



## 4 Personalising the IS Classroom – Insights on Course Design and Implementation

### Abstract

Personalising learning is one major avenue to address the increasing heterogeneity in today's (higher) education institutions. The present study discusses the design and implementation of a self-regulated, personalised flipped classroom course within the IS curriculum of a German university. Following a DBR methodology, relevant kernel theories are identified to derive general requirements and components for such courses, eventually describing the process of creating and implementing an instantiation transforming an existing university course. The requirements are evaluated referring to the implemented course, showing that e-learning reduces the effort of personalising the learning process.

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## 4.1 Introduction

From the Age of Enlightenment with scholars such as Wilhelm von Humboldt describing education as a moral imperative and personal responsibility (Berglar 1970) until today where education is often seen as an economic resource which must be maximised, individuals and societies have constantly striven to improve education. Today, more individuals than ever before receive extensive education, often provided by society. However, in a globalised world, learners pose increasingly heterogeneous requirements towards education, emanating from different goals, educational backgrounds, cultures, skills, and abilities (McLoughlin and Lee 2010).

Personalised learning is considered to be one of the major opportunities to improve education adapting learning processes to individual preferences regarding pace, methods, and contents (U.S. Department of Education 2010). As a result, there are currently numerous endeavours investigating and implementing personalised learning in research and practice (Pane et al. 2015; European Commission 2014). The two major avenues to achieve personalised learning are

- 1) self-regulated personalisation where the students are in charge of personalising their learning supported by the teacher and
- 2) adaptive learning where machine learning algorithms are used to analyse the learner's data to provide personalisation.

Both personalisation approaches are closely entangled with the digitalisation of learning processes, requiring e-learning support. In recent years, e-learning has become more than the mere substitution of traditional learning methods using electronic media. On the contrary, e-learning is augmenting, modifying, and redefining education creating new approaches, methods, and even paradigms (Puentedura 2003). One of these new learning methods is the flipped or inverted classroom aiming to switch

“events that have traditionally taken place inside the classroom now [to] take place outside the classroom and vice versa” (Lage, Platt, and Treglia 2000, p. 32).

With an increasing digitalisation of education, the idea of the flipped classroom has become the means of choice to implement self-regulated per-

sonalisation (Feldstein and Hill 2016; Bishop and Verleger 2013). However, there is still a considerable gap between the theoretical ideas of the flipped classroom and their practical implementation. Concepts and guidelines must be developed that adapt the flipped classroom to different educational institutions, subjects, and technologies. Besides only a small number of fundamental studies proposing beneficial effects of the flipped classroom, empirical results on learning outcomes, satisfaction, etc. are even more scarce (Findlay-Thompson and Mombourquette 2014).

The present study addresses this research gap aiming to improve teaching quality by building, implementing, and evaluating a course as part of the ISs and business curriculum of the University of Hohenheim as a self-regulated, personalised flipped classroom. The graduate course ANM is taught in the winter term of 2016 covering theories, concepts, methods, applications, and evaluation of business negotiations. The main feature of the transformed course is its implementation of personalisation on the level of learning tasks and learning tools using the PLF by Melzer and Schoop (2015).

After discussing our theoretical background (section 4.2), a short description of our research methodology (section 4.3) is provided. Following a design-oriented methodology, the paper focuses on the design of the course, deriving general requirements from the scientific literature and transforming these into general course components (section 4.4). These components are implemented in a real-life course, which is described in greater detail as a proof-of-concept to demonstrate its feasibility (section 4.5). Section 4.6 complements the practical description of the course showing how the requirements have been implemented sharing first key results gathered in the interaction with students. Finally, section 4.7 concludes the paper by summarising the approach and by discussing future research directions.

## **4.2 Theoretical Background**

The proliferation of the social-constructionist learning paradigm (Kafai 2006) induced a large-scale shift of the responsibility from teachers to learners. According to constructivism, there is no transmission of knowledge from the teacher to the learner; instead, the learners construct their knowledge themselves based on experience, reflection, and discussion with teachers or peers. Teachers merely act as moderators in this process, guiding and supporting the learners. This paradigm-shift, which

penetrates education from nursery to university today, paved the way for self-regulated learning putting the learners in charge.

We analyse personalised learning on the level of learning tasks using Bloom's taxonomy for learning, teaching, and assessment (Anderson and Krathwohl 2001). It defines learning goals as a combination of cognitive processes (i.e. remember, understand, apply, analyse, evaluate, create) and types of knowledge (i.e. factual, conceptual, procedural, meta-cognitive). Furthermore, the taxonomy assigns specific learning tasks to each cognitive process (i.e. the process of understanding can be performed by the tasks of interpreting, exemplifying, classifying, summarising, inferring, comparing, explaining, etc.). Cognitive processes respectively learning tasks and knowledge types can be combined to create exercises or assessments such as "Explain relevant tasks within the negotiation preparation phase". These learning tasks and their resulting exercises are the basis of self-regulated personalisation, as each learner should be able to select tasks based on their individual preferences, requiring a set of different tasks available to achieve one specific learning goal. Supporting learning electronically, these learning tasks can be performed using specific e-learning tools. Bloom's taxonomy is not limited to face-to-face learning but has been extended towards electronic learning defining a wide range of learning tools supporting each learning task (Churches 2009; Bower, Hedberg, and Kuswara 2010).

Such tools might be provided in two different forms: Firstly, VLEs (often termed Learning Management Systems) – the most commonly used e-learning applications – are software applications which provide a common platform for teachers and learners for the creation, communication and administration of learning materials (Schulmeister 2003). However, they scarcely address self-regulated learning. Although such systems are used at almost every higher education institution today, only a small fraction of their features is actually used in practice (Gayer and Müller 2015; Meiers 2012). Self-regulated personalisation thus remains a task for the lecturers developing the didactic foundations of their courses. Secondly, a more recent approach to support self-regulated personalised learning electronically is the concept of PLEs. In contrast to a VLE, a PLE is no single software application but rather a set of hardware and software tools, often social media applications, used for learning, selected by the learner according to individual preferences (Attwell 2007). Whilst early definitions of PLEs mainly focus on third party tools, recent definitions see PLEs comprising of

tools that may be provided by the learning institution and/or third parties (Kiy and Lucke 2016). Thus, a PLE may still be used after graduation for learning in the work place or even for informal learning at home.

To combine the ideas of self-regulated personalisation and PLEs, we use the PLF (Melzer and Schoop 2015; cf. Figure 16). The centre of the PLF encompasses lecturers and learners organised according to the COI framework (Garrison and Arbaugh 2007). Its overall goal is to provide a basis for designing and evaluating online and blended learning following a social-constructionist approach. The COI defines

- 1) social presence focusing on creating a sense of community between the learners,
- 2) cognitive presence i.e. implementing learning using the practical inquiry model ultimately facilitating critical thinking, and
- 3) teaching presence i.e. designing and organising the course providing instruction and facilitating discourse.

Within the PLF, the COI aims to personalise learning selecting learning tasks as well as learning tools within a PLE that fit the learners' needs. This might require individual decisions, group negotiations, recommendations, and/or prescriptions by the lecturer as processes of cognitive fit (Vessey 1991). Selected tasks and tools should fit in order to optimise learning as a process of task-technology fit (Goodhue and Thompson 1995). However, there are several moderating factors influencing the process of personalisation. The learning institution might influence personalisation by its strategy facilitating or sanctioning specific behaviour by its members. Also, the institution's infrastructure is an important factor. For example, there must be sufficient open learning spaces, computers, or access to a broad range of learning tools. Finally, the institution's learning culture must allow and support the freedom to personalise tasks and tools. The context of the learners also influences personalisation regarding

- 1) personal goals represented via the learning motivation (students with a high motivation certainly follow a different approach to reach their goals in studying compared to students with a lower motivation and

- 2) personal context such as having to look after family members or having a job besides studying limits the resources left for studying and thus influence personalisation.

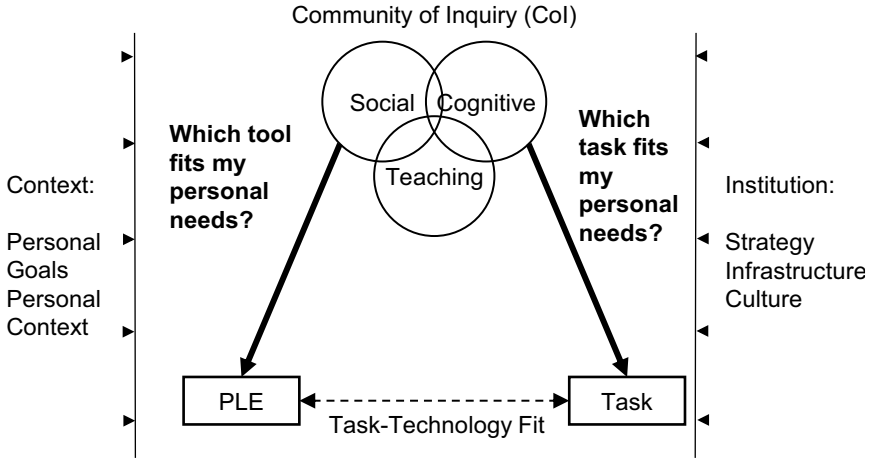


Figure 16 Personalised Learning Framework (Melzer and Schoop 2015, p. 7)

The most prominent method to employ self-regulated, personalised learning is the flipped classroom (Feldstein and Hill 2016; Bishop and Verleger 2013). Conforming to the notion of flipping the events from inside the classroom to outside the classroom and vice versa, a flipped classroom usually consists of two phases. The first is a distant phase, where the students acquire theoretical knowledge following explicit instructions from the lecturer supported by e-learning tools. The second is a presence phase – formerly the lecture – especially focussing on student-centred learning employing discussions and other interactive teaching techniques (Bishop and Verleger 2013). The flipped classroom implements a blended learning approach combining distance and presence education in a meaningful way. Its key feature is that in the lecture, lecturer and learners can rely on the previously acquired knowledge of the distant learning phase and focus on more sophisticated topics, application and immersion of the acquired knowledge. The distant learning phase is usually supported by videos or

readings focusing on lower order thinking skills, while the presence learning phase focuses on higher order thinking skills such as applying, analysing, and evaluating the knowledge acquired.

The flipped classroom concept has been developed for school education. However, published studies on flipped classroom implementation mostly focus on higher education (Bishop and Verleger 2013). The flipped classroom has been proposed to foster active and collaborative learning in large classes, courses with a high amount of procedural knowledge and a large variety in learning tasks (Milman 2012; Pierce and Fox 2012). Although the flipped classroom is a trending topic in research and practice, scientific articles describing the design of a flipped classroom for a specific context or investigating its empirical effects on learning outcomes, satisfaction, grades, etc. are still scarce (Findlay-Thompson and Mombourquette 2014).

### **4.3 Methodology**

The present study follows the pragmatist methodology of DBR which is prevalent in ISs research (Hevner et al. 2004) as well as in the learning sciences (Collins 1992). It aims to build and evaluate a practical instantiation of a self-regulated, personalised flipped classroom gaining exploratory insight into the numerous social, psychological, and technological factors influencing such a course. The paper at hand explicitly focuses on the design of the course describing

- 1) an explanatory design theory, deriving kernel theories from the literature to formulate general requirements which are then translated into general components and
- 2) a design method leading to a concrete instantiation of the course which will be evaluated (Baskerville and Pries-Heje 2010).

To identify kernel theories for the explanatory design theory, we performed a literature review on the topics of self-regulated and self-directed personalisation and the flipped or inverted classroom focusing on recent studies being published within the last five years. These kernel theories were mainly used to derive the general requirements which led to the design of the flipped classroom. Additionally, we thoroughly investigated the status quo of the course to be transformed performing interviews with the lecturer and post-doctoral research assistant that have taught the course

for several years. The course contents have been identified and structured according to their respective goals, teaching methods, learning tasks, tools, and relative importance. This information was used as the basis for restructuring the course keeping the contents constant and at the same time adhering to the general requirements, components and didactic goals of a flipped classroom.

## **4.4 Explanatory Design Theory**

In the following, we will derive requirements from the kernel theories (i.e. the PLF and COI), which are relevant conditions or capabilities to be fulfilled by a self-regulated, personalised flipped classroom. Table 12 lists those requirements in groups according to the related theoretical basis.

### *4.4.1 General Requirements*

Personalisation is a concept that is not unique to the domain of learning. ISs deals with personalisation aspects, especially within the context of e-commerce, for several decades, e.g. in online shops to increase the specificity of service delivery for increased customer satisfaction. Personalisation research in IS defines three dimensions of personalisation, which we will apply to the domain of learning (Riemer 2002). The first dimension is the personalisation of products, services, and offers referring to the learning tasks and tools embedded into the flipped classroom. Such learning tasks and tools should be selectable and configurable by the learners themselves based on recommendations by the lecturer or a recommender software; tasks and tools should be open for combination across learning units (R1). The second dimension is the personalisation of websites requiring one central platform for learning whose content, features, layout, and navigation can be configured according to the individual preferences of the learner (R2). The third dimension is the personalisation of communication content, channels, and attributes referring to individual communication with each learner according to their individual preferences (R3). Additionally, such personalisation must be supported by the lecturer providing the freedom and guidance necessary for the learners e.g. to be able to select and configure learning tasks and tools (R4; Melzer and Schoop 2015).

Further requirements emerge from institutional and contextual factors described in the PLF. Irrespective of whether VLEs or PLEs are used to implement a flipped classroom, we require learning tasks and learning



tools to be provided via one central platform, often the VLE or course-website that the institution provides (R5). This ensures that necessary infrastructure and management support for implementing a flipped classroom are provided including computer and learning facilities, which are irreplaceable in blended learning. It also ensures that lecturers and learners are familiar with the learning platform which increases its adoption. Especially ease of use of such systems has been deemed to be an important role (Parker and Herrington 2015; Melzer and Schoop 2014b; Miller 2012). Online learning is nevertheless still higher effort for the learners, as they must learn to use new technologies as well as new contents at the same time. Therefore, extensive support must be provided to the learners, e.g. through institutional trainings or specific course tutorials to learn how to use the necessary technologies (R6).

Further requirements are derived from the COI framework's social, cognitive, and teaching presences (Garrison and Arbaugh 2007). Achieving social presence and a sense of community requires open and affective communication between the learners directly face-to-face or in electronically mediated channels (R7). However, to achieve group cohesion, such communication must be directed towards an intellectual focus representing the course's learning goals. Therefore, collaboration needs to be encouraged either providing opportunities to learn in groups or even including collaborative tasks as mandatory course elements (R8). To foster cognitive presence, the model of practical inquiry should be used for learning defining four steps (Garrison and Arbaugh 2007):

- 1) triggering an event (i.e. identifying a problem for further inquiry);
- 2) exploration (i.e. investigating the issue through reflection and discourse);
- 3) integration (i.e. synthesising the ideas generated through exploration); and
- 4) resolution (i.e. applying the knowledge to other contexts).

The flipped classroom mirrors practical inquiry in several aspects. On the one hand, identifying a specific problem to tackle is especially important in distant learning phases since there is only limited communication between lecturer and learners (Bishop and Verleger 2013). On the other hand, reflective learning activities are in the focus (Miller 2012). Practical inquiry eventually fosters critical thinking; to fulfil this goal, especially practical and

collaborative learning tasks are necessary (R9; Garrison and Arbaugh 2007). Teaching presence leads to three separate requirements. The lecturer is responsible for designing and organising the course i.e. managing the interplay of social and cognitive presence through employing specific learning methods and technologies and adjusting them during instruction. This also includes keeping the overall effort of a flipped classroom comparable to a normal course and providing online learning within small chunks to ensure motivation (R10; Miller 2012). Teaching presence also encompasses facilitating discourse between the learners online as well as in presence learning to establish and maintain the community and at the same time keeping this discourse content-centred. Online forums, for example, have been found to show more interaction the higher the number and quality of lecturer posts (R11). Besides that, it requires direct instruction jolting and maintaining cycles of practical inquiry making sure to achieve the learning goals (R12; Garrison and Arbaugh 2007).

There are further requirements specific to the course at hand. They will be discussed in section 4.5.

Table 12 List of Requirements for Self-Regulated, Personalised Flipped Classrooms

#	Group	Description	Kernel theories
R1	Personalisation of tasks and tools	Provide personalisation of products and services	(Melzer and Schoop 2015; Riemer 2002)
R2		Provide personalisation of websites	
R3		Provide personalisation of communication	
R4		Provide freedom and guidance for personalisation	
R5	Institutional and contextual factors	Provide a central platform for learning	

R6		Provide reasonable IT infrastructure & support for learners	
R7	COI: social presence	Enable open communication	(Garrison and Arbaugh 2007)
R8		Encourage collaboration	
R9	COI: cognitive presence	Enable practical inquiry	
R10	COI: teaching presence	Design & organisation	
R11		Facilitate discourse	
R12		Direct instruction	

#### 4.4.2 General Components

In the following, we will derive seven general components from these requirements, which eventually form the basis for creating a flipped classroom. A blended learning course design always has to balance three heavily intertwined dimensions namely didactics, content, and technology. We structure our components according to these dimensions also addressing their overlaps.

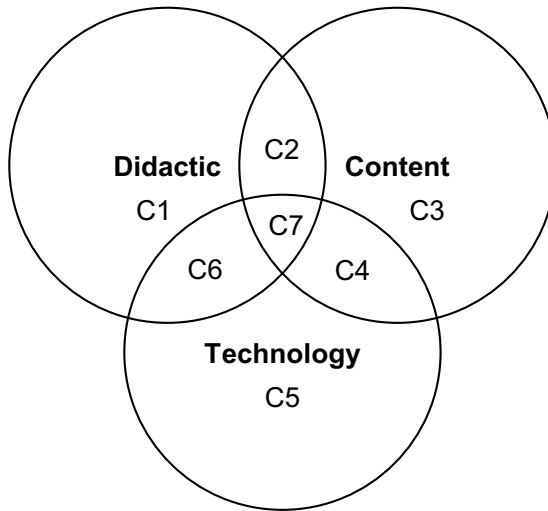


Figure 17 Didactic, Content, and Technology Dimensions and Related General Components

The didactic concept of the course needs to implement the core ideas of the flipped classroom providing a distant learning phase as well as a presence learning phase. However, these phases need to be structured in greater detail defining exactly when to provide opportunities for personalisation, collaboration, inquiry, instruction, and discourse (C1). Such a structure is usually provided by the lecturer, but is equally important for learners, especially in complex blended learning scenarios (Garrison and Vaughan 2011). Combining experiences from the model of practical inquiry (Garrison 2011) and the flipped classroom process model (Oeste et al. 2014) we define three phases:

- 1) a distant preparation phase focusing on the self-regulated acquisition of theoretical knowledge;
- 2) a presence lecture focusing on reviewing the preparation and immersing into more advanced questions using interactive teaching methods; and
- 3) a distant reflection phase enabling extensive individual reflection on the acquired knowledge.

Creating a real course requires the transformation of abstract learning methods into real exercises, which are to be performed by the learners reflecting the course's learning goals. Both collaborative learning and practical inquiry require learning tasks reflecting higher order thinking skills such as application, analysis, evaluation, or creation of knowledge. At the same time, performing such cognitive processes facilitates discourse between the learners. Along with common guidelines on creating learning materials, cognitive processes (Anderson and Krathwohl 2001) and corresponding learning tasks can be used to formulate exercises. In contrast to other flipped classroom approaches which implement distant learning mainly to acquire knowledge (i.e. lower order thinking skills), we aim to include higher order learning tasks throughout the course supporting our three-phase model of the flipped classroom. Each iteration of these three phases represents one course unit (C2). Figure 18 shows our personalised flipped classroom process model and the learning methods and tools assigned to each phase. Whilst the first phases explicitly encourage students to learn in groups and even perform exercises in parallel eventually synthesising their knowledge, that every group member has the necessary knowledge before the lecture, the third phase aims towards individual reflection on expectations and learning outcomes. Students receive individual feedback for each portfolio entry.

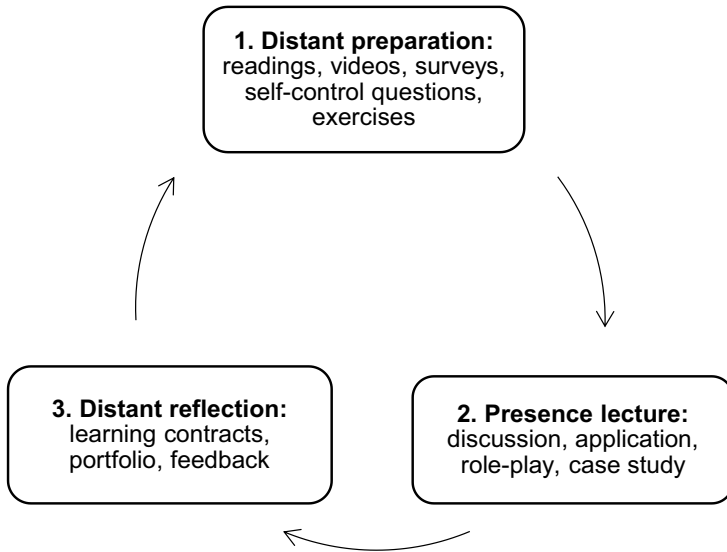


Figure 18 Personalised Flipped Classroom Process Model

The course content is also heavily intertwined with the didactic concept as well as the technology used to implement the course. As we aim to keep the contents constant to make the course comparable to previous years (C3), the only changes concern the new technologies to enable and support personalisation of products, services, websites and communication. While most learning tools already provide possibilities to personalise their user interface, a forum can be provided to enable personalised asynchronous communication for groups. Additionally, individual mail or personal communication within the VLE can be useful (C4).

Technological aspects of the flipped classroom are mostly implemented using a VLE as a central platform. Its institutional advantages (i.e. existing familiarity, trainings, IT infrastructure, and support) outweigh its disadvantages compared to PLEs (i.e. variety in tools, informal learning). Although this seems to be a controversial point for a course explicitly aiming to personalise learning, we argue that a VLE does not hinder self-regulated personalisation but can be used as a central platform to link to more personalised learning tools and thus provide a guided path towards personalisation. A VLE's main purpose is to facilitate design and organisation

of learning courses. It, therefore, provides one source already offering most products and services and extensive manufacturer documentation and support as well as additional support and trainings at the institution (C5).

Since the technology employed should support the desired didactic methods, it is vital to increase digital literacy of the learners and at the same time provide the technology with a purpose reflecting the course's goals. Although, most learners today are so-called digital natives (Prensky 2001), acquiring new knowledge parallel to acquiring it in an electronic and therefore unfamiliar way requires high effort (McLoughlin and Lee 2010). Therefore, increased emphasis has to be put on informing learners about the organisational structure of the flipped classroom (C6).

Eventually, all components described above have to be balanced against each other creating a real-life university course (C7).

## **4.5 Practical Design Theory**

### *4.5.1 Course Specifics of Advanced Negotiation Management*

Following the discussion of general requirements and components in the previous chapter, we will now focus on the practical design of our self-regulated, personalised flipped classroom university course ANM. This discussion will also include four further requirements specific to the general topic of the course which is negotiation management and in particular on negotiation planning, implementation, media, technology, and evaluation (cf. Table 13). Negotiations are a topic that cannot be learned theoretically. Rather, a combination of theory and practice must be the basis (R13; Lewicki 1997). Switching from a traditional course to a flipped classroom inherently leads to a switch in the role of the lecturer from that of mainly a teacher to that of the expert guiding and supporting the learners (R14; Melzer and Schoop 2014c). Since flipped classroom concepts rely on a solid electronic learning base, the technological aspect is even more important than usual in negotiation teaching. Thus, both face-to-face and electronic negotiations should be considered (R15; Köszegi and Kersten 2003). Finally, the need for assessment is even greater in self-regulated learning. Thus, the assessment in a negotiation course must be continuous and in a formative and summative manner (R16; Milman 2012).

Table 13 Negotiation Specific Requirements

#	Group	Description	Kernel theories
R13	Negotiation Didactics	Teach negotiation theory and practice	(Melzer and Schoop 2014c; Lewicki 1997; Köszegi and Kersten 2003; Milman 2012)
R14		Include negotiation expert knowledge	
R15		Address face-to-face and electronic negotiation topics	
R16		Provide formative (and summative) assessment	

All requirements and components for self-regulated, personalised flipped classrooms can now be integrated as shown in Table 14.

Table 14 List of General Components for Self-Regulated, Personalised Flipped Classrooms

#	Group	Description	Requirements addressed
C1	Didactic	Use a process model to structure the course	R1, R8, R9, R10, R11, R12
C2	Didactic & Content	Focus on higher order thinking skills throughout the course	R8, R9, R11



C3	Content	Provide correct and comprehensive content	R13, R14, R15, R16
C4	Content & Technology	Provide content using suitable technologies	R1, R2 R3, R4
C5	Technology	Use one central platform	R1, R2, R3, R5, R6, R10, R11
C6	Technology & Didactic	Extend organisational & technical support for learners	R1, R4, R6, R7, R10, R12
C7	Didactic & Technology & Content	Balance didactics, technology and content	R1, R4, R7, R8, R9, R13, R14, R15, R16

ANM is attended by approximately 120 to 150 management and ISs graduate students. The course has been in place in its pre-flipped classroom form for several years as a weekly lecture course. Following the idea that negotiations have to be taught theoretically and practically, the lecture aims to transmit factual knowledge regarding seven chapters (i.e. negotiation basics, negotiation planning, communication aspects, decision and negotiation analytics, electronic negotiations, dispute resolution, and culture in negotiations) while at the same time providing numerous opportunities to apply this knowledge in a variety of practical learning tasks such as small role-plays and case studies. The lecture is accompanied by several assessments during the term in the form of negotiation journals written by the students (making up 50% of the final grade), representing their reflections on the course content and their practical applications. The final exam assesses a broad range of knowledge acquired posing a recent real-life negotiation case study to be analysed requiring lower as well as higher order thinking skills. It makes up the other 50% of the final grade.

#### 4.5.2 *Creating a Personalised Flipped Classroom from Advanced Negotiation Management*

Although this course might not be the standard university course, providing a rather high degree of practical learning to a large number of students, we are convinced that it is destined to be transformed into a flipped classroom for further support of its variety of different learning tasks and self-regulated learning increasing the degree of personalised learning by sharpening its profile. To elicit the status quo, we conducted semi-structured interviews with the lecturer that created and taught the course since 2009 and the research assistant involved in the practical tasks. Using these interviews, we wanted to create a very fine-grained log as to which teaching methods are used corresponding to specific slides within each lecture, what learning goals they aim for, and how much lecture time they require. The resulting log then formed the basis for the restructuring of the course into a flipped classroom, mostly aiming to put theoretical teaching and corresponding topics into the preparation phase, while practical teaching methods and topics were kept in the lecture. At the same time the overall order of topics as well as the overall amount of effort for the students had to be kept within meaningful levels. This ultimately requires organisational decisions, e.g. when to begin with the first preparation phase, how many flipped classroom cycles to conduct, which material to discuss in the lectures, and how to activate the students in such a large course.

The new course was developed over several months with the general requirements and components in mind (cf. Tables 12 - 14). Regarding the practical implementation of our flipped classroom concept, one of the most important decisions was to use the open-source VLE ILIAS (German for “Integrated Learning, Information, and Work Cooperation System”) as a central platform. ILIAS is one of the most frequently used VLEs at German universities with installations in 91 higher education institutions and the University of Hohenheim as one of them (ILIAS e.V. 2016). ILIAS provides numerous features in the areas of personalisation, learning and course management, cooperation, communication, assessment, and competence management. Its features are comparable to other VLEs such as Moodle as it can be used to provide all course elements relevant for the preparation (learning modules, questions, readings), lecture (file management), and reflection phase (e-portfolio and assignments) as well as lateral features such as communication facilities in a flipped classroom. However, the main contribution of this work is not about the choice or implementation of a VLE,

but about its integration and extensive use of the available features to support self-regulated personalised learning in a flipped classroom.

#### 4.5.3 *Advanced Negotiation Management as a Personalised Flipped Classroom*

Based on the interviews and on the existing course material, we created an ILIAS learning module as the basis for the preparation phase. It serves as a reader for the students comprising of several webpages structured according to the eleven course's units each representing one iteration of the flipped classroom process model. Each unit consists of several pages on instructions and learning goals, preparation content, and concluding remarks what to do next (e.g. writing an e-portfolio entry). Each unit begins with explicit instructions (e.g. "Perform an analysis of platforms for Electronic Conflict Management") and corresponding learning goals (e.g. "Being able to analyse Electronic Conflict Management platforms regarding communication media employed and conflicts targeted") stating what the learners need to do in order to prepare for the next lecture as well as describing the competencies necessary to follow this lecture. The description of learning goals directly refers to the exercises stated within the preparation pages and were created using Bloom's taxonomy. They represent the interface between preparation and lecture for lecturer and learners as both can check here, which competencies should have been acquired during preparation. The pages presenting the content for preparing the lecture are based on the slides, which were previously part of the lecture and their corresponding notes. However, considerable effort went into restructuring, extending, and enhancing these materials providing a sound basis for preparation. We achieved this by following the structure of learning tasks and learning goals. Self-regulated personalisation is supported by enriching the textual basis of the reader through alternative learning tasks varying according to Bloom's cognitive processes and learning tools (e.g. reading a paper versus watching a video versus answering a survey versus checking the acquired knowledge answering self-control questions on cognitive biases in decision-making) providing content in various multimedia formats. The students are most of the time free to decide which one of the learning tasks to address or how to divide the tasks within their learning groups.

The lecture phase at first glance represents a traditional lecture at a university. Differences emerge in the didactic practices employed. The lecturer uses material such as excerpts from negotiations for the students to apply their knowledge. Case studies and role plays are used to apply the knowledge and to combine different concepts from various chapters of the lecture. Fishbowl exercises allow selected students to show their negotiation skills in front of their colleagues who in turn can analyse, criticise, and advise their learning peers (e.g. portraying different negotiation styles). Finally, important factual knowledge is rephrased by students in their own words to check whether they have understood the contents in a deep way to be able to talk about it in their own words. Since learners are prepared, more emphasis can be placed on sophisticated topics, application, and immersion of these topics performing interactive teaching techniques such as critical thinking, role-play, case studies, discussions, surveys, and assessments (Galbraith 2004). For example, the students learn about the debate of the cues-filtered-in versus the cues-filtered-out approach in order to apply it to negotiations conducted via electronic communication media (Walther and Parks 2011). In previous years, the lecture focused on transmitting factual knowledge about each perspective. Since the students prepared this factual knowledge in the flipped classroom, they now discussed their individually preferred perspective in order to make them stand in for the opposing perspective and persuade their peers accordingly, leading to fierce discussions and critical thinking.

The reflection phase is structured using the teaching technique of learning contracts requiring the students to submit several e-portfolios over ILIAS (Galbraith 2004). It enables learners to write an individual blog directly in ILIAS in the form of a personal portfolio, which can be accessed and graded by the lecturers including individual feedback. Each learner writes down individual expectations and goals she wants to achieve during the course in the beginning enforcing the learners to self-regulate their learning increasing metacognition. At the end of the course, the contract is evaluated in another portfolio entry on lessons learned as to which learning goals have been fulfilled and which have not, inducing reflection on the learning process. As part of this framework of the learning contract, further content-related journal entries have to be written to reflect deeply on the course's content and learning. ANM includes a negotiation case study, which enables the learners to negotiate with other students to apply their knowledge acquired about negotiations. This negotiation is the subject of

one of the portfolio entries facilitating reflection on preparation, implementation, and results of the negotiation from both participant's perspectives.

Through all phases, open communication between lecturer and learners needs to be facilitated. Therefore, an electronic forum within ILIAS is used moderated by the research assistant supporting the course. Furthermore, additional ILIAS personalisation features are used in the course. The system displays recommended timeframes when to perform which preparation units, lectures, or journal entries. Learners also have the possibility to track their individual learning progress in the course.

## **4.6 Evaluative Discussion**

Having described in detail how requirements relate to components of a self-regulated, personalised flipped classroom (cf. section 4.5), we now describe how each requirement is implemented presenting the key results of our approach.

Personalisation of products and services (R1) has been enabled by stating alternative learning tasks which vary according to the cognitive processes and learning tasks of Bloom's taxonomy. Besides that, a variety of learning tools is offered. Students are encouraged to learn in groups whilst preparing the lectures as well as during the lectures (R8) and select the learning tasks and tools in a self-regulated way, eventually synthesising their results with the help of the lecturer. Regarding personalisation of websites (R2), we heavily rely on the features of the VLE ILIAS used in the course, providing the possibility to personalise its look and feel as well employing the communication facilities in the form of a forum and mailings together with personal communication and standard e-mail to communicate with the students reflecting their preference (R3). The freedom of selecting tasks and tools is supported by a 60-minute tutorial on individual learning styles employing a questionnaire at the beginning of the course. Furthermore, learning tasks as part of the distant preparation phase are clearly marked as individual or group tasks (R4). ILIAS as a central learning platform is employed (R5), heavily relying on the university's IT infrastructure and trainings. However, additional effort is exerted on creating and integrating additional tutorials into the online preparation and presence lectures (R6). Besides that, open communication is facilitated employing a forum as well as answering questions personally and via email as soon as possible (R7). Employing our adapted flipped classroom process model

(cf. Figure 18), we implemented the process of practical inquiry (R9). Requirements on teaching presence have been implemented preparing the new course structure beforehand and maintaining it continuously during the lecture phase explicitly gathering feedback from the students to improve the course further (R10). The new course structure leads to far more sophisticated and lively discussion during the lecture (R11) integrated with elements of direct instruction (R12). Such an approach requires an expert lecturer, being capable of combining negotiation theory and practice (R13) including electronic negotiations (R15) as well as dealing with numerous different topics ad hoc (R14). Finally, besides the traditional summative assessment, numerous efforts have been exerted to provide formative assessment in the form of self-control questions after the preparation phases and the portfolio entries, summing up each unit (R16).

Albeit, a thorough evaluation of the transformed course is beyond the scope of this paper. First experiences gathered observing the course and interacting with the students are promising. First of all, personalised learning is often criticised for its increasing effort for the lecturers providing alternative tasks and tools. According to our experience, there was a considerable up-front effort to transform lecture slides and notes into the ILIAS learning module. However, during the semester, lecturer effort was almost comparable to traditional lectures, because a lot of questions by the students are answered automatically providing extensive e-learning contents online. Since ANM is the only flipped classroom course in their curriculum, the students needed some time at the beginning to adapt. After approximately three weeks of teaching, communication within the forum became very open and active (much more so than in previous years and in other traditional courses with a similar forum) with students posing and discussing questions to several course-related topics. Therefore, we agree with Lehmann et al. (2015) on the importance of interactivity in flipped classrooms. Furthermore, the students perceived the IT-infrastructure to be sufficient but requested even more course-specific and ILIAS-related tutorials, as many of them just started their graduate studies and were unfamiliar with the VLE ILIAS. We, therefore, extended our tutorials and created additional ones. Tutorials regarding learning methods were evaluated differently by the students. As graduate students most of them said, that they already knew how to learn. Therefore, demand was much higher for the technical tutorials. Our efforts to encourage the students to prepare and learn in groups remained largely unheard. Students reported that they did

not form learning groups due to the fact, that they did not know their peers at the beginning of their graduate studies and did not trust them enough to synthesise different knowledge while preparing the lectures. Therefore, they rather prepared the lectures alone, accepting the additional effort. In general, students reported high time-effort for the course which led to a separation of the students into two groups. Over the course of the semester approximately half of the participating students evaluated the course as being worth the effort keeping on preparing and participating in the lecture. The other half of the students used the online materials to prepare for the exam avoiding the lectures and their inherent interactivity. Similar separations have already been described in flipped classrooms (McNally et al. 2017) as “flip-endorsers” and “flip-resisters”. While not performing the preparation tasks does not lead to specific sanctions apart from lacking behind during the lecture, ILIAS statistics reveal that approximately three out of four students performed the preparation tasks. Creating a cohesive COI, therefore, did not work out for all students. Especially students who want to join the course several weeks after it started are hindered by entry barriers such as already existing learning groups, acquired knowledge of peers, and missed tutorials. From a lecturer’s perspective, teaching in a flipped classroom atmosphere is demanding. For once, the lecturer needs to be prepared to answer any suggestions, questions, critiques the students think about. This is much more the case as the students spend extensive time preparing for the lecture. Furthermore, new material is required for applying, contrasting, and illustrating the factual knowledge to create deep knowledge that can be combined, explicated, and communicated. Comparing it with the previous course, it is obvious that the discussions and interactions in the flipped classroom are on a much higher intellectual level showing that the preparation (albeit gently forced) leads to effective results and lasting knowledge experiences requiring an expert lecturer.

Generalisability of the presented work is one of its main limitations. While the general requirements and components can be used to design further personalised flipped classroom courses, the presented design is specific to its environment, course topic, and implementation. Our flipped classroom is one of very few courses following this concept in the curriculum of the participating students. Therefore, they are used to traditional university teaching and needed some time in the beginning of the course

to adapt and explore their new environment. To employ more flipped classroom courses a curriculum-wide perspective is necessary for their meaningful integration carefully planning the overall student-effort (Schaper and Tipold 2015). The transformed course followed a rather practically-oriented approach even in its previous form due to the subject. Therefore, workload for planning and implementing the practical lectures might have been lower compared to other courses. Another limitation of our study is that lecturer and advisor are at the same time researchers analysing the course.

#### **4.7 Conclusion**

The present paper describes the design of a self-regulated personalised flipped classroom university course presenting general requirements and resulting components derived from the PLF (Melzer and Schoop 2015). Following a DBR methodology requirements and components are implemented transforming the university course ANM at the University of Hohenheim into such a flipped classroom and implementing it. First experiences from designing and implementing the course show that personalising learning can be less effort for the lecturers than previously thought, if electronic learning tools are included. The course atmosphere was much more open and interactive than in traditional courses increasing satisfaction and learning for lecturers and learners. However, we experienced the learners to gradually separate into groups of “flip-endorsers” and “flip-resisters” (McNally et al. 2017) having less than half of the students attending the lectures at the end of the semester. In accordance with the literature, we experience that there is no one-size-fits-all approach incorporating personalised learning or the flipped classroom (Findlay-Thompson and Mombourquette 2014). Therefore, we agree with the literature and request the publication of further flipped classroom designs – providing blueprints for practitioners how to conduct a flipped classroom – and their evaluation aiming to disentangle the complex relationships between learning methods and learning outcomes.