

LEARNING SPACE OF THE FUTURE - MOODLE MEETS BLENDED LEARNING

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Abstract

Universities are under constant pressure to change, especially against the background of the mega trend of digitalisation. This has an impact on their core task of teaching. The Westphalian University is meeting this challenge. Innovative teaching and learning methods are of great importance for its further development. The "learning space of the future" is to become a reality at the Westphalian University very soon.

While classroom courses continue to be the focus of teaching they are qualitatively improved and made more flexible through eLearning modules that make sense in terms of media teaching.

This article presents a blended learning strategy based on Moodle. The pilot project is an exercise for the Business Informatics course for students of the Bachelor's programme in Business Administration and Economics. The exercise was largely designed as an "Inverted Classroom". In the following, the framework conditions and challenges of such a course are examined in more detail.

Keywords: Inverted classroom, digitalisation, blended learning, individualization, demand-oriented knowledge transfer

1 INTRODUCTION

The digitalisation of business, science and society has far-reaching effects on the professional and academic competence profile. As digitalisation progresses, there is a change in the way learning content is taught. The digitally extended communication and information channels such as Facebook, Twitter or WhatsApp, which students are using today, require new forms of interaction and collaboration.

Understanding is the goal of every learning process; however, it does not occur to students if they cannot follow the learning content, for example due to different levels of previous knowledge and learning speeds. New teaching scenarios using digital media and technologies make it possible to make the learning process more flexible and adapt it to the individual needs of learners. The quality development of teaching and learning processes can be supported by digitalisation.

However, digital media do not automatically improve the quality of teaching. Over the last 20 to 30 years, numerous studies have been carried out in this field. A key finding of these studies is that the effect and effectiveness of digital media does not lie in media technology itself, but in the design of the media in the respective educational context. "The challenge therefore lies in the media-didactic conception and design of courses that are to be linked to subject-specific teaching and learning objectives and the paths of competence development in the context of subject cultures". [1]

2 GOALS

Studies in recent years have shown that students at German universities are increasingly characterised by heterogeneous characteristics [2]. The growing diversity of learners presents every educational offer with the challenge of meeting the different individual requirements. [3] The increasingly diversified picture of students suggests that the teaching content should be adapted, i.e. away from classic "frontal" teaching in lectures to demand-oriented knowledge transfer. Target group-oriented learning means the consideration of individual needs to promote and support individual and cooperative learning processes.

Due to the high degree of flexibility and individualisation, the differences in performance between learners can be balanced to a large extent. Against this background, a blended learning format based on Moodle (vers. 3.2) has now been developed for the summer semester 2018 with the following goals:

- learn the basics with eBooks, instructional videos and online material at your own pace of learning on your own
- increase the variety of methods by using self-assessments, instructional videos and online material in the attendance phase to activate and apply knowledge from the instructional videos
- elaboration of this knowledge through practical exercises
- cooperative learning by presenting the exercises in small groups
- support for competence development in a timely and needs-oriented manner

2.1 CONCEPT

Combining digital teaching media and face-to-face teaching is a successful teaching method. A meta-analysis by the US Department of Education [4] shows that blended learning formats, such as the Inverted Classroom Model, achieve better results in terms of learning outcome than classic lectures in the traditional teaching format or exclusive learning using online tools. Another study has shown that students prefer cooperative and interactive learning with other students or the lecturer as opposed to individual self-study phases. [5]

In the blended learning approach and especially in the inverted classroom, phases of independent (computer-based) learning alternate with phases of face-to-face events. With the Inverted Classroom Model, students usually acquire the digitally provided content at home before the actual attendance phase. In the online phase, factual knowledge is imparted, which is used in the face-to-face course as a basis for jointly deepening and applying what has been learnt. In traditional lectures and/or attendance instructions, the concept was that factual knowledge was conveyed during the instruction, which was subsequently deepened and applied at home if necessary.

"Ultimately, all forms of learning between face-to-face and e-learning can be described as blended learning." [6] The combination of methodical, didactic, pedagogical and media concepts for conveying technical content is crucial to optimally complement the advantages of presence and eLearning phases. Pure attendance events as well as pure online events each have specific disadvantages. In the case of regular attendance courses, knowledge gaps in heterogeneous knowledge levels can only be compensated for by regular participation, but this is not always possible for all students. In the case of purely online events, problems include self- and time-management as well as a lack of personal contact (between students but also between lecturer and students) and a lack of social exchange.[6] Taking into account these specific problems, the questions arises how to balance presence and eLearning components in order to reach an optimum learning outcome.

2.2 Implementation

Moodle is a web-based, platform-independent open source learning management system that allows managing learners and events. It offers virtual learning environments, which provide different functions such as exercise and examination scenarios, discussion forums, voting, survey and quiz functions as well as support for group work. Content management systems, authoring tools and computer-based trainings are by definition not a learning platform, as they generate or present content but lack user administration and social communication possibilities.

The demand-oriented knowledge transfer takes place with the help of the different Moodle activities, which allow the lecturer to support each student individually. The target group for the exercise of the Business Informatics lecture are students in the Bachelor programme in Business Administration and

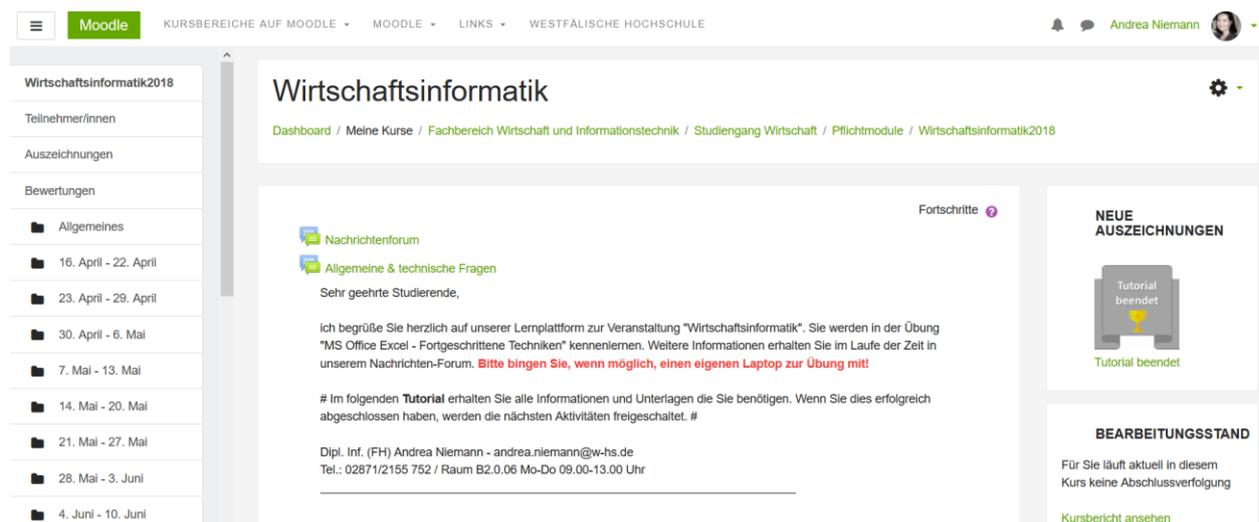
Economics in the 2nd semester. The number of students enrolled in this compulsory course is approximately 190, divided into 5 exercise groups. The exercise and lecture are supervised by two lecturers. The total workload is 210 hours, including 150 hours of self-study. Students should not only learn the basic concepts of information and communication technology, but also solve practical problems.

The exercise is included in the module grade with 50% of 7 ECTS. The topic of the exercise is the course "Microsoft Excel - Advanced Techniques" based on the book of the RRZN (publisher Herdt). It covers 17 chapters of the book. The attendance phases of the exercise last 90 minutes and take place weekly during the semester. The lecture lasts 90 minutes. The Moodle course is divided into 10 so-called "weekly learning modules". Every week, the various activities of the weekly block are to be processed. In week 11 there is a digital rehearsal and a Question Time.

In addition to the Moodle activities, the slides of the lecture are available for download as a weekly PDF file. Furthermore, a list with bibliographical references for preparation and follow-up is provided. Students have the opportunity to exchange views on the course in forums and to ask the lecturer questions. Via a news forum, students receive ad hoc e-mail messages on important topics and deadlines.

2.3 Moodle learning environment

This section presents an overview about the Moodle learning environment.



The screenshot shows the Moodle course interface for 'Wirtschaftsinformatik'. The top navigation bar includes 'Moodle', 'KURSBEREICHE AUF MOODLE', 'MOODLE', 'LINKS', and 'WESTFÄLISCHE HOCHSCHULE'. The user 'Andrea Niemann' is logged in. The course title 'Wirtschaftsinformatik' is displayed, along with a breadcrumb trail: 'Dashboard / Meine Kurse / Fachbereich Wirtschaft und Informationstechnik / Studiengang Wirtschaft / Pflichtmodule / Wirtschaftsinformatik2018'. On the left, a sidebar lists course activities: 'Teilnehmer/innen', 'Auszeichnungen', 'Bewertungen', and a calendar for 'Wirtschaftsinformatik2018' with weekly intervals from April to June. The main content area features a 'Nachrichtenforum' with a post titled 'Allgemeine & technische Fragen' addressed to 'Sehr geehrte Studierende'. The post text welcomes students to the 'Wirtschaftsinformatik' course and mentions an exercise on 'MS Office Excel - Fortgeschrittene Techniken'. It includes a note about a tutorial and contact information for Andrea Niemann. On the right, there are two panels: 'NEUE AUSZEICHNUNGEN' showing a 'Tutorial beendet' notification with a laptop icon, and 'BEARBEITUNGSSTAND' indicating that the course is currently not being followed.

Figure 1: Moodle Course Room

The learning environment is clearly structured. On the left side you have direct access to the weekly content and awards received. On the right side, the awards are displayed again graphically.

Wirtschaftsinformatik : Kursbearbeitungsdetails

Dashboard / Kursbearbeitungsdetails

Status *In Bearbeitung*

Erforderlich Alle nachfolgenden Kriterien sind notwendig

Kriteriengruppen	Kriterien	Anforderungen	Status	Fertig	Datum des Kursabschlusses
Eigener Abschluss	Eigener Abschluss	Selbst abgeschlossen markiert	Nein	-	
Aktivitätsabschluss (alle erforderlich)	Tutorial - <i>Wie benutze ich diesen Kurs?</i>	lektion ansehen	Ja	23. April 2018	
	Anmeldung Übungsgruppen - <i>möglich ab 19.4.18</i>	abstimmung ansehen	Nein	-	
	Testen Sie Ihr Wissen! Kapitel 1-2	test ansehen, Erreichen der Bewertung	Nein	-	
	Dateien Woche 1	aufgabe ansehen	Nein	-	
	Dateien Woche 2	aufgabe ansehen	Nein	-	
	Testen Sie Ihr Wissen! Kapitel 5-6	test ansehen, Erreichen der Bewertung	Nein	-	

Figure 2: Processing status

Under processing status, the student can view his open and completed activities.

23. April - 29. April

Bitte bearbeiten Sie folgende Kapitel in dieser Woche:
 Buch Grundlagen - Kap. 9 Spezielle Funktionen
 Buch Fortg. Techniken - Kap. 1 Namen
 Buch Fortg. Techniken - Kap. 2 Tabellen gliedern

- Video "Relative und absolute Bezüge"
- Video "Ausfüllfunktion"
- Testen Sie Ihr Wissen! Kapitel 1-2

Bitte laden Sie hier Ihre Ergebnisdateien hoch!

Dateien Woche 1

Eingeschränkt Nicht verfügbar, es sei denn: Die Aktivität **Testen Sie Ihr Wissen! Kapitel 1-2** ist als abgeschlossen markiert

Die Aufgabenstellung finden Sie im jeweiligen Buch am Ende des Kapitels.

Die leeren Übungsdateien finden Sie hier in der Aufgabe.

[Buch Grundlagen /Aufgabenblatt Prämien berechnen](#)
 Prämie-E.xlsx

Figure 3: Weekly block

The activities to be processed are specified in the weekly learning module. Below the date, the chapters to be edited in the book are displayed, followed by two videos on the topic and the activity in which the exercises are uploaded or downloaded.

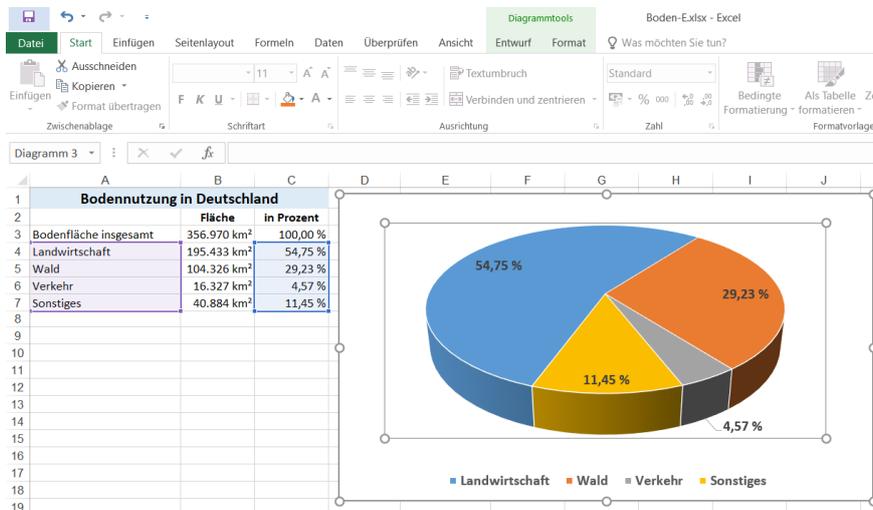


Figure 4: Sample exercise Chart creation

2.3.1 Introduction to the course

Students gain access to the Moodle course during the lecture. At the beginning they should go through an online tutorial. The tutorial contains information about the software to be used, the location of the eBooks, instructions on how to use the individual activities in Moodle and the organization of the exercise groups in the classroom event. In the first attendance phase, there will be an intensive instruction in the use of all materials.

2.3.2 Activities

For each week, there is a section that describes which chapters are to be worked on, followed by a self-assessment in the form of multiple-choice or assignment tasks. Students can check their level of knowledge on their own and, if necessary, rework content that they do not understand.

The exercises to be worked on are only unlocked once the learning success control has been successfully passed. The exercises are Excel files with pre-populated data. Each file contains practical exercises. After processing them, the solutions are stored in another activity.

Depending on the complexity of the topic, additional accompanying material such as learning videos or further literature will be provided. This way, students learn to actively use the media, which increases their media competence. Even if the learning path is clearly pre-structured, self-responsibility and self-efficacy are promoted. These requirements are important to successfully complete a course of study. The media offered are not only to be regarded as a means of controlling the learning process but serve the independent construction of knowledge.

2.3.3 Activation and feedback

The individual activities are only activated under certain conditions. The learning path is thus clearly structured. For each weekly learning module they have completed successfully, students receive digital awards (self-created Moodle badges). Regular performance feedback is important to maintain an increase in competence. [7] Students receive direct feedback from the lecturer during the attendance phases. It also gives lecturers an impression of the students' level of knowledge. Freedom in the choice of activities and learning pace allows students to maintain their motivation and to develop their skills on their own. A factual and objective assessment of individual learning progress is also encouraged. For the lecturer, more space is created for an individualized knowledge transfer.

There are various learning theories such as Behaviourism, Cognitivism and Constructivism. The concept is based on a constructivist approach. In this teaching theory, the lecturer is not the knowledge mediator, but acts as a consultant in the learning process. Students construct their own knowledge of the world based on individual experiences. [8]

The essential findings of teaching and learning research of constructivism is summarized as follows:

- Learning is based on independent learning activities.
- Learning is a self-directed process within a given learning framework.
- Learning is an active, contextualized process of constructing knowledge.
- Learning is a social process embedded in interaction with others [9].

2.3.4 Cooperative learning

Completing exercises in partner work or small groups therefore is explicitly desired. By Interaction and communication in the group, create knowledge arising from a process, whereby social impulses like e.g. dialogues, discussions or contradictions have a positive impact on the learning process. Another advantage of cooperative learning is the motivational aspect. [10]

Moreover, a bonus system has been developed to increase attendance rates in the exercise. In order to receive the bonus, students must meet various requirements. A prerequisite for this is to complete the respective weekly exercises. Then the students can enter their names in a virtual list if they are willing to present one of the weekly exercises to their fellow students according to the "Think Pair Share" method. The "Think Pair Share" method is a method of cooperative learning and describes an essential approach, which is divided into three different phases. [11] In the first phase of the "Think Pair Share"

method, each individual deals with the task on their own (think), followed by an exchange with a partner (pair) in the second phase and finally, in the third phase, the exchange takes place in the group (share). This method supports in particular the development of social learning and should contribute to an improved knowledge storage.

3 VALIDATION AND PERSPECTIVE

Feedback was obtained for validation and the evaluation has yielded the following results:

The following activities were perceived as particularly positive:

- the independent mode of operation (24%)
- the individual learning pace (20%)
- the presentation of tasks (17%)
- interactive work (12%)
- the bonus system (9%)
- the "pre-structured" learning path (8%)
- other (10%)

The following aspects were considered rather negative:

- the book in electronic form (22%)
- size of the exercise group (15%)
- the upstream test (18%)
- imprecise tasks (11%)
- the pre-structured learning path (9%)
- other (25%)

The preliminary results show that the students are more motivated and more willing to perform the exercise. The initial response of the students can be considered positive throughout. What is striking here, however, is that for some students the rather strict learning framework is regarded as positive, for other students as negative.

A complete evaluation can only take place at the end of the 2018 summer semester, after the end of the course.

The experience gathered in the first attendance phases show that providing the students with detailed information about the teaching method has a great influence on the acceptance of this teaching format. This experience also coincides with the results of the American study [12].

Table 1: Processing status of activities in week 2 (status at the end of week 2)

Total participants = 191 Activity	completed activity	Not completed activity
tutorial	94 %	6 %
Participation in exercise group	98 %	2 %
Test Week 1	84 %	16 %
Exercises week 1	77 %	23 %
Test Week 2	65 %	35 %
Exercises week 2	46 %	54 %
Test Week 3	10 %	90 %
Exercises week 3	3%	97 %

In the first group of students frequent questions showed that the students were not as intensively occupied with the tutorial as they should have been doing. Consequently, the tutorial was revised in such a way that the students have to answer specific questions in order to successfully complete this activity. To further increase acceptance, the aim for the next semester is to offer the tutorial as animated video.

Similar observations were made regarding the interaction with the eBooks. For this reason, self-assessments in the form of multiple-choice or assignment exercises have to be completed successfully before access is given to the weekly learning modules. The entire process of completing all tasks of the learning module became more time consuming than before, however the students concentrate much more on the content, which has been clearly demonstrated by the quality of the solution to the exercises.

4 CONCLUSIONS

In order to increase the variety of methods, the digital offerings will be further expanded in the course of the year in the form of short learning videos and interactive exercises. Students should be offered alternative opportunities to consume their knowledge. The "Think Pair Share" method is to be further developed in the attendance phases.

This pilot project can only be a first step towards sustainable success. It is already clear that the establishment is a long process and constantly requires new impulses as well as technical and didactic innovations.

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REFERENCES

- [1] Getto B. , Kerres M., “Digitalisierung von Studium und Lehre: Wer, warum und wie?“, in *Flexibles Lernen mit digitalen Medien ermöglichen* (Ackeren van I., Kerres M.) pp. 17-18 Münster: Waxmann, 2018
- [2] Wilkesmann, U. , Virgillito, A. , Bröcker, T. , Knopp, L., “*Abweichungen vom Bild der Normalstudierenden – Was erwarten Studierende?*” in *Studium 2020* (Kerres M. , Hanft A., Wilkesmann, U., Wolff-Benedik K. eds.), pp. 59-81, Münster: Waxmann, 2012
- [3] Kerres M., Schmidt A., Wolf-Benedikt., “*Didaktisches Konzept und Instruktionsdesign der Vielfalt gerecht werden.*” ?” in *Studium 2020* (Kerres M. , Hanft A., Wilkesmann, U., Wolff-Benedik K. eds.), pp. 36-42, Münster: Waxmann, 2012
- [4] Means B., *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies*. Washing, D.C.: U.S. Department of Education, Office of Planning, Evaluation and Policy Development, 2010
- [5] Schreiber BE., Fukuta J., Gordon F., Live lecture versus video podcast in undergraduate medical education: A randomised controlled trial. *BMC Med Educ*, 2010, <https://doi.org/10.1186/1472-6920-10-68>
- [6] www.e-teaching.org, Blended Learning, [Online] 28. 03 2017. [Citing from: 02. 05 2018.] Retrieved from https://www.e-teaching.org/lehrszenarien/blended_learning
- [7] Viebahn P., *Lernerschiedenheit und soziale Vielfalt im Studium. Differenzielle Hochschuldidaktik aus psychologischer Sicht*, p. 75, Bielefeld: UniversitätsverlagWebler, 2008
- [8] Reich K. *Einführung in die Grundlagen einer interaktionistisch-konstruktivistischen Pädagogik. Systemische-konstruktivistische Pädagogik*. Weinheim: Beltz, 2010
- [9] Reinmann-Rothmeier G., Mandel H. “*Unterricht und Lernumgebungen gestalten*” in *Pädagogische Psychologie. Ein Lehrbuch*, [eds.] Weidemann B. u. Krapp. A., Bd. 60, pp. 613-658 Weinheim: Beltz, 2006
- [10] Konrad K., *Kooperatives Lernen Lernen lernen – allein und mit anderen*, pp 79-87, Wiesbaden: VS Verlag für Sozialwissenschaften, 2014
- [11] Bönsch M., *Unterrichtsmethoden – kreativ und vielfältig. Basiswissen Pädagogik, Unterrichtskonzepte und –techniken*. Baltmannsweiler: Schneider-Verlag Hohengehren, 2002, pp 80-83.
- [12] Gilboy MB., Heinerichs S., Pazzaglia G., *Enhancing Student Engagement Using the Flipped Classroom*, In: *Journal of Nutrition Education and Behavior*, Volume 47, Issue 1, Elsevier Incorporated, 2015, P. 109-114.