

# The E-Learning System of Vienna University of Technology – adaptations, enhancements and extensions of Moodle to meet teaching and learning needs of the future

Andreas Hruska<sup>1</sup>, Katarzyna Potocka<sup>1</sup>

<sup>1</sup>Teaching Support Center, Vienna University of Technology, Austria  
[andreas.hruska@tuwien.ac.at](mailto:andreas.hruska@tuwien.ac.at)  
[potocka@elearning.tuwien.ac.at](mailto:potocka@elearning.tuwien.ac.at)

**Abstract:** This paper gives an introduction to the enhancements of the Learning Management System TUWEL of Vienna University of Technology, which facilitates Moodle as its core. The system is being used since 2005 – starting with 1.000 users and growing to 28.000 by February 2010 – to support and enhance learning and teaching at the university. it has been under active development.

**Keywords:** enhancement, development, MOODLE

## 1 Introduction

TUWEL is the Learning Management System of Vienna University of Technology, which facilitates Moodle as its core. We present features and enhancements implemented according to the requirements and feature requests of the university's teachers, students and organizational staff.

## 2 Interface between TUWEL and TUWIS++

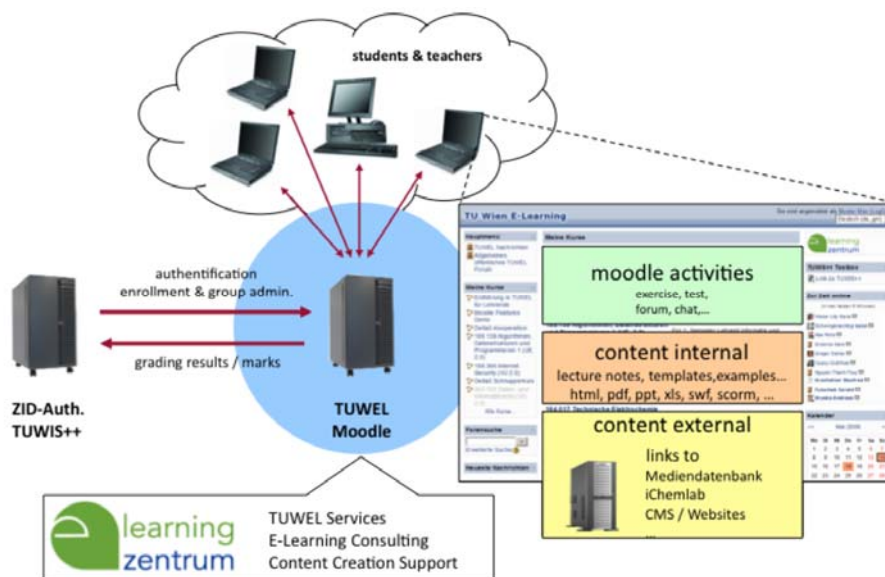


Figure 1 Moodle integration TUWIS++

An interface between TUWEL and TUWIS++ (the Information System of Vienna University of Technology) providing a fully digital workflow from course creation and participant management to grading and certification has been implemented. Authentication is provided by a proprietary Single-Sign-On Portal integrated into Moodle by a dedicated authentication plugin. Course enrollment information, group status and course start date is passed from TUWIS++ to Moodle and grading results are passed back to TUWIS++ for a seamless digital workflow.

The screenshot shows the TUWIS++ TUWEL interface. At the top, there's a navigation bar with links like 'Einstellungen', 'Abonnierte LVAs', 'Agenda', 'Termine', 'TU Info', and 'Hilfe'. Below this, a header section displays '015.087 TutorInneneinsatz im E-Learning' and 'Seminar, 2009S, 2.0h'. The main content area is titled 'E-Learning Einsatz in TUWIS++ ankündigen'. It contains three sections for course creation: 'Download von Onlinereessourcen', 'TUWEL Kurs (z.B.: Forum, Blog Wiki, Onlineabgabe, Onlinetest, Simulation,...)', and 'Anderer E-Learning Kurs'. Each section has a checkbox 'in TUWIS++ ankündigen' and input fields for 'Verfügbarkeit TT.MM.JJJJ' and 'URL'. The 'TUWEL Kurs' section also includes a 'Kursstartdatum' field set to '12.05.2009'. At the bottom, there are buttons for 'Speichern', 'Speichern und TUWEL Kurs erstellen / bearbeiten', 'Abbrechen', and 'Wiederherstellen'.

Figure 2 E-Learning integration TUWIS++

### 3 Automatic synchronisation

Automatic synchronization between the course start date and the visibility of courses is performed by a daily cron script. Teachers now don't have to bother updating the course visibility at the beginning of the term. This solution removed a source of regular organizational problems for hundreds of students.

/etc/crontab

```
20 0 * * * apache curl URL://startdate_visibility.php?password=secret > /dev/null 2>&1
startdate_visibility.php
```

```
124
125 if ($courses = get_courses()) {
126     foreach ($courses as $course) {
127         if (($course->visible==0) && (array_search($course->category, $categories)==false)) {
128             if ($course->startdate == $date) {
129                 //set the visible field to 1 = set the course visible for participants
130                 if (!isset($course->visible, '1', 'id', $course->id)) {
131                     mtrace($startdate." - <b>Failure:</b> Could not change visibility for course id=".$course->id." idnumber=".$course->idnumber."\n");
132                     $content .= $startdate." - <b>Failure:</b> Could not change visibility for course id=".$course->id." idnumber=".$course->idnumber."\n";
133                 } else {
134                     mtrace($startdate." - Success: Changed visibility for course id=".$course->id." idnumber=".$course->idnumber." shortname=".$course->shortname."\n");
135                     $content .= $startdate." - Success: Changed visibility for course id=".$course->id." idnumber=".$course->idnumber." shortname=".$course->shortname."\n";
136                 }
137             }
138             } else continue;
139         }
140     }
141 }
```

Figure 3 Checkmark assignment – grading

## 4 Course sorting overview

The new course sorting overview gives the administrator the possibility to choose a different front page layout for students, course creators, teachers etc. The courses will be sorted according to the start date set within the course settings.

Additionally we adapted the enhancements for the MyMoodle page, created by Berlin Humboldt University in Berlin. With this enhancement your courses on your MyMoodle site will also be sorted according to the start date. Additionally highlighting of duedates has been added.

Figure 4 MyMoodle sorted according to start date.

## 5 Extension of the assignment module

This extension includes the file name convention creator, file type checker, a print view of all submissions and a zip & download feature for all submitted assignments.

Upload a single file

Allow resubmitting

No

Email alerts to teachers

No

Maximum size

5MB

File types allowed for upload (,)

jpg,zip,tar.gz

Set standard filename

[idnumber]\_[lastname]\_[firstname]\_[assignmentname]

Figure 5 File name converter and file type checker

The file type checker ensures that only the specified types of files, defined by a list of allowed extensions e.g. “jpg,zip,tar.gz”, can be uploaded. The file name convention – set standard filename - provides fields for creating unique “speaking” filenames.

## 6 Enhanced scheduler module

The scheduler module enhanced with additional features contains an improved time-slot enrolment visualization, enrolment and un-enrolment deadline setting options and a print view possibility of all time-slots with corresponding data.

**My Appointment:** Dienstag, 26 Februar 2008 10:30 - 11:00 , Meeting with your Katarzyna Potocka, Location: HS 5 Unsubscribe slot ?

**Slots**

Save my choice

Date	Start	End	Choice	Member of Staff	Group Session	Attended	Location	Notes
Montag, 25 Februar 2008	10:00	10:30	<input type="radio"/>	Katarzyna Potocka	Free places: 3		HS 5	
	10:30	11:00	<input type="radio"/>	Katarzyna Potocka	Free places: 3		HS 5	
Dienstag, 26 Februar 2008	10:00	10:30	<input type="radio"/>	Katarzyna Potocka	Free places: 3		HS 5	
	10:30	11:00	<input checked="" type="radio"/>	Katarzyna Potocka	Free places: 2 Katarzyna-Anna Potocka	No	HS 5	
Donnerstag, 28 Februar 2008	10:00	10:30	<input type="radio"/>	Katarzyna Potocka	Free places: 3		HS 5	
	10:30	11:00	<input type="radio"/>	Katarzyna Potocka	Free places: 3		HS 5	

Save my choice

Unsubscribe slot ?

**Figure 6** File name converter and file type checker

## 7 Checkmark assignment

The checkmark assignment is a new assignment type to facilitate a very popular exercise mode at the Vienna University of Technology. Students have to solve up to ten (calculation-) exercises per week. They submit information on which exercises they were able to solve and are randomly asked to present these at the next face-to-face session, receiving or losing credits. Each examples can have an individual name and score. Grades can be calculated automatically for all or for all not yet graded assignments, saving teachers a lot of calculation work.

**Checkmark** \* Hide Advanced

Allow resubmitting ? No

Email alerts to teachers ? No

Number of examples

Number of first example

Individual grading/naming\* ? ☒ activate individual function

Individual naming (,)\* ?

Individual grading (,)\* ?

**Figure 3** Checkmark assignment – settings

**188.391 Objektorientierte Modellierung (VU 2,0) 2009S**

TUWEL > 188.391 OOM SS09 > Assignments > Di-KreuzerIn Übungsblatt 6 > Submissions

Separate groups: All participants

First name: All A B C D E F G H I J K L M N O P Q R S T U V W X Y Z  
Surname: All A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Page: (Previous) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 ...24 (Next)

First name / Surname	Matrikelnr.	Grade/Max	Comment	Last modified (Student/in)	Last modified (LVA-Leiter/in)	Status	Final grade
TU WIEN		6 / 6		Examples: 31, 32, 33, 34, 35, 36 Donnerstag, 4 Juni 2009, 03:52	Dienstag, 9 Juni 2009, 12:47	Update	6.00
TU WIEN		6 / 6		Examples: 31, 32, 33, 34, 35, 36 Dienstag, 9 Juni 2009, 07:42	Dienstag, 9 Juni 2009, 12:58	Update	6.00
TU WIEN		5 / 6		Examples: 31, 32, 33, 34, 35 Dienstag, 2 Juni 2009, 03:49	Dienstag, 9 Juni 2009, 12:58	Update	5.00

Page: (Previous) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 ...24 (Next)

print view XML Output  
Calculate not graded Calculate all grades

Submissions shown per page 3  
Allow quick grading  
Save preferences

**Figure 7** Checkmark assignment – grading

## 8 Upload grading files

Many teachers use short face-to-face interviews to verify the origin of the uploaded assignments or use other presence events in addition to the online upload. It is also very popular to use a spreadsheet application for grading especially when offline. The implementation of the possibility to upload a grading file within the online assignment has been a urgent request right from the start of the services. The content of the grading file is integrated directly into the grading of the specified assignment. A template grading file with all user data (Name, Group, ID-number) is provided for download making user identification quick and easy. This enhancement is mostly used for non-online activities like laboratory work or practical / outdoor exercises.

**188.391 Objektorientierte Modellierung (VU 2,0) 2009S**

TUWEL > 188.391 OOM SS09 > Assignments > 1. Test > Submissions

Separate groups: 05

First name: All A B C D E F G H I J K L M N O P Q R S T U V W X Y Z  
Surname: All A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Page: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 (Next)

First name / Surname	Matrikelnr.	Grade/Max	Comment	Last modified (Student/in)	Last modified (LVA-Leiter/in)	Status	Final grade
TU WIEN		83 / 100	Gruppe C (Gelb)		Mittwoch, 29 April 2009, 04:02	Update	83.00
TU WIEN		43 / 100	Gruppe C (Gelb)		Mittwoch, 29 April 2009, 04:01	Update	43.00

Page: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 (Next)

print view XML Output

Submissions shown per page 3  
Allow quick grading  
Save preferences

**Upload Grades**

Upload this file:

**Figure 8** Checkmark assignment – grading



## 9 Element replication

For a faster and easier creation of a course structure, the element replication makes it possible to copy already created elements. Teachers can choose elements (e.g. forum, assignments) they want to replicate and decide how often they should reappear within your course. The new elements only need minor editing saving teachers a lot of generally needed time for parameter setup.

The screenshot shows the 'Element replication' interface in Moodle. It is divided into two main sections: 'Select a Course-Section' and 'Select Content to Replicate'. In the 'Select a Course-Section' section, a list of course sections is shown, with 'Course-Section 5' selected. Below this list is a checkbox labeled 'Copy course-section title' with a question mark icon. In the 'Select Content to Replicate' section, a list of content elements is shown, including 'Label - Abschlussbewertung', 'Forum - Informationsforum zur Prüfung', 'Quiz - Abschlussbewertungsangaben 2010-S2+S3', 'Quiz - Abschlussbewertungsangaben 2010-S1', 'Assignment - Abschlussbewertung Excel', 'Assignment - Abschlussbewertung LaTeX', 'Assignment - Abschlussbewertung Project', 'Assignment - Abschlussbewertung Word', and 'Assignment - Bewertung und Zusatzpunkte für Mitarbeit'. To the right of this list is a dropdown menu for selecting the number of times to replicate the element, with options from 'x1' to 'x10', and 'x4' is currently selected. At the bottom center of the interface is an 'Execute' button.

**Figure 9** Element replication

## 10 External Server Assignment

Many Institutes have developed specialized utilities for checking assignments e.g. automatic XML syntax parsing or semiautomatic test-suites for java applications.

These utilities can now use the “external server assignment type” as an interface to Moodle. Moodle provides user authentication and access control via roles, hence the external server application can focus on its core task. Additionally the load generated by checking the uploads is generated on the external server and not on the Moodle system, avoiding performance issues.

The assignment sends the uploaded file to the assignment file space and simultaneously via curl to the external server. An iframe provides interaction in the remote external server. Check results can be passed back to the assignment and grading module.

**186.172 Algorithmen und Datenstrukturen 1 (VL 4,0) 2010S**

**Abgabe 1**

Separate groups: All participants | View 49 submitted assignments

Available from: Donnerstag, 8 April 2010, 12:05  
Due date: Montag, 17 Mai 2010, 01:05  
Upload attempts: 0/30

Upload a file (Max size: 1MB - File Type: java)

**Abgabe 1**

**Deadline: 2010-05-17 13:00:00**

Hinweis! Da es vor allem am Tag der Abgabe zu einer starken Belastung des Servers kommt, ist es nicht möglich ihnen sofort eine Rückmeldung des Systems garantieren zu können. Um noch garantiert eine Auswertung ihrer Abgabe vor der Deadline zu erhalten und somit noch eine weitere Abgabe vor der Deadline möglich ist, müssen sie bis spätestens 2010-05-17 01:00:00 abgeben

Ihre letzte Abgabe war positiv!

Allgemeine Informationen	Informationen zu den Instanzen	Abgabe # (id)	Sourcecode	Output	Bewertung	Abgabezeit
abgabeid 10088	Instanz # 0000	1 (id:10077)	Sourcecode	StandardOutput	Positive Abgabe!	2010-04-26 21:26:43
	0001	2 (id:10088)	Sourcecode	StandardOutput	Positive Abgabe!	2010-04-27 21:00:30

Figure 10 External server assignment

PHP template code is provided for the external server side component, but can be implemented in any server technology providing http communication.

## 11 Further information

Some enhancements are available for download at

<http://tracker.moodle.org/secure/IssueNavigator.jspa?reset=true&query=hruska+potocka&description=true&body=true>.

For further information feel free to contact us.



**Dipl.-Ing. Andrea Hruska**

+43 (0) 664 8333 554  
andreas.hruska@tuwien.ac.at  
Technical Director  
Teaching Support Center  
Vienna University of Technology



**Katarzyna Potocka**

+43 (0) 1 58801 41565  
potocka@elearning.tuwien.ac.at  
Lead Software Engineer  
Teaching Support Center  
Vienna University of Technology