

# The blended learning concept of the Medical University of Graz and its technical realization

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## Abstract:

*In winter semester 2002/03 a new integrated and modular curriculum for human medicine was introduced at the Medical University of Graz (MUG). In the same year the Virtual Medical Campus Graz (VMC), the eLearning portal of the MUG, was launched. The VMC currently hosts the learning management systems Join2Learn (J2L) and Moodle. J2L as the primary eLearning platform of the MUG currently holds more than 10,800 unique learning objects, and serves more than 5,300 students from three studies. In this paper we introduce the technical realization of the (mandatory) virtual lectures of our blended learning concept. Once the content is created and the lectures are planned the process is fully automated. This includes generation of grades and needs no further administrative interaction by the teachers. Teachers can fully concentrate on continuously updating of the virtual content and to answer specific questions of students.*

## 1 Introduction

In winter semester 2002/03 a new integrated and modular curriculum for human medicine was introduced at the Medical University of Graz (MUG). In the same year the Virtual Medical Campus Graz (VMC) [1], [2], [3], the eLearning portal of the MUG, was launched. The VMC currently hosts the learning management systems Join2Learn (J2L) and Moodle, and provides furthermore access to the central study organisation system MEDonline and to the electronic library. J2L as the primary eLearning platform of the MUG currently holds more than 10,800 unique learning objects, and serves more than 5,300 students from three studies. Moodle was successfully started as an alternative platform with begin of the summer semester 2010 with one module from human medicine, two free optional subjects and about 460 active students.

## 2 Integrated curriculum and eLearning

The new integrated curriculum for human medicine consists of modules and tracks. The entire academic year is organized in six time slots, each with a duration of 5 weeks. In each slot one module is offered, tracks are offered over one semester. Modules and tracks consist furthermore of lectures (participation voluntary), seminars (participation mandatory, group size 24) and exercises (participation mandatory, group size 12).

Within this new curriculum the blended learning concept was integrated and implemented from the very beginning. Parts of the new curriculum were virtualized, meaning that these parts could be executed virtually from home without requiring the physical presence of the students at the university [4]. This includes multimedia online studying material as well as exams via so called web based training modules (WBT). With this innovative concept

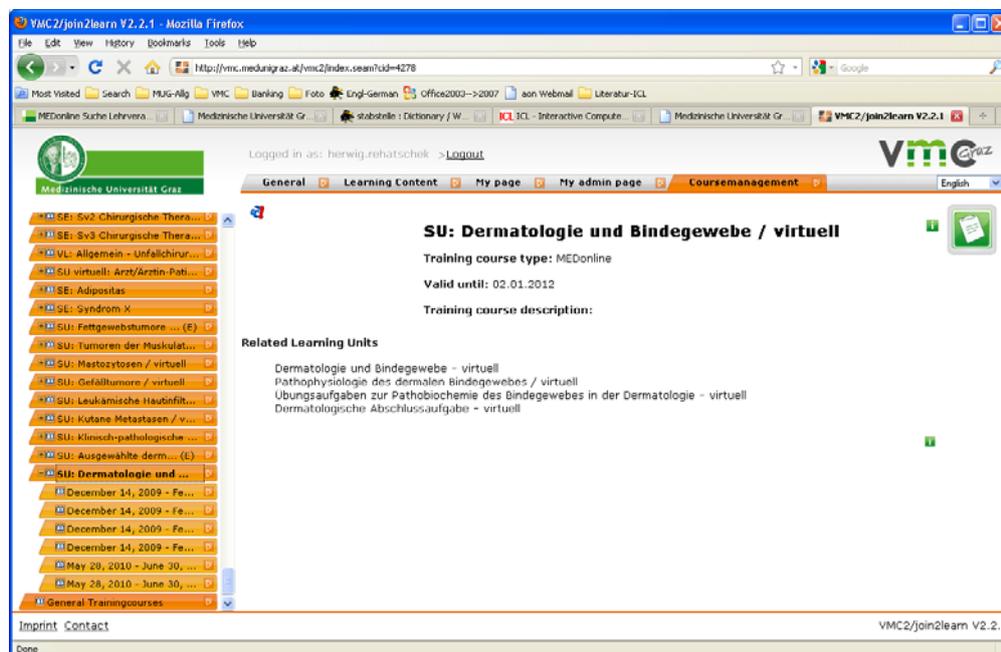
students have a significant amount of flexibility to organize the study individually and to decide for themselves where and when to learn.

The fully virtualized parts of the curriculum are called “virtual lectures”, and they must be executed by students in order to continue with their study. With status of March 2010, 243 lessons of 45 minutes each are offered as “virtual lectures” within the study programme “human medicine”, which corresponds to approximately 16 semester hours. In terms of WBTs 16,935 WBT questions exist within J2L and 32,024 single WBTs were executed by students within the summer semester 2009.

The technical realization of this part of the study program is a fully automated process and – according to our knowledge – unique. It is discussed in the next chapter.

### 3 Technical realization

The execution of virtual lectures is fully automated. The process starts with the planning of the fully virtualized lectures within MEDonline [1], the central lecture and exam administration system for all studies offered by the MUG. Virtual lectures are specifically tagged within MEDonline, but apart from this are treated as all other lectures within the system. In parallel to the planning, the content of the virtual lectures has to be authored within the eLearning platform J2L within a so called learning unit. Within such a learning unit the responsible teacher has to provide material which is relevant in order to pass the exam and one or more WBTs. The WBT currently can consist of either multiple choice, single choice or word division questions. Students have to pass this WBT in order to get a positive grade on the lecture. When the creation of a virtual learning unit is finished in J2L, a J2L course is created by the administrative staff, with the learning unit assigned to it. The course management of J2L is visualized in Figure 1.

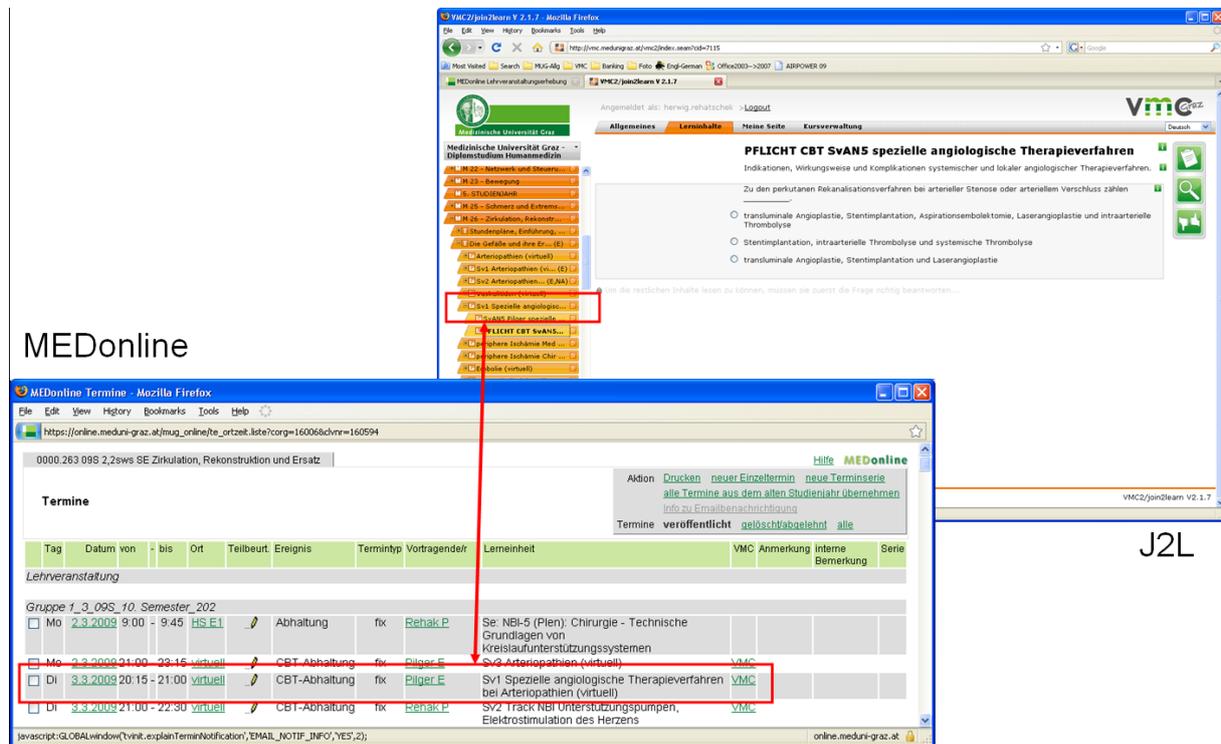


**Figure 1:** Course management for virtual lectures within the Join2Learn LMS

The courses are listed on the left side of the screen. Each course which has valid registered students has furthermore starting dates assigned. On the right side learning units are listed which are assigned to the course and contain the actual WBTs. They can be associated via an editing interface right here.

Then, the internal ID of the J2L course is synchronized to MEDonline, where it is associated to the corresponding lecture during the planning phase of the semester. From now on the two

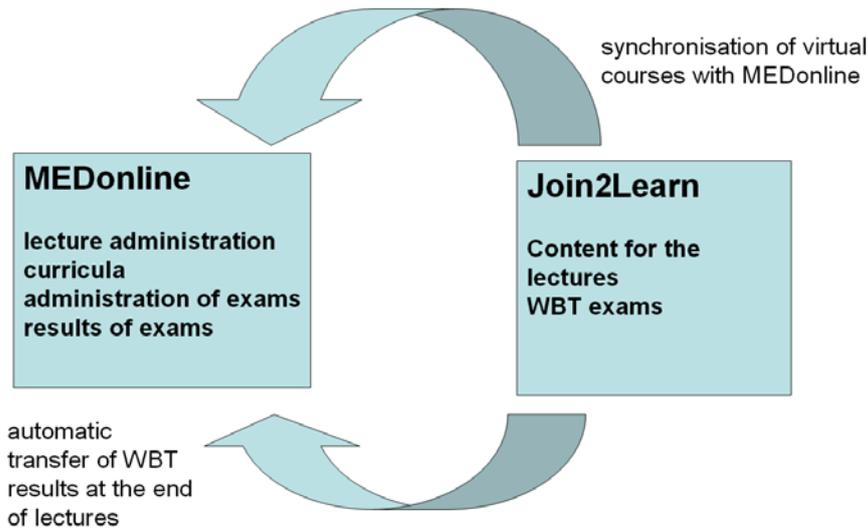
systems are “connected”. In Figure 2 an example for such a connection is given. In the left bottom a lecture from MEDonline “sv1: Spezielle angiologische Therapieverfahren bei Arteriopathien” is listed, on the right upper side the associated learning unit (containing the WBT) is shown to which the lecture in MEDonline is connected via the internal ID. In the MEDonline view also the type “virtuell” (virtual – identifies this lecture as a virtual lecture) and the starting date of the virtual lecture (3.3.2009 – 3 March 2009) can be seen. This is the date from where the virtual lecture will be presented to students within J2L who are registered for this virtual lecture.



**Figure 2:** Connection of MEDonline and Join2Learn LMS

When the planning is finished and the content for the virtual lecture is created, the process can be executed fully automatically with usually no further interaction of the teacher. To each virtual lecture planned within MEDonline students organized in groups are centrally registered or in some cases can register by themselves.

As already explained in chapter 2 our new curriculum is based on modules which last for 5 weeks. In case a module contains virtual lectures (e.g. a seminar), the start date of this lecture is transmitted via a special interface to J2L. Based on the ID transmitted by MEDonline (which was generated before by J2L, see above), J2L can associate the MEDonline lecture to a unique J2L course. J2L now generates the corresponding tasks for the registered students by copying the WBTs from the authoring/editing area to the exam area. From now on the WBTs can be executed by the students who are registered to the lectures. We want to emphasize the fact, that the WBTs shown to students for execution cannot be edited anymore, in order to ensure that all students see the same questions during the duration of the lecture. Changes can be made to the WBTs, however, they are not visible for students until the next lecture starts (eg. in the next time slot in 5 weeks). This process between MEDonline and J2L is visualized in Figure 3.



**Figure 3:** Synchronisation of virtual lectures between MEDonline and Join2Learn

All tasks presented to students (see Figure 4) must be executed the latest until the end of the lecture, which is usually a five weeks block. The starting and closing dates of the virtual lectures are clearly indicated to the students for each task, as can be seen in Figure 4.

The results of all WBTs of all virtual lectures offered until the closing date are written back to MEDonline via the special interface. From this date on the tasks cannot be executed anymore in J2L and the results are now visible for all students in MEDonline. Within MEDonline grades are automatically calculated according to a stored clef.

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OFFENE PFLICHTAUFGABEN: NUR SEMINARE UND ÜBUNGEN!

In den offenen Pflichtaufgaben werden derzeit sowohl virtuelle Vorlesungen als auch virtuelle Seminare und Übungen angezeigt. Wir weisen darauf hin, dass **NUR DIE VIRTUELLEN SEMINARE UND ÜBUNGEN Pflicht-WBTs** beinhalten. Die **virtuellen Vorlesungen** dienen zu reinen Übungszwecken und sind **nicht verpflichtend** zu absolvieren.

**Content of not-finished mandatory tasks**

SE: Seminar 1b - Stromwirkungen (virtuell) <a href="#">Pflicht-WBT - Stromwirkungen</a>	Apr 29, 2010	Jun 24, 2010	0.0 %
SE: Seminar 2b - Med. elektrische Geräte (virtuell) <a href="#">Pflicht-CBT - Med. elektrische Geräte</a>	Apr 30, 2010	Jun 24, 2010	0.0 %
SE: Seminar 3a - Ausgewählte kritische Geräte (virtuell) <a href="#">Pflicht-CBT - Ausgewählte kritische Geräte</a>	Jun 1, 2010	Jun 24, 2010	0.0 %
SE: Seminar 2a - Elektroinstallation - Sicherheit (virtuell) <a href="#">Pflicht-WBT - Elektroinstallation - Sicherheit</a>	Apr 30, 2010	Jun 24, 2010	0.0 %
SE: Seminar 3b - Med. Gase / Vakuum (virtuell) <a href="#">Pflicht-WBT - Medizinische Gase / Vakuum</a>	Jun 1, 2010	Jun 24, 2010	0.0 %
SE: Seminar 4a - Gefährliche Stoffe / Brandverhütung (virtuell) <a href="#">Pflicht-WBT - Gefährliche Stoffe / Brandverhütung</a>	Jun 2, 2010	Jun 24, 2010	0.0 %
SE: Seminar 4b - Risiko / Sicherheit / Unfälle (virtuell) <a href="#">Pflicht-CBT - Risiko / Sicherheit / Unfälle</a>	Jun 2, 2010	Jun 24, 2010	0.0 %
SE: Seminar 1a - Medizinproduktegesetz (virtuell)	Apr 29, 2010	Jun 24, 2010	0.0 %

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VMC2/join2learn V2.2.1

**Figure 4:** View of mandatory tasks for students in J2L

For any further offerings of the same virtual lecture the process is now fully automated and needs no interaction with the teacher anymore. Since the teacher does not have to invest more

time on administrative tasks he can now fully concentrate to update the WBTs and the accompanying material on a regular basis.

## 4 Conclusions and Outlook

We introduced the technical realization of the (mandatory) virtual lectures of our blended learning concept. Once the content is created and the lectures are planned the process is fully automated. This includes generation of grades and needs no further administrative interaction by the teachers. Teachers can fully concentrate on continuously updating of the virtual content. They can also answer questions, which students might have during execution of the virtual lecture. Additionally, as most of our teachers are physicians, this process saves their valuable time resources, thus allowing more intensive bedside teaching.

In order to provide more flexibility and to ensure performance requirements for handling more than 5300 students, we decided to introduce Moodle with 1<sup>st</sup> March 2010 as an alternative eLearning platform. Within the first time slot (5 weeks) in the summer semester we ran a pilot phase and evaluated the new platform with students and a teacher. The result of this evaluation clearly indicated, that Moodle is the LMS which is favoured by the students and teachers. In May 2010 we decided to introduce Moodle as the primary eLearning platform of the MUG by winter semester 2010/11. Currently we implement an interface between MEDonline and Moodle in order to execute (mandatory) virtual lectures also within Moodle.

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- [5] MEDonline is a specific implementation of the system "Campus Online", developed by the Technical University of Graz <URL: [https://online.tu-graz.ac.at/tug\\_online/webnav.ini](https://online.tu-graz.ac.at/tug_online/webnav.ini)>

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