

Education, networks and technology

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After working about 15 years in GIS education, and some 10 years in GIS distance education, the observed pace of further development and change is still brisk, and sometimes even seems to accelerate. Many educational initiatives, curriculum projects and media developments started from the assumption that a well-defined body of knowledge and skills needs to be acquired by students of GIS, but this today is probably less the case than a few years ago: in short, we now need to provide learning environments for individuals to be successful in tomorrow's world of GI, without exactly knowing how this will look like!

From this starting point, I would like to outline a few theses and general remarks as a basis for further discussion:

Identify the truly generic components in GIScience

The issue of education vs training, of acquiring general structural and methodological knowledge vs software skills has been around all the time. Still, curricular concepts and widespread practice of GIS instruction do differ considerably: directly marketable student skills in specific software products, and teaching straight from software products seem to be up-front attractive propositions. The challenge of long-term educational investments, of transferable 'generic' knowledge is not that easy to meet. And, it is a moving target, with a current list of GIS foundation topics today probably being quite different from such a list several years ago!

Who's driving - technology or demand?

This clearly brings up the point of whether technological change is a valid measure of what is and needs to be done with GIS. End users actually don't have that much different requirements than years before, the same or similar questions need to be answered. While GI-analytical methods are quite stable on a conceptual level, computer science has (re-)claimed much of the structural foundations of handling geographic information: what to many end users appears to be fundamentally new concepts on the data organisation level actually is the introduction of sound and otherwise widely established practice. Thus, apparent paradigm changes in technology are actually 'only' steps on a somewhat delayed learning curve within geo-IT.

Learning to learn

This motto has been around for awhile (by the way, only few teachers have been taught how to teach ...), and certainly is at the core of 'livelong learning' as it definitely will be required from every participant on the economy. There is a general as well as a subject matter-specific component to this: to cover the latter, it is important to 'socialize' students into the broader world of GIS, to make them familiar with resources, media, industry players, lead institutions and other places where to look for current information. Once students are successfully introduced into the current stream of 'best practice' and professional as well as institutional environments, applying their general learning skills they need to be able to keep up with ongoing developments.

Individualized learning opportunities

Traditional education is focused on building competences during one or more 'learning phases' which then can be applied during professional application phases. This is based on the assumption that we can determine beforehand what is going to be needed during professional practice periods. Increasingly, we will have to abandon the knowledge-and-skills-storage or just-in-case logic of traditional education, and need to move on to just-in-time and just-for-myself education: the core issue of educational design is less 'what do students need to know for task x' but rather 'what orientation and framework do students need to flexibly find out how to tackle task x'. In addition to such a broad orientation in a subject area, numerous study units or learning opportunities need to be available for on-demand learning by professionals.

Professional development

The general concept of lifelong learning translates into the more specific idea of ongoing professional development for an individual being active in any given field of practice. In order to fulfil the needs of an evolving state-of-the-art based on changing technology, offers for on-demand self-guided learning 'anytime, anyplace' need to be available. Clearly, approaches like distance learning are very important options for in-service professionals, who need to respond to upcoming qualification requirements by using the whole gamut from residential short courses to fully internet-based media. Then, conventional books as 'anytime, anywhere' learning opportunities have been around for a long time, and certainly have not replaced, but rather complemented other learning options. This demonstrates that learning within a social context, relating to tutors and peers is a valid, attractive and successful option - education providers clearly have to offer more than publishing houses do!

GI learning (multi-)media

The GI community -like many other disciplines- now already has many years of experience with various kinds of digital, multimedia and online learning resources. Practical longterm use of these tutors, media packs and learning environments varies widely, but certainly helps to design the next generation of learning media. Several principles are now in the process of being adopted by the educational community, leading away from total solutions aiming at qualifying the GIS practitioner through one set of materials. These principles stress building-block units on a low level of granularity, flexibly combined according to different syllabi controlled by emerging curricula. These educational components aim to be 'learning bites' for the average attention span of the learner, and probably can double as fun, entertaining experiences as well. At the same time, the application of principles of active learning, constructivist building of knowledge in a feedback-rich environment lead to a much more effective acquisition of knowledge and skills.

Open systems in education

Applying the component architecture idea to education, we clearly have to look at compatibility and organisational issues of learning units. Here we have a lot to learn from other open systems initiatives, as well as from distributed component architectures. The IMS consortium demonstrates how educational meta-descriptions need to be applied in order to make flexible and efficient use of learning media. To build different specific courses from available media resources, to plug best-of-breed components into any given course structure, these educational components clearly need some kind of 'compatibility wrapper' around them to identify, qualify and quantify their respective contents, to determine their 'fitness for use' for a specific learning context.

Networks

looking at some of the above stated concepts and requirements, it becomes clear that the average sized GI team in most educational institutions will have a hard time complying and keeping up with the demands. Networks provide the likely organisational models for success in the future of education. Networks provide a means for pooling resources, at the same time lots

of diversity, specialisation and flexibility in organisation. The success of initiatives like UNIGIS and many European projects is based on the strengths of using networks as organizing principles, and it can be safely assumed that the level of integration will move from per-project towards much deeper institutional meshing. Anticipating upcoming organisational and business models for complex educational tasks is a challenging game, but be prepared to confront keywords like competing alliances, edu-miles, edu-tainment as well as new rules and players in this game!

These notes have been prepared as a conceptual overview of some ideas presented as a keynote at EUGISES, but are not a complete and balanced summary of the presentation. The above hypotheses are intended to stimulate personal ideas and contribute to opinions in order to provide a challenging discussion environment.