

CUSTOMIZING LECTURES AND EXTENDING THE CONTENT POOL BY USING *GEOINFORMATION.NET*

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ABSTRACT:

The internet platform *geoinformation.net* offers 14 modules with a huge amount of content to support blended learning proposals. The content covers a basic set of academics with the intention to provide a basic curriculum for geoinformation.

A fundamental concern during the development of *geoinformation.net* was to ensure a maximum of flexibility in terms of content combination and extensibility of the content pool. Closely connected with this point was the hope to increase the level of content reuse by reducing the content adoption barrier level.

Starting from the *geoinformation.net* platform there are several demands to make on the functionality of the interaction tool, the LectureBuilder. Those demands include technical demands on the one hand and interaction demands on the other hand. Due to this, one demand was to support the *geoinformation.net* specific lecture navigation, as described in (Steinrücken&Plümer, 2004), and the *geoinformation.net* specific stylesheets for any lecture created by the LectureBuilder. Furthermore a user management is required to remember once created lectures of registered users to enable them to edit these lectures and then download them again.

To achieve a long-term usability of the LectureBuilder and the connected product, the lectures, the LectureBuilder is based on popular international standards, like the content modules. These standards are in particular standards of the world wide web consortium [W3C] (XML, HTML et. al.). This proceeding compared with proprietary solutions offers several advantages like no license fees, downward compatibility of standard successors and a high level of interoperability. These are advantages which are essential for the long-term availability of project contents and services. In addition a couple of presentation tools like PowerPoint offer the possibility to export HTML and open by this way a possibility to generate slides to expand the content pool of *geoinformation.net*.

Nowadays the LectureBuilder tool is available via <http://www.geoinformation.net>.

KURZFASSUNG:

Die Lehr- und Lernplattform *geoinformation.net* stellt im Internet mit den 14 Lernmodulen bereits einen umfangreichen Satz an Material zur Unterstützung von Blended-Learning-Angeboten bereit. Hierbei handelt es sich um einen Fächerkanon, wie er für die Lehre im Rahmen eines Geoinformationscurriculums benötigt wird.

Ein wesentliches Anliegen bei der Entwicklung der Plattform *geoinformation.net* war hierbei eine möglichst weitgehende Flexibilität hinsichtlich der freien Kombinierbarkeit von Materialien und Erweiterbarkeit der Materialsammlung zu erreichen. Hiermit verbunden war die Hoffnung hierdurch die Hürden für eine Übernahme der Vorlesungsmaterialien an nicht projektbeteiligten universitären Lehrinrichtungen zu senken und dadurch die Chancen einer Wiederverwendung zu erhöhen.

Aus der Plattform heraus ergaben sich jedoch auch Anforderungen an die Funktionalität des Interaktionswerkzeugs des LectureBuilders. So muss für alle herunterladbaren Vorlesungen gewährleistet sein, dass sie über die in (Steinrücken&Plümer, 2004) beschriebene Navigation verfügen und dem projekteigenen Layout folgen. Außerdem sollten einmal zusammengestellte Vorlesungen nachträglich geändert und/oder ergänzt und dann erneut heruntergeladen werden können, was eine Nutzerverwaltung notwendig macht.

Um eine langfristige Verwendbarkeit des LectureBuilders zu erreichen wurde, wie bei den Lernmodulen auf verbreitete internationale Standards gesetzt. Insbesondere sind dies die Standards des WWW-Consortiums (u.a. XML, HTML, CSS, JavaScript). Dieses Vorgehen bringt gegenüber proprietären Lösungen mehrere Vorteile mit sich, wie z.B. das Entfallen von Lizenzkosten und eine Abwärtskompatibilität von Nachfolgestandards. Gründe die eine langfristige Verfügbarkeit der Projektergebnisse leicht verhindern können. Daneben bieten verbreitete Präsentationswerkzeuge wie z.B. PowerPoint die Möglichkeit HTML zu exportieren und öffnen somit eine einfache Möglichkeit um Folien zur Ergänzung des Folienpool zu generieren.

Der LectureBuilder ist mittlerweile in der Version 2.0 online auf <http://www.geoinformation.net> verfügbar.

1. INTRODUCTION

The creation process of a lecture requires a huge amount of time to plan the general layout, design the slides and generate the required animations. Even if there are no actual didactical and design research results taken into account.

A reduction of the time quota for the creation phase of a lecture results in a reduction of its perceivability. This may lead to a higher workload for connected exercise courses and a lack of understanding within constructive lectures.

By increasing the rate of reuse it is possible to avoid these problems on the one hand and to reduce the time quota needed for lecture creation on the other hand. One precondition for such a kind of proceeding is publicly accessible, well documented teaching material with a high didactical and design quality level. It is also important to ensure flexible combination capabilities for the available teaching material. Nevertheless such a kind of a teaching material pool offers the opportunity to provide the material of a lecture for pre- and postprocessing which should be done by the students.

Nowadays many universities like the University of Stuttgart (<http://www.uni-stuttgart.de/online/>) or the Massachusetts Institute of Technology (<http://ocw.mit.edu/index.html>) provide teaching material online via the internet.

The internet platform *geoinformation.net* represents the teaching material pool for the LectureBuilder tool, which will be presented within this article. The whole teaching material is publicly available, freeware and enfold a basic curriculum for geoinformation. The material from the pool can be downloaded as prefabricated lectures or via the LectureBuilder as collection to generate new customized lectures. Further features of the LectureBuilder are the capability to generate offline lectures, the upload and integration of new material and the generation of a consistent layout and navigation.

Parallel to the project *geoinformation.net* there have been several other projects in the context of blended learning like GITTA (Weibel, 2004) (<http://www.virtualcampus.ch>), FerGI (Schiewe et al., 2004), gimolus (Müller, 2004) (<http://www.gimolus.de>) and WEBGEO (Sauer et al., 2004) (<http://www.webgeo.de>). The focus of those projects was the creation of e-learning material and connected tests for self-study at home or exercises.

Another important difference exists within the access authorization and the size of the atomic components. Each of the projects mentioned before requires a registration to access the teaching material and some of them, like FerGI, require special proprietary software to gain access. All of the projects have blocks of slides as atomic components.

2. TECHNICAL CONCEPT

By developing the LectureBuilder *geoinformation.net* meets the demands of its users, who want to adapt the teaching material to their context. This capability is given within commercial presentation software like PowerPoint, which supports the reorganisation of the slides within the sequence of the lecture. Similar features should be realised to support the reorganisation capability for the slides of *geoinformation.net* given as HTML files, to automatically generate the lecture navigation described by (Steinrücken&Plümer, 2004) and to apply the *geoinformation.net* specific stylesheets. The features have to work with the *geoinformation.net* slides as well as with the slides uploaded by the users.

2.1 Data pool

The data pool of *geoinformation.net* is organised by using the file system as shown in fig. 1. Any slide, its metadata file and its connected content like images are in separate folders, which are the atomic parts of the data pool. The connected metadata file contains information about the author, the copyright and the creation date. All the slide folders that belong to one lesson are in one folder and all the lesson folders belonging to one modul are grouped in one folder. All modul folders together constitute the data pool of *geoinformation.net*.

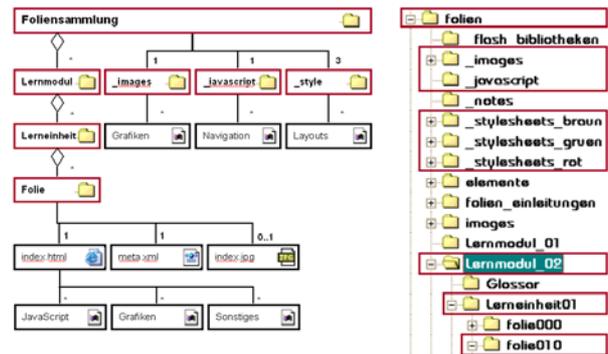


Figure 1 : Structure of the data pool

This internal structure has to be taken into account during the creation of new lectures, because there are several compartments of the HTML file like scripts or stylesheets which are referenced by relative links within the HTML files. If there are any changes within the folder structure, this will lead to layout and navigation problems that could only be removed by editing every HTML file.

The pool index is generated by a separate tool, which also ensures correct metadata files and detects the local content files associated with the HTML files.

Every uploaded slide has to be integrated into the structure described above and has to get a metadata file. During the upload process many changes will be performed within the source code of the HTML file to integrate the geoinformation stylesheets and the navigation scripts. Any registered user will get an individual modul folder, which contains a lesson folder for separate uploaded slides and separate folders for every lesson uploaded as zip file with more than two slides.

Other users will be handled as guest and can upload only single slides into the default folder of the guest modul folder.

2.2 Features

The LectureBuilder provides several features. The central feature is the composition part where new lectures can be created and downloaded for later use. The realization of this feature is based on a combination of HTML and JavaScript. Both are supported by any common browser like the Mozilla Firefox or the Internet Explorer. One important reason for the shift from the java applet technology to the new technology was the reduction of loading time and the chance to resign the java plugin. Created lectures will be served as zip archive, which contains the slides, the associated metadata, all navigation scripts, stylesheets and required images.

The second feature is the upload part, which accepts HTML, jpg and zip files. Uploaded separate html files will be supplemented by stylesheet and script code for navigation and layout reasons. Uploaded separate jpg files will be embedded in a new generated html file. Uploaded zip files will be decompressed and the packed html files will be transformed into *geoinformation.net* conform files in separate folders. This process can handle as html exported PowerPoint presentations if they were submitted as zip archives. Animations will be removed during the transformation process. For every generated or transformed slide a metadata file will be generated.

The uploaded files will be publicly available and cannot be removed or edited by the user.

The third feature is the user management. This feature enables users to become registered user. While a

registered user is logged in any downloaded lecture will be remembered and can be reopened for editing. Registered users have the advantage that during the upload process some metadata will be derived automatically from the user registration informations.

2.3 User interface

The user interface has four parts (Figure 2).



Figure 2: menu of the LectureBuilder portal

The first part is the lecture composition part as shown in Figure 3 and Figure 4. On the left hand side (Fig. 3) can be found the slides available in the pool on *geoinformation.net*. The modules, their lessons and slides are organized in a tree structure. The modules and lesson can be opened by the plus symbol (Figure 3: Nr. 1) in front of the connected name (Figure 3: Nr. 5+6) and closed by the minus symbol (Figure 3: Nr. 2). Behind any modul or lesson there is a button to deselect all slides within the modul or lesson (Figure 3: Nr. 7+8). If a lesson is open, any slide in this lesson can be selected by using the associated symbol (Figure 3: Nr. 9). The metadata of a slide can be accessed by using the document symbol (Figure 3: Nr. 4) in front of the slide title (Figure 3: Nr. 3). Behind the slide title is a checkbox (Figure 3: Nr. 10). Checked boxes represent selected slides.

If slides are selected, they will be automatically added to the new lecture (Figure 4), deselected slides will automatically be removed.



Figure 3: visualization of the accessible pool content

On the right hand side (Fig. 4) can be found the created lecture. Any slide is listed in the presentation order. The order within the lecture could be reversed by using the reverse button (Figure 4: Nr. 7). By clicking the slide title (Figure 4: Nr. 3) it is possible to get a preview of this slide, which will be opened in a new browser window. The metadata can be accessed by the associated document symbol (Figure 4: Nr. 2). Selected slides can be moved up (Figure 4: Nr. 5) or down (Figure 4: Nr. 6) by the up or down symbol. A slide can be selected by checking the checkbox in front of the slide (Figure 4: Nr. 1). The slide navigation type could be selected by the combo box behind the slide (Figure 4: Nr. 4). Possible navigation types are linear for content slides, tiefe for slides with additional information and examples for one content slide and zwischen for slides which do not contain content but separate topics of a lecture. Finished lectures can be downloaded by using the download button (Figure 4: Nr. 8).

The second part is the upload part. The upload part is realized as a combination of html forms and java servlets. First of all the user has to submit a html, jpg or zip file in combination with information that is needed to create the metadata. If zip files are submitted the title tag in its html files will be taken to generate the slide titles within the metadata. Wrong file types of submitted files will be detected and rejected. In this case the servlet generates an error message.

If a single html file is submitted the system performs a check routine to ensure that all relative to the html file referenced parts will be submitted to. To achieve this, a special upload form will be generated.

Submitted zip files have to have all the needed relative linked parts for any of its html files inside. No framesets are allowed. Otherwise an error message will be generated.

The third part is the user management. The user management opens an easy way for users to perform changes within once downloaded lectures and supports the metadata creation by auto completion.

The fourth part is the online documentation.



Figure 4: Creating a lecture with the LectureBuilder

The final product (Figure 5) is a compressed presentation, provided as zip archive. The archive contains all slides,

the associated metadata, the navigation and the layout information. During the decompression process, a geoinformation folder will be created which contains the presentation. The presentation can be started by the index.html file in the geoinformation folder. The substructure of the subfolders of geoinformation is similar to that on *geoinformation.net*.

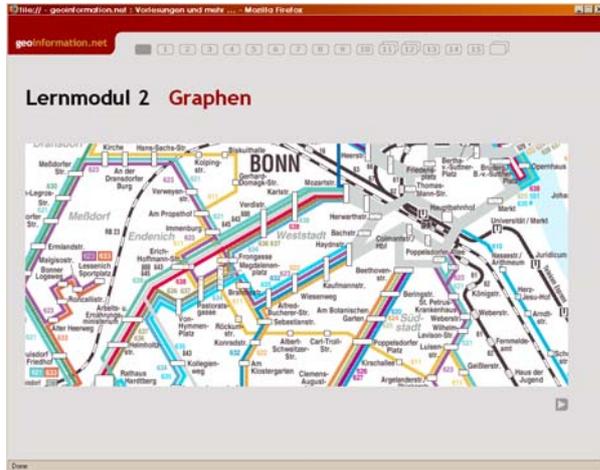


Figure 5: A created lecture

3. CONCLUSIONS

The adaptivity, the extensibility and the reusability of the teaching material within the modules was a very important concern during the creation of *geoinformation.net*. Based on this fact the use of open standards and opensource internet technologies was focussed instead of proprietary solutions.

This leads to the fact that users of *geoinformation.net* need to have an internet browser and some plugins like flash but no expensive software systems. The chosen design demands an extra tool to support lecture developers during the lecture creation process to keep the technical complexity of the underlying system out of it. This job does the tool presented in this article. Finally remains the hope that the tool will help to keep the created content up to date and boost the reuse quota.

During the development process many required new features could be identified. First of all the internationalisation of the created content. We have had several requests from non-german-speaking countries, which want to integrate the *geoinformation.net* material into their lectures. To fit this demand some future work has to be done.

Another focus of future work will be the changeover to xml as base technology instead of html. This will offer the possibility to have smaller atomic components on a sub slide level and an easy creation of different output formats like pdf or others.

4. REFERENCES

Steinrücken, J. & Plümer, L. (2004): *Medien im Hörsaal*. In Plümer, L. & Asche, H. (hrsg.): *Geoinformation – Neue Medien für eine neue Disziplin*, S. 29-42. Heidelberg

Weibel, R. (2004): *GITTA – Bausteine für einen virtuellen Campus zur akademischen Ausbildung in Geoinformation in der Schweiz*. In Plümer, L. & Asche, H. (hrsg.): *Geoinformation – Neue Medien für eine neue Disziplin*, S. 131-141. Heidelberg

Schiewe, J.; Ehlers, M. & Grendus, B. (2004): *Fernstudienmaterialien Geoinformatik (FerGI) – Konzeption und erste Implementierungsbeispiele*. In Plümer, L. & Asche, H. (hrsg.): *Geoinformation – Neue Medien für eine neue Disziplin*, S. 143-153. Heidelberg

Müller, M. (2004): *gimolus – GIS. Und modellgestützte Lernmodule für umweltwissenschaftliche Studiengänge*. In Plümer, L. & Asche, H. (hrsg.): *Geoinformation – Neue Medien für eine neue Disziplin*, S. 154-166. Heidelberg

Sauer, H.; Fuest, R. & Goßmann, H. (2004): *WEBGEO – Geographie online lernen! Die nachhaltige Integration neuer Medien in die Grundausbildung*. In Plümer, L. & Asche, H. (hrsg.): *Geoinformation – Neue Medien für eine neue Disziplin*, S. 167-178. Heidelberg

Schulmeister, R. (2001): *Virtuelle Universität – Virtuelles Lernen*. München/Wien

Kerres, M. (2001): *Von der Pionierleistung in den Alltag. Nachhaltige Implementierung mediengestützter Lehre*. In *Wissenschaftsmanagement. Zeitschrift für Innovation*, 7:5, S. 17-20.