

The Age of Geo-Literacy - ArcGIS for Schools



Esri have big plans for the next phase of GIS, and it all starts in the classroom. In the following article, Niall Conway reflects on his recent experience at the Esri UK Annual Conference in May and explains why understanding of GIS is likely to increase in years to come.

Over the last 10 years, I've developed an interest in GIS education, particularly in terms of how the subject is taught and how the imagination of students is captured and maintained. This interest began while undertaking a postgraduate in Urban Planning in 2007, where only two of my fifty or so classmates joined me in the GIS major module. This was largely due to, I expect, the fact that GIS was, at the time at least, considered as an unappealing and less-relevant career skill set - especially for the more theoretical-minded aspiring

planners. What, after all, do concepts such as projections, vertexes, spatial queries have to do with urban planning?

Recognising that it could be a subject of the future, I decided to, somewhat stubbornly, tackle the GIS learning curve in the years since then. This culminated in my recent attendance at the annual conference of the company behind the software which I first used. The Esri UK AC was held at QEII Conference Centre in London on 22 May, in the leafy and historic surroundings of London's Westminster. During the conference, I had the fortune of meeting some of the committed team-members behind the ArcGIS for Schools program who are working to increase the appeal of GIS among young adults at the grassroots level, as well as to bridge the knowledge gap which currently exists across a range of industries.

The conference is one of the largest gatherings of GIS Professionals outside of the United States. Despite coinciding with the GeoBusiness conference in the nearby district of Islington, it attracted a large attendance from both Esri and non-Esri representatives, including from industry influencers such as Ordnance Survey, DigitalGlobe, Harris, Trimble Geospatial and the Royal Geographical Society. The presentations, which were delivered in rooms by the names of Cambridge, Windsor, and Victoria were structured under the distinct themes of 'Enterprise GIS', 'Data in Action', 'Analytical Insights', 'Collaborative Working', 'Smart Infrastructure' as well as ones titled 'Technical' and 'Developers Forum'. Presentations, which were delivered by the likes of Transport for London, Homes England and the Environment Agency, covered topics such as NSDI development in Afghanistan, reporting methodologies by the ONS, reclaiming dark skies, and the use of open-sourced data for real-time traffic incident detection. They also included presentations by Esri on the new ArcGIS Pro, as well as wider platform integrations using JavaScript, Jupyter Notebooks, runtime SDKs, and REST APIs. Among the most memorable keynotes included the use of Esri City Engine for building expansive 3D cities for a Disney animated movie, a presentation on how GIS could be used by authorities to respond to a global medical epidemic scenario, as well as a fascinating glimpse into Esri's new AI-driven virtual urban planning assistant. Think Alexa guiding you through the steps for mapping a house extension in ArcGIS Online and you may get the idea.

Breaking New Ground

In addition to the mentioned presentations, a key focus of the day's events was on the topic of GIS education. The ArcGIS for Schools program is an initiative by Esri to make its software freely available to schools, with the aim of helping students to develop valuable skills for solving complex and often interrelated social, economic and environmental challenges. The UK program focuses on both GCSE Geography students and A Level students - it has over 1,500 schools signed up and this number is increasing by an average of 40 per week. The program, which currently has some 60,000 registered pupils, makes Esri technology freely available to the classroom and acts as a gateway for exploring data from a wide range of free sources. These include data from Ordnance Survey MasterMap, the National Library of Scotland, as well from the reasonably priced EDINA resources (i.e. a part of Edinburgh University which delivers the Digimap data service to UK-based higher and further education institutes).

In terms of its background, the ArcGIS for Schools initiative in the UK follows on from the company's involvement in the US government's Connect-ED programme for K12s, which was launched by the Obama administration. According to Esri MOOC Manager Adena Schutzberg, some 6,000 schools have signed up since the programme was launched in 2013, while some 133,000 people have completed her own online courses over the past four years alone. Closer to the UK, meanwhile, Esri Ireland is preparing for a September rollout of its ArcGIS for Schools program to up to 5,000 primary and secondary schools across the island. According to Aideen Croasdell, the Program Lead for Esri Ireland, the all-island program will, just like the equivalent US and UK programs, focus on supporting curriculum based teaching, and in particular the computer science and other STEM subjects.

According to Rob Sharpe, Head of Education for Esri UK, the ArcGIS for Schools Program is less about teaching GIS to students (which is not currently in the UK education curriculum) and more about enhancing the quality of existing teaching practice in the classroom. The reason why it is possible to do this, as opposed to in previous years, is, he notes, because much of Esri's software currently exists as a cloud-based service. Since classrooms are no-longer constrained by the lack of IT infrastructure (such as powerful PCs onto which GIS can be installed and configured), students and teachers simply need a reasonable internet connection speed and a browser in order to use

ArcGIS Online, Esri's online version of ArcGIS desktop software. Similarly, for field based studies, students simply require a smartphone installed with the Survey123 app in order to capture field data which can subsequently be displayed in a Storymap. Combined with the readily available ArcGIS Living Atlas data resources, students can use a wide range of basemaps and reference information in order to build up a comprehensive picture of the world. Students and teachers can, for example, upload a CSV file or a shapefile into ArcGIS Online, and use ArcGIS Community Analyst in order to build personalised infographic-rich dashboards. During one workshop which I attended, participants were learning how to combine and visualise statistical datasets, such as demographics, house prices, and income levels in order to create a rich profile of their community.

The grassroots-level ArcGIS for Schools program is focused on changing the broader industry in years to come. First and foremost, this will be felt in the third level education system, where this year alone some 30,000 UK students have moved into non-geography related university courses. Since many future 'fresher' students will already have a basic knowledge of GIS, some educational content in the introductory modules will inevitably be supplanted. Although this may require an adjustment by the academic community, it is a minor inconvenience considering the future benefits which it will bring. Sharpe, for example, believes that the learning opportunities for future third level students will be enhanced considerably thanks to the program, and that GIS will be introduced to a much broader range of industries in years to come. Just as 'geo-literate' graduates enter STEM-focused workplaces, less-technically inclined students are likely to introduce a range of new visualisation and analytical skills to their future chosen workplaces. Just imagine what maps, combined with the power of social media tools such as Facebook and Snapchat, could bring to industries such as tourism, retail and advertising. In order to "spread the GIS message" even further, Sharpe notes the value which GIS volunteers or 'Geomentors', such as those within the Esri customer-base, bring to students. For him, getting more teachers mentored will greatly influence the success of GIS education in the UK and will help students to acquire jobs in the increasingly geo-focused UK landscape.

Reflections

In the days that followed the Esri AC, there were two other seemingly unrelated experiences with technology which made me reflect on the conference. In particular, it concerned the depth of education around GIS in the ArcGIS for Schools program, which currently relies on the more lightweight ArcGIS platform. The first experience occurred while spending time with my young niece, who at one point unsuccessfully asked Alexa to play one of her favourite songs, 'Ten Green Bottles'. The next experience was while landing into Dublin airport the following morning. Just after the plane touched down, the pilot accelerated the engine again, took off, and subsequently attempted, for whatever technical reason, another landing. What both of these experiences made me realise is that while technology is becoming both more simplified and 'intelligent' at the same time, there will always remain a need for human intervention on certain occasions. While Alexa's inability to understand the word 'bottles' may not be such a big deal, the failure of a plane's sensors to detect and locate the presence of some debris on the runway is anything but. Considering this, just as children will one day learn the subtleties of language, GIS professionals of the future will still need to have a comprehensive understanding of the geospatial concepts upon which the technology is based, including those mentioned at the beginning of this article.

In response to this analogy, Rob Sharpe reiterated the point that ArcGIS for Schools is not about simplifying GIS, but rather rather simplifying the job of teachers who can, for example, drag and drop a CSV file into a browser in order to display points, instead of using the more complex techniques required in earlier software versions. Learning about concepts like layers and cartographic aspects such as styles, annotation, and basemaps should instead be considered as an added benefit of this approach - as should the ability to easily demonstrate the distortions which occur from the use of certain projection systems. The more technically-inclined students will, meanwhile, notes Sharpe, be provided with the resources to 'dive as deep as they want to' into the technology. Esri's provision of access to the many ArcGIS platform developer resources, including the iOS and Android developer toolkits, will, no doubt, appeal to the 'take apart/re-build' hacker instincts of children.

Although Esri's drive to get its technology into the hands of users at the grassroots level will inevitably be interpreted by some as a means to establishing its foothold in future markets, I believe that this and the equivalent government-supported initiatives are being delivered for all the right reasons. The programme is a reflection of the Dangermond's strong commitment to geographic education, and it is focussed on enabling tomorrow's leaders to use geographic data for the purpose of solving complex and often interrelated real world problems. In any case, it is also worth remembering that Esri is perhaps the only GIS company with the resources and capacity to roll out its technology on such a wide scale. Opensource, despite its large community and the free availability of its software, cannot, after all, currently provide the same degree of support and online resources that a proprietary vendor such as Esri can.

Perhaps it is no coincidence therefore that during one of the final coffee breaks at the Esri AC, I noticed the British Conservative politician, William Hague, walking past the conference centre in the direction of the nearby House of Parliament. 'Maybe he's on his way back from the conference', I joked to myself. Or maybe not, I then decided. After all, considering that many of the current challenges which exist could be attributed to the lack of GIS education in previous years, perhaps his possible attendance was instead motivated by a political interest in the ArcGIS for Schools program.

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