Multi-usable courseware for flexible and demand-driven education at ITC

Drs. G.T.M. ten Dam
ITC, International Institute for Geo-information Science and Earth Observation,
Hengelosestraat 99 7500AA Enschede, The Netherlands
tendam@itc.nl

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ABSTRACT:

The paper describes the change in education at ITC, from fully face-to-face via the use of an electronic learning environment towards online learning and all possible combinations of face-to-face and distance learning. The didactic approach has changed as well. The paper describes how ITC is working on this enormous change by the development of multi-usable, on-line courseware and tries to deal with related issues that have come on our way of change. These issues include the selection of the basic instructional design of multi-usable courseware, accreditation of flexible and joint courses, copyrights on educational materials, selection of standard geo-software for teaching and instructional design and technical support and training for lecturers. The first results show that indeed one set of courseware can be used in different modalities. Well prepared reading materials and exercises plus guidance during the course are the most crucial for effective online teaching, the use of multimedia is less crucial. ITC staff is not yet fully prepared for a change of working style and preparation of materials long before the course will be run. The time needed for the development of multi-usable courseware is underestimated.

RECENT CHANGES

ITC is an Institute for International Education in the Netherlands. It specializes in Geographic Information Systems and Remote Sensing and their application in various fields. ITC's mission is capacity building in countries that are technologically and/or economically less developed. This is done through research, education and consulting. ITC has expertise in the entire chain in geo-information handling, from data acquisition to dissemination to use in different application fields as well as the context and organizational setting in which geo-information management takes place.
Until recently ITC's main educational activities were under- and postgraduate courses at different levels (Certificate, undergraduate and postgraduate Diploma, Master degree and Master of Science degree) offered at ITC and contract teaching in the context of institutional development in less developed countries. All courses were offered face-to-face by ITC staff. This has changed rapidly over the last few years. Our target group and their training needs are rapidly changing. New target groups have been reached. New delivery mechanisms, allowing for part-time and distance education, have been introduced. Joint courses are offered with partners in both LDC and western countries. The educational program has become more flexible and more demand-driven.
In order to survive in an ever increasingly competitive world the variety of ITC's educational products must and will increase further:

- First of all a comprehensive education and training programme will be maintained at ITC.
  The demand driven strategy and definition applied for capacity building, imply attention to both scientific and professional requirements. This means that both a scientific MSc and a professional Master course will be maintained.
- In addition the education programme will include (postgraduate and regular) diploma courses, short courses ranging from 3 weeks to 3 months, tailor-made courses on demand as commercial products and refresher courses. The focus will change to more and higher specialized short courses and tailor made contract education as core business of ITC rather than supplementary service.
- More delivery modes: Next to full-time face-to-face study at ITC, the flexibility for the participants in terms of pace of study and location will increase; part-time study, distance education, joint courses in the region (see next bullet), etc.
- Linked to the academic degree courses delivered in Enschede, ITC will enhance its policy of joint educational programmes, building on the capacity that has been created over the past 40 years in ITC's target countries. ITC aims for 2009 to have 20 operational partnerships in delivering joint educational programmes.
- Next to the traditional target groups from developing countries, ITC will offer courses to Dutch and other European participants.

According to ITC's Strategic Plan (ITC, 2004) not only the number of modalities offered will increase, also the output per modality must increase considerably. Only the output of academic degree programmes at ITC is expected to decrease. The input of all other modalities must increase considerably: regular diploma and short courses at ITC, courses for Dutch and European participants, joint courses, refresher courses, distance education and contract education and training.

These modalities and output have to be realized with the same or slightly fewer resources, both staff time and finances. This has asked for a new format for educational materials and for a new educational approach.

ITC'S AIM: FLEXIBILITY FOR STAFF AND CLIENTS

ITC aims at what many Australian universities have already realised: online courses with online materials that can be taken by participants the way that suit them best; on campus at ITC or at the premises of ITC's partners, as distance course or any combination of these two. The courses can be taken in fulltime mode, part-time or spread over a longer period. These online courses offer flexibility to the participants and also to the lecturers. The teaching can be done in different ways, by staff at one location, shared by staff at different locations and even with input from experts all over the world.
Also in contract teaching the same flexibility is possible, depending on the wishes of the client. Combinations of face-to-face block teaching and distance learning plus online after care are possible. In all its delivery methods, ITC wants to continue what most participants mention as ITC's strongest points in education: practice oriented courses in combination with extended support and guidance by experts in geo-information and in the application field of the participant. This starting point has clear consequences for the type of distance courses that ITC will offer that excludes stand-alone packages.

For ITC this aim means an enormous change. We are changing from fully face-to-face via the use of an electronic learning environment towards online learning and all possible combinations of face-to-face and distance learning. The didactic approach has to change as well. This paper will describe how ITC is working on this change and the problems (most of these existed already but have become much more urgent to solve in an e-environment) that constantly come on our way of change.

PROJECT ORGANISATION

The scope of the change and the consequences for the organisation require a powerful project organisation. The Steering group, chaired by the rector of the ITC (that shows the importance of e-learning for ITC), takes decisions on policy, priorities and work plans. The project group prepares and implements the work plans and monitors each courseware development project. The actual development of each courseware package and distance course is done by an development team and is run as a project. The terms of reference and the responsibilities of the project manager are clearly described.

MAIN STEPS

Use of an electronic learning environment

In 2001 ITC introduced an electronic learning environment in its courses at ITC. By now all materials in all modules are available online, easily accessible for participants. Easy for the colleagues to find out what is done in other modules and easy for archiving and re-use next year. The main purpose of this environment is, however, that it allows combining face-to-face and online learning and fully distance education. For ITC the introduction of the electronic learning environments is the first step towards blended and distance education and distant support to joint courses.

Development of multi-usable courseware[1]

ITC is now working hard on the next step, the development of multi-usable courseware.
The modalities and combinations of content will increase but the content itself will not necessarily change. This allows for re-use of content and consequently also re-use of courseware. ITC's current courseware is mainly developed for face-to-face teaching at ITC. Re-use in other modules requires labour-intensive re-development. When the same courseware must be used by staff of partner institutes in joint courses, the transfer of the expertise of the lecturer is labour-intensive. When the same courseware is used for distance education, adaptation or re-development of the courseware is needed.
ITC needs courseware that can be used in different modalities. This requires that the courseware is suitable for online delivery and that it is less lecturer-dependent. More than in face-to-face course materials expertise of the lecturer that is needed for regulation of the learning process, guidance of the exercises and provision of feedback must be integrated in the courseware. A lecturer manual must be available.

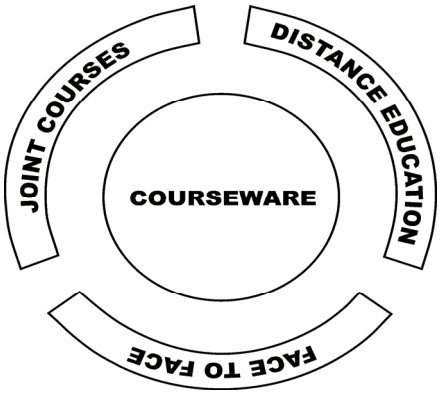

Figure: multi-usable courseware

[1] Work definition courseware: Courseware is the structured set of all teaching and learning materials of a module, made available in the electronic learning environment. These materials include: literature, lecture notes, slides, assignments and data, standard help and feedback, discussion items, example exams, assessment criteria, assessment form, and if needed the teacher manual.

The new courseware will be available in the electronic learning environment and will be the same in all modalities. The guidance provided by the lecturer will differ per modality (but will be prepared as much as possible and integrated in the courseware; e.g. FAQ, example results of exercises, help to participants for foreseen problems):

- In face-to-face courses at ITC: The lecturer will complement the courseware with face-to-face tutoring, supporting lectures or question hours and supervision of practical exercises.
- In joint courses: Lecturers of the partner institute can rather easily use the low lecturer-intensive courseware to offer the module. The lecturers can add additional face-to-face components similar to what the ITC lecturer can do in face-to-face courses at ITC. Whenever necessary an ITC lecturer can provide additional online support to the lecturers or co-tutor the participants directly.
- In distance education: The tutoring is done online, using the communication functionalities in the electronic learning environment and other ICT.

To help the lecturers to make the shift to multi-usable courseware they are asked to design and develop courseware for distance courses. If the courseware is suitable for DE it will also be suitable, with a few of the above smaller additions, for use in face-to-face courses and joint courses. In this paper we will therefore mainly talk about distance courses and online courseware but this will include use of the same courseware in joint courses and in face to-face courses at ITC.

Task based learning

ITC developed several stand-alone distance course packages in the past. However, experience with development of courseware suitable for online teaching and online tutoring was limited. After study of several distance courses offered by other institutes, ITC has chosen for task based learning (DU, 2004) as basic instructional design of the online courseware. Modules are divided in tasks in which theory and practice are integrated. Each task has to result in a deliverable or product that is posted in the discussion board. Fellow-participants and/or the lecturer can discuss the results or provide the feedback. The deliverable allows the lecturer to keep track of participant progress and to check whether the participant has understood the content. To give the participants a feeling of belonging to the course and the course group e.g. a video to introduce the course and the course staff is added and communication between participants and participants and staff in the discussion board is stimulated.
This task based approach could also be an answer to results of evaluations of face-to-face courses at ITC that show that although participants are still satisfied with the content of the courses, the number of remarks and complaints about the teaching approach, which is not seen as suitable for adult education, increases. To offer more effective education and to stay competitive a change in didactic approach from teacher-centred to student-centred is needed. The leading principle for the design of modules should change (further) from the best teaching methods and sequence for the lecturer to the optimum learning process for the participants. Modules that consist of one or a series of learning units (tasks, assignments, projects) could realise that goal.

Learning units and tutoring

The key question to answer in the design process of module courseware will be: What learning units (Karjalainen, 2004), tasks, assignments or projects, must be done by participants and in what order to guide participants from their starting level to the required end-level of the module?
Every learning unit consists of a description of the end product, the way the participant should get there (path, steps, materials that have to be used, etc.), learning materials, communication between participants and/or between participants and staff during the learning unit, and the feedback that will be provided on the end-product.

This learning unit approach allows for several didactical approaches, from fully closed to fully open assignments, and from heavily teacher regulated education to individual learning paths and high levels of student independence. Although several newly (re-) developed modules might start with relatively closed learning units, all modules will gradually offer more choices for participants and more individual learning paths. The role of the lecturer will more and more change from teacher to tutor.

RELATED ISSUES

Learning Content Management System: Less lecturer-dependent courseware as described above will lead to more efficiency in the execution of the same modules in different modalities. Efficiency of ITC's education can be increased further by sharing courseware components and learning units between different modules. Therefore a Learning Content Management System (LCMS) is essential. An LCMS can make existing or newly developed courseware accessible and re-use more likely. The best granularity (learning units and/or components of learning units) of the content in the LCMS will need special attention. A special working group will be appointed to advise how ITC can best manage its learning content as well as all other documents that ITC produces.

Accreditation: The current accreditation of ITC's degree courses is based on the organisation and face-to-face delivery of the courses that are fully taught at ITC's premises in Enschede. ITC's distance courses and joint courses are not (yet) accredited. ITC intends to base the quality (that meets the requirements of the Dutch accreditation organisation NVAO) of ITC's courses and modules on the distance education modality. In that scenario the face-to-face activities that are added in courses at ITC and in joint courses

abroad are seen as extra service to the participants on top of the standard minimum delivery quality.

Copy rights on educational materials: Courseware development, an LCMS and re-use of materials by others require a clear and well implemented policy on copy rights. The Dutch and international law has always been quite clear about copy rights on research output, but the rights on education materials required a (subjective) interpretation of the law. Some lecturers refused to put their materials in the electronic learning environment since they feared that colleagues would use and even change their materials without proper acknowledgement. (It has indeed happened several times that materials of colleagues were used in contract teaching without mentioning the name of the original author.)
ITC is developing copyright rules for internal use, stating that ITC has the commercial rights of all education materials but that the intellectual rights are of the author. Colleagues can use the materials and add new components but they are not allowed to change.

Geo-software: Also essential for courseware development and re-use of courseware is a selection of standard geo-software packages that ITC will use in its courses, to avoid that many software-specific versions (and regular updates to new versions of the SW) of exercises have to be made. The IT department is working on such selection.
Another issue is what software to use in distance courses. Can you expect that the participants will pay for commercial packages for use in a short course? Can you expect that they have already access to it? The solution that ITC has chosen is that for the basic courses in GIS and Remote sensing use is made of free software like ILWIS that is produced by ITC in house or free or almost free temporary (student) licences like for ERDAS and ArcGIS. For the more advanced distance courses access to the commercial software that is used in the course is an entry requirement (training participants who will not have access to the software after the course has finished is not very useful).

Support for staff: Developing student-centred e-learning and courseware is a new task for lecturers of ITC and of partners for joint education. They need training and on-the-job support. For efficient development of effective courseware both didactical and multimedia/technical expertise next to content expertise are needed. Three experts should closely work together. The didactical expertise in courseware development is limited within ITC. The instructional designers take further training as well. The multimedia and technical expertise is scattered over the building and grouping this is important to share expertise and to make it better accessible. The old idea of a multimedia support group might be a good option.
Also training is needed for the delivery of online courses, online tutoring and provision of feedback. ITC is developing a whole range of courses and workshops: refresher workshops on the use of the electronic learning environment, courseware design, online tutoring, online group work and audio- and video- communication and courses in the use of multimedia. Next to these courses and workshops ITC organises education seminars where staff can present their experiences with course ware development and online and distance courses.

FIRST EXPERIENCES

- ITC has re-developed courseware for a few modules. A few distance courses are developed and offered. The student results with the new courseware in distance courses and in face-to-face courses at ITC are positive. In the meantime ITC has learned a lot. Especially the planning of the courseware development stage and the organisation of the course delivery can be improved.
Until now we have been working on re-design of existing modules. In the new UPM and GIM courses the new modules will directly be developed as multi-usable courseware.
- The time planned to re-develop a module into distance education format or courseware was usually not enough. It would have been sufficient for the re-development but lecturers spent much of the available time on improvement of the materials. Materials that would have been good enough for another face-to-face run are not considered as good enough for inclusion in a package that will become standard for a few years.
- Lecturers tend to spend a lot of energy on labour-intensive transformation of the lectures into e-lectures to present and explain to the participants what they would explain in class in face-to-face courses. Slide shows enhanced with animations and other multimedia are popular, also video lectures are used often. Animations, audio and video are powerful tools for explanation of concepts and to bring real-life into the course. At least a few participants per animation have indicated that it was very helpful for their learning process. Nevertheless participants have clearly indicated that not these fancy additions but the quality of the reading materials, well prepared exercises and the guidance offered by the lecturer during the course are the most crucial. This has lead to the recommendation to the development teams to develop the readings and exercises and prepare the feedback first and then spend the remaining time on add-ons, adding new ones every year.
- Lecturers and project managers tend to underestimate the time needed for the delivery of the course and especially the guidance during their first distance course. Provision of feedback does take much time and in the design of the exercise the time needed for proper feedback is not sufficiently taken into account. This usually changes after one run.
- Distance education and courseware development require a change of working style. Courses and materials have to be prepared long before the course is run and staff has to work in teams. Both do not match well with the current working style of ITC's lecturers. This might also explain why the current practice to make one of the lecturers project leader of the development team does not always work well.

- The new style of teaching will change and has already changed the content of the work of ITC's lecturers. They will have to spend more time on the development and maintenance of courseware, more time on online guidance and feedback and less time on face-to-face teaching at ITC or abroad. The lecturers' tasks and consequently required skills have diversified further. Whether staff will like to do all these tasks themselves or that they will prefer specialization is not yet clear.

CONCLUSIONS

The use of the same courseware set in different modalities is indeed possible. The first student results are positive. Staff has already experienced the power of good online courseware; in distance courses and for easy transfer of the teaching task to partner institutes in joint courses.

The statement in the conference brochure is only partly supported: "The highly integrated multimedia technologies of e-learning are rapidly changing the style of education."
ITC's style of education is indeed rapidly changing; from fully face-to-face education to different kinds of combinations of face-to-face and online learning, from face-to-face approaches to e-learning and from face-to-face based materials to highly flexible courseware. For this change the introduction of an electronic learning environment was crucial. But more advanced multimedia technologies play only a minor role. Although high-tech technologies are an essential component of the content of ITC's courses, the high-tech multimedia are not the key for success in the delivery of ITC's courses, neither in face-to-face or in distance courses.

ITC is well on its way from a mainly face-to-face to a flexible education institute that is constantly adapting its courses and can deliver education products on demand. The way is long and challenging and includes dealing with problems that we had not foreseen. But the first results show that we are heading in the right direction.

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