

GIS education: A Global Summary

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Abstract

This paper will assess the state of GIS education. Using information gathered from ESRI's records, the World-Wide-Web, and many other sources, the author has attempted to gather enough information to give us an idea of just where we stand today with geospatial education. The spread of GIS Education is a great success story. Thousands of people countries all over the world have contributed to a tremendous increase in the teaching and awareness of GIS. I estimate that about 150,000 students a year are learning something about GIS in a classroom. Distance education in GIS is reaching thousands more every year. The author will attempt to provide a comprehensive view of where we stand in GIS education around the world.

Introduction

These are very interesting times to be involved with geospatial education. In a recent book, "Thinking About Technology", James Pitt (Pitt 1999), a philosopher, wrote that technology often precedes the development of a science. Writing about the telescope and the microscope, he said that these technologies had a phenomenal impact on science. The microscope's impact on the biological and medical sciences is truly awesome. The same can be said for the impact of the telescope on astronomy. I think that we are in a similar situation, where the new geospatial technologies will fundamentally change the spatial sciences. We are just beginning to invent or discover GI Science. I think that this new science of spatial analysis will have an impact across the whole spectrum of academic disciplines. How do I justify that extravagant claim? Let's take a look at what is happening in GIS education around the world.

GIS In Higher Education

All over the globe, GIS education has been amazingly successful. This claim of success can be demonstrated by the fact that ESRI has over 21,500 clients at institutions of higher education. This represents approximately 7,000 universities in about 150 countries. This list includes almost every major university in the world.

Based on information from many sources, I estimate that there are approximately 150,000 students a year taking at least one course in geospatial technology, and these courses are being taught in many different disciplines. On some campuses, 40 or 50 different faculties (departments, disciplines or institutes) are using GIS for research and/or teaching. These faculties are as diverse as agronomy, criminal justice, chemical engineering, environmental law, forestry, marketing, religion, and veterinary medicine. For a complete list of disciplines using GIS see (<http://www.esri.com/industries/university/deptlist.html>). Some universities have as many as 30 or 40 different geospatial courses in their catalogues.

Degree Programs

The number of masters degree programs in GIS is impressive. One recent web-survey found 79 masters degree programs in 19 countries. This number is continually growing. In addition, there are numerous undergraduate degree programs in other disciplines where you can do a significant amount of course work in GIS and achieve a certificate or a minor. A searchable database of over 450 college and university programs with contact information for each program is available at <http://gis.esri.com/university/onlinedb.cfm>.

Research

Looking over the list of recent grants from the US National Science Foundation reveals an amazing array of GIS related topics that received grants. One grant in biological sciences was titled “Molecular Studies of Cospeciation Enhanced by Exhaustive Sampling and GIS Technology.” Other grants were in the fields of archaeology, regional Science, geology, civil engineering, arctic sciences, curriculum development, and computer science. For more info on NSF grants see (<http://www.nsf.gov/>). At the University of California Santa Barbara, Michael Goodchild is directing the Center for Spatially Integrated Social Sciences. At University of California Berkeley the Electronic Cultural Atlas Initiative (<http://ecai.org/>) is bringing the Humanities into the world of geospatial research.

GIS Books

An Amazon.com search of “geographic information systems” yields 826 books. Barnes and Noble list 811 books. If you include related subjects like “spatial analysis” or “geospatial technologies” the list gets much bigger. There are new GIS books coming out every week in dozens of different application areas.

Online GIS courses

There is a wealth of online GIS educational materials and programs. Online certificate programs and masters degrees are easily found with a simple Google search on the words “GIS” and “education.” The popularity of online education is shown by the fact that the ESRI Virtual Campus has over 246,000 registrations for its courses over the past few years from 189 different countries. The Virtual Campus now offers approximately 80 different courses on GIS technology, applications and science. The application areas covered include: agriculture, business, census, conservation, earth science, forestry, health, hydrology, secondary education, marine science, public safety, and local government. Distance education programs exist at universities in many countries. UNIGIS, a distance has member locations in 15 countries and is working to expand to several more countries.

GIS in Secondary Education

GIS education has moved into primary and secondary school systems, with notable programs in Australia, Canada, Denmark, Germany, Sweden, Switzerland, and the US. Recently Costa Rica put GIS in over 200 schools and a similar program is underway in Belize. There are about 10,000 schools in the US that have included GIS in their offerings. In schools, the focus is not so much on teaching GIS, as it is on the use of this technology to teach the existing curriculum. Many teachers have their students do exercises in environmental sciences using GIS as a tool for the analysis of the data collected. GIS is also found in courses for geography, social studies, earth sciences, and environmental sciences. There are a number of good books on the market that address the special needs of teaching with GIS at the secondary level.

Job Market

Students graduating from GIS programs at universities are generally finding a job market with many opportunities. In April 2003 the US Department of Labor stated, “In a period of nationwide economic downturn, the geospatial industry offers hope. Across the country, tens of thousands of trained workers are needed to fill positions that are going begging.” The United States Department of Labor and the United States Department of Education have teamed up to promote careers in geo-technologies on the web. The Geospatial Information section under the “What’s Hot” section of the Career Voyages Web site (<http://www.careervoyages.gov/>) provides students with information about careers geospatial technologies.

There are dozens of websites that advertise GIS jobs today. Two different GIS job websites listed around 200 job vacancies each. One website in the UK (<http://www.gisl.co.uk/jobs.htm>) had GIS jobs listed in the following categories.

Agriculture
Coastal zones
Digital cartography, mapping & GPS survey
Environmental assessment
Food security
Forestry

Hydrogeology
Land registration & cadastral survey
Master planning
Oil gas & mineral exploration
Rural development
Urban & physical planning

Use survey & planning land information systems
Water resources development

Wildlife & park management

Conclusions

Looking over the tremendous accomplishments in geospatial education and research over the past 20 years you can feel proud, but the challenge remains great. I, personally, believe that we are just beginning, that we are at the start of new era of spatial awareness. Fifteen years ago I could not imagine that we could come so far, that the general public would be using online resources like MapQuest, that cars would have navigation systems, and hikers and fishermen would be using GPS to find their way around. Or that phones would know where they are. I cannot imagine where we will be 15 years from now, but I am excited at the possibilities. You, the educators working with geospatial technologies, are making all this happen.

References

Pitt, Joseph, 1999, Thinking About Technology: Foundations of the Philosophy of Technology. Seven Bridges Press, USA.