIS to give to teachers and this has been very well received. GIS posters produced by André Jacobs have also been used in the classroom very successfully. Teachers are requesting a GIS career DVD and SAGTA is awaiting funding to produce this.

Last year, the University of Pretoria (UP) hosted a very successful Tech Camp. The US State Department and AAG provided funding which allowed 30 learners from previously disadvantaged areas in South Africa, together with ten visiting American students, an opportunity to engage with geotechnologies. Pupils were placed in groups and were asked to research a local geographic issue, in this case the issues around the Centurion Mall development. They had to collect spatial data, map the data using QGIS, Google Earth and ESRI StoryMaps and present their findings. On the strength of this intervention, UP and the Junior Tukkies programme with their sponsors ran a similar GIS camp for 50 learners this July 2015 (see Fig. 3). The plan is to roll out similar GIS learner camps in all provinces. Sponsorship from industry is key to making this possible.
Another successful intervention has been the concept of “GIS power lessons”. Here, GIS specialists visit schools for a morning and teach learners about GIS. The entire GIS curriculum is often covered. A recent project at St. Stithian’s College required 90 boys to upload their routes to school into a GIS and produce individual maps and a combined map. GIS projects using case studies and GIS to solve real geographic issues have been used very successfully in the classroom. Fig. 4 is an example of a map showing the best location of a possible new open-cast mine in Thabazimbi. All the geoprocessing skills required in the grade 12 CAPS geography curriculum, such as query and buffering, are used in this example.

Visits by guest speakers from the geo-infomatics/geospatial industry are well received. However, they involved coordination as the same people usually volunteer. I am frequently asked for job shadowing opportunities. I would like to suggest that associations such as GISSA and SAGTA drive a project arranging school visit to those in industry who are prepared to host learners for a day or a week. Lastly, school-based research projects and science olympiads involving the use of GIS, although in their infancy a have been very effective learner-based interventions. Globally, the concept of “geotainers” is well-received and it would beneficial in South Africa.

A “one-model fits all” does not work in a South African context where access to resources is so varied. A mixed approach of using both teacher and learner interventions is more successful. It is imperative that the GIS industry works together to help promote GIS at secondary level. The sustainability of having a sufficiently skilled labour force for the geo-science industry depends on this. I believe that a more coordinated approach is necessary, where professional associations such as GISSA and SAGTA pool resources and support interventions which are proven to work.

Contact Bridget Fleming, AfriSpatial, Tel 082 775-7072, bridget@afrispatial.co.za