Source: Teach Secondary {Main}
Edition:
Country: UK
Date: Friday 1, September 2017
Page: 88,89
Area: 1065 sq. cm
Circulation: Pub Stmt 18000 Monthly
Ad data: page rate £1,400.00, scc rate £0.00
Phone: 01206 505900
Keyword: ESRI UK

What lies beneath THE MAP?

GIS technology offers a pathway to deeper geographical understanding for students and teachers alike, explains **Rob Sharpe**

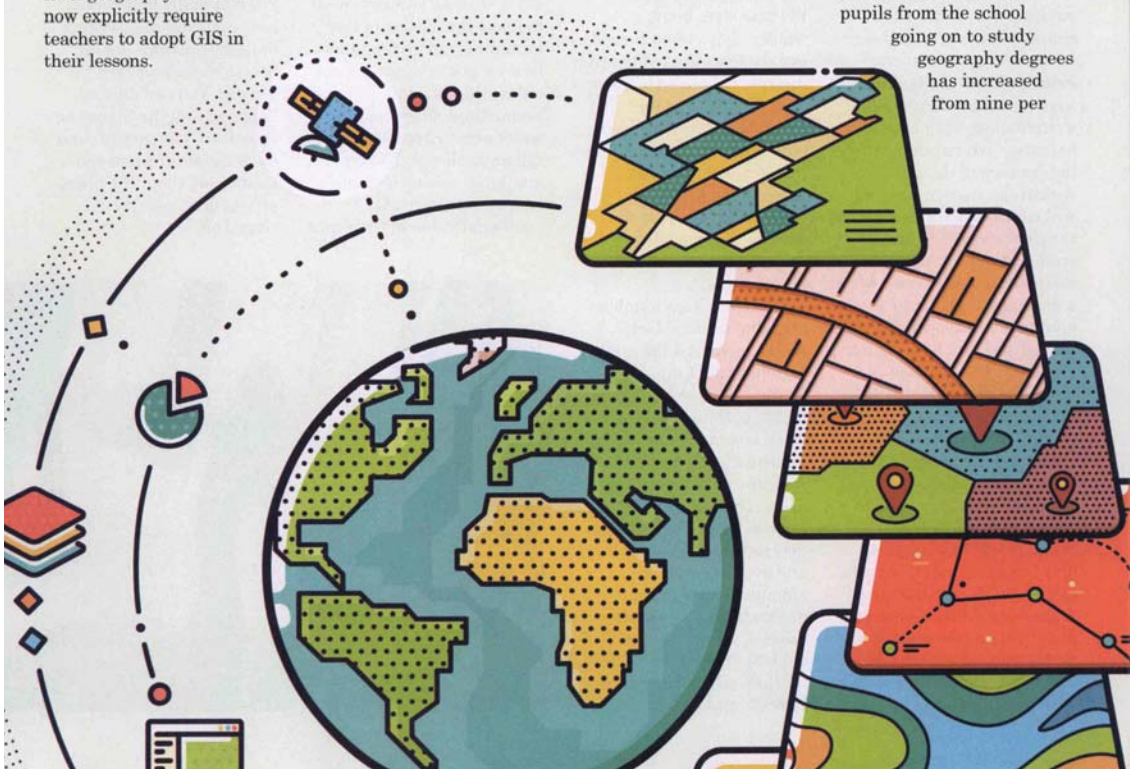
The internet and access to more data continues radically to alter how information about the world around us is applied and shared. We all know that technology is an excellent medium for teaching and engaging with pupils, but when it comes to geography, it is in fact a 30-year-old innovation – GIS (Geographic Information Systems) – that is becoming increasingly recognised as a powerful tool for teaching. Indeed, the GCSE and A level geography curricula now explicitly require teachers to adopt GIS in their lessons.

So what is GIS? Simply put, GIS is a way to analyse data through maps and web based apps. Used by governments, local authorities and across many industry sectors from insurance to retail, it helps organisations to unlock the full potential of data to improve operational and business outcomes. In the classroom, it can help teachers meet curriculum challenges and support pupils as a practical and interactive learning tool.

Let's get started

A teacher can start their GIS journey in a very simple way with just a laptop, a projector and a web browser. As part of a new Free4Schools initiative from Esri UK, teachers can access free GIS software called ArcGIS Online, which includes detailed maps and data from a local to a global scale. A bank of curriculum-aligned resources and lesson plans to enable teaching with GIS is also available.

At Dover Grammar School for Boys, geography teacher Thierry Torres is not just teaching GIS as part of the curriculum, but using it as a vehicle for delivering entire courses. He is inspiring young people to collect data in the field using their smartphones, create professional looking maps and answer complex geographical questions by performing geospatial analyses. Since starting to use GIS to deliver more absorbing lessons, based on real-world geography issues, the number of pupils from the school going on to study geography degrees has increased from nine per



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cent in 2012/13 to 70 per cent in 2015/16.

Time constraints have often been cited as one of the major challenges for any teacher interested in teaching with a technology such as GIS. The pressure on teachers and schools seems to mount from term to term, not least with the added challenge of the latest grading structure for GCSEs and A Levels.

However, there is now a significant network of GIS professionals who use the technology in their everyday working lives, volunteering their time to mentor teachers to develop their own GIS skills and enthuse their pupils. The GeoMentor programme is run by the Royal Geographical Society and Esri UK, to help teachers learn the basics of GIS and deliver engaging and informative lesson plans, and help children gain the knowledge they need to be successful in their GCSE and A Level geography studies.

Multiple benefits

With 180 resources, Esri UK's free library of teaching materials provides teachers with an immediate solution for delivering inspiring geography lessons with curriculum aligned outcomes. Created by a geography teacher, the materials cover Key Stage 3; GCSE and A Level with the main themes of: physical geography, human geography, fieldwork and skills plus STEM subjects.

ArcGIS Online offers teachers free access to multiscale, high quality local (including those from Ordnance Survey) and global maps that can help secure locational knowledge and form the basis for front-of-class geographical enquiry, saving teachers' time searching for the relevant materials. For example, at the start of each lesson GIS can be used to place the lesson in a spatial context, locating the pupil in relation to the subject being studied. Pupils can be asked a range of geographical questions, from identifying countries and cities, estimating distance and comparing different locations. These activities can take just a few minutes at the start of a lesson but are an important gateway to learning to teach with GIS.

There are a number of GIS apps for mobile devices that help pupils collect data in the field, which they can analyse back in the classroom. 'Survey 123' is one such app, enabling pupils to build and publish a survey in a matter of minutes. Another data collection app, 'Collector for ArcGIS' was used by sixth form students across London and the South East of England in a project led by the Royal Geographical Society to create an interactive map to discover areas of noise pollution and tranquillity. Learning in this way can give pupils the experience of using GIS with real data that helps to encourage the process of working like a geographer and thinking like a geographer. These mobile apps can be used by students for both GCSE and A-Level fieldwork data collection.

Real-life applications

GIS undoubtedly offers teachers and pupils a pathway to a deeper geographical understanding. If we were to take physical geography as an example, and the study of earthquake distribution and their causes, GIS offers a constructivist approach to learning, as opposed to relying on a passive learning style. In teaching about this subject, many teachers will look at maps showing the locations of earthquakes. A teacher who is versed in modern GIS could move beyond the passive viewing of the map to extracting the data that sits behind the map. For example, an activity that could be part of a wider class based geographical enquiry could ask the question, 'is there a relationship between earthquakes and plate boundaries'? GIS is the perfect constructivist tool to address this question as it allows pupils to easily explore data, create maps and include additional data such as plate boundaries.

The fact that GIS is now a curriculum requirement, coupled with its real-life applications across all industries, means that understanding and teaching with GIS must surely be a priority for all schools. Not only does GIS technology enable teachers to deliver the curriculum effectively, by completing often complex tasks in a quick and simple way, pupils also become armed with knowledge and tools they may find invaluable for their future careers.

ABOUT THE AUTHOR
Rob Sharpe is training and education manager at Esri UK. Find out more about the Free4Schools initiative at schools.esriuk.com

"Our pupils are now more engaged in lessons, more inspired to pursue geography careers, and more likely to become GIS technology innovators of the future."

Thierry Torres, geography subject leader, Dover Grammar School for Boys