

**Lessons learned from training GI professionals using a mixture of
traditional and e-learning methods:
Experiences from a software company and an institute for higher education**

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SUMMARY

Experiences with electronic learning methods used by a GI (Geographic Information) software company (ESRI Nederland) and a higher educational institute for professional education (Van Hall Larenstein) in the Netherlands are presented. The focus of this paper is on the combination of traditional lab-based approach (a lecturer available in-classroom) used in conjunction with either e-learning (ESRI Inc's Virtual Campus) or Computer Based Training (ESRI NL). The following topics are presented:

- development time of the material;
- quality of instruction indicators;
- outcome of the training for the GI professional;
- overall user experience for the professional and the educator; and,
- relationship with theoretical background (e.g. the GIS Body of Knowledge).

It has been found that most professionals prefer e-learning as an instructional method, but also like to discuss the methods and applications of the newly learned material directly with a lecturer. It is felt that the hybrid approach presented by the two organizations provides the flexibility requested by the professional and the rich learning environment of a live instructor that is needed for greater knowledge transfer.

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1. INTRODUCTION

In the Netherlands, education in Geo-Information (GI) for professionals is offered by both the private sector via training companies or software vendors and public institutions, typically, universities and education providers. Both types of training cater to people already working with Geographic Information Systems (GIS) who have a requirement to gain more knowledge and experience. This paper examines two of these organizations and the e-learning methodologies they implemented: from the private sector, ESRI Netherlands (ESRI NL) is the reseller of ESRI software; from the public institution realm, the Van Hall Larenstein institute for Higher Education.

As the workforce has become more mobile and virtual, advancements have been made in the ability to deliver training in non-traditional ways. One such advancement has been various e-learning methodologies. These are methods of teaching that rely heavily on computers to deliver not only the software being trained (in the case of GIS) but also deliver the training material and education program.

In recent years both organizations have implemented separate e-learning components to supplement their training calendar. While they use different technologies, their principle goals are similar.

2. COMPARISON OF E-LEARNING TECHNIQUE

2.1 Case: ESRI Netherlands

Description

ESRI Netherlands is a professional GIS organization that sells GIS software and has extensive experience in the field of geo-information. They are the sole distributor of ESRI software in the Netherlands. In addition to software sales, ESRI NL offers training, technical and business consultancy and software support. ESRI NL is located in Rotterdam and currently has about 120 staff members. ESRI NL's training team consists of five full time trainers, a training manager, one training coordinator and an administrative assistant.

Training activities provided by ESRI NL occur predominantly within the Netherlands but occasionally ESRI delivers training abroad, mainly for large international organizations. For training in the Netherlands, there are three locations: Rotterdam; Zwolle; and Eindhoven.

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The majority of the training material used by ESRI NL is produced by ESRI Inc, located in Redlands, USA, however, the most popular training courses are translated to Dutch. In addition, many of the exercises use Dutch data sets. ESRI NL's training programme consists of standard training, customized training and special training programmes like intensive master classes. In 2007 230 training courses were conducted: a 15% increase over 2006.

Until 2004 all the training conducted was Instructor Led Trainings (ILT), but in 2005 ESRI Nederland created their Computer Based Training (CBT) courses. The CBT courses are based on the visual aids of standard classroom training material. Supplementing the standard slides is an instructor led discussion of each slide. These recordings are similar to what a student would hear and see from an instructor in a traditional ILT course. CBT classroom participants listen to the lectures using headphones while the presentations are shown on the participants PC monitor. Just like during a standard training, each chapter's slides and lectures are presented, followed by the corresponding exercises. A trainer is present in the classroom to assist during the exercise and answer questions that may arise.

ESRI NL created the CBT courses to address both the requirements of the professionals for more flexibility and to facilitate ESRI NL's goal of being able to offer more training courses simultaneously. During the week long CBT periods, a participant can schedule their course during any of the days. As an example, a student who needs to take a three day course can schedule Monday, Wednesday and Friday training days to work around their schedule.

Currently, a CBT session is held each month, during which five training courses are offered:

- Introduction to ArcGIS I
- Introduction to ArcGIS II
- Building Geodatabases
- Working with Spatial Analyst
- Advanced Editing Techniques

In 2006, eleven CBT sessions were held, for a total of 72 participants. In 2007, ten CBT sessions were conducted, for a total of 90 participants; an increase of almost 25%.

Lessons learned

For each course, the participants complete an evaluation. By examining the evaluations, it is apparent that most of the CBT participants were enthusiastic about this training method. Some of the advantages felt by the students are:

- Ability to do the training at their personal pace. No reliance on other participants;
- Ability to plan the training days according to need and other work;
- Ability to listen to parts of a training more than once, if needed.
- Ability to skip certain parts or chapters of a training.

CBT attracts customers that find it difficult to be out of the office for three days in a row.

A disadvantage regularly mentioned is the lower amount of interaction in the classroom. For example, questions asked by one participant may be valuable as well to other participants.

Creating a CBT course is a significant investment for ESRI NL. Each training day takes about two days of recording and processing – the typical course runs between 2 and 3 days. In addition, the training courses are updated regularly with each new software release requiring translation from English and a full re-recording.

The best indicator of the effectiveness of the CBT programme is to compare evaluations of ESRI's most popular training, "Introduction to ArcGIS I". The evaluations of the ILT format and the CBT format of the same course show no significant difference in student experience and value of learning.

2.2 Case: Van Hall Larenstein

Description

The Van Hall Larenstein institute has been performing GI education to professionals for over 15 years. Significant changes in the composition of the student body have occurred over this period. In the early years, the students were likely GI focused while these days, the course participants are likely from a variety of backgrounds. Classes might be filled with students from environmental studies, animal management or civil engineering. Some enter the course with almost no software experience, but with a spatial background (e.g. environmental planning) while others may have extended training but need a technical brush-up or have specific questions they would like to address. To deliver relevant educational material with the right content for all of these different people the Van Hall Larenstein institute had to use material developed by others such as ESRI inc's Virtual Campus (<http://training.esri.com/gateway/index.cfm>). This training medium had the added advantage of being delivered over the internet. This was a large benefit for students as many have trouble following long courses because of their work obligations.

Van Hall Larenstein structures their training programme in the following manner:

1. Students participate in an intake interview in order to establish the needs and existing competencies (see e.g. Meyles et al, 2005 and Bakker et al, 2004)
2. Guidance for relevant e-learning courses from the list of the Virtual Campus and other theoretical and practical material including books, content developed by the institute, demonstrations, and exercises). Most of these materials are served to the student with the help of an electronic learning system like Blackboard.
3. Participants complete the e-learning course (including the additional material), do a test and write an evaluation.
4. Lecturer discusses the results with the participant.
5. The cycle may be repeated as needed with additional topics.

Background for the possible list of topics is the Geographic Information Science and Technology Body of Knowledge (Dibiase et al, 2006)

Lessons learned

After five years of using their e-learning system, there are several trends have been identified. The most important issue is that the learning style of the participant must be considered when designing a programme for a student. Further, students have the best results when they are highly motivated to gain GI education, and can learn independently. Students that require more feedback or rely on educators for their learning paths will thrive with this method when they are able to incorporate the e-learning component with traditional methods. In general, it has been found that a blended system of e-learning with interaction with the lecturer is preferred by most students.

An additional finding is that ESRI inc's Virtual Campus courses are most effective if the participant can see how they can use the material in their day to day work. If the lessons and exercises are not applicable to the students workflow, they tend to follow the exercises without gaining much permanent learning.

Quality indicators as indicated by participant satisfaction indicates that expectations of the participants is the major factor in determining course success. If a student expects that after several GIS e-learning courses (ie 60 hours), that he or she will be knowledgeable on many aspects of GIS use including data entry, analysis and presentation, they will likely evaluate the course poorly. If the student expects that the e-learning courses will help them independently of the lecturer, they will likely be more satisfied.

The last comment that is frequently encountered, and is not specific for e-learning, is the translation of American examples to Dutch context. This is not done by ESRI inc. but it is felt that translation of ESRI inc's Virtual Campus to a Dutch context would be beneficial to many students.

2.3 Comparison

Both organizations use different methods (CBT or Virtual Campus) for their e-learning courses with the same goals and reasons for development, implementation and use of a GI system. ESRI Netherlands focuses on training the practical use of ESRI software; Van Hall Larenstein focuses on a more general theoretical education in GIS while using ESRI products. In terms of flexibility, the CBT is a better option because the course material is updated in-house and can be highly customized to suit the Dutch audience while the Virtual Campus that the Van Hall Larenstein Institute depends on does not allow for this flexibility, because it is developed in the USA.

Most likely, the difference in approach for e-learning course delivery is related to the different roles in the education and labor market these two organizations play.

3. CONCLUSION AND RECOMMENDATIONS

The general conclusion is that for a specific group of participants, those that are self reliant and know what their educational goals are, e-learning as done by either organization provides a good training option. Depending on the needs of the client either approach can be used in conjunction.

It is thought that the market for this type of e-learning (either as standalone option or in a hybrid format) will only increase in the future and that more options for e-learning and/or traditional training methods will developed. The more different the customers will be, the more different educational methods will be needed, and perhaps developed by the wider GI community.

From a business point of view efficiency for development and updates of these e-learning materials could be increased. As for all other GI educational materials the life cycle (development, use, update, re-use, outdated) is rather too short for a good economical use..

Some specific indicators to check which method will be more suited for a specific audience need to be developed.

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BIOGRAPHICAL NOTES

Marinus de Bakker is active for more than 20 years in geo-information education, mostly in regular Higher Education at the Van Hall Institute and for GI professionals on the job (waterboards; local and regional government; engineering and consultancy firms). Recently he changed his job for the consultancy firm AQUAGIS where he is active as business consultant and coordinator for the different types of training courses.

Martin Engels has 15 years of professional experience in geo-information. First as a user and analyst in El Salvador with the FAO. After moving to the Netherlands he started as a

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