TILBURG SERIES IN ACADEMIC EDUCATION KNOWLEDGE, SKILLS, CHARACTER

Breaking Barriers:

Innovation through Collaboration

Edited by
Sander Bax, Gerwin van der Laan and Tessa Leesen

TILBURG UNIVERSITY

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Contents

Dedication

The theme of this issue is innovation through collaboration. In creating this publication, innovation was also realized through renewed collaboration. The new editors are grateful to their predecessors for the successful series they set up. Alkeline van Lenning and Herman de Regt collected essayistic articles in previous volumes of the Tilburg Series in Academic Education. These contributions have had a wide reach within Tilburg University thanks to the emphasis on teachers, support staff and policymakers as the series' readership. The new editors want to maintain the inclusiveness of the Tilburg Series as they reach out for new types of contributions. This volume also tries to reach readers outside Tilburg University by inviting authors from other universities, while seeking to create space for analytical contributions that investigate whether the ideas suggested in the essays are also found in educational practice. Not every innovation will succeed. The editors of the Tilburg Series are open to feedback on this new path.

A special thanks goes to the authors who contributed to this volume of the Tilburg Series. The editors are grateful to Annemeike Tan and Jasmijn van der Mast of the Marketing & Communication Division for their excellent support.

Introduction

Breaking Barriers: Innovation through Collaboration

Sander Bax, Gerwin van der Laan and Tessa Leesen

To adequately prepare students for life and work in a fast-changing world, institutions of higher education are expected to continuously evolve, improve and innovate the content and practice of teaching and learning in their programs. Innovation is both a tool to solve problems and a vehicle to keep course content and pedagogical strategies up-to-date. To design good and useful educational innovation projects it is necessary to identify the challenges teachers and students face in the practice of education. Is the curriculum and course content still up-to-date? What is the analysis of the problem? What mechanisms cause the problem to occur? Does the solution lie in offering course materials differently? Does the assessment match the material offered? Do teachers feel a need to invest in their skills?

In processes of educational innovation it is extremely important to focus on the teacher's perspective. Not only are teachers, more than any other stakeholder, eyewitnesses to what takes place in the classroom, they also play a key factor in sustaining and improving the quality of education. The first ambition for this volume was to promote the teacher as the protagonist of educational innovation – after all, it is the teacher who adopts state-of-the-art research in course content, introduces new pedagogical strategies and technological tools, and implements assessments that are up-to-standard. In doing so, the teacher operates in close interaction with a range of stakeholders: students, peers, educational experts, management, international partner universities, societal partners and the labor market.

The article of Antoine van den Beemt and Tim Stevens analyzes the role of the teacher in the implementation of challenge-based learning at TU/Eindhoven. Challenge-based learning is a pedagogical strategy that invites students "to put theory to the test in addressing real problems in collaboration with actors of society" (Leijon et al., 2022, 609). Students search for solutions to address open-ended, contemporary challenges such as sustainable energy, pollution, climate change and migration. They do so in collaboration with each other, with experts and with their teacher. Educational innovations, such as challenge-based learning, require teachers to adopt new tasks and roles. The authors distinguish three teacher roles: teacher as innovator, teacher as learner, and teacher as practitioner. Van den Beemt and Stevens discuss the development of an integrated program of research and practice that supports teachers in taking on these roles and equips them to address educational challenges.

This volume of the Tilburg Series in Academic Education showcases several other inspirational innovation projects being conducted at Tilburg University and externally. Rather than putting the teacher at center-stage, these articles evidence the importance of collaboration in educational innovation between different agents in higher education. The contributions not only deal with policies, ideas and opinions about innovation, they also present concrete examples of educational innovation projects in which collaboration is at stake.

Collaboration in academic teaching and learning

The educational innovations presented in this volume illustrate that course and program design are turning into team efforts. Since collaboration is the common thread in this series, we would like to discuss the conceptualization of the term. Literature offers a plethora of definitions (Newell & Bain, 2008; Thomson et al., 2009). Based on a literature review, Newell and Bain (2008, 17) distinguish six key elements that all definitions of collaboration have in common: "two or more agents; autonomous and voluntary; engage in agreed processes of interaction; share or come to an understanding of a problem domain; share decision-making; toward a common goal or mutual benefit".

According to this definition, collaboration takes place between two or more agents. The added value of collaboration between teachers is illustrated by the contribution of Gerwin van der Laan and Ellen Dreezens. The authors make a plea for virtual team teaching in higher education. Multiple disciplines are necessary to grasp contemporary issues. Programs or courses that focus on such problems would not be possible without collaboration between disciplines. Collaboration between silos of academic expertise is required to provide students with the knowledge and skills they need to achieve learning goals and be prepared to tackle contemporary challenges. The authors argue that virtual team teaching is an effective pedagogical strategy to integrate different disciplinary perspectives in the analysis of contemporary issues. In doing so, virtual team teaching fosters students' understanding of these challenges and creates a climate in which students are invited to join the debate with teachers and with each other.

Collaboration can also transcend teams of teachers. This volume presents forms of intra-institutional collaboration between different stakeholders. Sander Bax explores the added value of collaboration between teachers and educational specialists at Tilburg University to successfully implement its educational policy. The spearhead of this policy is good (blended) educational design: the thoughtful integration of online and face-to-face learning activities within one course or study program so that students attain the intended learning objectives. In his article, Bax points out that the design/redesign of a course or program is time-consuming and requires multiple forms of expertise: content-knowledge, instructional design, multimedia design, and assessment. Bax argues for establishing "a culture of mutual support" that allows teachers to benefit from the expertise of the likes of instructional designers and assessment specialists. This collaborative approach and exchange of expertise facilitates effective blended learning designs, at both the course and program level.

Chiara Baldo and Jimmy van Rijt argue that blended learning is reported to have several important benefits over more traditional modes of teaching, such as greater student flexibility, more options for differentiated instruction and improved student engagement. The potential added value of blended learning notwithstanding, teachers may reject it when it conflicts with their ideas on what constitutes good education. The authors present a literature review on teacher beliefs regarding blended learning and examine how university support can best be shaped to fit with what teachers know, think and believe about blended learning. The policy must both be in line with teachers' views or they will resist implementation of blended learning, and feed teachers' relevant knowledge and skills about blended learning or implementation will not be ideal.

Tilburg University's emphasis on blended learning has led to a large number of initiatives. Such focus not only enables the university to provide support for teachers who want to innovate when educating, it also offers a richer picture of what works and under what conditions. This volume of the Tilburg Series in Academic Education includes two studies measuring the effectiveness of blended learning initiatives. In these articles, effect studies, particularly randomized-controlled trials, are used to demonstrate whether educational innovations yield superior learning outcomes through a comparison with programs/courses in which the innovation has not been implemented. If such a comparison is impossible for practical or ethical reasons, data collection on the adoption and diffusion of the innovation as well as user experiences generate insights into the added value of the innovation. A scientific approach to studying the effectiveness of blended learning or other innovations may thus generate feedback that can serve as input for both teacher beliefs and university policies.

Sabita Soedamah-Muthu and co-authors Leanne Hekman, Mercedes Almela and Amy Hsiao assess the implementation of blended learning in the psychology program at Tilburg University. Their starting point is that blended learning offers added value, but that its implementation is hampered by lack of experience. The large classes in the psychology program present additional challenges that might be addressed by blended learning. The aim of the article is to formulate recommendations – based on user experiences – for colleagues who are considering introducing blended learning. In line with university policy, the main recommendation is to consider a complete redesign of the course when introducing blended learning, because ideally the learning goals and the teaching and testing methods are closely intertwined.

Ludo Juurlink observed cramming behavior in students at Leiden University. Retention of knowledge is stimulated when students apply a learning strategy with spaced repetition. A Comenius Leadership Grant gave Juurlink the opportunity to test whether an app could counteract the tendency to procrastinate. Push messages on students' smartphones invite students to work on portions of the subject matter intermittently, which would make the material stick better. Juurlink's initial findings show distinct patterns in the extent to which the app is embraced by students in different programs. The big question that could

not be fully answered yet is whether the app ultimately led to better learning outcomes in students who used it.

Before expanding on other forms of intra-institutional collaboration, it is worthwhile touching upon a possible flipside of focusing so intensively on blended learning. Taking the perspective of teachers into account, we must ensure that blended learning is not imposed as a straitjacket on all courses. No single innovation will be effective for each course, and teachers may feel pressured to introduce an innovation they do not consider appropriate for their course. Worse, teachers may experience little room to develop initiatives that do not fit within the chosen theme. For that reason, it is of the greatest importance to use a bottom-up approach that takes teachers' beliefs, needs and educational practices as a starting point for deciding which innovations are relevant for which program or course and which aren't.

Several other contributions to this volume discuss and evaluate concrete educational innovation projects that have been conducted recently. Michael Bender and Thorsten M. Erle discuss an innovation project in which they develop an educational design based on principles of gamification and roleplaying to provide students with more opportunities to develop intercultural communication skills. Bender and Erle set up a vertical (Master/Bachelor) and horizontal (Bachelor/Bachelor) structural interaction between local (Dutch) and international Bachelor's students and students in a master-level course. Students meet in newly designed roleplaying exercises to build basic, intercultural skills relevant for their future careers by interacting with horizontal peers from diverse backgrounds. Their article reports on the development, uptake and effectiveness of these exercises while discussing their potential and importance within modern curricula.

Preparing students for life and work in today's world demands more than "just" adding knowledge and skills. Monique Van Dijk-Groeneboer, Louis Pötter, Bianka Demeter and Ellen Dreezens present the module "Becoming a Resilient Professional", which is a pilot for a cross-faculty minor program at Tilburg University. This pilot aims at educating students to become resilient professionals. In the module, the teachers explore innovative ways of teaching by bringing together groups of students from different faculties – and therefore knowledge sources – that work together on wicked problems. The course builds on the concept of subjectification (Biesta, 2018). Students are challenged to consider who they want to be as a person (subject), to acquire knowledge and skills (qualification) and get connected to the world they live in (socialization). To that end, students must know themselves as a person and understand how they want to "be in the world" as a person. The authors show that gaining knowledge through self-awareness and perspective-taking did take place in the pilot modules. Many students acknowledged they learned a lot about themselves, their strengths, their core values, even their moments of depression and how to deal with them. Participating in this module helped students become more resilient to deal with life issues, and they seemed able to integrate it with the knowledge and skills gained in their educational programs.

The contribution of Uwe Krause, Inge Sieben and Ellen Claes presents an even broader range of collaboration – that between universities, NGOs and secondary schools in the EVALUE (European Values in Education) project. EVALUE is based on the European Values Study (EVS), an international survey research project that explores attitudes and opinions of citizens in nearly all European countries. Social and educational scientists of four European universities and an NGO collaborated with various secondary schools in the universities' home countries. The challenge was to make the survey data accessible for educational purposes. To reach this goal, the project produced values dimensions and background information based on scientific insights, created an educational framework, and constructed teaching materials in cooperation with the participating schools. These materials were trialed, evaluated and adapted, based on feedback from teachers who had used them. The paper describes the EVALUE process and output. It also reflects on how this output can contribute to powerful knowledge and explores in what ways the educational output might affect students' learning.

Many of the innovation projects conducted within Tilburg University not only aim at knowledge transfer, but also focus on skills and character-building. The Tilburg Educational Profile, with at its core the connection of knowledge, skills and character, stimulates the design and implementation of many such projects. In our volume we come across several examples of this. Anne van der Velden and Louise van Hoek present their experiences with the educational innovation project "The Societal Challenge", a learning event that explores the connection between professional practice and academic programs. This innovation project draws on principles from challenge-based learning to enhance students' professional skills. In their article, Van der Velden and Van Hoek argue that educational innovations such as the societal challenge could create a positive effect on students' career-readiness. They make a plea to interweave these activities within the program courses already offered.

The contributions to this volume of the Tilburg Series in Academic Education hopefully clarify that many of our teachers collaborate with colleagues within the university and with parties outside the university in their ideas about and design of innovative education. These articles showcase the importance of collaboration both on a content level (collaboration between disciplines, new interdisciplinary projects) and on an organizational level (innovative educational culture). In the end, such collaborations will be beneficial to our students, who enjoy up-to-date academic education that empowers them to confront the grand challenges facing society.

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01.

A Blended Learning Approach for University Education at the Bachelor's Level:

Sustaining and Strengthening Teaching Innovations for Post-Covid Education

Sabita S. Soedamah-Muthu, Leanne Hekman, Mercedes Almela and Ya-Ping (Amy) Hsiao

Abstract

Background The COVID-19 lockdown forced teachers to adapt fast from on-campus to online education. Many teachers started experimenting with online tools for the first time. The end of the lockdown posed an important question: back-to-usual, or harness this learning and effort? Blended Learning (BL), a combination of on-campus and online education, could be the answer. BL has been shown to increase student engagement and better address higher-order thinking skills (HOTS) training. However, its implementation and redesign of courses at the Bachelor's level are challenging due to factors such as large classes and teachers' lack of experience.

Aim To improve university education by using BL redesign, describing the process, comparing the satisfaction of teachers and students in two courses that integrate BL redesign, and deriving a set of recommendations for implementation.

Methods Two courses in the Bachelor Psychology program at Tilburg University, which registers about 700 students annually, were chosen. A core team of experts, course coordinators, and student assistants were key to redesigning the courses with BL and constructive alignment. Qualitative (interviews with teachers) and quantitative methods (questionnaires for students) were employed to evaluate the courses.

Results Courses were redesigned by rewriting learning goals and syllabi, making them more concrete, clearer, and more student-centered. Storyboards were designed to illustrate the connection between online and on-campus activities. Formative and continuous assessment opportunities were implemented throughout the course. During midterm evaluations student satisfaction with the redesigned activities was high for Course 1, particularly the videos, lectures, quizzes, and portfolio. The evaluations were more modest for Course 2, but highly appreciated were an animated knowledge clip, lectures, practicals, and quizzes. Teachers were satisfied with the BL redesign and indicated their willingness to use BL for the next academic year.

Conclusion This was a first step to implement BL in two Bachelor's courses. Our findings show that BL redesign was possible in the Bachelor Psychology curriculum with a large number of students, limited time of staff, and COVID-19 restrictions. The overall experience was positive and insights for best practices are now applicable to many courses.

Introduction

The COVID-19 pandemic affected education worldwide, from primary schools to universities. A major consequence of the lockdowns was the switch from on-campus teaching to online education. Teachers had to adapt their teaching methods quickly, and many teachers began experimenting with online tools for the first time. This accelerated shift is known as emergency remote teaching because it is a temporary response to a crisis and differs from a pre-planned online instructional design (Whittle et al., 2020). With this in mind, many new learning materials (e.g. videos, assignments, feedback procedures, supportive documents, and other instructional tools) were developed, and most students could achieve their learning goals without attending lectures on campus. The end of the lockdowns therefore posed an important question: back-to-usual or harness all this learning and effort? This article examines to what extent blended learning (BL), a combination of on-campus and online education (Bonk et al., 2012; Wong et al., 2014), provides a valid answer to this question.

Over the last decade, BL has become a widespread instructional mode. BL combines the best of online teaching and face-to-face instruction (Alammary et al., 2014; Owston et al., 2019). For example, the on-campus mode of BL ensures students' regular exposure to the learning materials, thus preventing study delay behavior, and the online mode of BL provides students with flexibility to learn at any place, time, and pace that suits their personal learning style (Patchan et al., 2016). BL facilitates three major interactions that contribute to student learning performance (Garrison & Vaughan, 2008; Islam et al., 2022; Patchan et al., 2016): 1) student-content interaction because BL mostly involves active learning and flipped teaching approaches (i.e., students need to be well-prepared for in-class activities), 2) student-student interaction because usually BL includes activities to apply content in small groups, creating a rich environment (providing two modes of education, online and on-campus, and more student-centered activities) for students to engage in collaborative and cohesive discourse, and 3) student-teacher interactions because the use of online preparatory materials allows more instructional time to be spent on in-depth discussions and the attainment of higher-order thinking skills (HOTS) (Akyüz & Samsa, 2009; Lu, 2021). A key aspect is that it isn't necessary to provide all the content on campus anymore. Students have been activated at home as a condition before attending lectures. As a result, lecturers can free up time for more in-depth discussion of difficult topics on campus (Owston et al., 2019) or for students to apply the new knowledge to solve cases or problems (Patchan et al., 2016).

Many researchers claim that BL will be the new instruction model for course delivery in higher education (Anthony et al., 2022; Norberg et al., 2011; Ross & Gage, 2006). Therefore, the question now should not be whether to blend or not, it should instead focus on how to design effective and efficient BL through thoughtful integration of both on-campus and online modes (Garrison & Vaughan, 2008). However, its implementation and redesign of courses at the Bachelor's level are challenging due to factors such as large classes (Herbert et al., 2017) and teachers' lack of specific training and experience in online

teaching and wanting technology proficiency (Patchan et al., 2016). Bearing these factors in mind, it is important to explore the process of instructional redesign to adapt courses for BL. We aimed to improve university education by using BL redesign, describing the process, comparing the satisfaction of teachers and students in two courses that integrate BL redesign and deriving a set of recommendations for implementation.

Methods[1]

Context and two pilot courses

This project was conducted for one year, from February 2021 to February 2022, in the accredited 3-year Bachelor Psychology program[2] with a Dutch (NL) and International (EN=English) track at Tilburg School of Social and Behavioral Sciences (TSB), which registers about 700 students annually. Until the COVID-19 lockdown in March 2020 the Bachelor Psychology had only on-campus education. During the lockdown many teachers had to adapt their courses to an all-online format. In this project, BL was designed at TSB for the first time in a large program of Bachelor's students.[3]

This project aimed to redesign two courses that were selected via two steps. First, an overview of all 108 courses in the Bachelor Psychology was made that included all learning goals, placement of the courses in the curriculum (blocks 1-4, years 1-3), teaching and assessment methods, and student evaluations of the past year. Next, the following criteria were used to select the two courses:

1. score of 3 or higher, on a 5-point scale, on student endterm Evalytics evaluations (course educational quality as a whole).
2. HOTS addressed in the course learning goals. We checked whether the learning goals included verbs indicating HOTS based on Bloom's taxonomy: analyzing, evaluating, and creating (Anderson et al., 2001).
3. online teaching developed during the Covid-19 lockdown period.

Based on this process, two courses with both a Dutch and an English track were selected. Course 1 was a year 1 Bachelor Psychology course taught in block 2, from October to December 2021, which had two course coordinators. Course 2 was a year 2 Bachelor Psychology course in the Major Clinical Psychology, which is a student choice specialization, also taught in block 2, which had one course coordinator. Both courses had a large number of students (course 1 n = 700, course 2 n = 400), and the coordinators agreed to this intensive collaboration with our teams.

[1] Because of length constraints, all questionnaires, tables and figures are placed in an Appendix (shorturl.at/fqr06).
[2] https://www.tilburguniversity.edu/education/bachelors-programs/psychology
[3] This was part of the SUTQ trajectory (a senior teaching qualification) of the first author (SSM) and funded by EDUiLAB.

Organizational structure

An important part of this project was to design and implement an efficient procedure to redesign a course using BL in the Bachelor Psychology. A project team of experts was installed, including course coordinators, an instructional designer, an assessment specialist, an educational technologist, and two student assistants. Frequent meetings were organized with the project team to discuss progress. A Microsoft Teams environment was organized to liaise with all stakeholders on a regular basis. Academic directors within TSB, including those from Bachelor's and Master's programs, the curriculum team of Psychology, the education support team (EST), and the education committee (with student members) were informed. An EDUiLAB grant of €10,000 was obtained to employ two part-time student assistants to help with the organization of the project.

Some conditions before BL design

As pointed out by Garrison and Vaughan (2008), before implementing BL, any redesign should first examine the course design to optimize student-centered learning. We therefore emphasized the constructive alignment approach, which introduces a better connection between learning goals, contents, activities, assessment, and learning outcomes. With this better structure and emphasis on student-centered learning, we expected students to take a more active role in the learning process (i.e., working more on knowledge construction than reproduction) (Biggs & Tang, 2007). To stimulate student engagement, in addition to the endterm assessment we added some continuous assessment tasks to increase three types of interactions: student-content (e.g., videos, quizzes), student-student (e.g., group work), and student-teacher (e.g., in-class discussions).

Student and teacher evaluations of redesigned BL courses

Multiple evaluation methods, quantitative student questionnaires and qualitative teacher interviews were employed to assess student and teacher satisfaction as well as general satisfaction with the courses. The insights from these evaluations are interesting for other teachers who would like to apply BL in their courses.

Student midterm evaluation

The course coordinators developed their own midterm surveys for students to obtain feedback on the course design and to make improvements if necessary. These surveys focused on preference for BL or traditional education and likability of the various specific elements. They used both closed and open-ended questions. Only one questionnaire (in English) was sent for Course 1 due to time constraints, two questionnaires (Dutch/English) were sent for Course 2.

Student endterm Evalytics evaluation

This is the university standard end-of-course evaluation with 13 questions applied through the Evalytics software, with no specific questions on BL. It consists of three parts: course evaluation, teacher evaluation, and assessment evaluation. Each question was rated on a 5-point Likert scale.

Appendix[4]

Table 1 *Descriptive statistics for results (per question) of Blended Learning student survey*

No	Question	Course 1 NL		Course 1 EN		Course 2 EN		Course 2 NL	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Integration of online and in-class activities									
1	Activities I completed in Canvas prepared me for in-class learning.	4.05	.99	4.13	.87	2.93	1.49	3.27	1.24
2	Online materials help me gain a clearer understanding of the subject.	4.20	1.02	4.35	.86	3.61	1.23	4.09	1.02
9	My online learning activities in Canvas were well-integrated with my face-to-face learning.	4.18	1.04	3.67	1.00	2.54	1.29	2.64	1.22
4	I feel more confident coming to class having studied certain materials in advance online.	3.68	0.98	4.04	1.01	3.25	1.35	3.82	1.18
Student engagement									
5	My online experiences helped me engage actively in my learning.	3.72	1.21	3.77	1.15	3.14	1.51	3.59	1.22
3	Doing the online activities helped me participate and learn more in class.	3.64	1.12	3.44	1.11	2.86	1.32	3.36	1.26
6	With a certain level of understanding of a topic before coming to class, I am more likely to ask questions in class.	3.32	1.18	3.69	1.32	3.29	1.24	3.36	1.43
10	Canvas materials provided me with opportunities to apply or practice what I learned during in-class sessions.	3.93	1.04	3.92	.90	2.75	1.35	3.23	1.19
Flexibility									
11	With online materials provided on Canvas, I can study anytime, anywhere.	4.36	.99	4.71	.62	4.54	1.00	4.00	1.20
12	With online materials provided on Canvas, I can study at my own pace.	4.61	.81	4.69	.72	4.68	.86	4.27	.98
Interaction									
14	With this Blended Learning approach, I interact more with other students inside and outside the classroom.	2.84	1.31	2.92	1.13	2.75	1.29	2.18	1.18
15	With this Blended Learning approach, the quality of my interaction with other students inside and outside the classroom is much better.	2.80	1.17	2.98	1.02	2.79	1.37	2.18	.91
16	With this Blended Learning approach, I interact more with my lecturers inside and outside the classroom.	2.52	1.00	2.83	1.02	2.29	1.21	2.68	1.29
17	With this Blended Learning approach, the quality of my interaction with my lecturers inside and outside the classroom is much better.	2.68	1.05	3.00	.97	2.57	1.26	2.59	1.18
Communication									
18	The expectation of lecturers in terms of students' participation and output from studying online were clear.	3.84	1.06	3.71	.90	2.61	1.34	3.14	1.04
Level of thinking skills									
8	Compared to other courses in the Bachelor Psychology, in this course I practiced more higher order thinking skills (such as analyzing, questioning, evaluating, reasoning, and creating new work).	3.22	1.18	2.94	1.00	2.11	1.13	2.14	.77
19	This course focused mostly on remembering and understanding knowledge.	4.11	.97	4.08	.71	3.68	1.31	3.82	1.18

5 -point Likert scale, ranging from strongly disagree (1) to strongly agree (5). These two questions were implemented in Figures 1 and 2: Question 7: Which class modality do you prefer? Question 13: Given a choice, would you enroll in another Blended Learning course? NL=Dutch track, EN=English track

[4] See the link: shorturl.at/fqr06

Blended learning student survey
The European Maturity Model for Blended Education (EMBED) was used for this final BL student survey (Van Valkenburg et al., 2020). To measure various aspects of BL, 15 out of 19 questions for this survey were based on the questions in a study by Bouilheres et al. (2020) exploring the benefits of BL toward students' learning experiences. These 15 questions (Table 1) measured five dimensions of students' learning experiences:

1. flexibility of online learning compared to in-class learning (questions 11, 12).
2. clarity of communication (question 18).
3. amount and quality of students' interaction with lecturers, with other students, and with the content (questions 14, 15, 16, 17).
4. Students' engagement with the content, peers and teachers, as well as their motivation for learning (questions 3, 5, 6, 10).[5]
5. integration between online learning and in-class learning (questions 1, 2, 4, 9).

Two additional questions (8 and 19) were added to measure whether students thought they practiced more HOTS in these courses. The final two questions (7 and 13) focused on course modality preference and on whether, given a choice, students would like to enroll in other BL courses. The total 19 questions of this survey were rated using a 5-point Likert scale, ranging from strongly disagree (1) to strongly agree (5).

Note that the questions were slightly reworded to better reflect the learning environment at Tilburg University, particularly the use of Canvas as the Learning Management System as well as to fit the scale of measurement. Using these previously tested questionnaires, albeit in a slightly modified way, ensured the validity of the questionnaire.

Teacher interviews
The three course coordinators were interviewed to reflect on their experience designing and teaching the course. Topics discussed in the interview were: BL design, workload, interaction quality and quantity, flexibility, and grading. The discussions were held via Zoom and recorded for analysis purposes. Minutes were taken during the interview and the major themes were summarized.

Results

Changes in redesigned courses
The first part of the results focuses on the changes made in both courses as a result of the BL redesign. For more specific details on the courses before and after the BL redesign, refer to Tables 2 and 3. These main changes were essential for the BL design:

[5] Three questions relating to students' motivation to participate and engage with the learning were filed under the student engagement construct, whereas in the original survey they were placed as a separate construct.

1. The learning goals were rewritten in a more student-centered way, making them more concrete and using appropriate action verbs to underscore the thinking skills and activities that were required from students. This improved the learning goals in terms of clarity and was checked by our Tilburg University assessment specialist.
2. The constructive alignment model was used to align learning goals, activities, didactical approach, and assessment with the new BL elements. As extra assignments were added, these needed to be aligned properly.
3. The syllabi were written/rewritten to provide clear structure to students on the contents of the course and teaching methods, with an emphasis on assignments, reading materials, and what is expected from students in terms of assessment.
4. Storyboard/design (Figure 1) was used in each course to illustrate a learning journey structure. This was a new visual overview of the course, in one picture with limited words. It contained details on which activities were held online vs on campus and the order of activities, taking into account the weekly planning. It improved the structure of the courses.
5. Educational materials were redesigned for the online portion: Canvas was restructured, an animated clip and other videos were designed or obtained from YouTube or previously recorded lectures, exercises to engage student-content interaction with videos were created, student groups who would collaborate on the assignments were organized, discussion boards were installed, and assignments were set.
6. Grading and assessment changed, peer-review procedures were installed with newly made rubrics. Single multiple-choice exams for large student numbers were generally used to assess courses in the Bachelor Psychology. The exams were taken at the end of the course (usually after six weeks). With the BL redesign we added, as an addition to the final multiple-choice exam, other activities throughout the course; this is needed for students to memorize contents in the long term. With the BL redesign new online assignments were created, which were graded with summative or formative assessment methods.

Table 2 *Course 1 EN/NL before and after Blended Learning was applied*

Before	After
12 Canvas modules 1. Small videos of the slides and explanation 2. Small clips of other people 3. Read literature (textbook) before 4. Quizzes	6 Canvas modules 1. One lecture 2. One or two book chapters/articles 3. One interactive Q & A session → Post questions on discussion board in Canvas 4. Individual assignment
Workgroups on zoom (not mandatory) 1. Groupwork: present and evaluate an existing test for a personality trait 2. Discussions 3. Low attendance	Organized on Canvas 1. Online activities (videos, personality test, quizzes) 2. Students were asked to sign up for Peer feedback with Pitch2Peer software 3. Online Trait Portfolio → Pick one trait and make assignments about it 4. Discussion boards to ask questions
Multiple-choice exam at the end	Multiple-choice exam at the end (75%) and portfolio (25%)

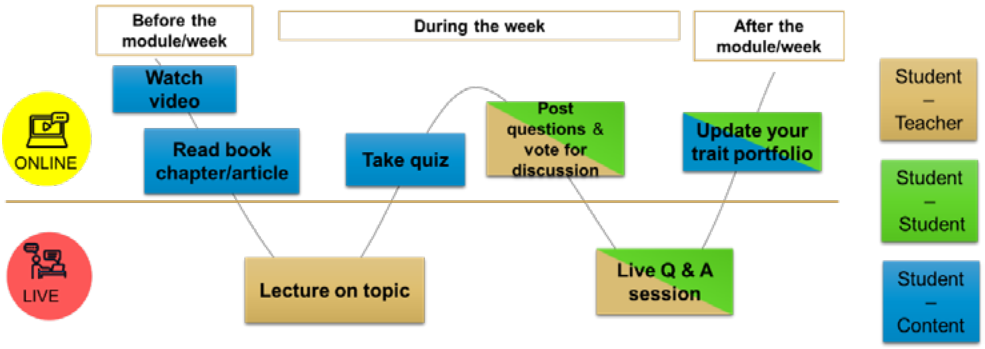
EN=English track, NL=Dutch track

Table 3 *Course 2 EN/NL before and after Blended Learning was applied*

Before	After
12 lectures with PowerPoint & videos	Weekly structure: one theme per week - 6 weeks 1. Online knowledge clips and quizzes 2. Read literature 3. On campus lecture/practical 4. Online assignment 5. On campus lecture/practical 6. Online Q&A
No syllabus	Structured syllabus was created
Choice between: • A literature assignment consisting of three practicals, students had to do literature searches in groups and present a PowerPoint • 2 seminars, practice at home and students had to present a PowerPoint	Organized on Canvas: • Group poster assignment • Reflection assignment
	Use of peer feedback through Pitch2Peer, compulsory for students
	A discussion board was organized on Canvas to ask questions
Assessments • 1 MQ mock exam • 1 MQ exam (48 questions)	Assessments: • 1 MQ exam • Pass/Fail on assignments

EN=English track, NL=Dutch track
Q&A=question and answer
MQ=multiple-choice questions

Figure 1 *Storyboard/design*



Q&A=question and answer

Evaluations

Student midterm evaluation

For this student midterm evaluation the response rates were 15-19%. Table 4 shows student preference for instruction mode. Students of Course 1 preferred BL mode (65.9%) over the traditional mode of teaching (26.4%). This was not the case for Course 2 students, where approximately half of the respondents preferred traditional lectures and the other half BL (see Table 4).

Table 4 *Results of student midterm evaluation - overall course format preference question*

Which course format do you prefer?	Traditional %	Neutral %	Blended learning format %	Responses N (%)
Course 1 NL/EN*	26.4	7.7	65.9	104 (15%)
Course 2 EN	45.9	8.1	45.9	38 (19%)
Course 2 NL	42.1	5.3	52.6	38 (19%)

For Course 1, one questionnaire was administrated to students for both the Dutch and International track, for Course 2 two questionnaires were administrated.
EN=English track, NL=Dutch track
N=number of students

As for course elements (Table 5a and 5b), again differences were observed between Courses 1 and 2. In the midterm evaluations student satisfaction with BL design was high for Course 1, particularly with the videos, lectures, quizzes, and portfolio. The evaluations were more modest for Course 2, but highly appreciated were an animated knowledge clip, lectures, practicals, and quizzes. Of interest is that only a minority of respondents appreciated the peer feedback (for portfolio) in Course 1 (27.6%) and the group poster assignment in Course 2 (20.7%).

Table 5a and 5b *Results of student midterm evaluation - Likeability of course elements*

5a Course 1 NL/EN (N=104)			
I like the ... in the blended learning structure (%)	**Disagree**	**Neutral**	**Agree**
videos	4.8	5.7	89.5
lectures	5.8	2.9	91.3
reading chapters	11.4	11.4	77.1
quizzes	0	3.8	96.2
Q&A sessions	16.2	31.4	52.4
portfolio [assignment]	15.2	19.0	65.7
peer feedback (for portfolio)	22.9	49.5	27.6

5b Course 2 NL and EN						
	Course 2 EN (N = 38)			Course 2 NL (N = 38)		
I like the ... in the blended learning structure (%)	**Disagree**	**Neutral**	**Agree**	**Disagree**	**Neutral**	**Agree**
online clips	30	10	60	31.6	7.9	60.5
lectures	27.5	17.5	55.0	13.2	5.3	81.6
practicals	26.3	15.8	75.9	26.3	21.1	52.6
animated knowledge clip	27.5	12.5	60.0	18.4	7.9	73.7
online quizzes	0	20	80	7.9	7.9	84.2
online Q&A discussion boards	20	32.5	47.5	21.1	21.1	57.9
group poster assignment	62.5	22.5	15.0	60.5	13.2	26.3
practical assignment	41.0	12.8	46.2	36.8	13.2	50.0

EN=English track, NL=Dutch track
Q&A=question and answer

Student endterm Evalytics evaluation

The general evaluation system of Tilburg University was Evalytics, which is not specifically designed to evaluate BL yet still gave an indication of students' general course satisfaction.

For this student endterm Evalytics evaluation the response rates were 9-18% for the course evaluation. These Evalytics evaluations are presented in Table 6 (response rate) and Table 7 (descriptive statistics). Student response rates were quite low (Table 6). Although the overall course satisfaction (Q6) was low for Course 2 (M = 2.8), most questions were scored higher than 3.0 in both courses (Table 7). Table 8 presents the mean scores on a 10-point scale. The student evaluations for Course 1 were high, 7.8 out of 10, whereas for Course 2 a reasonable score of 6.5 was obtained.

Table 6 *Student Endterm Evalytics evaluation - Sample sizes and response rates*

	Course 1 NL	Course 1 EN	Course 2 EN	Course 2 NL
Course evaluation				
Sample size (N)	40	67	31	32
Response rate (%)	9	18	16	11
Population size	447	369	198	295
Teacher evaluation				
Sample size (N)	51	82	54	61
Response rate (%)	11	22	27	21
Population size	447	369	198	295
Assessment evaluation				
Sample size (N)	34	12	26	16
Response rate (%)	8	4	15	6
Population size	420	334	179	257

EN=English track, NL=Dutch track
N=number of students

Blended learning student survey

Although Table 9 shows extremely low response rates for this survey (8-14%), the descriptive statistics per question (Table 1) and per scale (Table 10) show that BL facilitates flexibility (higher than 4.0). Several aspects of student-student and student-teacher interaction were perceived as less satisfactory (lower than 3.0).

Students were asked about the level of thinking skills practiced in the courses – higher-order cognitive thinking skills, such as analyzing, questioning, evaluating, reasoning, and creating new content. The majority of students agreed that in Course 1 they practiced more of these HOTS (score 3.22 on a 5-point scale in the Dutch track and 2.94 in the International track). In Course 2 the majority of students did not feel they practiced more HOTS (scores 2.11-2.14 for both language tracks).

While there are differences in preference between students in the two courses, overall we can see that most students prefer either courses taught mostly face-to-face with minimal use of Canvas, an equal mix of face-to-face and Canvas content, or extensive use of Canvas, but still with some face-to-face class time (Figure 2). Hence students prefer a BL format (Figure 3). The majority of students will probably or definitely enroll in a future BL course.

Table 7 *Descriptive statistics for student endterm Evalytics evaluation*

	Course 1 NL		Course 1 EN		Course 2 EN		Course 2 NL	
Questions	M	SD	M	SD	M	SD	M	SD
1. The course fit well with my prior knowledge and skills.	4.1	0.8	4.1	0.8	3.9	0.9	3.8	0.8
2. The learning goals of the course were clear to me.	3.9	0.8	3.8	1.1	3.1	1.1	2.9	1.1
3. The study materials (e.g., books, syllabus, other literature, assignments, Canvas environment) helped me achieve the learning goals.	4.1	0.9	3.9	1.0	3.3	1.1	2.9	1.1
4. I have acquired new knowledge and understanding from this course.	4.5	0.7	4.2	1.0	3.7	1.0	3.5	1.1
5. I have acquired new skills from this course.	3.9	1.0	3.5	1.2	3.4	0.8	3.1	1.1
6. In general, I am satisfied with this course.	3.9	0.8	3.7	1.0	2.9	1.2	2.7	1.1
Teacher questions								
7. The lecturer explained the subject matter clearly.	4.0	0.8	3.8	1.0	3.5	1.1	3.4	1.0
8. The lecturer stimulated me to think actively about the subject matter.	3.8	1.0	3.5	1.1	3.4	1.1	3.2	0.9
Assessment questions								
9. The study load matches the credits for this course (note: 1 EC equals 28 hours).	4.1	0.8	4.1	1.0	3.7	1.2	3.7	0.9
10. The assessment provided a good reflection of the learning goals and learning materials.	4.3	0.6	4.5	0.9	2.5	1.3	2.9	1.3
11. The questions and/or assignments in the assessment were formulated clearly.	4.4	0.7	4.1	0.9	3.1	1.2	3.1	1.4
12. Prior to the assessment, it was clear to me what was expected of me regarding the assessment.	4.0	1.0	3.6	0.9	2.6	1.4	2.8	1.3
13. I had enough time to complete the assessment task(s).	4.8	0.5	4.5	1.0	4.6	0.8	4.4	1.0

5 -point Likert scale, ranging from strongly disagree (1) to strongly agree (5).
EN=English track, NL=Dutch track
EC=European credit transfer and accumulation system (ECTS), study points acquired with each course. 1 EC=28 study hours

Table 8 *Standard student Endterm Evalytics evaluation average scores*

	Course 1 NL	Course 1 EN	Course 2 EN	Course 2 NL
Course	8.1	7.7	6.7	6.3
Assessment	8.7	8.3	6.6	6.8
Teacher	7.8	7.3	6.9	6.6
Total	8.3	7.6	6.7	6.5

Note. Numerical scale 0-10

Table 9 *Blended Learning student survey - Sample sizes and response rates*

	Course 1 NL	Course 1 EN	Course 2 EN	Course 2 NL
Sample size (N)	56	52	28	24
Response rate (%)	13	14	14	8

Table 10 *Descriptive statistics for results (per scale) of Blended Learning student survey*

Course	Blended Learning scales	M	SD	α	N
Course 1 NL	Flexibility	4.49	.71	.41	44
	Communication	3.84	1.06		44
	Interaction	2.71	.87	.76	44
	Student engagement	3.65	.81	.68	44
	Integration	4.07	.69	.63	44
Course 1 EN	Flexibility	4.70	.61	.78	48
	Communication	3.71	.90		48
	Interaction	2.93	.56	.84	48
	Student engagement	3.70	.72	.50	48
	Integration	4.05	.61	.56	48
Course 2 EN	Flexibility	4.61	.92	.96	28
	Communication	2.61	1.34		28
	Interaction	2.60	1.17	.93	28
	Student engagement	3.01	1.03	.75	28
	Integration	3.08	1.04	.78	28
Course 2 NL	Flexibility	4.14	.95	.68	22
	Communication	3.14	1.04		22
	Interaction	2.41	.96	.86	22
	Student engagement	3.39	.99	.78	22
	Integration	3.45	.80	.62	22

EN=English track, NL=Dutch track
M=mean
SD=standard deviation
N=number of students

Teacher interviews

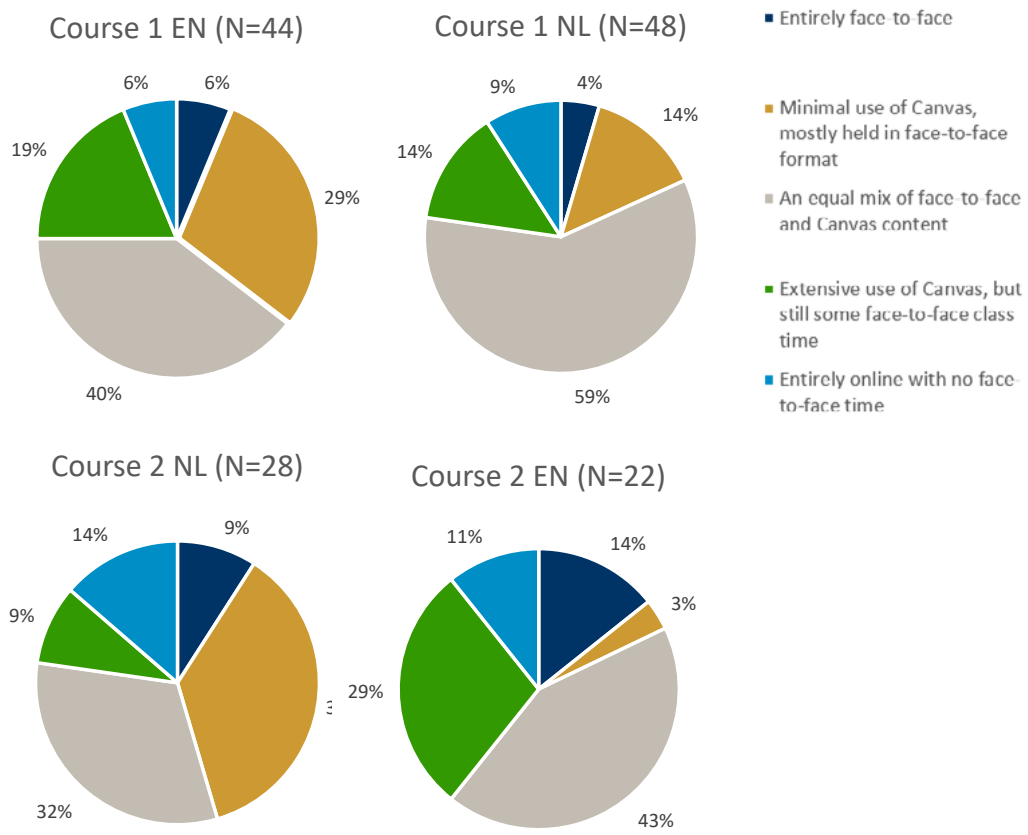
Overall experience with blended learning

Generally, all three course coordinators were positive about the process and outcomes of the BL design of their courses and the extra support they received during this project to organize this. They recommend this format for other courses, because of the variation it offers to both teachers and students and the return-on-investment of time. They liked the mix of on-campus and online lectures and students working on assignments every week, not only focusing on a final exam. Students were engaged in the course every week. Teachers indicated their willingness to use BL elements for the next academic year. However, they agreed that teachers need support with the first-time redesign of their courses in BL format.

Workload

The workload was less intense in Course 1 (because it was divided between two coordinators) than in Course 2 (one coordinator). Teachers felt the initial time investment to redesign the course was high, but that it paid back immediately because of the reduced number of lectures and the elimination of working groups. Content materials can be re-used for years to come.

Figure 2 *Blended Learning student survey: Which class modality do you prefer?*



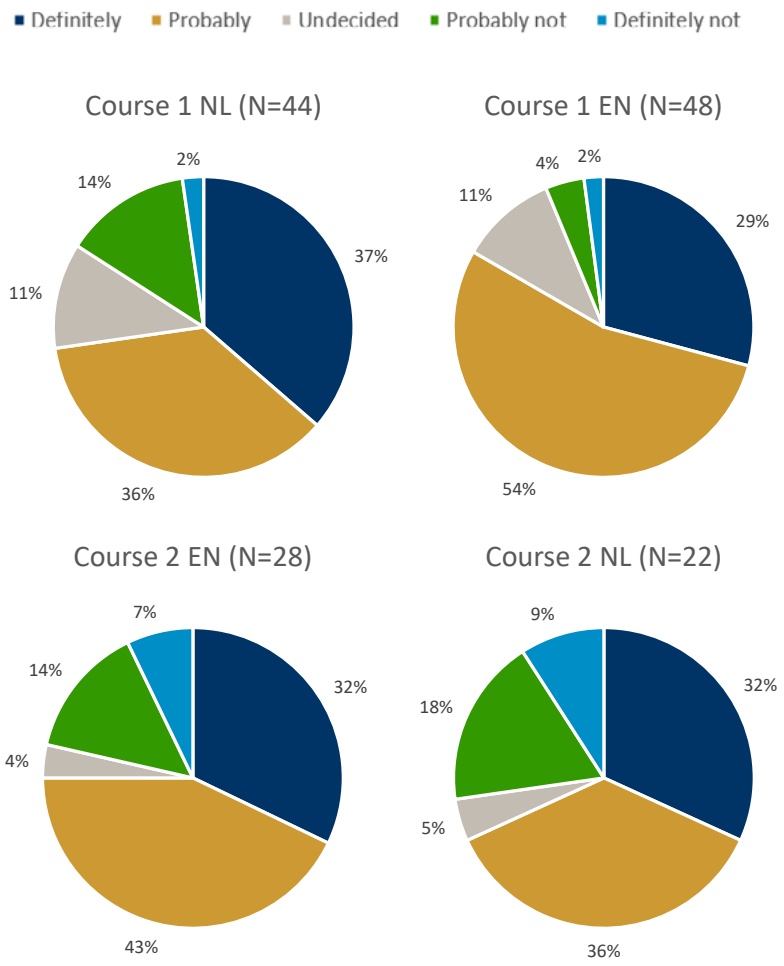
EN=English track, NL=Dutch track

The course coordinators also received some support from student assistants during the design and delivery of the course, but spent extra personal time on it too. They preferred getting allocated time for BL, because there is much to organize – for example the videos, quizzes, lectures, assignments, deciding what and when the students need to hand in work, making rubrics, storyboard. Grading assignments is the part of BL that contributes most to the added workload.

Communication and Canvas organization

Course 1 coordinators put in great effort to organize a clear structure on Canvas and place all necessary information in the syllabus. All aspects of the course were thought through and viewed from a student-centered perspective. Students asked fewer questions about course organization, structure and design than in previous years.

Figure 3 *Blended Learning student survey: Given a choice, would you enroll in another Blended Learning course?*



EN=English track, NL=Dutch track

As for Course 2, extended time was also spent writing a clear syllabus and creating a clear Canvas structure, yet due to delayed publication students still asked many questions at first. However, the clear organization of Canvas was well received by the course coordinator and the students. It should also be noted that the course coordinator took over this course for the first time and had to become familiar with the contents while designing a new course structure, which was quite challenging.

Interaction

The amount and quality of interaction between students and teachers was different

between the courses. The interaction was frequently affected by the change in COVID measures. Course 1 teachers thought there was enough room to interact with the students, although the large group size of 700 students is a limiting factor. The teacher for the Dutch track of Course 1 interacted more with students than in previous years. The chat function, which was interactive, worked well for online lectures. Many questions were asked. Unfortunately, teachers did not have time to address all that was planned for the lecture, because so many questions were asked and too much content was prepared. They moved part of the lecture to the live Q&A. In general, English-track students asked more questions than Dutch-track students. The Course 2 teacher hoped for more interaction online, through Canvas discussions, but this didn't work out as planned because students did not participate in the discussion board.

Student engagement

The teachers noticed most students were engaged in the course every week. BL also increases weekly teacher engagement with the content and the students. The on-campus activities helped students learn more and study better. Teachers noticed that students asked specific questions during lectures, indicating they had in fact prepared for the lectures.

Peer feedback

Both courses used peer feedback to allow students to improve their draft assignments based on the criteria. For Course 2 this was a compulsory part of the assignment, therefore everyone gave and received feedback. For Course 1 it was an optional part of the assignment. Because the peer feedback tool was not properly linked to the student groups, some students gave feedback but did not receive it.

Conclusion and Discussion

This was a first step to implement BL in courses in the Bachelor Psychology. For Course 1, most students (66%) preferred the BL design over a traditional course structure (26%). Students of both courses also liked most of the course elements, such as videos, lectures, quizzes, and the animated knowledge clip, except for the peer feedback assignment in Course 1 and the poster assignment in Course 2. Peer feedback differences could be explained by some students not receiving peer feedback because it was a voluntary activity. For Course 2, although student evaluation results are less satisfactory than Course 1, when we look at the likability of the course elements often found in BL course designs (online discussions, quizzes, video clips), most students did like those elements that promote student-content interaction.

Response rates to the student evaluation questionnaires were quite low, so this needs to be considered when interpreting the results. Overall, we can conclude that both students and teachers had a positive experience with many of the elements that were introduced with the BL redesign of the courses. This result aligns with other BL study findings (López-Pérez et al., 2011; Owston et al., 2019; Patchan et al., 2016). Teachers found the initial time investment to redesign the course was substantial yet paid off immediately because

of the reduced number of lectures and the possibility to re-use content materials in the coming years. They experienced the benefits of a student-centered course design through improved communication, and higher and more continuous engagement throughout the course. Students really enjoyed the variation in learning materials and activities provided to them in a structured way, while still offering flexibility to choose a personal study pace and place (Patchan et al., 2016; Waha & Davis, 2014).

The process used to redesign these courses has yielded many insights for best practices, and the results show potential for implementation in other courses. Yet our findings show there is still much to improve in student-student and student-teacher interaction, and more work needs to be done to be able to make a full transition from a traditional teacher-centered mode to a more student-centered BL that aims to build a community of inquiry (Garrison & Vaughan, 2008). We can use the results not only to improve the courses for next academic year, but also to infer recommendations for policy on BL. Next, we reflect on these issues and make recommendations for BL implementation first, after which we address the limitations of this project.

Recommendations to BL implementations

Teachers need support and time to design BL courses

To properly integrate online and on-campus instruction, teachers need to have a clear understanding of what BL means and what options are available for their course type. Some resources and support are already in place at the central and school level, but are not well organized yet. Developing a toolkit that suits our university didactic framework to provide procedural knowledge and tools can help teachers clear up their misconceptions and facilitate their BL design process (Alammary et al., 2014).

As addressed in the teacher interviews, even with all the support received teachers still spent a lot of extra time redesigning their courses. Not only creating new content materials, but also reviewing the constructive alignment of a course and changing those elements costs time. If teachers are expected to redesign their courses entirely to a blended format, they report needing dedicated time to do so.

For both course types, teachers were assisted by student assistants through an SUTQ project funding from EDUiLAB. The student assistants played a vital role in setting up the online learning environment in preparation for the course (Broadbent et al., 2018).

Equally important to note here is that this project was a pilot in nature and aimed at exploring the redesign of an entire course, thus requiring extensive support and capacities. To keep BL design manageable and feasible, we recommend that teachers focus on one BL design dimension (e.g., student-content, student-student, student-teacher) in each course implementation (Garrison & Vaughan, 2008).

Pay close attention to student study load
When the traditional lecture-workgroup structure is abandoned and/or the number of lectures is reduced, time is freed up for students to engage in other activities. When selecting these activities it is important to consider the time spent on each activity. There is a risk of selecting too many and overwhelming students with in-person or online learning activities that do not necessarily serve the learning objectives. Ideally, each activity should be explicitly connected to the learning objectives of the course. Students report they feel more motivated to work on assignments if there is a clear purpose and if they are linked to the learning objectives. It is also helpful to indicate which assignments are a mandatory part of the course and which are optional (for practice purposes).

Improving interaction by constructively aligning online and on-campus components
In the extra BL survey, the amount and quality of interaction between students and with teachers was not rated very highly, and yet interaction is a key aspect of BL course design. These findings may explain why engagement with HOTS were not perceived as satisfactory, given the fact that student-student and student-teacher interactions are likely to stimulate students to engage in deeper cognitive processing (e.g., analyzing, questioning, evaluating, reasoning). From teacher interview results, it seemed that most interaction activities focused on student-teacher discussions and the low teacher-student ratio made it difficult to ensure sufficient student-teacher interaction in these large groups. As suggested by BL literature (Francis, 2012; Garrison & Vaughan, 2008; Hamann et al., 2012; Stein & Graham, 2020), using collaborative small group work can effectively increase student-student interaction, and asking each group to report their results so the teacher can provide whole-class feedback and discussion can efficiently increase student-teacher interaction. Although collaborative small group work has the potential to make large classes feel small, it requires thoughtful design to align before-, during-, and after-class activities as well as to select the right mode, online or on-campus, at each stage. This complexity can be overwhelming for teachers who are transitioning from traditional to BL education. To facilitate this design issue, we recommend providing teachers with evidence-based design patterns for BL group activities (Garrison & Vaughan, 2008; Patchan et al., 2016).

Focus on student engagement
Students taking Course 2 can be expected to be motivated because they chose this course for their major as a specialization in the Bachelor. Yet we always need to foster that motivation and put in effort to keep students engaged. Some ways to make content more engaging: make the content personal by connecting it to student experiences and use authentic assessment tasks that emphasize real-life cases in psychologists' professional contexts.

Considerations for peer feedback activities
Peer feedback can be a very useful learning activity for both students and teachers. Students not only learn from giving and receiving feedback, but also get an opportunity to improve

their assignment before submitting it to the teachers for grading. Both courses used peer feedback, but it was only successful in the course where it was mandatory. If it is not a mandatory activity, another way to ensure that all students who submit the assignment also receive peer feedback is to let them sign up for the peer feedback activity.

Limitations

As mentioned before, both courses were taught in semester 1, block 2 of academic year 2021/2022. It should be noted that after 3-4 weeks of teaching the courses in a blended format a switch had to be made to fully online teaching, due to Covid-19 measures. Even though students were asked to only consider the first few weeks of teaching in the BL survey, the results should be carefully interpreted. The response rates were low. Also, apart from the teacher interviews, only student surveys were used. Student surveys should not and cannot be used as the only barometer of good teaching or good course design. Therefore, when drawing up the recommendations we placed more emphasis on the teachers' reflections.

This was a first step to implementing BL in two Bachelor courses. Our findings show that BL redesign was possible in the Bachelor Psychology curriculum with a large number of students, limited time of staff, and COVID-19 restrictions.

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02.

European Values in Education – How Data from the European Values Study Find their Way into European Education

Uwe Krause, Inge Sieben and Ellen Claes

Abstract

This contribution describes the cooperation in the recent KA2 Erasmus+ project EVALUE: European Values in Education, which is based on the European Values Study (EVS), an international survey research project that explores attitudes and opinions of citizens in nearly all European countries. Social and educational scientists of four European universities and one NGO collaborated in this project together with various secondary schools in the home countries of the universities. The challenge was to make the survey data more accessible in all participating countries for educational purposes. To reach this goal, the project produced values dimensions and background information based on scientific insights, created an educational framework, and constructed teaching materials in cooperation with schools. These materials were trialed, evaluated, and adapted based on feedback from teachers that worked with them. This paper describes the entire EVALUE process and its outcomes. It will address the map tool, the classroom tool, and the curriculum framework. It also describes how these outcomes can contribute to powerful knowledge and explores in what ways the outcomes might affect students' learning and the repertoire of teachers.

Societal Changes and Citizenship Education

Processes of European unification and globalization seriously challenge the processes of identification of individuals in European member states. The rise of extremism and populism in politics and society seems to confirm that parts of the population feel threatened by such developments and are increasingly anxious that national borders will become obsolete, with serious consequences for national economies, cultures, and identities. The war between Russia and Ukraine not only questions the peace order after 1989, but also emphasizes the concept of national identity. The recent economic recession – partly because of the Russian-Ukrainian war but also due to discussions about Covid-19 and climate change – has induced social and political frictions, while growing migration from inside and outside Europe raises questions of security and solidarity. These developments all stress the importance of the concept of identity and values: the answer to the question "Who am I?" becomes increasingly important (Sacks, 2007) yet is not easy to answer because of its often-multilayered nature.

Since 1981, social scientists have tried to investigate the (changing) values of Europeans by collecting data in the European Values Study (EVS). Starting with ten Western European countries in 1981, the fifth wave of data collection took place in 2017 and covers nearly all European countries. Over 300 carefully translated questions are asked in face-to-face interviews to a representative random sample of the adult population of a country (for more information, see www.europeanvaluesstudy.eu). Topics covered are family, work, religion, environment, well-being, politics, and a broad spectrum of societal issues. The collected data form the basis for many scientific articles and theory-building. To reach a broader public, the results of the last three waves were published in an atlas format (Halman, Luijkx & Van Zundert 2005; Halman, Sieben & Van Zundert 2011; Halman, Reeskens, Sieben & Van Zundert, 2022). The advantage of displaying data in maps and graphs compared to tables and more complex statistics is that similarities and differences between countries become immediately visible and possible patterns can be easily recognized. In the atlases, the main results of the EVS are complemented with brief explanations to understand the patterns visible in the maps.

The atlases and the data of the EVS have a big potential to address values issues in educational settings too. While the focus on identity issues in society leads to an increasing emphasis on emotions, and existing anxieties and fears can easily turn into anger (Marcus, 2002) or hatred (Moïsi, 2009), especially in education a culture of responsibility and reciprocity is crucial for democratic civic learning. Such a culture can be cultivated through understanding, reflecting, and comparison, thus by forming a clear idea of how to position oneself within a diversity of opinions and which explanations there might be for one's own viewpoint in relation to that of others. Particularly for young people, it might even be more difficult to find a balance between their identity and the diversity found in society (and the antagonisms it brings about).

Despite the urgency for values education (and citizenship education), research shows that teachers struggle to teach controversial issues and that citizenship and values education are often neglected in schools (Budke, Krause, Von Reumont & Maier, 2017; Avery, Levy, & Simmons, 2013; Campbell, 2008). The reasons for this are diverse, but pressure to adhere to and complete the curriculum is one of them. Teachers also fear bias or being accused of it (Hess, 2009). They lack expertise in developing and guiding teaching activities, are struggling with an adequate teaching style, and often lack topical, expert knowledge (Stradling, 1984); how to deal with student sensitivities and spontaneous remarks (Philpott et al., 2011); and how to achieve an appropriate classroom climate (Claes, Maurissen & Havermans, 2017; Crombie & Rowe, 2009). Literature does acknowledge that the role of the teacher is key in realizing successful values education. Because of the described challenges, governments of numerous European countries emphasize the importance of citizenship and values education and have developed various initiatives.

One such initiative is the KA2 Erasmus+ project European Values in Education (EVALUE). The aim of the project is to address some of the difficulties secondary school teachers experience while dealing with controversial issues, and to offer teaching tools and learning materials. For the described societal challenges, the main goal is to understand identity and values as a multilayered concept that can be perceived differently in different contexts (countries) and by various social groups. The project is an example of how knowledge transfers from the scientific domain of knowledge production – in the terminology of Bernstein (2003), the vertical dimension – via the recontextualization by the pedagogic field (e.g., teacher training universities) to the horizontal dimension, which are the schools where values education takes place. As Bernstein (ibid.) emphasizes, the transformation of knowledge undergoes two recontextualization phases.

The tools of the EVALUE project

The project is based on the results of the EVS (see www.europeanvaluesstudy.eu), complemented with selected data of the European Social Survey (ESS; see www.europeansocialsurvey.org) and World Values Survey (WVS; see www.worldvaluessurvey.org). These three surveys meet high methodological standards (for an overview of the methodologies, see the respective websites) and thus represent high-quality data about the opinions of citizens in Europe. These data are crucial for good values education, as they can be used as a reliable source to arrive at a valid argumentation about values (Roberts, 2013; Brookhart, 2010) in educational settings.

First, in the EVALUE project (see www.atlasofeuropeanvalues.eu) the EVS and selected ESS and WVS data are displayed in a **map tool** showing average population scores per country. The data are available for the 1981, 1990, 1999, 2008, and 2017 waves, and will be updated for every new data wave. Maps with survey information from two waves can be compared to discover changes over time, or they can be compared with context information (such as GDP per capita). When comparing the information, the tool allows for adjusting intervals so that two maps are comparable via the legend. It is also possible to compare different respondent groups, like old/young, high/low income, etc. An example of such a comparison can be found in Figure 1. The two maps show that in most European countries younger people are more willing to give money for environmental causes than elderly people. Maps and the modes of comparison make it possible to distinguish geographical patterns (e.g., richer vs poorer, Catholic, former communist countries) as well as sociological patterns (e.g., young vs old, male vs female, high vs low income). Not only is this conducive to the development of important information and numeracy skills necessary for enquiry (Jones, 2017; Roberts, 2013), it also fosters multi-perspective approaches, which are an important part of higher-order thinking (Krause, Béneker & Van Tartwijk, 2021; Vasiljuk et al., 2022).

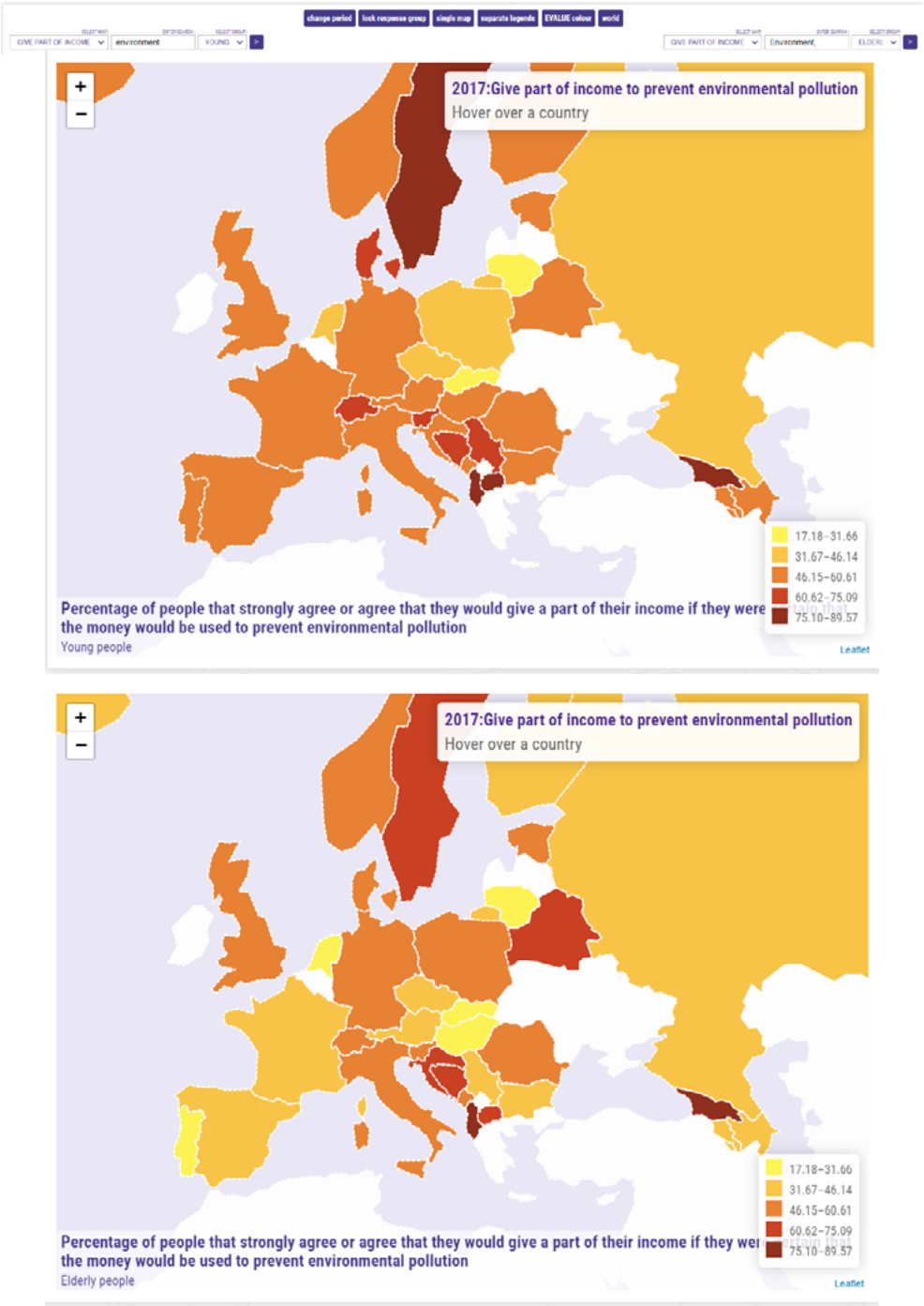

Figure 1: *Willingness to give money for environmental purposes – young vs elderly people. Source: www.atlasofeuropeanvalues.eu*

To help students and teachers interpret the data presented in the maps, **values dimensions** were created by a multinational team of social scientists, bringing in a large variety in country-specific dimensions. These values dimensions comprise general dimensions – such as materialistic vs post-materialistic values, political left vs right self-placement, religious/conservative vs non-religious/progressive values, and localist vs cosmopolitan identities – plus several dimensions on five important contemporary themes: migration, environment, democracy, solidarity, and tolerance. Each dimension consists of a reliable scale of combinations of questionnaire items. For each dimension, multiple perspectives are offered to explain differences between countries and between social groups. These perspectives are described in the three types of background information for the five contemporary themes: (1) a report with scientific information, for teachers who are considering studying the material more in depth and are looking for possibilities for further reading; (2) a short version, which gives teachers a quick overview with sufficient information to deal with the data in an educational setting and which can also be used as a source of information for students in the higher grades of secondary education; and (3) visuals, which make the theories even more accessible and understandable and might support literacy skills (Walshe, 2017). In the sample maps of Figure 1, for instance, we could explain the relatively high score on support for the environment in Sweden by economic affluence, whereas the high scores in Albania or Georgia might be explained by exposure to environmental degradation. Offering this kind of information is a key aspect, as one threshold for teachers in values education is lack of sufficient knowledge, which leads to uncertainty (Stradling, 1984). In the learning process, the offered values dimensions represent conceptual knowledge, which combined with the data (maps) foster the development of systematic knowledge – again a key element of powerful knowledge (Béneker, 2018; Young & Muller, 2010; Maude, 2017; Krause et al., 2021).

The defined values dimensions can also be displayed in the **classroom tool**. This tool offers the possibility to register and create a digital "classroom" and to invite students from teachers' own or different classes (even when they are abroad, for example in an exchange project). Based on their answers to a short questionnaire with relevant survey questions selected from the EVS, students have the opportunity to place themselves/their class within the visual presentation of the values dimensions and compare themselves/their class with other classes or different respondent groups of other countries. The dimensions are displayed as a scatterplot, with one dimension on the Y-axis and another on the X-axis. To illustrate the theme "tolerance" (see Figure 2), we distinguish between private tolerance (sexual-ethical permissiveness, indicating the acceptance of homosexuality, abortion, divorce, euthanasia, suicide) and public tolerance (civic permissiveness, indicating the acceptance of claiming state benefits illegally, cheating on tax returns, paying cash to avoid taxes, accepting a bribe, not paying public transport fares). Combining these two dimensions in a value-cross can answer questions like "are individuals who are tolerant in one domain also tolerant in another domain?" The private tolerance dimension can further be combined with several general value dimensions, such as materialist vs postmaterialist values (see Figure 3 – postmaterialists are generally more tolerant, e.g., Inglehart, 1988)

or religious/conservative vs non-religious/progressive values (religious/conservative individuals are generally less tolerant, e.g., Halman and Van Ingen 2013).

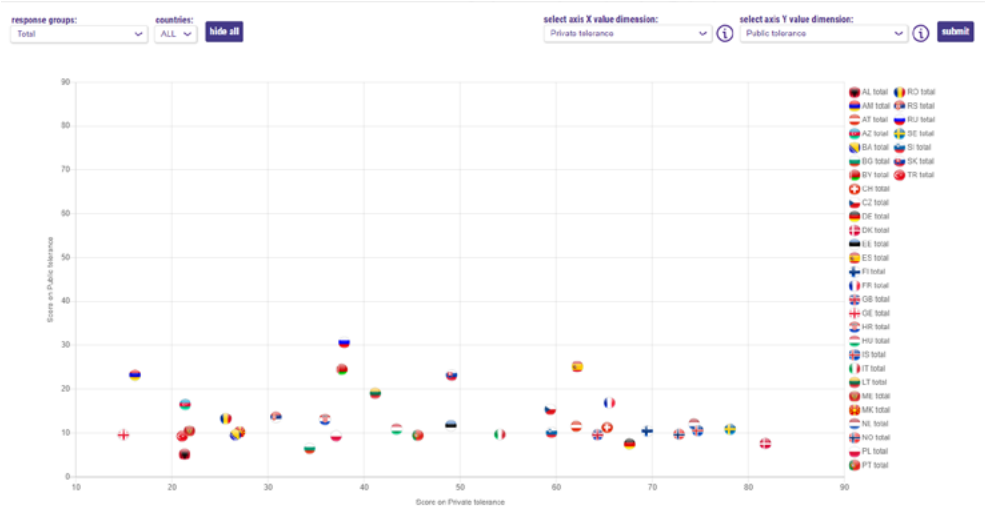

Figure 2: *Values dimensions Private Tolerance (x-axis) and Public Tolerance (Y-axis). Source: www.atlasofeuropeanvalues.eu*

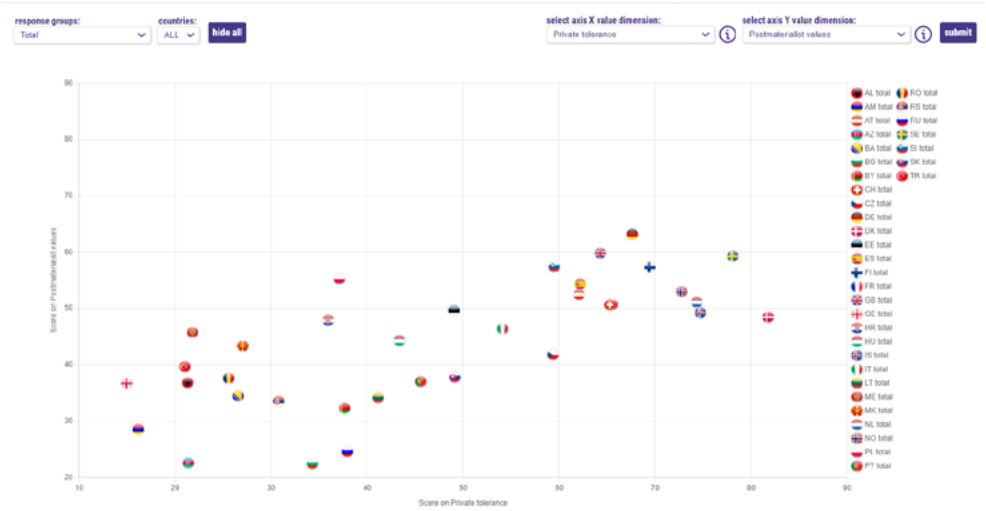

Figure 3: *Values dimensions Private Tolerance (x-axis) and Post-materialism (y-axis). Source: www.atlasofeuropeanvalues.eu*

Teaching about values requires guiding principles that meet the highest standards for values education, consider the most topical research outputs regarding values education,

and take into account the delicate positions in various settings. These principles should provide teachers with insights on how teaching materials can be constructed by the teachers themselves.

A **curriculum framework** facilitates the teacher in this sense and focuses on two key aspects: values clarification and values communication (Pauw, 2009). Values clarification considers opinions people have and why people have similar or diverse ideas about a topic. Values communication is the capability to articulate one's own perspective, listen to other standpoints, and react to them. As described in the Introduction, this is a crucial element of powerful knowledge (Béneker, 2018) and powerful teaching (Roberts, 2017).

Some teachers find it hard to develop their own teaching materials, especially when it concerns controversial issues. Still, teachers remain the hub for values education. As teachers function in different curricular contexts and partly experience an enormous pressure to deliver the curriculum (Krause, Béneker, Van Tartwijk, Maier, 2021; Krause, Béneker, Van Tartwijk, Uhlenwinkel & Bolhuis, 2017; Van den Akker, 2003), it is important to support them in this respect, so that they do not perceive the EVALUE tools as a playground for extracurricular activities but can use them with their regular lesson plans. To this end, in every participating country experts on teacher training contacted a variety of teachers in diverse school settings. In close cooperation with them, and after several stages of trial and improvement, numerous **teaching materials** for the aforementioned five contemporary themes were developed. As teachers lack teaching strategies for values education (Stradling, 1984), a variety of teaching strategies were implemented in the materials, all with proven evidence that they help teachers achieve their goal (Roberts, 2003; 2013; Claes et al., 2017).

In the EVALUE project, curriculum documents of all participating countries were examined to define general and subject-specific teaching aims as labels for a **curriculum matrix**. These labels were subsequently used to tag maps and teaching materials, to make both accessible to teachers in the easiest way possible.

Last, **instruction videos** explain how to work with the offered tools; they specifically describe how the map and scatterplot tool function. The map tool and the classroom tool are available in **nine languages**: English, German, French, Spanish, Dutch, Italian, Slovak, Turkish, and Catalan (with more to come). In this way, teachers and students in these language regions can work with the data at all educational levels, independently of their mastery of the English language.

Experiences by students and teachers

As the saying goes, the proof is in the pudding. So to examine whether the developed tools and materials were helpful, in a first attempt to collect data 25 teachers from Turkey, Slovakia, and the Netherlands were questioned about their experiences during the trials in various ways, such as face-to-face interviews and questionnaires. The teachers were

also asked to collect students' reactions, but only a few responded to this particular request. Teachers' workloads, especially during the Covid-19 pandemic, appeared to be excessive. The main focus of these evaluation methods was to determine to what extent the outcomes of EVALUE contributed to values clarification and values communication. It must be mentioned that due to the pandemic, possibilities for trials were not easy under any circumstances, and were partly done in online sessions.

Teachers in Turkey, Slovakia, and the Netherlands scored the developed materials especially high on their contribution to the expression of students' own attitudes and opinions, dealing with controversial issues and critical thinking, and handling data in different forms. These outcomes were in line with the intentions as formulated in the developed curriculum framework of the project. When asked in more detail, teachers referred to the importance of the offered explanations as values dimensions. A Slovak teacher stated:

> "They helped me fundamentally; they helped me familiarize myself with the topic, I didn't have to look up all the information on the internet. At the same time, the clarity of the explanations had a positive impact on the teaching process."

This teacher is clearly referring to some of the issues that come up when teachers are struggling to teach controversial issues, such as the knowledge aspect (Stradling, 1984). Also, the teacher elucidates that the way in which the information was presented was suitable for knowledge transfer toward students. The latter is confirmed by a Dutch teacher:

> "They certainly got on with it [explanations of the dimensions], and if we are talking specifically about contact and competition theory, they still quoted it regularly. Also when they were arguing. So they applied it, which I think also means that they understood it ... That certainly added something, and they did understand the subject better as a result."

This teacher is not only referring to the value of the explanations purely as information for a better understanding: the statement implies that students were using the information in their argumentation, which is indeed an important aspect in higher-order thinking (Brookhart, 2010). Another Dutch teacher elaborated on the aspect of values communication:

> "We have, for example, adopted the strategy opinion line. Well, in that way you force yourself and the group you're working with to speak out about why they take a certain position. And when you're talking about controversial topics, I think it is important to express why you think a certain way and also to ensure that a discussion can take place – 'Oh, but you think that and I hear you say that, but could you explain in more detail how you see it, because that's what I think'. And yes, in my opinion, when you talk about controversial topics, that conversation should take place, the conversation about why."

This statement indicates that the offered tools function interdependently: the values dimensions and the data in maps or graphs foster the warrant and backing in an argumentation, while the teaching strategies are necessary to elicit discussion and do so in a responsible way, thus tackling some of the difficulties experienced by teachers (Stradling, 1984; Crombie & Rowe, 2009). Enabling participation of students in societal debates in such a way is a key aspect of powerful knowledge (Béneker, 2018).

Teachers refer to the role of data offered as maps and scatterplots (classroom tool). A Slovak teacher states:

> "The teaching materials also develop reading literacy – the ability to understand maps and graphs and interpret data from them very significantly supports communication skills and, above all, the ability to argue."

This refers to the importance of developing literacy and numeracy (Walshe, 2017 and Jones, 2017), to which the materials contribute. A Dutch teacher elaborates on this aspect:

> "This has an added value because pupils, at least in the group with whom I did this, are hardly familiar with it in mathematics, where we would perhaps expect it to be offered as a method for presenting something. At first glance they are amazed that this can be done, that you can compare two variables on the basis of a number of questions and then explain, 'hey, what is your position on this?' They are very impressed by the number of variables that the tool itself offers, so that you can select what kind of groups from which country and with what kind of background and that you can compare with a group average from your country, for example. At first they are very impressed and then a comparison is made very quickly. And of course we also used it in the exchange with those Finnish schools and that is very interesting, because they want to know a lot about each other. What better way is there than to compare them?"

In their comments students also referred to the maps and scatterplots. A Hungarian student, participating in an exchange with Dutch and Turkish students, states:

> "It was new to me because we don't use tools like that, but it helped a lot in learning, they were visual".

Most of the students indicated that they "learned a lot about values and differences between cultures" and, especially in student exchanges, that they "learned what it's like to interact and talk with [people from] other cultures".

From the evaluation instruments it becomes clear that both teachers and students also faced challenges while working with the developed materials and interactive tools on the website. Several teachers indicated that working with the map and classroom tool demanded knowledge on how to handle both tools. Although some teachers mentioned

that students could work with the tools with astonishing ease and use them intuitively, some students indicated that using the tools was new for them as they had not worked with them before. To this end, instructional videos were created to make the tools more accessible for both teachers and students. Another issue for some teachers was that the texts with background information were hard for some of the students to understand. Some adapted the texts by themselves or spent more time than foreseen on the texts in the classroom to make sure that the students understood the information given. Based on this feedback, infographics have been developed to allow easier access to the background information. In other cases, students faced no difficulties with the texts, which indicates that this problem very much depends on the level of the classes. Last, a few teachers mentioned that they underestimated the skills needed to guide the teaching strategies offered in the materials. They argued this was partly the case because they left teacher training years ago and established a teaching routine based on teacher talk supported by PowerPoint presentations and textbook tasks.

To summarize, we can state that with the developed tools and materials, the EVALUE project met its target to support teachers in values education and foster values clarification for students and values communication by students. Some of the difficulties experienced during the trialing phase at schools led to adaptations that are now offered to potential users (instructional videos, infographics). Based on the received feedback, the partners of the EVALUE project want to continue and concentrate on two aspects: how can teachers be supported in using adequate teaching strategies, and how can these strategies be applied successfully in challenging classroom environments (lower level, high percentage of students with a migration background)?

Conclusion

The intention of this contribution was to show how knowledge transforms from the domain of knowledge production (by universities) through recontextualization (by teacher training universities) to secondary schools (horizontal dimension). The starting point was twofold: data and theories about values on the one hand, and the difficulties experienced by teachers in teaching controversial issues on the other. The project European Values in Education (EVALUE) shows how important adequate recontextualization by teaching experts is in supporting teachers to fulfil an important yet challenging task: teaching about controversial issues. It also clarifies that the role of teachers is key in values education, as they have to re-contextualize the offered information and bring it into teaching practice.

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03.

Teacher Beliefs as the Linking Pin between University Policy on Blended Learning and Educational Practice

Chiara Baldo and Jimmy van Rijt

Abstract

Even well before the Covid-19 pandemic, blended learning (BL) was expected to become "the new traditional model" of teaching in higher education (Ross & Cage, 2006; Dziuban et al., 2018). Despite this projection, implementing BL continues to be a challenging process. While BL is reported to have several important benefits over more traditional modes of teaching, such as greater student flexibility, more options for differentiated instruction, and improved student engagement, the adoption of BL modalities largely depends on teachers' attitudes toward BL. In other words, teacher beliefs – what teachers know, think, and believe, as defined by Borg (Borg, 2006) – shape educational practice and therefore the extent to which courses are blended. The potential added value of BL notwithstanding, teachers may reject it if it conflicts with their current ideas on what constitutes good education.

Most universities, Tilburg University included, encourage teachers to think about systematically implementing BL (Bax et al., 2022). As a part of this policy, teachers may be supported in various ways. We argue that more effective forms of teacher support can be achieved if we first gain a clearer picture of teachers' beliefs regarding BL. This way, potential mismatches between university policy on BL and educational practices can be unearthed, and policy and educational support can be improved accordingly. In this contribution we will discuss current research on teachers' beliefs about BL in higher education, providing a theorized rationale for an upcoming research project that explores teachers' beliefs about BL at Tilburg University.

Introduction

Blended education, the combination of blended teaching and blended learning (BL), is complex and multifaceted. A hint to such complexity is given by the fact that, despite relatively close views, academics have not yet agreed on an univocal definition of BL. For instance, Brown (2016) defines BL as the integration of face-to-face and online instructional technologies through purposeful design. To illustrate, according to Brown simply posting the syllabus on the learning management system would not be considered an example of BL, since a purposeful integration of the face-to-face and

online components is lacking. And yet a teacher who sets up a discussion board to link synchronous and asynchronous discussion for before, during, and after class is indeed engaging in blended instruction. Another definition of BL is provided by Boelens et al. (2015), who describe the pedagogical concept of BL as the deliberate combination of online and classroom-based instruction aimed at activating and supporting learning. Compared to Brown's (2016) definition, Boelens et al. (2015) place the accent on the *intended aim* of BL. There are many other definitions of BL in the literature (e.g., Graham, 2006; Garrison & Kanuka, 2004; Torrisi-Steele, 2011), evidencing some ambiguity in terms of what the concept conveys. This poses a challenge for educational researchers, and it has led some to conclude that the pedagogical potential of BL is underused (e.g., Theelen & Van Breukelen, 2022).

Despite differences in conceptualization, researchers regard BL as an innovative approach to optimizing student learning (Köse, 2010). BL has been implemented for over two decades, as multiple elements substantiate its benefits (Vo et al., 2017). First, it allows students to learn at their own pace and to review lessons repeatedly to meet requirements, potentially increasing their engagement and motivation to consume teaching materials compared to traditional teaching methods (Hung, 2015). Second, interactions between teachers and students in the classroom can become more frequent, providing students with more opportunities for reflective knowledge construction and the development of higher-order thinking (Hung, 2015; Kim, Kim, Khera, & Getman, 2014; Lai & Hwang, 2016). Third, the digital environment provides more diverse and accessible content resources for learning while facilitating the development of new teaching strategies geared toward educational innovation (e.g., the flipped classroom model, a method that falls under the BL umbrella) (Hao & Lee, 2016; Hao, 2016). BL does not come without difficulties for teachers though. Given the potential pedagogical difficulties BL poses, in the current paper we will argue that exploring teachers' beliefs is essential to optimize BL. We will first outline the rationales for exploring teachers' beliefs on this topic, then outline a research project that aims to investigate said beliefs.

Teachers' difficulties with BL

There are several reasons why teachers may find BL challenging. First, it considerably alters the logistics of teaching activities and teachers' instructional patterns. Teachers must devote substantial time to redesigning their courses – time that many teachers struggle to find (Wanner & Palmer, 2015). Second, BL may interfere with teaching styles and preferences, which in turn can influence students' learning efficiency (Frunză, 2014). For example, while some teachers may prefer teacher-directed practices, BL shifts the focus to student-to-student collaboration and problem solving. Third, implementation of BL may not receive full support from educational institutions (Hao & Lee, 2016; Wanner & Palmer, 2015).

Many teachers also question the benefits of BL for students and report negative perceptions and beliefs about the use of technology for teaching (Rasheed et al., 2020). For instance,

technology can be seen as a barrier to competency (Pilgrim et al., 2017), making teachers skeptic about online instruction positively influencing learning effectiveness (Lightner & Lightner-Laws, 2013).

For these reasons, and despite its potential added value, teachers may reject BL if it conflicts with their current ideas on what constitutes good education, as beliefs and attitudes about both pedagogy and technology influence decision-making processes. Given that in any educational change process, teachers exert substantial influence (Guskey, 2002), it is important to understand the potential relationship between beliefs and practice as well as the possible internal and external influences that may facilitate or hamper this connection.

Most research endeavors conducted with the aim of exploring BL in higher education focus on students' perspectives, experiences, and outcomes (Brown, 2016). According to the literature review of Torrisi-Steele and Drew (2013), less than 5% of the research on blending in higher education explores academic practice (e.g., teaching, curriculum design, professional development, training for instruction). Little is known on what teachers believe about BL and how that relates to practice, and relatively limited qualitative research has examined their values, beliefs, and experiences in relation to BL (Smith & Hill, 2019). Lei et al. (2018) confirm this view by noting that, although teachers play an important role in fostering flipped teaching (a BL method), the relevant factors that affect teachers' behaviors in conducting flipped teaching have rarely been discussed. Such lack of empirical evidence leaves us with scarce conceptual understanding of how blended instruction manifests as a practice (Brown, 2016). A BL research project (outlined below) will therefore be examining teacher beliefs about BL at Tilburg University.

Aim and context of the BL research project

At Tilburg University, a strategy was adopted in 2021/22 to accelerate the implementation of BL. BL is in fact already being implemented by many teachers across all faculties (e.g., Tilburg School of Humanities and Digital Sciences (TSHD)'s Exploring BL Project). It follows that, by gaining insight into the beliefs that shape teachers' educational practice, Tilburg University's BL-related vision and policies can be positively informed and educational support improved. Only then can teachers be encouraged toward a more meaningful and systematic implementation of BL. The current article aims to set the groundwork to scientifically support the upcoming research into university teachers' beliefs regarding BL.

The upcoming research project, which will be undertaken between November 2022 and October 2023, is part of TSHD's Exploring BL project (Bax et al., 2022). In the project, conducted by the Tilburg Center of the Learning Sciences (TiCeLS), we explore possible difficulties when drafting and rolling out BL-related policies, which can potentially be relevant to the entire university. The BL research project first explores TSHD teachers' general beliefs about BL, focusing on the pedagogical and didactic elements of BL. The project will particularly examine teachers' beliefs about students' motivation to learn and how that perceived motivation is impacted by certain BL pedagogical elements. Motivation

to learn is observed in terms of students' sense of *Relation* (or *Relatedness*), *Competence*, and *Autonomy* (Ryan & Deci, 2000). This will be investigated quantitatively with a survey, to be distributed among TSHD teachers. A qualitative follow-up will comprise interviews with TSHD teachers to gain a deeper understanding of their BL beliefs. The second part of the project will focus on students' perceptions of BL, targeting the same variables (i.e., motivation, relatedness, competence and autonomy). They will be asked about their own beliefs about BL elements they experienced in a particular course, so that we may examine potential mismatches between their teachers' beliefs and their own. To gain a clearer understanding of the relevant variables from the BL research project, we will discuss the current state-of-affairs regarding teacher beliefs about BL, plus examine core concepts that might play a role in the motivation to adopt BL.

Teachers' beliefs about pedagogical and didactic elements of BL: the state of play

This section discusses the existing conceptualizations of teachers' beliefs in literature. Fischer and Hänze (2020) found that university teachers hold two overarching sets of beliefs that impact their practice. First, *transmissive beliefs*, referring to the transmission of knowledge and theory, which in turn impact the quality of instruction. Second, *constructivist beliefs*, referring to clarity of instruction, active student involvement, and rapport (Fischer & Hänze, 2020).

To better appreciate how beliefs about BL are aligned with teachers' performed practice, Deng et al. (2014) classified teachers' beliefs about educational technology into two categories. First, *teacher-centered beliefs*, which stress subject matter expertise and the authority of the teacher. Second, *student-centered beliefs*, which are associated with social-constructivist perspectives on learning and based on which students are encouraged to actively participate in authentic problem-solving (Deng et al., 2014).

Bruggeman et al. (2022) showed how teachers hold an evaluative belief about BL. Evaluative beliefs relate to something as being "good or bad" (e.g., "I believe that BL is a good approach"). Most of their participants believed that BL can contribute to deep and meaningful learning experiences for students. To further illustrate, most teachers apply BL so that contact moments are dedicated to adjusting misconceptions and to developing a deeper understanding of the theory by applying it to practical cases. According to this belief, students construct personal meaning by applying the theory to practical situations. In fact, deep learning draws from a constructivist view of learning that encourages students to go beyond the mere assimilation of theoretical knowledge (Bruggeman et al., 2022).

Two prescriptive beliefs also emerged from Bruggeman et al. (2022). In prescriptive beliefs, a certain action or situation is advocated as desirable or undesirable (e.g., "I believe that BL should include online interaction"). More specifically, their teacher sample stressed the importance of online flexibility and face-to-face interaction. Most participants believed that one of the most important aspects of the online learning environment lies in the flexibility it affords. For instance, the possibility to work with reusable online lesson

packages allows teachers to address students with different prior knowledge. In general, the flexibility afforded in terms of space and times gives students the freedom to get to the core of knowledge in a more open-ended fashion that better suits their individual needs. Still, teachers mentioned that a limitation of the online learning environment lies in its inability to provide an in-depth dimension, a deficiency which is compensated by face-to-face interaction aimed at realizing deep and meaningful learning (Bruggeman et al., 2022).

Motivation to learn

Given the density and complexity of motivation as a construct, this research aims to shed light on three of its dimensions: *relation*, how a blended course design affects the interaction among students and between students and the teacher; sense of *competence*, the ability to adapt and thrive in a BL setting; and last, a sense of *autonomy* as students progress through the course.

Extrinsic and intrinsic motivations are the primary drives responsible for encouraging an individual's creativity and keenness to engage in certain activities, both of which lead to different behaviors and outcomes (Ryan & Deci, 2000). Through his Motivation-Opportunity-Ability (MOA) theory, Lawshe (1945) posited that the occurrence of a specific behavior is primarily influenced by individual characteristics (motivation or ability) and the external environment (opportunity). According to the MOA framework, "motivation" entails behaviors derived from an individual's values and beliefs; "ability" relates to behavioral decisions based on available resources, knowledge, and skills; and "opportunity" refers to behaviors under external environmental constraints (Lawshe, 1945). According to the MOA theory, motivation can directly affect individual behaviors, with ability and opportunity exerting a moderating effect on the behaviors.

Lai et al. (2018) built on the MOA theory to construct a research model aimed at exploring the direct effects and interactions of individual motivation, personal ability, and external opportunities to predict teachers' continuance use intention for BL methods. In their study, where "challenge motivation" refers to the extent to which teachers are keen on seeking complex, difficult tasks (Amabile et al., 1994), it emerged that teachers' challenge motivation is positively associated with continuance use intention for blended teaching methods. The relationship between challenge motivation and continuance use intention for blended teaching is contingent on perceived self-efficacy. Mutual interaction occurs among teachers' challenge motivation, perceived self-efficacy, and supportive blended teaching resources for the continuance use intention for blended teaching (Lai et al., 2018).

"Compensation motivation" refers to the extrinsic rewards provided by the school as compensation for the time and effort expended by teachers on blended teaching tasks, and manifests, for instance, via teachers' concerns about salaries or promotion opportunities while engaging in blended teaching activities (Amabile et al., 1994). Lai et al. (2018) found that teachers' compensation motivation is positively associated with the extent to which teachers are willing to continue conducting blended teaching methods. The relationship

between compensation motivation and continuance use intention for blended teaching is contingent on perceived self-efficacy. When self-efficacy is low, teachers are motivated to continue blended teaching if they are compensated. Conversely, when self-efficacy is high, compensation motivation is not a driver for continued blended teaching. Mutual interaction occurs among teachers' compensation motivation, perceived self-efficacy, and supportive blended teaching resources for the continuance use intention for blended teaching (Lai et al., 2018).

As Brown (2016) explains, the beliefs teachers hold about BL are influenced by both internal and external motivational factors. The theories and models discussed above were therefore used to inform the theoretical framework of the current study by shedding light on how such intrinsic factors (e.g., challenge motivation, self-efficacy) and extrinsic factors (e.g., compensation motivation, opportunity) affect teachers' intention to apply BL methods. With this in mind, it is now possible to explore in more concrete terms some of the beliefs and attitudes that affect teachers' behaviors toward BL with regard to the three aforementioned dimensions of motivation: relation, competence, and autonomy.

Motivation to learn: Relation

Teachers' belief that their relationship with students may shift in the transition to BL can influence their adoption of BL. Interactions between teachers and students in the BL classroom can become more frequent, providing students with more opportunities to develop higher-order thinking (Hung, 2015; Lai & Hwang, 2016). Cheung and Vogel (2013) found that, in a BL setting, students see teachers more as facilitators of learning than as a source of knowledge to rely on. This leads to a common belief among teachers that, through the modification of traditional teaching methods, BL somehow relegates the teacher to the background, as teachers are no longer required to fill class time with lecturing. However, Chen et al. (2014) maintain that one condition BL is premised on is that teachers are not meant to be replaced by flipped teaching. On the contrary, in the flipped classroom model students consume video lessons and reading material before class, which frees up time for interaction and practice during contact time, meaning teachers must assume an even more important role (Chen et al., 2014).

Flipped teaching emphasizes teaching that focuses on student-centered learning and depends on reviving students' learning motivation to help them build learning autonomy. A student-centered classroom relies on multiple teaching strategies, such as small-group problem-solving, cooperative learning, and group discussions. Creating this environment can pose a challenge as teachers may not be sufficiently prepared to apply new pedagogies to support student-centered learning strategies (Kim et al., 2014). Ellis et al. (2006) found that teachers with a more student-centered approach are more likely to cohesively adopt blended instructional practices, whereas teachers with a more teacher-centered approach tend to adopt BL practices in a more fragmented manner. It is important to keep in mind that "student-centered" and "teacher-centered" are not quality labels: one is not necessarily better than the other, the former may just be a more natural fit for adopting BL.

Generally speaking, previous studies have revealed that teacher readiness has a significant, positive influence on the application of innovative didactic strategies to teaching activities (Copriady, 2015). If follows that teachers who are motivated to accept a new challenge, such as adapting to the new interaction dynamics that BL relies on, will be more willing to continue implementing BL (Lai et al., 2018).

When discussing the influences of BL on student-student interaction, synchronicity is an important dimension to remember. BL positions itself somewhere in the middle of the e-learning continuum, which spans from real-time (synchronous) to fully asynchronous interaction. The benefit linked to this midway positioning derives from the fact that synchronous interactions make students feel like participants rather than isolated learners, thus increasing their engagement and motivation. Many teachers who are transitioning from a traditional, fully synchronous teaching practice to a blended one may experience some resistance precisely toward the online component BL relies on. For instance, teachers might believe that BL may lead to what Rasheed et al. (2020) identify as "students' isolation challenges", which relates to the emotional discomfort and isolation students experience when studying online (Kaufmann & Vallade, 2020).

Motivation to learn: Competence

Not surprisingly, technology represents a big influential factor when it comes to the adoption of BL. It is therefore important to also concentrate on teachers' beliefs regarding the link between technology and pedagogy, e.g., their own perceived competence when it comes to the integration of information technology into teaching activities (Philipsen, Tondeur, Roblin, Vanslambrouck, & Zhu, 2019).

The ever-changing nature of technology poses a great challenge to teachers (Copriady, 2015). While implementing BL, many teachers are likely to face challenges such as the need to acquire new technological skills, having to deal with the reconceptualization of pedagogical roles, or having to cope with the risks associated with the delivery of courses in a blended format (Vaughan, 2007). For example, Reid (2014) identifies access to technology, reliability of technology, and the complexity of technology as potential barriers to the adoption of technology for blending. Teachers' beliefs about the usefulness and effectiveness of a technology also inform their decision-making process (Dagada, 2005).

The introduction of new teaching tools may challenge the already well-established teaching and learning expertise of experienced teachers (Rogers & Finlayson, 2004). This is linked to the concept of perceived self-efficacy identified by Lai et al. (2018) as the extent to which teachers evaluate their own capacity to organize and perform tasks in the BL setting. Self-efficacy can encourage or inhibit the internalization and regulation of a specific behavior (Bandura, 1977). Should inhibition occur, a teacher might use a pretext not to perform a behavior (Ryan & Deci, 2000). Conversely, high perceived self-efficacy leads to more active and confident effort (Bandura, 1977). A factor likely to increase the intention to use online tools in the classroom lies in the provision of training aimed at allowing teachers to gain

technological experience and therefore develop technological literacy (Rienties, Brouwer, & Lygo-Baker, 2013).

Among others, Vo et al. (2017) found that BL can better support student learning in STEM disciplines than in non-STEM subjects. More specifically, Arbaugh (2013) observed that STEM students perform better in a BL setting as opposed to the traditional classroom. The main cognitive purpose in STEM subjects focuses on applying and testing ideas with linear argumentation as well as developing problem-solving and practical skills, while non-STEM subjects emphasize intellectual growth including analysis, synthesis, and interpretation of human experiences (Neumann, Parry, & Becher, 2002). This arguably requires more teaching presence in the online environment, compared to STEM disciplines, for more (online) critical discourse to occur (Arbaugh, Bangert, & Cleveland-Innes, 2010). Non-STEM disciplines instructors should therefore pay more attention to the facilitation of constructive and critical online discourses if BL is to engender higher learning quality compared to other modes of delivery. To illustrate, the flipped classroom model places lectures or presentations online while turning "homework" assignments into the on-campus activities. This is more commonly done by STEM teachers, due to the nature of the subjects and because the emphasis is placed on the teacher's role of content expert. Humanities and social sciences teachers who flip their classes also move knowledge transfer online but tend to dedicate on-campus sessions to the consolidation and co-construction of knowledge and meaning via constructive dialogue, with an enhanced role as discourse facilitator (Arbaugh, 2013; Stein, & Graham, 2020). In conclusion, different teaching approaches are required to best support learning in both STEM and non-STEM domains (Vo et al., 2017).

Regardless, BL allows both types of students to maximize the time they spend preparing at home to then bring their opinions, questions, and misconceptions to an arena where they can be addressed in interaction with peers and experts and where co-construction of knowledge and meaning happens. That being said, discipline differences do introduce the need for different teaching approaches. For these reasons, teachers may be hesitant to adopt BL given its unknown effect on their respective disciplines. In other words, the struggles in fully adopting technology for teaching might stem from the perception that educational technology might distract and disrupt instruction and that, in a BL setting, teachers end up with two teaching components to deal with (Rasheed et al., 2020).

The benefits of BL for students have been questioned by many teachers, also along the belief that some students may not have the digital skills needed to manage a technology-integrated environment (Hao & Lee, 2016). Such belief originates from what Rasheed et al. (2020) identify as "technological literacy and competency challenges", which refer to students' challenges regarding proficiency and competency in the effective use of technology for studying. Teachers' concerns may also be linked to what Rasheed et al. (2020) identify as "technological complexity challenges", which refer to students' obstacles when faced with complex or over-sufficient technologies for learning. The risk

involved is that students spend a significant amount of time learning how to use these technologies or get distracted by the innovative characteristics and complexities of the online learning environment to the detriment of learning in the online environment – for example, students could be distracted by technology when educational institutions provide technologies and services that students do not have regular access to in their homes (e.g., high broadband Wi-Fi misused for faster video streaming on YouTube, downloads, and other non-educational purposes). That being said, the authors' distraction-related concerns seem to be more relevant to primary and secondary student populations operating in an online environment while at school (Rasheed et al., 2020).

Motivation to learn: Autonomy

Another belief that can affect the adoption of BL is linked to teachers' perception of students' readiness to cope and thrive in a BL setting. As mentioned, BL practices challenge not only the traditional role of teachers but also that of students. The belief that students are accustomed to passive learning and to the traditional teacher-driven classroom setting may clash with BL's emphasis on teaching that focuses on student-centered learning. Its promise lies in the ability to stimulate students' learning motivation to help them build learning autonomy. BL can in fact lead to learning effectiveness if students take ownership of their own learning. Thanks to the flexibility and autonomy afforded by BL, students are required to self-regulate their learning activities outside of face-to-face sessions. Self-regulation refers to the set of student behaviors that allows them to self-regulate their feelings and thoughts and to plan actions for achieving their learning goals. Teachers may hold the belief that students' potential tendency to procrastinate, lack of self-regulation skills, and poor time management skills result in insufficient preparation for class (Rasheed et al., 2020). Teachers may also be wary of blending out of concern that learners may use most of the time intended for studying in the online environment for other activities (Rasheed et al., 2020). Lack of proper preparation prevents students from engaging in meaningful discussion, performing practical tasks, or meaningfully engaging in peer-learning activities during class time. So, the extent to which teachers are willing to prepare and implement flipped teaching can be influenced by whether they believe their students can handle it.

Gonda et al. (2021) also acknowledge that moving education online seriously tests students' self-regulatory abilities, as it carries the risk of increasing academic procrastination. They argue that it is therefore necessary to adapt teaching methods to the current educational trend so that such methods, in addition to their educational function, support the development of self-regulatory abilities (Gonda et al., 2021). For instance, Gonda et al. (2021) propose a flipped classroom design set up so that students realize that their classroom performance is dependent on their preparation outside the classroom. According to such design, contact hours focus on application tasks, students receive immediate feedback, and their activities are continuously evaluated. The provided knowledge clips do not cover the entire content of the written material, to motivate students to consume both written and video materials. An online forum is available for

students to engage in mutual discussion on how to prepare for a classroom meeting. All questions asked to the teacher outside the classroom are answered in the form of a video recording, so there are no barriers while doing homework. Regardless of which course design or teaching method adaptation is chosen, it has become apparent that, due to the extra flexibility online education affords and the procrastination risks associated with it, implementing BL can be more successful when coupled with strategies aimed at developing students' self-regulatory abilities (Gonda et al., 2021).

Conclusion

Without aiming to be exhaustive, the current article summarizes some of the most frequent beliefs teachers hold about BL, setting the theoretical groundwork for a BL research project at TSHD. Perhaps, not surprisingly, perceptions about implementing this less traditional mode of teaching and learning vary within the teaching community. This ensues from blending education requiring its stakeholders to invest in the development of new teaching and learning strategies and to deal with the risks and opportunities inherent to any educational innovation.

For instance, BL is appreciated for the flexibility it affords, allowing students to review materials at their own pace and time, potentially increasing engagement and motivation to consume the learning materials. Still, this expanded freedom requires the development of students' self-directed learning abilities to counteract the risks associated with procrastination and poor time management. Many teachers also welcome the student-centered approach emphasized by BL, as it potentially allows students to develop a higher degree of autonomy and ownership in their learning process. Student-centeredness likewise affords more frequent and meaningful classroom interactions, in turn leading to deep learning via the in-class application of theory with the support of the teacher and peers. BL may make learning more inclusive by granting students (also those with certain learning disabilities) access to more diverse content resources, in the process fostering differentiated learning.

Teachers are sometimes concerned about the time investment required to redesign their courses and acquire new digital skills, a process that does not always receive the full and necessary support by educational institutions. Blended education can be seen as a disruptive process and the technological component of BL is sometimes perceived as a barrier to competency. Some teachers believe that adopting BL might interfere with their teaching style – where their content expert role is relegated to that of a "mere" facilitator replaced by online resources – and with students' learning preferences and academic success. Indeed, technology can potentially distract and disrupt instruction. And teachers are concerned that online study could lead to a set of challenges related to student isolation, technological literacy and competence, as well as technological complexity.

Investigating teachers' beliefs and attitudes that affect the BL implementation process is fundamental for a conscious, sustainable, and successful placement of BL pedagogy in higher education (Bruggeman et al., 2021). In particular, teachers' beliefs about students' sense of relation, competence and autonomy in BL contexts would have to be examined to gain a more or less complete picture of the relevant dimensions of implementing BL. The upcoming BL research project therefore has the potential to improve BL teaching practices at Tilburg University.

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04.

Serious Games for Intercultural Skills - Harnessing Horizontal and Vertical Asymmetries in Expertise and Diversity across the Curriculum

Michael Bender en Thorsten M. Erle

Abstract

Master's students often have limited opportunities to apply the expertise they develop, and when it does happen it usually is within their own group (i.e., their course peers). They are rarely challenged to instruct, moderate, or coach others. Similarly, local and international Bachelor's students hardly interact with one another to practice intercultural communication skills, as also recognized by elected representatives (i.e., school council). There clearly is untapped potential for meaningful intercultural contact to develop intercultural communication skills. We therefore set up a vertical (Master/Bachelor) and horizontal (Bachelor/Bachelor) structural interaction between local (Dutch) and international Bachelor's courses and a Master's level course. Students meet in newly designed roleplaying exercises to build basic intercultural skills relevant for their future careers by interacting with horizontal peers from diverse backgrounds. The exercises take place in specific negotiation and mediation settings to ensure that learning transfer can occur (i.e., applying knowledge). These games are facilitated by Master's students who received additional training, so they can apply and develop their advanced intercultural skills and group management expertise in a real setting, with real cultural diversity (vertical peers). We have executed this practical course element for two years in a row, initially in an online-only format (20-21), then in a blended course with in-person game sessions (21-22). We report on the development, uptake, and effectiveness of these exercises, and discuss their potential and importance within modern curricula.

Introduction

We set out to improve the educational experience for our students and tackle two specific problems. First, students need more and qualitatively richer practical, job-relevant training in 21st century intercultural skills. Second, international and local students have little contact with each other, which is necessary to reap benefits associated with internationalization at home and study-abroad programs. To address both issues, we developed a structure that brings together both horizontal and vertical peers in roleplaying exercises. Horizontal peers (HPs) are students of the local and international Bachelor Psychology, with one group mainly comprising Dutch students and another students from predominantly other

(European) countries.[1] Vertical peers (VPs) to these groups are Master's students in the Master Work and Organizational Psychology.

The courses involved are the second-year Bachelor's courses Cultural Psychology (local #500188 and international variant #500308) and the Master-level course Work Group Psychology (#500841). This ensures that the specific type of skills training (i.e., intercultural skills, team supervision, facilitation) is closely linked to the course goals.

Why trainings? Preparation for professional growth

To increase the job prospects of our future graduates, we aimed to provide them with more opportunities to train relevant professional skills. Intercultural skills trainings, such as roleplaying sessions, develop two types of skills in particular: learning and innovation skills (critical thinking, problem solving, communications, creativity, innovation) and career and life skills (collaboration and teamwork, leadership and responsibility, initiative and self-direction, flexibility and adaptability, social and cross-cultural interaction, career and learning self-reliance, productivity, accountability) (Kivunja, 2014a; Lamb, Doecke, & Maire, 2017).

Intercultural skills do not develop automatically through intercultural exposure, but only when structural efforts are made by an institution (such as Jacobs University Bremen, one of the most international universities in Europe) (Binder, 2018). Experiencing structural support is especially important for positive acculturation trajectories of international students (Bender, Van Osch, Sleegers, & Ye, 2019). However, at TiU there was no structurally organized contact between international and local students at the Bachelor's level as part of the curriculum. Student representatives in the School Council and the Program Committees of the Bachelor's programs also expressed their desire for increased interaction between the groups.

For international students, such exercises allow for the development of relevant intercultural communication skills (e.g., language skills). At the same time, they provide Dutch students with the opportunity for internationalization at home, which may otherwise be difficult due to financial, motivational, or administrative barriers (e.g., curricular interference with going on an exchange; EUROSTUDENT; Macready & Tucker, 2011). Additionally, for Bachelor's students of both programs, seeing their VPs "in action" will provide them with first-hand experience on educational activities in the Master's program, giving them a clear prospect of their skills development.

Similarly, students of the Work and Organizational Master's program learn about team supervision and group management skills but have little opportunity to apply these skills, another educational demand that we fulfilled with this project. Master's students became

[1] A proportion of students in the international program is also Dutch, but self-selected into an international, English-language program.

facilitators of the roleplaying exercises with real mixed multicultural teams, foreshadowing later activities in their professional careers (e.g., as a consultant, trainer, coach, advisor, team lead). Facilitators prepare teams, display leadership/organizational skills, and attend to diversity-related issues. Previously, these skills were only theoretically taught as part of the curriculum, but the present exercise also forces students to apply them.

Although group exercises can facilitate the development of interpersonal skills, cross-cultural collaboration, and higher-level learning (Sweeney, Weaven, & Herington, 2008), their effectiveness depends on the structure into which they are embedded: facilitators need to prepare, coach, and debrief the group work to reap those benefits, particularly where diversity in cultural background is concerned (Kivunja, 2014b). We therefore used a close supervision design to (a) prepare Master's students for their team facilitation (pre-training exercises, lectures), (b) allow for reflection (course assignment); and (c) provide in-course supervision on challenges and learning experiences between exercises. For the Bachelor's students we planned a longitudinal design to test whether key aspects improve after the exercises, where we focused on intercultural skills which synergistically represent a crucial element of the HP interaction (see also Schnabel, Kelava, Van de Vijver, & Seifert, 2015). We implemented peer feedback, which is increasingly used as a supplement for examination (Freeman & Parks, 2010; Li et al., 2016); peer involvement promotes quality feedback (Liu & Carless, 2006). Last, we stressed that these exercises are not only for the benefit of Bachelor's students but also relevant for the course progress of Master's students, to increase collegiate cooperation between HPs and VPs.

Exercise materials

We designed a new mediation and negotiation game, for which all materials are openly available (https://osf.io/8f4vs/). The games were inspired by the classic works on intercultural communication by Deardorff. The first game serves as a warm-up, the second is a more complex challenge (e.g., via communicative roles, norms, negotiation strategies). Both games provide ecologically valid and credible conflicts, and team instructions that make resolution of the conflict during the roleplaying game unlikely, because ending the game is undesirable as the focus lies on facilitating interaction.

Experiential learning activities are full of surprises and challenging for (student) facilitators (Austin & Rust, 2015). Careful guidance is therefore necessary, reinforcing that this is supposed to be a difficult, real-life task; that mistakes are learning opportunities; and that their peers are the most forgiving interaction partners they will ever experience. For both games, we created learning materials for both Bachelor's and Master's students, including a 'living check list' to facilitate learning experiences from a student-centric perspective. Items include the avoidance of cognitive biases (e.g., ethnocentrism), procedural obstacles (e.g., turn-taking), and ensuring basic communication (feedback rules). Peer feedback matrixes and questionnaires were also developed. Table 1 shows a schematic timeline of the materials development process for academic year 2020/21, to facilitate planning of similar activities.

Table 1. *Schematic process across the courses (example courses academic year 2020/21)*

Stage	Start	End	Activity
1 Preparation	1-Jun-2020	1-Sept-2020	Development course material, learning goals, roleplaying games, assessment
2 Implementation	1-Sept-2020	31-Oct-2020	*Start Courses* Pre-assessment of skills (Bachelor) Lectures and working groups (Bachelor + Master)
3 Assessment	1-Nov-2020	1-May-2021	Post-assessment skills (Bachelor) Focus groups (Bachelor + Master) after working groups Debriefing (project team)
4 Dissemination	01-May-2020	31-Oct-2021	Analysis Report Dissemination TiU, Netherlands, Europe

Note. The academic year started on 01 September 2020.

In terms of the Tilburg Educational Profile (TEP), such games contribute to the development of skills as they translate theory into practice. They are not only motivating, but also provide a chance for problem-based learning (Hmelo-Silver & Barrows, 2006; Groves, 2005; McParland, Noble, & Livingston, 2004). This enhances cognitive immersion and perspective-taking, a cornerstone of intercultural competence (Schnabel et al., 2015). Theoretical content applied in new, interactive settings is typically processed at a much deeper level (Marton & Saljo, 1976; Biggs, 2003; Entwistle, 1981; Ramsden, 2003), and contributes to active learning beyond content (*character* in the TEP).

Roleplaying exercise #1

The first game was used as a warm-up (in year 20/21) for participants to understand the basics of a roleplaying exercise. The content was relatable for students in the international and local Bachelor's program: as part of the introduction of new students, associations ask for funding and university support, and, most importantly, volunteers for introduction (TOP) week or a new buddy system. They were tasked to play three different roles: an international student association (arguing for the buddy system; international HPs); a Dutch student association (arguing for the TOP week: Dutch HPs); and a group of university representatives as mediators (VPs).

Roleplaying exercise #2

The second game is more demanding, has a stronger cultural focus, has been used across all years, and will be used as the main game in the future. A fictitious company ("OSAM") needs to appoint a new leadership position. Two divisions of the company (European – the Dutch HPs; Asian – the international HPs) have different priorities (and communication styles) as to how to fill this position but need to agree on the appointment (for the benefit of the company as a whole). The VPs again facilitated the exercise.

Implementation

Participants received a general scenario description beforehand, which was also repeated by the facilitators at the beginning of the exercises. The teams had about 10 minutes to study additional and exclusive information about the scenario before the first half of the roleplaying exercise started (lasting around 15 minutes). After this period, the facilitators could interrupt the game for a timeout, a first moment to probe how the interaction between the two teams are going. After the second half (again after about 15 minutes), the HPs reflected together on their communication and negotiation skills during the exercise, while the VPs guided them toward insights about how they made or did not make use of intercultural skills during the negotiation. In addition to this important experiential debriefing, we included peer assessments about the roleplaying exercise after the game concluded, testing students' perceptions of the learning outcomes as well as their preparation for the session. All steps of this procedure were documented for the facilitator in an overview document (see https://osf.io/8f4vs/).

Implementation challenges

The main challenges encountered during the first iterations of the exercise were implementation in online and offline settings, and imbalanced course sizes. The exercise was first implemented online (due to pandemic lockdowns), and only later on campus. Online environments are less conducive to student immersion (e.g., due to malfunctioning Wi-Fi connections), while also affecting communication independently of intercultural and group processes (e.g., due to muted microphones/deactivated cameras). For on-campus implementations it is important to note that the exercise needs to be scheduled and rooms need to be booked early, as facilitation in the past occupied up to 20 classrooms simultaneously. While the exercise was similarly evaluated in online and offline environments (see Tables 2-3), we recommend an in-class format for optimal experiential learning; this obviously necessitates more planning.

For imbalanced group sizes, the developed materials proved to be very flexible. With a low number of Bachelor's students, for example, the first game can be used to train the facilitators (as done in 2021/22), or multiple Master's students can be assigned to facilitate the same session (as done in 2020/21). Similarly, for a low number of Master's students, more Bachelor's students can be assigned to each game session or each Master's student can be asked to facilitate multiple games. The number of HPs that participated in the exercise ranged around 180-300 Bachelor's students and the number of VPs ranged around 40-60 Master's students, and in all iterations of the exercises it was possible to create an adequate matching of students. The developed materials can thus be used in a variety of educational contexts and class sizes, and this challenge should not discourage use of the developed materials.

Exercise effectiveness and reception

To assess effectiveness of the exercises, we used a pre-/post-assessment to inspect the development of intercultural competence. We collected peer ratings of the exercise and conducted a focus group to collect insights into the activity and its reception.

Development of intercultural competence

For the pre-/post-assessment of Bachelor's students' intercultural skills we split the sample into before (50%) and after (50%) the exercises. The split was designed to somewhat disentangle effects of familiarity with the testing material. Participation rates were too low to be conclusive. There was no significant effect of the training ($t(42) = 1.159$, $p = .253$, $d = 0.077$), but for the whole course, differences between T1 ($M = 4.73$; $SD = 0.62$) and T2 ($M = 4.82$; $SD = 0.59$) were statistically significant, suggesting a training effect ($t(137) = 2.019$, $p = .045$, $d = 0.172$).

Exercise reception: Peer ratings

Students rated their peers' preparation, activity, and contribution as very high across years (around 8 on a 10-point scale), and ratings by the facilitators corroborate that impression (impression management is not a concern for them). Students were not considered to be as familiar with the relevant cultural knowledge to portray the team they represented (around 6 on a 10-point scale). Open-ended responses by Master's students about the exercise were also very positive and indicated that the exercises were seen as relevant to future career prospects. Table 2 summarizes HP ratings of the respective other team, and Table 3 summarizes VP ratings of all HPs.

Table 2 *Means (and standard deviations) of peer evaluations by the respective other team*

Item	Academic year 2020/21, Game 1		Academic year 2020/21, Game 2		Academic year 2021/22, Game 2	
	Dutch students (*N* = 75)	International students (*N* = 65)	Dutch students (*N* = 72)	International students (*N* = 57)	Dutch students (*N* = 75)	International students (*N* = 74)
The team has read the syllabus and had knowledge on the scenario of the game.	7.51 (2.13)	7.51 (2.33)	8.32 (2.03)	8.60 (1.33)	7.63 (2.33)	7.53 (2.46)
The team showed relevant background knowledge of Cultural Psychology.	6.15 (2.29)	5.49 (2.19)	6.61 (2.26)	6.29 (2.20)	7.60 (2.01)	7.19 (1.56)
The team actively participated throughout the whole session.	8.03 (2.07)	8.35 (1.72)	8.49 (1.70)	8.61 (1.72)	8.77 (1.56)	8.38 (1.84)
The team worked and coordinated well together.	7.51 (2.29)	7.80 (1.79)	8.04 (1.83)	7.96 (1,69)	7.94 (1.73)	7.78 (1.62)
The team worked and coordinated well together.	7.51 (2.29)	7.80 (1.79)	8.04 (1.83)	7.96 (1,69)	7.94 (1.73)	7.78 (1.62)
The team contributed to the achieved outcomes of the game.	7.91 (1.70)	7.85 (1.87)	8.07 (1.92)	8.07 (1.54)	8.40 (1.82)	7.85 (1.73)

Notes. All ratings were made on a scale from 0 (completely disagree) to 10 (completely agree).

Table 3 *Means (and standard deviations) of peer evaluations by the facilitators of the session*

Item	Academic year 2020/21, Game 1		Academic year 2020/21, Game 2		Academic year 2021/22, Game 2	
	Dutch students (*N* = 38)	International students (*N* = 38)	Dutch students (*N* = 37)	International students (*N* = 37)	Dutch students (*N* = 36)	International students (*N* = 36)
The team has read the syllabus and had knowledge on the scenario of the game.	6.84 (2.47)	7.00 (2.56)	8.03 (1.52)	7.89 (1.69)	5.86 (2.89)	6.42 (2.22)
The team showed relevant background knowledge of Cultural Psychology.	6.35 (1.65)	6.24 (1.96)	6.95 (1.69)	7.21 (1.61)	7.28 (1.78)	7.11 (2.00)
The team actively participated throughout the whole session.	8.24 (1.69)	8.51 (1.54)	8.37 (1.62)	8.08 (1.51)	9.00 (0.99)	8.50 (1.75)
The team communicated appropriately.	8.24 (1.53)	8.57 (1.28)	8.03 (1.52)	7.89 (2.06)	8.39 (1.25)	8.03 (1.60)
The team worked and coordinated well together.	7.81 (1.65)	8.14 (1.48)	7.76 (1.62)	7.66 (1.94)	8.19 (1.47)	7.25 (2.58)
The team contributed to the achieved outcomes of the game.	8.14 (1.69)	8.43 (1.50)	8.18 (1.35)	7.82 (1.45)	7.97 (1.48)	7.72 (1.73)

Notes. All ratings were made on a scale from 0 (completely disagree) to 10 (completely agree).

Exercise reception: Focus groups

Focus groups were held after the course (academic year 2020-21), about the entire course (including the exercises). To facilitate students speaking freely, and to protect their identity, we did not record or take notes during the session. Notes of the major points were taken after the session. Students:

- appreciated the contact between local and international students as a learning experience.
- commented that those peers dissatisfied with the exercises invested little time.
- complained that their peers did not show up for sessions they signed up for, recommended making the exercises mandatory.
- appreciated that there was connection between courses (Bachelor/Master), which is not self-evident from the curriculum.
- mentioned several areas for specific improvements (e.g., seeking more information ahead of time; implemented in 2021-22)

For further details on student perspectives on the roleplaying exercise, listen to the podcast episode "Serious games for intercultural skills" by the Educational Innovation Lab (EDUiLAB) of Tilburg University.

Discussion

An interactive classroom is an integral part of teaching, particularly when naturally occurring interaction is structurally limited – be that due to pandemic constraints or structural lack of opportunities between student populations. This particularly applies to internationally oriented universities: > 4.5 million tertiary students worldwide are enrolled outside their country of citizenship, with numbers increasing every year. In 2016-17, an all-time high of 112,000 international students (11.4% of all students) were enrolled in the Netherlands (Huberts, 2017). Future graduates – both local and international – require more intercultural skills than previous generations, and the students, as expressed by the School Council of TSB, recognize this.

Providing both local and international students with 21st century skills, particularly intercultural skills, is an opportunity the Dutch educational context has long been aware of. For local students, studying abroad is not always feasible, and for international students skills acquisition is not automatic. Diversifying learning experiences without moving (i.e., internationalization at home) can contribute to skill-building elements in curricula (beyond the present courses),[2] allowing for the application of relevant theories that are taught as part of one or multiple courses.

[2] The first author designed a video conference course with Dutch (in Tilburg) and Peruvian (in Lima) students, with learning goals centering around appropriately communicating across technical boundaries (video conferencing) and cultural differences (see Transfer, 22 (6), 14-16 and Transfer, 22 (4), p. 26).

To teach those skills, we recommend making use of the existing, untapped diversity in student backgrounds. Involving individuals with diverse cultural backgrounds means that we not only make the cultural skills exercises more lifelike; they will have a meaningful real component that course participants will relate to, in an educational context that is supervised and as safe as possible, offering opportunities for learning. Bringing HPs together to achieve this was a logical and cost-neutral step. The connection to VPs is novel and promising. Master's students have more training and can apply the expertise they have gathered when supervising and instructing their VPs, and they engage and work with actual diversity (between the local and international HPs), which reflects experiences in multicultural teams. Bachelor-level students receive more training and develop their skills, and see their VPs and potential role models in action, which provides them with a clear picture of their educational opportunities, increasing clarity and motivation.

Practical exercises that capitalize on student imagination, experience, and involvement are posing an ever-changing context in which students infuse their knowledge into the classroom as they interact with scenarios we designed, and apply what they've learned to dynamic lifelike situations. We see students engaging with the roles and growing beyond the presented content to develop skills and attitudes.

Although much can be done to improve the efficiency of the procedures in the long term and boost student involvement, there is also increasing interest in these types of exercises, which focus on translating knowledge students have developed into action and present them with cases or even practical challenges of actual companies they are interacting with (e.g., via the matchmaking company Master Challenge[3]). We therefore believe that to teach 21st century skills to students, teachers should also adopt 21st century teaching methods, involving blended, experiential, and challenge-based learning.

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[3] The first author and Djurre Holtrop collaborated with https://masterchallenge.me/ in their course Diversity and Inclusion at Work (#575039) to pair student consultant teams with companies' actual diversity challenges.

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Appendix: Supplemental Materials on OSF

- General OSF project website: https://osf.io/8f4vs/
- Syllabus Working Groups Dutch: https://osf.io/ehts2/
- Syllabus Working Groups English: https://osf.io/rxgep/
- Canvas guidelines for students: https://osf.io/xwcv7/
- Canvas + Zoom guidelines for trainers: https://osf.io/3anf8/
- General guidelines for trainers: https://osf.io/tf6jq/
- Presentation slides for train-the-trainers session: https://osf.io/txgzy/
- Materials for roleplaying exercise #1 "Buddy Project":
  - Trainer instruction: https://osf.io/gx3nt/
  - general scenario description: https://osf.io/zhsg4/
  - team #1 instruction: https://osf.io/4jp7q/
  - team #2 instruction: https://osf.io/cx5sz/
- Materials for roleplaying exercise #2 "OSAM":
  - Trainer instruction: https://osf.io/u4y2d/
  - general scenario description: https://osf.io/e6w72/
  - team #1 instruction: https://osf.io/ahe86/
  - team #2 instruction: https://osf.io/2n47w/

Note: the material included on the OSF website is the material used for academic year 2020-21. Updated material for the blended course in 2022-23 will be added in the future to the OSF page.

05.

Virtual Team Teaching

Gerwin van der Laan and Ellen Dreezens

Introduction

Among the challenges facing higher education are the selection of appropriate pedagogy to foster understanding of grand challenges among students, and the decision of which elements to retain in post-pandemic online education. This paper analyzes these two challenges and makes a case for "virtual team teaching", an online pedagogy suitable to teach topics that require the study of multiple disciplinary perspectives. The paper derives insights from semi-structured interviews and prior work to build a case for virtual team teaching in higher education.

The first challenge for higher education is to analyze the multidisciplinary complexity of grand challenges or wicked problems (Nowell et al., 2020). National and international initiatives, such as the Dutch National Research Agenda (NWA) and the UN Sustainable Development Goals, steer academic research and education toward addressing complex societal problems, often requiring an interdisciplinary approach. Academic degrees are likewise introduced or reoriented towards multidisciplinary. For example, Tilburg University offers 70 academic Master's programs/tracks on its website (Tilburg University, n.d.). These programs describe their core identity on the university website in around 50 words. Already in these very brief statements, 26 programs (37 percent) explicitly present themselves as combining insights from different perspectives.

The challenge for such multi-perspective programs is to explicitly connect disciplines, integrating rather than presenting them alongside each other. A specific pedagogy to achieve an integrative analysis of multiple perspectives is team teaching, in which two teachers from different academic disciplines are jointly responsible for a course. Davis (1995) categorizes different team-teaching approaches on a continuum. At one end is the serial arrangement in which the course focuses on multiple perspectives, but teachers teach consecutively, each taking several lectures. This is called a *rotational* approach to team teaching. At the other end of the continuum are teachers who plan and implement a course together, using a *collaborative* approach (Deighton, 1971). Here the instructors work far more collaboratively throughout the process. They plan, grade, and participate in class sessions together (Paul & McAndrews, 1991). Even in the collaborative approach, rotational elements prevail: one lecturer is in the lead while another follows. Positions change throughout the semester.

The second challenge revolves around the possibilities of online education for higher education. While a marginal element in most institutions until the early 2020s, the Covid-19 pandemic implied a major push in the diffusion of online delivery of course content (Nikdel

Teymori & Fidel, 2020). Education before and during the pandemic represents endpoints of an underlying curriculum, varying from fully on-campus to complete online delivery.

Initiatives now arise to design courses in-between these endpoints as teachers ask what elements of online education constitute effective means to realize learning objectives. Even if teaching from behind a computer screen is not required from a public health perspective, online elements continue to have a place in courses and curricula (Van Lenning & De Regt, 2022). These questions revolve not only around which learning objectives are fostered with online tools, but also around the pedagogies employed to reach the objectives. For example, while knowledge clips may be a replacement for knowledge transfer in lectures, they are not suitable to be replaced in class discussion.

This paper contributes an initial case for virtual team teaching, i.e., team teaching online, and proposes contexts in which virtual team teaching may be particularly useful. How does technology foster the realization of learning objectives that would be more difficult to attain offline? Can subsets of students for whom it is challenging to join in a traditional course be offered (more meaningful) education through virtual team teaching? Is there a case for implementing virtual team teaching instead of traditional forms of team teaching in analyzing grand challenges? This paper studies the intersection of the two trends: the increasing interdisciplinary complexity of wicked problems and the enhancement of using online, educational pedagogies.

The empirical context of his paper is University College Tilburg, which offers a Liberal Arts and Sciences Bachelor program. There are 65 courses on the program, 30 of them team-taught. Of these 30, nineteen correspond with the description of the rotational approach and eleven with the collaborative approach. In this text we focus on the collaborative type. The teachers involved in these courses were all confronted with the need to transition to virtual team teaching in the spring of 2020, when the Dutch government closed (large parts of) higher education to slow down the then-nascent pandemic. In October 2020, the directors of the Liberal Arts and Sciences Program interviewed the teachers involved in team teaching. The summaries of these interviews served as the source material for this paper. After a brief reference to literature on team teaching, we discuss the practice of team teaching within the Liberal Arts and Sciences program of University College Tilburg.

Grand Challenges and Team teaching

The term “grand challenges” can be traced to the turn of the 20th century, when German mathematician David Hilbert formulated mathematical problems that were perceived as obstacles to advancing the sciences (George et al., 2016). Solutions to these challenges would encourage further breakthroughs in adjacent fields. The concept has evolved to include problems that transcend national and disciplinary boundaries. According to Ferraro et al. (2015), grand challenges are characterized by their complexity, uncertainty, and evaluative elements. Poverty and climate change are only two examples of topics that meet the criteria; more broadly, it could be argued that the UN Sustainable Development

Goals are grand challenges. For a paper on teaching, it is relevant to note that grand challenges are complex in the sense that a single individual cannot assess all the relevant aspects of the problem. They are uncertain even to the extent that not only is there a wide array of possible scenarios, but also that many of the scenarios are unknown. They are evaluative in the sense that an individual may experience a value conflict when assessing a grand challenge from different perspectives, and the evaluations of the proper course of action derived from these conflicting values may evolve (Ferraro et al., 2015). Courses on specific grand challenges thus need to bring together multiple disciplines and invite learners to reflect on their own (multiple) positions.

Unfortunately, higher education institutions have not developed the structures required to teach students to address grand challenges. Michael Crow, former president of Arizona State University, coins the dominant form of organizing a "differentiation model" (Crow, 2010): particularly research universities have created a departmental structure which facilitates specialization rather than reaching out to different disciplines. In an effort to differentiate schools from their national and international "competitors", specialization in niches and school-centrism was emphasized even more (Crow, 2010). Although the study of grand challenges demands in-course integration, Liberal Arts and Sciences programs with their focus on integration of disciplines in the curriculum may provide an interesting exception to this trend of specialization. Indeed, offering multiple perspectives in a single course is a more advanced form of integration of disciplines compared to offering multiple courses each focusing on a different discipline (Skorton & Bear, 2018), a format in which students are tasked with connecting the disciplines across courses themselves.

A specific way to meaningfully connect various academic disciplines is team teaching. When two teachers present a topic from different viewpoints, students gain knowledge and skills from multiple perspectives simultaneously (Crossman and Behrens, 1992). Students are likewise encouraged to integrate perspectives and assess where positions differ and whether/how they can be reconciled. Because both teachers are present, this allows them to respond directly to each other's ideas.

Team teaching not only promotes teaching multiple perspectives, it also increases dialogue and encourages student participation (Anderson & Speck, 1998). Team teachers confront students with a topic that can be analyzed from multiple disciplines, share their (divergent) interpretations of this topic, and investigate in front of and with the student audience which disciplinary assumptions cause their interpretations to differ, or seek ways to integrate the perspectives. The teachers show in front of students how an academic debate is conducted: which types of arguments are valid, which customs apply to social interactions in such debates? Seeing a discussion between teachers take place shows students that academic positions are open for discussion, and the behavior of the team teachers strengthens students' ability to participate in academic debates themselves (Colby & Rice, 1971; Hale & Klaschus, 1992). Hence team teaching produces a climate in which students are invited to join the debate with the teachers, emphasizing active and

participative learning. In the context of grand challenges, students are actively challenged to evaluate their own positions, making team teaching particularly suitable for the study of such topics.

Benefits of team teaching accrue to the teachers too. A team-taught class may provide more intellectual excitement. Particularly in differentiated university education (cf. Crow, 2010), team teaching may facilitate the professional development of the involved teachers (Crawford & Jenkins, 2017). By jointly preparing courses and classes, lecturers may discover new pedagogies that contribute to their teaching skills set (Haddon, 2011).

The main drawback of team teaching is the time investment required. The course planning must be done in full cooperation, to avoid confusion among students and misunderstandings between teachers. Students must be explained how the course is set up and what the teachers have in mind. Some students will have to get used to this way of teaching and might find the structure, alternating between different worldviews, confusing. The teachers can remove this confusion by explaining the classification and the coherence of the topics in advance, which is time-consuming (Leavitt, 2006).

Online Education and Virtual Team Teaching

Distance education emerged in the second half of the 20th century as a method to allow groups lacking access to university campuses to enjoy education, and as a means to cater to student groups larger than what lecture halls could accommodate. Bernard et al. (2004) conducted a meta-analysis on the effectiveness of online education, which included 232 empirical studies. They concluded that effect sizes were near zero on average, suggesting that distance education is neither better nor worse than classroom instruction. Moreover, the study found a wide variety in effect sizes: for some studies digital education far outperformed traditional education, but other studies found the opposite effect. Positive effects on the realization of learning objectives and student attitudes toward the course were particularly likely for asynchronous distance education. In asynchronous distance education, the technology allowed students to access the material at different moments in time. Bernard et al. (2004) thus suggests that for some courses, digital education may indeed be more effective than traditional instruction.

The Covid-19 pandemic implied a major boost to online education. Online education was implemented not because of considerations of optimal course design, but instead because public health concerns necessitated on-campus education to be locked down. Extending the argument of Bernard et al. (2004), some courses would fare less well online and the post-pandemic push to resume on-campus education is understandable. For other courses, lecturers may have been forced to develop new modes of delivering the course material, in the process discovering that online tools could indeed be valuable toward realizing the course objectives. A complete overview of which online elements to retain is beyond the scope of this paper (see Van Lenning & De Regt, 2022). We do wonder, however, whether the online environment offered team-taught courses possibilities to improve student learning.

An Empirical Exploration of Virtual Team Teaching

In the University College Tilburg definition, team teachers present at least half of the classes together. They jointly prepare and deliver the lectures and assessment of the course, and sometimes jointly provide seminars, tutorials, or lab sessions as well. Eleven courses meet this definition of team-taught courses in the Tilburg Liberal Arts and Sciences program. Therefore, eleven interviews were held to answer two questions: how was team teaching organized before Covid restrictions were imposed, and how did the transition to online team teaching go? While the interviews imply a census of team teaching at University College Tilburg, the methodology is open to challenges, hence it allows only exploratory inferences. For example, there were six interviewers involved who set out to answer two broad questions, therefore consistency in how the interviews were conducted was not ensured. The academic value of the summaries was only discovered after the interviews were aggregated; initially, program management had policy intentions when commissioning the interviews. With the above limitations in mind, the interviews yielded several interesting observations.

First, the interviews reiterated benefits and drawbacks mentioned in the literature reviewed above, regarding team teaching in general. The interviewees appreciate that team teaching is a natural means to communicate contrasting perspectives: it gives a voice to individual perspectives, and the personification of perspectives helps get the message across. Team teaching also demonstrates to students how an academic discussion is to be conducted and encourages student participation. Team teaching allows improved class management, as while one teacher interacts with the students the other can attend to how the interaction is received (cf. Flanagan & Rolston, 1983). The main drawback to team teaching remains the time investment required from teachers. In the interviews two additional risks were mentioned. First, too much discussion may lead to relativism: if any position can be debated, is science just another opinion? Second, teachers may get caught up in their discussion and build arguments that do not align with students' abilities. These two risks are to be avoided when delivering a team-taught lecture.

The above benefits and drawbacks apply to virtual as well as traditional team teaching. The online environment opens up new possibilities to lecturers and presents additional challenges.

First, teachers experienced that attention span and energy differed from an in-class context. Virtual team teaching, much like other forms of online education, requires teachers to reconsider how class activities are spread out over the scheduled hours. Also, virtual team teaching necessitates student preparation. Similar to an in-class context, lower student preparation reduces the effectiveness of the class, but the shorter attention span in online classes is likely to amplify the effect of preparation on class effectiveness. Teachers often opted to organize knowledge transfer in videos made available before class, although others also continued to rely on course readings to communicate content. Organizing disciplinary knowledge transfer in videos allows teachers to focus on integrating disciplines

in the online session. A tool used to enhance preparation is to ask students to submit questions or assignments before the online session, with these questions or the answers to assignments taking center stage. In larger courses, online survey methods or small-scale meetings in prior tutorials may be effective to harvest students' views.

Second, the class management advantage of team teaching was also mentioned for virtual team teaching. Online platforms often facilitate different modes of communication, and while some students prefer to be seen and heard, others favor written communication via chat messages. While for a single teacher the different communication modes may slow down the class, the presence of two teachers allows one to take the lead in the spoken conversation as the other monitors written contributions. The team teacher tasked with (temporarily) monitoring the written messages may mediate between those contributing in writing and the "main" discussion, filtering when required. In this way, virtual team teaching may invite students to participate who would otherwise fear the spotlight of the class discussion or who need more time to find the right words for their thoughts. This adds potentially unique student perspectives, thereby creating a more complete overview of how students evaluate aspects of the grand challenge being addressed in class.

Third, an online environment facilitates the use of tools not available in a traditional classroom. Interviewees mentioned using shared whiteboards, word clouds, polls, and quizzes, both planned and on an ad-hoc basis. Also, break-out rooms in which subgroups discuss before bringing the arguments into a plenary discussion were mentioned – both with or without guidance by a teacher. Particularly in larger courses, where students may be more eager to participate, parallel break-out rooms may be set up within seconds. While team teachers may also moderate subgroups in offline team teaching (Beate & Simons, 2016), an online environment allows for a larger number of break-out rooms. Two interviewees reported, for example, breaking up a group into up to 25 parallel groups of three-to-four students, which then becomes a safe place to try out students' ideas in a group of peers. To kickstart the plenary discussion, breakout room representatives are asked to enter the result of the group discussion on a common whiteboard or on a website, which creates a real-time word cloud. Virtual team teaching thus allows for a superior overview of students' personal beliefs and, consequently, a connection to them. Although there are downsides to this too, teachers interested in the population distribution of answers to a potentially sensitive question may allow anonymous posting of views to word clouds or quizzes. Since in virtual team teaching students and teachers are already online, the digital tools likely present less of an additional distraction compared to using similar techniques in the classroom. A benefit of virtual team teaching as compared to other forms of online education lies in the effort required to set up digital tools; since one teacher can "work the technology" while the other keeps up the discussion in class, virtual team teaching allows for the ad hoc use of online tools without losing momentum in the online session.

Fourth, team teachers report several downsides of virtual team teaching compared to traditional team teaching, stemming from the challenges of relatively unstructured discussions on an online platform. The distance between students and teachers may increase or decrease when transitioning to virtual team teaching. This depends on the balance between the lecturer being one among many stamp-sized cameras on the online platform rather than facing the class elevated on a (tangible) platform in an in-person setting, and the occurrence of fewer social interactions between students and teachers during breaks. Nonverbal communication is difficult in online settings, reducing student contributions to the spoken or written word. The absence of nonverbal communication online also complicates monitoring class energy and students' progress, particularly in larger classes. Turn-taking may also be compromised as a result of the absence of nonverbal cues. Indeed, interviewees who taught first-year students – those who had never been in a classroom together – reported these downsides of virtual team teaching the most, rather than those teaching in classes where the students had jointly enjoyed in-class education before the pandemic hit. These prior experiences presumably bred a set of norms that students could reactivate during discussions in virtual team-taught sessions.

Conclusion

Society expects higher education to focus on grand challenges – problems that transcend national and disciplinary boundaries. These problems are complex, uncertain, and evaluative. This paper reviewed literature on team teaching and proposed that it may be an effective pedagogy to analyze grand challenges. The Covid-19 pandemic implied a push for online education and led University College Tilburg to explore virtual team teaching in its Liberal Arts and Sciences program. This paper documents the results of eleven interviews and asks whether virtual team teaching may be an effective pedagogical modality.

Our conclusions cannot be decisive, partly because of the unstructured nature of the interviews. While the pandemic gave new impetus to online education, it also created an extraordinary situation from which evaluations cannot be extrapolated to "normal" times. While virtual team teaching may be beneficial for some courses, all team-taught courses were forced to transition to online education – without consideration of the effectiveness of the transition for student learning.

Also, the student view was not included in the analysis. Students may appreciate online education differently in a context where all activities, educational and social, are either cancelled or offered online. This paper treated students as a homogenous group. Kintu et al. (2017) suggest that some students may flourish relatively more in an online environment, whereas others benefit more from a traditional teaching environment. Kovacs et al. (2018), for example, find preferences for online versus offline education to be associated with student gender and age. Instructors need to be cognizant of the different effects on subsets of students when designing virtual team-taught courses.

With these limitations in mind, some initial ideas arise from our exploration. First, because of the pivotal role of student preparation for effective virtual team teaching among all courses in a curriculum, teachers focusing on grand challenges may benefit more from virtual team teaching than those focusing on topics perceived as less relevant by students. Second, virtual team teaching may allow teachers to quickly elicit student views. If bringing in personal (student) opinions matter, and if the absence of nonverbal cues does not prevent the online session from being a safe place, virtual team teaching may offer the tools to elicit such opinions, even on an ad hoc or repeated basis. Third, the difficulty reported around nonverbal communication and turn-taking suggests that virtual team teaching may be most effective for student groups that have previously met in person.

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06.

Into the Heart of Academics: Building Resilience through Formation

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At Tilburg University we hope to educate our students to become resilient professionals (Strategisch Plan TiU, 2022). Preparing students for life and work in today's world requires more than "just" adding knowledge and skills. Students will become change agents and develop solutions for problems their teachers cannot solve, and yet those same teachers must prepare them for that. This process entails a different role for the teacher as well. Next to adding knowledge as an expert and training skills that build competencies for future tasks, an educational pilot encourages teachers to teach students how to be resilient, rooted individuals in a rapidly changing world. At university, for the teacher this means introducing new strategies in interaction with peers and students. It also means creating educational scaffolds (instructional elements to enhance learning new concepts and skills) that help build that resilience and rootedness. Most of all, it means facilitating participants in education to grow and create together. The teacher is open to what the students bring in when dealing with global issues like climate change, cybercrime and citizenship values. In this way, the teacher acts as a catalyst for the change process in education, becoming a change agent more than an expert on the concept itself.

In our module "Becoming a resilient professional", a pilot for a cross-faculty minor program at TiU, we explore this innovative way of teaching by bringing together groups of students from different faculties – and therefore knowledge sources – that work together on wicked problems. The different teachers entering wicked problems develop new theory thanks to the cross-faculty student input. This demands an open mindset from teachers too – quite different from the expert role in the more traditional way of teaching – plus builds their resilience. Last, students become more aware of their talents and values, which helps them become rooted, resilient professionals. This takes place in reflection sessions that run parallel to the other educational units. Reflecting on their own biography, their strengths and their values come to the fore and explicitly build their resilience.

Introduction

Everyone experiences hardships in their lives – getting bullied, losing a job, getting divorced, losing a dear friend or family member – yet people differ strongly in their responses. Some get dragged down by difficulties, others can keep going, and yet others even grow from these events. This difference in response opens up the question of what made that difference. One big factor is resilience.

The concept of resilience has been studied for many years. It started with defining what characterizes a resilient person (Follen, 1841), then investigating resilience's benefits (e.g., Cassidy et al., 2013), and nowadays exploring what improves a person's resilience (e.g., Feretti & Bub, 2014). Resilience itself is defined as the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional and behavioral flexibility and adjustment to external and internal demands (VandenBos, 2015). It is often referred to as the ability to bounce back.

This skill has been linked to many positive outcomes, like higher job success (Fernández-Martin et al., 2020), higher personal well-being (Cohn et al., 2009), and even better physical health (Schure et al., 2013). This is because it helps people cope with challenges in life and not get pulled down by them. And not only does it prevent negative consequences, it also leads to personal growth (Kobylarczyk & Ogińska-Bulik, 2015).

Since the definition and benefits have already been widely studied, the development and beneficial factors have slowly been gaining more attention. We mention some ingredients found in research, without being exhaustive. Kawamoto et al. (2017) found that curious people can cope more easily with social rejection – a feature of resilience. Curiosity thus seems to play a role in becoming more resilient. Passion likewise seems to be relevant, because it mediates the effect of character strengths on athletes' resilience (Vančáková et al, 2021). Routines, recommended by many health advisors, can further improve our resilience; Ferreti & Bub (2014) show this by investigating the effect of family routines on the resilience of low-income preschoolers. And social connectedness is one of the strongest benefactors of resilience (e.g., Sulimani-Aidan, 2021). In this article, we will focus on another factor that may contribute to improved resilience.

At Tilburg University we are developing a module on becoming a resilient professional. Based on our university's educational profile we want students to grow in knowledge, skills and character, and especially the latter is our focus. We hope to develop an entire minor program available to all students (as we will elaborate on separately), but here we focus on the executed pilot module. In this module, the question of what helps students become more resilient came up multiple times. What stood out in the 38 evaluation forms of our participating students, more than curiosity, passion and others, was *gaining knowledge*. This is a broad concept and cannot be easily connected to resilience, so we further delved into what that meant for them and what knowledge they were referring to. The two dominant answers were gaining knowledge to improve *self-awareness* and *taking new perspectives*. Self-awareness can be described as self-focused attention or knowledge (VandenBos, 2015). That means being aware of one's strengths and weaknesses; to know about one's thoughts, feelings, actions; and one's ideas, beliefs and values. It makes us more confident and creative, improves our self-control, and without it we could not take the perspective of others (Silvia & O'Brian, 2004). Perspective-taking is defined as "Looking at a situation from a viewpoint that is different from one's usual viewpoint. This may involve adopting the perspective of another person or one associated with a particular social role

…" (VandenBos, 2015). It has been linked to many positive outcomes, like better social bonds (Galinsky et al., 2005) and better conflict resolution (Sessa, 1996). Interestingly enough, there is little research connecting it with resilience.

The task of this article is therefore to find the connection between self-awareness, perspective-taking and resilience in the eyes of students, and how this can help them and others bounce back from their aversive experiences.

Research design

After a few decades, most students primarily remember the happy times they experienced during their university years: a time when they built lifetime friendships, found their future partners, learned how to live their lives independently from their parents, and achieved focus for their future careers. They may, however, be less prone to remember that these years were also a time of struggling with fundamental questions, at the levels of both their personal and professional futures. Today, even more than in past decades, students are constantly reminded of the need to "excel" in every respect. Since the goals of academic education are marketized, students themselves also tend to describe the goals of their education in financially measurable terms of success instead of emphasizing the intrinsic value of education in terms of personal growth and intellectual development (Schuurmans, 2020).

Studies show that many students experience student life as a stressful and difficult time, and that performance pressure is one predictor of burnout symptoms among students (Dopmeijer 2021). A prevailing meritocracy has broadly installed the idea that success and failure in professional and personal life, and responding to the dilemmas involved, is a person's full individual responsibility. It is therefore necessary to learn how to cope with the strains this individualist paradigm produces, and more important, to develop personal and professional resilience that allows for different perspectives and helps create a resilient attitude toward future challenges and ethical dilemmas. In a small survey we conducted, our students (N=38) said they would like to gain more stability, strength, balance and resilience. We are convinced that building personal strength also helps become a more resilient professional, so in the module described we focus on both.

Following Van der Meer et al. (2018), we define resilience as "the process wherein an individual maintains a relatively stable, healthy level of psychological and physical function when confronted with potentially traumatic events". The need for students to cope with rapid societal changes, both in their personal lives and in their professional careers, calls for changes in higher education. In addition to acquiring knowledge and skills, students need to develop themselves as responsible human beings that are equipped to deal with the many choices and challenges they will be facing in their work environments. More specifically, students of Tilburg University – with its focus on social sciences and the humanities – are expected to be able to understand the consequences of globalization, digitalization, pluralism and sustainability; reflect critically on their values and behavior;

and contribute to meaningful solutions (Strategic Plan TiU 2018-2021). The relevance of these topics and characteristics is obviously not limited to student life but will also be significant in professional life. To become resilient professionals, students must know themselves and understand how to contribute to societal progress.

The concept of subjectification (Biesta, 2018) is central to a type of education that is not purely cognitive. This means that students are challenged to consider who they want to be as a person (subject), next to acquiring knowledge and skills (qualification) and getting connected to the world they live in (socialization). To that end, students must know themselves as a person and understand how they want to "be in the world" as a person. In other words, this process of subjectification is not just a theory or a cognitive process, but a process about one's heart and soul. In this project we facilitate this process by letting students become aware of their own talents and of the values they use when making critical decisions. Using one's talents fits well with the leadership program of Tilburg University, "Connected Leading".

In 2020, Tilburg University developed a minor program for students of all faculties, and the first pilots were conducted in 2021/22. A cross-faculty minor program comprises 30 ECTS and will be accessible to third-year Bachelor's students of all programs. Students and teachers work together in a Professional Learning Community (PLC). Important aspects of the PLC are team diversity, collaboration between students and professors, interdependency, accountability, reflective doing and problem solving (Koopman et al., 2020). The minor program includes a general guided interactive reflection program of 12 ECTS and six thematic modules of 18 ECTS, focusing on practical dilemmas. Both parts of the minor program run in parallel to allow continuous interaction between the respective learning goals. Both will also be linked to the development of students' professional skills in their respective BA programs.

The first part of the minor program comprises six modules built around specific societal challenges (18 ECTS in total). We envisage modules of 3 ECTS each, to be offered by all Schools of Tilburg University. The themes will be connected to each school's profile and come from the topics mentioned by participating teachers and by students in our preliminary surveys as the pilots described in this article. Prospective themes include major global issues such as technology, the effects of climate change, the need for sustainability, COVID-19 and possible future pandemics, and how these themes affect students' future lives and professions. At the personal level we foresee resilience related to success and failure. A more "unexpected" theme a teacher is introducing, related to the substantial problems of subversive crime that the Netherlands faces, is the risk of recruitment into criminal networks. The problem is not just relevant for students who are trained to be chemists and may end up working in a synthetic drug laboratory, for example, but it equally affects academics who are trained for jobs that may facilitate subversive crime, such as accountants and lawyers. Subversive crime doesn't just relate to criminal offenses, but also to noncompliance with regulatory and fiscal laws. Students have also

mentioned examples from their side jobs and internships. Again, topics will ultimately be chosen in cooperation with students.

The core of the second part, the guided interactive reflection program, is facilitating students to reflect on the values they use when they make choices in life and especially when collaborating with others in these six modules. Becoming more aware of one's own talents and how to use them professionally will likewise get attention. This helps form what we might call the students' professional and personal moral compass (Van Dijk-Groeneboer, 2020). At the micro level, we address questions such as: Who am I as a person, what are my roots when considering my biography, what are my talents, who do I want to be in the world? At the meso level, the program addresses questions of professional being: What am I doing, who am I or do I want to be as a professional? How and why do I act in my occupational life the way I do? At the macro level, we discuss the context in which one lives, studies and works; the organization, city and country one lives and works in; and the way one responds to this context. A person's biography (micro) and profession (meso) direct their actions toward this context (macro). Becoming aware of the connection between the three levels and the choices individuals make in life following from this interaction is an essential element of the program.

Developing a minor program like this takes time and effort, plus experimenting. This is still ongoing at this very moment. Hence in this article we describe the first two steps made in a pilot of the envisioned program: describe the steps we took and the way we gathered data in these two rounds. For this article the research question is, then: What elements are evaluated as successful by students building their resilience in an extracurricular program? The entire research on and toward the pilot module can be considered an iterative process; throughout the steps the module is adjusted upon evaluating the results, as can already be deduced from this article.

Method

During the first pilot module called "Path to Resilience", 14 students met seven times in one semester and had to do assignments about their strengths and talents, the people they can fall back on in difficult times, the music they get inspired by and the things they are grateful for. In the final meeting they were asked to describe elements they learned about their own resilience and guidelines for becoming a resilient professional after graduation. Reflection reports were produced after every session, and analyzed on elements of resilience, self-awareness and characteristics to rely on which they learned about in the module.

This first module was used as a basis for a second pilot module called "Connecting to your Resilience, Courageous towards your Happiness". Here 16 students participated in the three units provided. The different elements were: on-campus lectures about strategies toward happiness with exercises as homework; online lectures on positive psychology with assignments to be fulfilled digitally; and reflective group sessions, as mentioned in

the first module, along the entire semester to further deepen the impact. As described, in-between these reflective sessions students were asked to do assignments about related exercises on personal and miscellaneous topics like composing a biographic timeline, doing a diary exercise, writing a gratefulness letter. The assignments of the two modules with on-campus meetings were used for this article.

The analysis of the assignments in the first pilot were based on the "Glossy-Style Resilience Self-Test for Young People" by Cloin et al. (2020) and its five factors contributing to resilience: self-confidence, emotional response, self-reflection, family support, and social network. While trying to categorize students' answers, it stood out that some questions were beyond their grasp. Next, the focus shifted to those exceptions, and the one standing out the most for students was Gaining Knowledge. As this is too much of a broad concept, and since we were interested in what exactly Gaining Knowledge offers students to improve their resilience, we categorized the types of Gaining Knowledge. The ones most often mentioned were Self-Awareness and Perspective-Taking.

To further investigate, at the end of the second module we assigned students to think about how and why *Gaining Knowledge* helps one become more resilient, and to describe how *Self-awareness* and *Perspective-Taking* play a role in it. The answers in this assignment were further analyzed, and the results are shown below.

Results

As results, we present quotes to illustrate the qualitative material from the reflective sessions. The additional data gathered will be elaborated on in later publications. We specifically asked participants in the second pilot how self-awareness and perspective-taking helped them feel more resilient.

> I realized that being able to show emotions is so much more valuable for me as a person because I feel like it lets everything out, even if just for a moment. Nevertheless, it might not work for everyone and you should not put pressure on yourself for not being emotional, because I know how your own story can sort of make you feel 'being used to it', and when you tell it to others it is not as impressive as you think it is for you. But it is impressive. Give yourself credit for having made it to where you are right now. [...] I used to think oversharing is cringy, but then I figured out that if it helps me grow as a person and overcome my inner struggles, then I should not care if anyone thinks that I'm too much or about being judged. In the end, it matters what we all take away from this, right? And I found it so, so inspiring and brave how you all shared your stories and how that made you the person you are today. My struggles of course have not vanished overnight, but I found the last session very inspiring and encouraging, and I like that the group functions as a safe space without judgment.

In this quote different perspectives come forth as well as different aspects of self-awareness. Perspectives of others are: it might not work for everyone, not putting pressure on everyone, people think I'm too much, your stories made you the person you are today. Showing my emotions, giving myself credit, not caring if I'm judged are mentioned as self-awareness elements. Calling the group a safe space is a good description of what the teacher has focused on to allow the group to become that place where you can look at your own resilience in the presence of others and reflect on it out loud, and by doing so gain more knowledge about yourself and about dealing with the perspectives of others.

In the evaluation form at the end of the second pilot module, interesting remarks and learning gains were also gathered, like:

> I can fall back on my friends who I got really close with over the whole Covid period.
>
> I feel grateful for everything I managed to achieve. Sometimes I can get really ambitious, but it really pays off in the end.
>
> I feel happy when I am with my family, spending time with friends and even riding on a bike when the weather is fine.
>
> I lose energy when I feel like people are disappointed in me, don't accomplish an important task.
>
> I realize I do not feel resilient when I stay in bed all day procrastinating, have no direction, or when I am in a loud environment.

In these quotes students describe their self-awareness and, more specifically, the experiences that help them become more resilient: having friends to fall back on, being with family, riding a bike. Knowing what does not help feel resilient likewise comes up: procrastinating in bed, feeling that people are disappointed in me, getting too ambitious.

We also evaluated the pilot modules each time and used this information to further finalize the program. Adding the elements of positive psychology and happiness strategies was a success, so we left them in the program. In the next pilot module we will further use activating exercises to work on self-awareness and perspective-taking, evaluating them along the way and adding a blended learning module on entrepreneurial literacy. The entire program now consists of 9 ECTS and next year we hope to work on the full minor program.

Conclusion and discussion

We can conclude that gaining knowledge through self-awareness and perspective-taking did take place in our pilot modules. Many students acknowledged they learned a lot about themselves, their strengths, their core values, and also about their depressive moments and how to deal with them. They became more aware of the moments they were happy and what caused that experience, as well as those moments they were not feeling resilient and what strategies might help them out. Strategies they mentioned were listening to music, taking nature walks, talking to a friend. Participating in this module helped students become more resilient to deal with issues in life and they seemed able to integrate this with the knowledge and skills they gained in their educational programs. More focus on that integration is on our research agenda. Integrating this knowledge on personal resilience with the professional they want to become, based on the knowledge and skills in the rest of their educational program, will also be within our research scope.

Though these results are only from two small groups of students, and many more data is still to be analyzed, the quotes presented give us as teachers/creators and researchers enthusiasm to keep on going with creating this minor program and allowing many more students to acquire these experiences during their university life. It makes them young adults with more self-awareness, with – next to knowledge and skills – also the ability to be resilient in their own way, fitting their talents, and following their path to become resilient and happy professionals. Building further on these pilot modules toward a large minor program as suggested in the Introduction seems very valuable, since students really gain knowledge about themselves as persons and as professionals, and feel more resilient. We are already preparing a next pilot with three participating schools and new topics to build further on these experiences.

Teachers too experienced a new way of teaching, in which they learned from the participating and co-creating students. They gained knowledge about becoming resilient themselves and about students' learning process. The next step will be experimenting with larger groups of students and teachers, building an entire minor program with all TiU schools, working on this co-creating educational design which opens both teachers and students to become change agents in the world, each in their own professional context. It is great to find enthusiastic teachers to collaborate on this at all of our university's schools, and that jointly with our students we can work on this extra asset: building a professional identity by becoming more resilient through gained self-awareness and perspective-taking.

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07.

Enhancing Expertise in (Blended) Educational Design. Toward a Tilburg University Network of Educational Development and Innovation[1]

Sander Bax

Introduction

After the height of the COVID-19 pandemic, educational institutions faced two pressing questions. First, how to get students who had spent 1.5 to 2 years studying (at least partly) in isolation and remotely to properly reconnect with their learning communities and be physically present at their institutions. The need for a return to campus was underscored by several articles, presenting data on the major impact of the coronavirus measures on the mental and physical health of many of our students.[2]

The second question was of a different order. The coronavirus measures had also made it clear that there was great potential for educational innovation, especially where online and hybrid education were concerned. All lecturers at universities gained experience with the gains and losses of online education (zoom lectures, knowledge clips, digital assessments). In short, much had been learned, and now how could we ensure that those lessons would not be lost by returning *en masse* to campus, returning to "what we have always done".

In this contribution, I would like to describe – from my role as Vice-Dean for Education at the Tilburg School of Humanities and Digital Sciences and, in that capacity, heavily involved in policy choices regarding the implementation of blended learning – how we as a School have tried to plan our response to this, and what plans we have at Tilburg University to boost educational innovation and educational improvement over the next five years.

Blended Learning

First it is important to clearly define what we mean by blended learning, especially since the concept is often confused with related yet rather different concepts such as online learning or hybrid learning. At Tilburg University, we define blended learning as the merging of face-to-face and online education within a single study program, in which both forms

[1] This essay is written based upon several documents that were drawn up collaboratively: Bax & Heck (2021); Shaping (2021); Bax *et al.* (2021); Heck *et al.* (2022); Bax *et al.* (2022).

[2] Leesen (2021); Oostema (2021).

reinforce each other.[3] In other words, blended learning means that traditional lectures are supplemented and enhanced with studying in a digital environment where students are given access to digital educational materials and can study in their own time.

It is important to stress that blended education and learning is NOT hybrid learning. After all, "online learning" means that all parts of the course are offered online. It is de facto distance learning. Blended learning is also different from hybrid learning. By this, we mean education in which online and on campus activities are offered simultaneously (synchronously), so that both on-campus and online students can attend the same educational session. Hybrid learning is thus a much narrower concept than blended learning; it can be one of the modalities chosen in a blended learning design.

The choice was made to focus on the broader concept of blended learning.[4] In doing so, Tilburg University responds to the social development in which digitalization plays an increasingly strong role and ensures that we turn the lessons learned during the lockdown into improvements that also lead to better academic education in a sustainable way. Technological innovations play a role in this (online assessment, gamification, knowledge clips), but it is important to draw our blended learning program more broadly than that. The circumstances of the pandemic forced lecturers to rethink and redesign their courses, not only technologically but also pedagogically and didactically. Therefore, it is very important to include the full scope of educational design in blended learning projects.[5]

At Tilburg University, we try to construct our programs and courses using the principles of constructive alignment. Central to the notion of constructive alignment is that different learning goals require different educational designs and different forms of assessment.[6] A program's learning outcomes and course objectives largely determine how a course can and should be designed. That means that every educational innovation should be designed per program and course specifically. No ready-made models can be made that apply to all courses. This implies that a university wishing to implement blended learning must ensure above all that educational design expertise in the organization be reinforced.[7] The idea is that by increasing expertise in educational design, education can be improved and renewed in the years to come.

The "Exploring Blended Learning Project"

In academic year 2021-2022, the Tilburg School of Humanities and Digital Sciences decided to set up a project called "Exploring Blended Learning TSHD".[8] We chose that name deliberately because we wanted to take our principles seriously and did not believe

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3 Anderson (2003); Garrison & Vaughan (2008); Stein & Graham (2020); Last & Jongen (2021); Dragt *et al.* (2021).
4 Bax *et al.* (2021)
5 McKenney & Reeves (2013); Plomp & Nieveen (2013).
6 Tilburg University. Constructive Alignment. https://videocollege.uvt.nl/Mediasite/Channel/teacherdevelopment/watch/83d89fc0bb3a4c269af70002133431e31d
7 Graham *et al.* (2013).
8 Bax *et al.* (2021).

that blended learning is something you can just "roll out". We wanted to explore with lecturers, academic directors, instructional designers, assessment specialists and other stakeholders what blended learning could do for us. That meant first and foremost that we conceived the concept of "blended learning" as an intellectual endeavor.

In this context, it was important for us to develop and share expertise in (blended) educational design as a key driving factor. We wanted to set up projects that would help us deliver scenarios and design patterns for blended learning, based on the results of carefully selected pilots. From those scenarios we could then derive, at best, design principles for good (blended) education.

The purpose of this was twofold. Throughout this project we wanted to foster a culture of mutual support in which lecturers, instructional designers, assessment specialists and teaching assistants can work together and make use of each other's expertise and input, while ensuring that our interventions were evidence-/research-based. To this end, we set up research (including educational design research) with colleagues at the Tilburg Center of the Learning Sciences on teacher beliefs, which resulted in collaborative article for the Tilburg Series in Academic Education written by a researcher from TiCeLS and one of our instructional designers.

We decided that it was important to first clarify what blended learning has to offer for our courses, what its added value could be, and then to work out some good examples for it. The emphasis of our activities lay not just on encouraging blended learning but on bringing forward the added value of blended learning for our various programs.

As we learned from literature and from previous initiatives, designing effective blended learning requires lecturers to integrate content with pedagogical and technological knowledge. We also learned that this integration can be quite demanding for lecturers, and that it sometimes overloads them. We decided it is crucial to take this complexity into account and to strive for proper support to ensure effective design for blended learning. Hence the goal of our project was twofold:

- **Cooperation in course design:** Create a culture and the support opportunities in which lecturers, instructional designers, assessment specialists and teaching assistants can work together and make use of each other's expertise and input (an "innovative educational culture").[9]
- **Pilots/proven scenarios:** Deliver scenarios and design patterns for blended learning based on the results of carefully selected pilots. The interventions are evidence-/research-based, and their effectiveness will be investigated systematically and scientifically.

9 Bax & Heck 2021; Shaping 2021.

The first step we took was to strengthen our scholarly expertise in blended learning, in educational design, and in pedagogical and didactical innovation. In addition to the assessment specialist already available at the School, we recruited two instructional designers and several teaching assistants. We involved colleagues from the Tilburg Center of the Learning Sciences in the project and linked it to our existing TEP/Innovation Network, in which lecturers from all TSHD's organizational units come together to think about educational innovation and improvement.

We did not want these new officials to develop support plans in their own bubble and then offer them to the School. Our goal, in close consultation with the programs, was to create a collaborative culture between lecturers and these educational professionals in which they work together from the design phase of a blended course all the way through to the evaluation phase of a course or program, and can make use of each other's expertise.

To connect well with the various programs' developments and wishes, the Vice-Dean for Education and the Program Manager of Educational Development and Innovation held meetings on this topic with all academic directors individually each year in September. In these meetings we emphasized the importance of conducting pilots arising from problems experienced in practice by lecturers and academic directors.

Lecturer-representatives from each department and education professionals are united in the TSHD TEP/Innovation Network, which meets on a monthly basis. News, experiences and projects are shared in this network. The network basically operates as the hub where everything comes together, and new ideas are developed and shared.

A selection of activities in this domain was developed and conducted between September 2021 and September 2022.

- Sixteen blended learning pilots were conducted, at both the course and program level.
- The instructional designers organized "summer redesign sprints" with lecturers during the summers of 2021 and 2022. Some of these were turned into pilots for our Exploring Blended Learning project.
- The TSHD TEP/Innovation Network organized the annual TSHD Educational Event in June, where educational developments and projects were shared.
- For the Bachelor's in Cognitive Science and Artificial Intelligence, a program level analysis of 13 Bachelor's courses was conducted and a recommendation was written for various ways in which this program could be improved in terms of blended learning. The analysis is an evidence-based intervention that mainly draws input from the European Maturity Model for Blended Education.[10]

[10] Van Valkenburg *et al.* (2020).

In the past year, the focus lay on setting up pilots and other activities together with the programs and ensuring that our education professionals would be in the picture and involved in initiatives of the programs. We can conclude from the feedback we received from academic directors and teachers that took part in the pilots that the creation of a collaborative culture amongst lecturers, program directors, researchers and the TSHD education professionals as we envisioned it has taken off quite well.

Reaching the second goal of the project and delivering scenarios that are proven to work seems to take more time than the one year we have been working on this project. The pilots we conducted taught us a lot about which interventions made teachers enthusiastic, but also which interventions seemed less effective. At present we are working on a project for developing good ways to evaluate the projects and for devising small research designs that give us insights into the effects of the design principles used in the pilots. This part of the project will be a main focus in academic year 2022-2023.

We also want to work, even more than this year, with an approach that focuses on the analysis of larger components of programs (learning pathways, tracks, academic year) and to see what blended learning design can do for those components. In doing so, we want to tie in with the university-wide development toward a Tilburg University Network of Educational Development and Innovation; this will be discussed in the next section.

A Multi-Year Program on Blended Learning

In the summer of 2021, Tilburg University's Executive Board determined that the university would use the concept of blended learning as a starting point for improving and renewing education in 2022-2027.[11]

To realize this ambition, a working group was set up between February and June 2022 that was given two assignments: design a multi-year plan to implement blended learning and an organizational form that can best support that implementation.[12] The size of the group allowed us to consider the best way to accomplish both tasks from as many different perspectives as possible.

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[11] Bax *et al.* (2021). The report *Tilburg University Education in 2021/2022 and Beyond* (April 2021) made recommendations to improve education and the support of education, helped amongst others by blended learning. The Strategy 2022-2027, *Weaving Minds and Characters* expresses the ambition to reinforce support of our lecturers to improve the design and implementation of their continued education and to offer them innovative opportunities to strengthen their education and further develop themselves professionally.

[12] The large group consisted of representatives from the Schools and the Divisions: academic directors, lecturers, students, innovation coordinators, instructional designers, educational specialists, information managers, policy advisors (including representatives from the Schools), TIAS, Language Center, Teacher Development, EduILab, Library and IT Services, and the Schools' Educational Support Teams. These people were involved in the TUNED IN-working group: Sander Bax, Jolanda Bachrach, Hans Gielen, Tessa Leesen, Roos van Deijck, Nina van der Steen, Marije Markus, Pascale Wösten, Inge van Rijt, Daniëlle op Heij, Casmir Wernaart, Ian Sumner, Sabita Soedmah-Muthu, Tjits Roselaar, Drew Hendrickson, Steffie van den Bosch, Esther Breuker, Linda Mous, Marit Spek, Eefje Ernst, Dirk Brounen, Petra Heck, Olga Zweekhorst, Jocelyn Manderveld, Samuel Goyvaerts, Hannes Datta and Joshua Stassen.

As starting point, we formulated several preconditions to give us direction. An important principle of Tilburg's educational profile is character-building (personal development; Bildung; subjectification), which requires a personal approach to students where much attention is paid to their development. A new blended program should therefore also take the need for small-scale education as starting point for its design principles. For example, it appeared that on-campus education is considered crucial for interaction, bonding and motivation of students, among other things, but also that online work forms can preeminently provide greater accessibility and flexibility. An example of such a blended learning design might be a course in which lecturers use their lecturing time on campus for small-scale education, while the large lectures are offered in the form of knowledge clips or via other digital modalities.

Design Principles for Good (Blended) Education

As a next step, the working group formulated so-called "design principles for good (blended) education". Would it be possible to create a manageable list of principles from which programs and courses could develop customized blended learning interventions? This is explicitly not a list that should function as the holy grail – it should serve as a starting point that we can keep adjusting, adapting and improving over the next few years based on research and evaluation of the projects we execute and on input we receive from outside.

This approach stipulates that online education requires a different design approach than on-campus education.[13] It is therefore essential to work toward an educational design that addresses all functions of education, resulting in a harmonious whole that combines the strengths of online and physical learning.

To arrive at the basic principles of blended learning, we started by asking ourselves the fundamental question: what is good academic education? What does a good academic course or a good academic study program look like? This means that the first and most important condition for a multi-year program of blended learning is that we continue to develop our expertise in instructional design (educational design). How do we properly align learning objectives, learning activities and assessment (constructive alignment)?[14] How do we ensure adequate and up-to-date academic content? And how do we ensure community and character-building in education?

The design principles can be considered as a starting point to answer these questions. In the coming years, we want to optimize Tilburg University's expertise in educational design principles, and the Tilburg University Network of Educational Development and Innovation (TUNED IN) will be the wheel that will guarantee this expertise is shared with our university's community. Expanding our expertise in blended learning will have a major

[13] Durrington *et al.* (2006); Czerkawski & Lyman (2016).
[14] Tilburg University. Constructive Alignment. https://videocollege.uvt.nl/Mediasite/Channel/teacherdevelopment/watch/83d89fc0bb3a4c269af70002133431e31d

impact on the way our degree programs and our courses are being designed. Tilburg University education shows a great diversity in lectures, tutorials, seminars, working groups, practical training, etc. Each program, course, or part of a course looks different. This means that every different course or program needs the best possible educational arrangement for its students to achieve optimal results. Aided by this expertise (also fueled by educational research) in the field of (blended) educational design, we help our educational staff design their courses and programs in order to meet what we, at Tilburg University, understand to be excellent education.

Blended learning requires a careful consideration for each program and for each course when it comes to which didactic principles are most appropriate and which part of our education is offered on campus or online. Blended learning involves designing an optimal combination of learning activities in terms of which ones take place online or on campus, including assessment. It starts with determining the learning objectives and learning activities of that course and then deciding which parts of the course will benefit from being offered online and which will not. Different learning outcomes for programs and different learning objectives for courses require different educational designs. The way a course is blended therefore depends strongly on the characteristics and specificities of the discipline being taught.

In the educational and the learning sciences, new knowledge about educational design is constructed constantly. It is important for Tilburg University to create an innovative educational culture that is open to new insights in educational research, that stimulates small innovative experiments, and that spreads educational expertise to as many lecturers as possible. We want to realize an innovative culture that offers plenty of room for small-scale experimentation, using trends and developments we see in education (e.g., flexibilization, open science, learning analytics, new tooling). As a research institute we have the responsibility to carefully monitor the follow-up effects of educational innovations by improving and stimulating research in and about education (e.g., learning analytics, educational design research, and other forms of innovative educational research).

The Tilburg Center of the Learning Sciences will play a crucial role in bringing together campus-wide research projects that monitor the effects of implemented educational innovations (learning analytics) and that collect examples and good practices of evidence-informed education. Besides research on education, there should also be ample opportunities, facilities and funding for experiments, as well as space for lecturers to integrate new didactic methods and tools into their courses and share educational experiences with each other. It would also be important to encourage and support the application of grants for educational and research projects more explicitly, for example with a dedicated incentive policy.

The seven design principles for blended learning

1. Work with a well-considered blended learning design.
At both the program and course level, determine which learning objectives and outcomes will continue to require on-campus activities that add value to students and which activities will lend themselves well to online learning. Make use of constructive alignment in designing the course.

2. We design activating and motivating education.
Use activating educational methods to engage students in the various learning activities and to interact with the lecturer, with the learning content and the study materials offered, and with their fellow students.

3. We provide a clear structure and communicate clearly.
Provide, at both the program and course level, a clear planning and structure (with interim deadlines, evaluations, feedback moments and assessments) to help students take control of their own learning.

4. We design well-considered forms of assessment.
Design, in harmony with learning goals and outcomes, a good combination of formative and summative assessment occasions supporting the student's learning process at the appropriate cognitive level (constructive alignment).

5. We provide an inviting and inclusive blended learning environment and learning resources.
Design activating learning resources and offer an inviting, safe and inclusive learning environment both on campus and online.

6. We design blended education collaboratively and provide good support.
Design blended education in a multidisciplinary team in which lecturers and educational experts work together and good support is provided.

7. We continue to evaluate and improve education.
Ensure that blended course and program design is evaluated regularly and effectively.

How to Implement Blended Learning?

The seven design principles – and their possible updating and adaptation in the coming years – can count as the core of educational design expertise we would like to spread as widely as possible across our university. But designing and implementing blended learning is a comprehensive and challenging task.[15] What is the best way to reach and engage lecturers? How do we give lecturers sufficient time and space to reflect on their education? How do we create a culture where lecturers, academic directors, innovation coordinators, instructional designers and assessment specialists work together to design or redesign programs and courses?

[15] Durrington *et al.* (2006); Graham *et al.* (2013); Czerkawski & Lyman (2016).

To this end, the working group has proposed implementing a multi-year program focused on blended learning, with substantial resources at the central and School level that will ensure large-scale implementation of blended education within Tilburg University at the program and course level. Large-scale implementation will only succeed if we design blended learning collaboratively, so sufficient time and space, adequate support, and appropriate training for lecturers need to be provided. For the blended learning program to be a success, a policy to better appreciate achievements in education in the context of the Recognition & Reward program is crucial. Involving instructional designers in every new design is key. Sometimes it is enough to change the form of the education and assessment, in other cases the content and goals require change too. Looking at this cohesively within a curriculum (team) contributes to the quality of the redesign.

Good education is always in motion, but that does not mean that motion per se makes education good. We are aware that implementing blended learning must be done incrementally. Designing good education takes place in cycles, with improvements made and lessons learned in each cycle. We anticipate a cyclical process with the seven design principles leading, where we can start with courses and programs that can be considered "early adopters", and in which lecturers and programs with ample expertise in educational innovation play a key role in creating a snowball effect that eventually reaches all our programs – for we know that even the smallest adjustment, like making better use of our learning management system Canvas, can have a big impact on the quality of education. To make that happen, we are setting up design teams in all Schools that will support the programs in order to implement blended learning roughly according to the phases presented below.

Toward a Tilburg University Network for Educational Development and Innovation

The development and support of blended learning requires several areas of expertise to work together. Designing education that interweaves online and on-campus components calls for a multidisciplinary approach, which is rarely combined in one person. Blended learning demands a design process that combines several forms of expertise, such as content knowledge, instructional design, assessment expertise, multi-media design and technical knowledge. To implement blended learning on a university-wide level successfully, we propose developing a network organization whose main goal is to ensure that the expertise on the key design principles for good academic education is being shared throughout the University. We have proposed giving this new network organization the name Tilburg University Network for Educational Development and Innovation (TUNED IN).

In the summer of 2022, the Executive Board endorsed the report *TUNED IN Tilburg Network of Educational Development & Innovation. Blended Learning Program 2022-2027*. Through TUNED IN, Tilburg University will work on implementing the expertise in and enthusiasm for the design principles in the organization. It means that that expertise must come from educational research and other well-considered visions of educational

innovation and improvement. TUNED IN must enable educational research as well as strengthen an outward look.

In the coming years we foresee a substantial reinforcement of educational design expertise at the university. The challenge for the university lies in ensuring that that expertise can move smoothly through the organization. In the fall of 2022 an organizational structure will be designed to realize this, so that from 2023 the academic programs can start working with all the help that is and will be available.

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08.

Inviting Professional Practice into the Curriculum

The TSHD Societal Challenge as Case Study

Anne van der Velden and Louise van Hoek

Career-Ready Students

In March 2022, the Tilburg School of Humanities and Digital Sciences organized the first edition of the Societal Challenge, a learning event where academic knowledge and professional practice come together. Students worked in multidisciplinary teams on societal issues, according to the principles of challenge-based learning. During the day, they were coached by experts from the professional field and from academia, culminating in a final pitching event where students presented their innovative solutions, founded on knowledge derived from both science and practice. The process of getting to the solution is valued just as much as the solution itself, and learners continuously reflect on content and process. In this article we would like to further explore the topic of making the connection between professional practice and academic programs. We argue that educational innovations such as the Societal Challenge could create a positive effect on students' career-readiness. We believe that the best place for activities that support career preparation is interwoven within the program courses already offered. In contrast to some students accepting a delay to gain professional experience (e.g., to do an extracurricular internship), we advocate that a study program by itself should provide a confident start on the labor market. To ensure the career-readiness of our students, it is natural to give professional development a permanent position within the curriculum. Because of this, the Societal Challenge can serve as a sample approach and an instigator to increasingly connect to professional practice within an academic context.

Students Do Not Feel prepared to Start their Career

There seems to be a constant need among university students for a strong(er) connection with professional practice: "An often-heard student complaint is that they experience their curriculum as a disconnect set of courses or modules, with only implicit relationships between the courses and an unclear relevance of what they are supposed to learn for their future professions and why."[1]

For years, research universities have scored relatively low on questions in the National Student Survey that inquire about the connection with the labor market. For Tilburg University this has repeatedly been the lowest score on the list: "the items related to labor

[1] Merrienboer & Kirschner (2018), p. 4.

market preparation are the most important points of improvement".[2] The National Alumni Survey (NAE) portrays a similar picture.[3] Overall, respondents to the NAE are positive about the program, but graduates are more critical about the skills and preparation for professional practice they acquire during their studies. About one in three respondents is dissatisfied/very dissatisfied with these topics.[4] A third source, the Bachelor Outflow Survey of Tilburg University, refers to the "connection to the labor market and career perspectives" as a reason to choose for a Master's program at a different university.[5] Also mentioned here is that for students who have not decided on their Master's yet, one of the most important information needs in order to make this choice has to do with career prospects.

Much can be said about the outcomes of these surveys. It can be questioned whether they are representative of the general student population's opinion. Also, should items related to the labor market even be receiving high scores, or is this to be expected from a research university? To what extent should the curriculum enhance career-readiness? There are many viewpoints on this topic by policymakers, employers, academics, students and society, reflecting different beliefs on the role and position of research universities. But a common thread running through all these visions and opinions is that the university has a key role in preparing young adults for their future role in society. "Universities are educating the future workforce, contributing to solving complex societal issues", advocates Pieter Duisenberg, President of the Association of Universities of the Netherlands.[6] And the Tilburg Educational Profile states that "students at Tilburg University are educated to become knowledgeable, self-aware, and engaged academics, who understand society and want to play a significant role in it".[7] Thousands of Tilburg University graduates go out into the world each year and have jobs that directly affect our society. Making students feel confident at the start of their career is crucial. It isn't merely a distinct phase in college life where decisions must be made: it affects our alumni's future careers and our society as a whole.

The Importance of Career Self-Efficacy

There is a large body of literature on career-readiness, employability and other concepts related to the school-to-work transition, and career management in general. A few important concepts are highlighted here, starting with career self-efficacy. This can be defined as people's judgments of their abilities to perform the behaviors necessary in a particular career-relevant domain.[8] It is considered essential to successful career

[2] Internal Memo NSE Results (2022).
[3] The National Alumni Survey (formerly: WO Monitor) is a national survey of all recently graduated Master's and doctoral students at Dutch universities; it is administered every two years since 2009.
[4] Internal Report Results National Alumni Survey (2022): Research into the current labor market. Position and satisfaction in 2019-2020 with Tilburg University Master's programs among alumni.
[5] Internal Report 'Bachelor Outflow Survey 2021'.
[6] Vermeulen (2018).
[7] Tilburg University Educational Vision Statement, June 2017. Retrieved from: https://www.tilburguniversity.edu/about/education/tep
[8] Betz & Voyten (1997).

management, regardless of knowledge and skills, and is one of the best predictors of many beginning career behaviors.[9] More generally, self-efficacy – as coined by Bandura in 1977 – is a personal judgment on one's capacity to execute actions necessary to reach a certain goal. It is closely related to self-esteem, self-consciousness and self-awareness, but connects to a specific aspect of one's life. A strong sense of self-efficacy contributes to personal well-being and reduces stress. A person with high self-efficacy views challenges (such as the start of one's career) as things that are supposed to be mastered rather than threats to avoid.[10]

Research strongly supports the role of self-efficacy as a predictor of academic performance and persistence, as well as career decision-making intentions and behaviors.[11] For example, Abele and Spurk (2009) showed for over 700 highly educated and full-time employed professionals that participants with higher career self-efficacy at graduation were more satisfied with their careers seven years later than those with lower career self-efficacy. Other studies have found career self-efficacy to be associated with success criteria of intrinsic fulfillment and work-life balance.[12] If we want to ensure a sustainable school-to-work transition for our students, promoting career self-efficacy seems crucial. The impact of low career self-efficacy can be considerable. Taylor and Betz (1983) found levels of self-efficacy to be significantly predictive of levels of career indecision,[13] indicating that students reporting low career self-efficacy were more undecided and procrastinated making career decisions. Similarly, Swanson and Fouad (2015) showed that low self-efficacy acts as a barrier to integrate into a profession, which is why some graduates struggle to begin their careers successfully.

Promoting Student's Career Self-Efficacy

How can we improve the career self-efficacy of our students, making them feel ready for the start of their career? Bandura (1977) identifies four information sources that cultivate self-efficacy beliefs: successful experiences or accomplishments, receiving encouragement and verbal persuasion by others (i.e. advice and encouragement from a reliable source), learning vicariously by observing role models, and learning to manage emotional states. Betz and Hackett (1981) related these same four sources specifically to the development of career self-efficacy. Educational researchers have designed experiments based on this theory to measure the effect of interventions. Reddan (2015) showed that students became more aware of their achievements through completion of numerous self-awareness and work-related activities, such as interviewing relevant professionals and hearing stories from peers about successes and failures in their career decision-making processes.[14]

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9 Bandura (1977); Stajkovic & Luthans (1998).
10 Zhou et al. (2021).
11 Betz & Voyten (1997).
12 Al-Bahrani et al. (2021).
13 Taylor & Betz (1983).
14 Reddan (2015).

Research also evidences a significant relationship between career self-efficacy beliefs and career exploration activities. Komarraju, Swanson and Nadler (2013) investigated the effectiveness of a range of career exploration and management activities in increasing psychology students' career self-efficacy, and found that only assignments providing concrete professional experiences predicted such increases: "In completing carefully developed assignments that simulated real-world experiences, students acquired the confidence to navigate the path toward entering the workplace."[15]

Multiple studies address students' very limited idea of what working life entails. Most students postpone active thinking about their careers until graduation.[16] According to Bridgstock (2009), for ideal economic and societal outcomes, career management skill development should be carefully integrated into courses early on in university programs and should be made mandatory. Similarly, Fouad et al. (2016) conclude that it is important for professionals in higher education to develop and implement strategies to help students overcome developmental milestones such as choosing career paths. Engaging students in career exploration can result in improved career decision-making skills and contributes to their academic success. If we want our students to gain in career self-efficacy, offering them an arrangement of career exploration activities appears to be a promising strategy.

Learning Strategies to Connect Professional Practice to Academic Context

How can we achieve improved career self-efficacy without making concessions to our academic content? First, it should be done with great care. A balance must be found: "Just as under emphasis on career management will result in less favourable graduate employability levels, the sacrifice of important discipline-specific or generic skills in favour of job search and acquisition skills will likewise produce suboptimal outcomes."[17]

We should look for opportunities to integrate career exploration and management activities in courses so that it adds to the theoretical knowledge already being discussed. It can be used as a way to deepen or broaden the topic, or serve as an example or case study. It can involve activities such as "clarification of personal aims and abilities, understanding the requirements of the labor market, being able to actively engage in the career building process or learn adaptability to the changing demands of the working world".[18] We could connect students to alumni who can share their experiences (observing role models) or increasingly invite guest speakers to our courses to build the bridge between the academic knowledge we teach and the implications for society.

A possible learning strategy to integrate preparation for professional practice in the curriculum can be found in the introduction of challenge-based learning (CBL). Building on the success of problem-based learning models, CBL provides a framework for effective

[15] Komarraju et al. (2013), p. 11.
[16] Bridgstock (2009).
[17] Bridgstock (2009), p. 39.
[18] Bridgstock (2009).

learning while solving societal challenges. In their research report, Johnson et al. (2009) articulate this beautifully: "What if rather than trying to teach them problem solving, we actually encouraged them to take on problems that needed solving? Rather than teaching them a science curriculum, what if we opened the door for them to do science?"[19] This learning strategy is a much-discussed topic in the varied educational field. The focus here will lie on its potential as an opportunity to invite professional practice into the curriculum.

The TSHD Societal Challenge as Case Study

In academic year 2021-2022, the Tilburg School of Humanities and Digital Sciences (TSHD) introduced the Digital Humanities Societal Challenge. First, to improve the labor market transition and position of its students; second, to educate its students to become critical professionals with societal impact; and third, to innovate and use the digital humanities character of the faculty for societal impact. Implementing the principles of CBL in an extracurricular activity, around 50 students worked in multidisciplinary teams, on societal challenges formulated by participating organizations within the overarching theme of "Digital Humanities".

An invitation went out to the entire TSHD student population, attracting participants from all disciplines and educational levels. During a kickoff event one week before Challenge Day groups were formed, and students got to know each other by participating in a teambuilding training. Right away, they were asked to reflect on their own role within the team, team dynamics and their approach to the challenge. On Challenge Day, the student teams worked on different case studies under the guidance and support of experts from professional practice and academia, who provided insights and direction from both academic and practical perspectives. Students were challenged to work together, analyze the problem, ask the right questions, acquire in-depth knowledge of the subject, apply their own knowledge and skills, think creatively about solutions, and present their thoughts. At the end of the day the teams pitched their solution. A jury of experts (again, from both academia and professional practice) evaluated each pitch based on predefined criteria and selected a winning team. Last, an important component was reflection on the learning process, which was guided in different ways. After students successfully completed the Societal Challenge, they could write a self-reflection on their learning goals for which they received an Edubadge, an online certificate that visualizes the knowledge and skills they have gained.

[19] Johnson et al. (2009) p. 2.

The Four Societal Challenges

Elisabeth-TweeSteden Hospital (ETZ) – How can we make patients feel responsible for their own medical data?
In many hospitals, like in the Elisabeth-TweeSteden (ETZ) in Tilburg, every new patient is given access to their personal electronic health record (PEHR). Only a small proportion of patients activates or visits their personal account, and an even smaller proportion actually manages their own medical data. We want you to make patients feel responsible for their own medical information in such a way that they regularly check, verify and/or update their medical information in the patient portal.

Ipsos – How to motivate consumers to limit their meat consumption to combat climate change?
Avoiding meat and dairy products is the one of the biggest ways to reduce your environmental impact on the planet. An Ipsos study showed that a majority of the Dutch population (75%) indeed finds it important to contribute on a personal level to combat climate change. However, only a small group is willing to pay money for specific actions. We want you to choose a target group and write a recommendation on how to best approach this target group to motivate them to limit their meat consumption.

The Netherlands Institute for Social Research (SCP) – How should we advise on controversial media narratives around COVID in a meaningful and ethical way?
During the COVID crisis concerns about misinformation, disinformation and fake news became more relevant for policymakers from different domains. But how to define, detect and combat misinformation in times when scientific knowledge is scarce and changing? We want you to write a policy recommendation analyzing the dynamics of interests at play and the complexity of the misinformation debate.

T*Agency and FutureLab Tilburg – How to make the city of Tilburg greener and more sustainable?
The Netherlands is urbanizing, and keeping cities more habitable and sustainable is becoming increasingly important. Tilburg is known as one of the hottest cities in Western Europe. It is important for the city to preserve nature and adapt to climate change, to ensure its livability and sustainability and that of its citizens. We want you to increase the greenery in the center of Tilburg in an original and innovative way.

The Societal Challenge, and CLB in general, contribute to career exploration and self-efficacy by creating a positive experience and a safe environment for students to connect to professional practice. It provides students with an opportunity to gain professional experience and become aware of the overall and societal value of the knowledge and skills

they have acquired in their academic program, building confidence and career-readiness by contributing to their career self-efficacy. This transcends knowledge transfer: it aims toward transfer of learning, i.e. using and applying previously acquired knowledge and skills to new situations or contexts.

Students strengthen the link between what they learn in their courses and what they perceive in the world around them. With CBL, students simultaneously acquire disciplinary knowledge and transversal competencies, all while working on societal problems.[20] Johnson et al. (2009) arrived at the same conclusion – that with CBL, students not only mastered the subject-area content but also developed many of the skills identified as vital for today's society (sometimes called 21st century skills), while being increasingly satisfied and engaged with the course.[21]

CBL meets the desire of students to find a sense of meaning in their education.[22] It helps them get a realistic idea of the issues they can contribute to, now or in the future. This can boost academic motivation because it is clear what their knowledge and skills can be used for, what the future benefit is within their career, and what impact it can have in society – something that can contribute to academic success and lower dropout rates. Last, challenges not only prepare students for their role in professional life by letting them transfer learnings and create positive experiences, effectively contributing to their career efficacy: challenges also impact society directly. They bring together organizations, societal partners, academics and students. The current societal challenges, such as energy, climate, water and security, cannot be tackled in isolation. For society to reap the benefits it is crucial to cooperate and make connections between scientists, businesses and the government.[23] The Tilburg University Impact Program states: "In order to advance our complex society we need knowledge and innovation, both social and technological, and a concerted effort by all stakeholders. (...) It is Tilburg University's goal to contribute to this effort."[24] That can be done in many ways – an important one is teaching our students to use their knowledge and skills aiming toward societal impact.

An Open Invitation

CBL provides an effective framework to incorporate professional practice and societal impact, supporting the career readiness of our students, maintaining academic quality, and contributing to students' sense of meaning and academic motivation. Other ways are possible too: many case studies are already being investigated and new educational innovations introduced each year. Comenius grants increasingly include topics related to employability and inviting professional practice, evidencing the growing importance of the subject and providing an incentive for academics to come up with innovative ideas.

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[20] Nichols et al. (2016).
[21] Johnson et al. (2009).
[22] Malmqvist et al. (2015).
[23] Comenius Grant 2022. Retrieved from https://www.nro.nl/en/nieuws/themas-comenius-2022
[24] Retrieved from https://www.tilburguniversity.edu/research/impact/vision

The Societal Challenge of the Tilburg School of Humanities and Digital Sciences provided a day full of vivid discussion and collaboration between students, academics and societal partners. Participants were delighted with the interdisciplinary format, and students valued the opportunity to experience how they could apply their knowledge to real-world societal issues. The most valuable result is yet to be proven; we hope the TSHD Societal Challenge will turn out to be a catalyst to invite professional practice within the academic program and support our students' career self-efficacy.

We invite you to think about possibilities within your program and courses and will be happy to closely collaborate in supporting the professional development and career preparation of your students.

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09.

Teachers in Challenge-Based Learning

Antoine van den Beemt and Tim Stevens

Abstract

This article considers educational innovations as changes in the educational environment that ask teachers to adopt new tasks or roles. We distinguish three teacher roles in educational innovations: teacher as innovator, teacher as learner, and teacher as practitioner. While presenting challenge-based learning (CBL) as a case of educational innovation, we discuss how at Eindhoven University of Technology an integrated program of research and practice helps teachers take on these roles. An instrument to visualize CBL implementation and CBL design principles at the course level is presented as a dialogue tool to engage teachers in the innovation process. The main conclusion is that innovation should be a means to help teachers address their challenges, rather than a goal in itself.

1. *Educational Innovation: The Case of Challenge-Based Learning*

1.1 Educational Innovation and the Role of Teachers

Although the term educational innovation is widely used in research and practice, there is no commonly acknowledged definition (Schophuizen & Kalz, 2020; Tassone et al., 2021). Innovation is generally seen as a deliberate change process, in contrast to routine developments and improvements based on regular procedures (van Staveren, 2019). Innovations may involve changes in cultures, policies, technologies, institutions, or systems, but in essence all innovations involve doing things fundamentally differently and thus require some form of behavioral change.

Educational innovations are changes in the educational environment that ask teachers to assume new tasks or roles. Hence, whether educational changes are "innovative" depends on the respective context – on whether it requires teachers to adopt new tasks or roles. The university teacher expertise framework (*UNITE;* van Dijk et al., 2020) but so far there has been little insight into what these answers have in common. More common ground regarding what teacher expertise entails is necessary for research and support of the professional development of university teachers. To this end, this study aims to find consensus regarding what constitutes teacher expertise in higher education by identifying teacher tasks. We conducted a systematic review in which 46 frameworks for teacher expertise from research and practice contexts were identified, analysed, and synthesised. Six teacher tasks were distinguished: 'teaching and supporting learning', 'educational design', 'assessment and feedback', 'educational leadership and management', 'educational scholarship and research', and 'professional development'. Additionally, the following

three dimensions for task-related development were found: 'better task performance', 'ability to carry out a greater variety of tasks', and 'a larger sphere of influence'. We present and visualise these tasks and task-related dimensions for development as the UNIversity Teacher Expertise (*UNITE* helps specify the expertise necessary in the context of innovation. The framework differentiates between improvements of basic teaching tasks ("better task performance") and changes that involve taking up new tasks ("ability to carry out a greater variety of tasks" and "larger sphere of influence"). Educational innovations tend to require taking up new tasks.

The adoption of new tasks can involve a different teaching role in relation to students, such as shifting from acting as a lecturer to a facilitator of student group learning processes. It may also involve new roles in the educational system (in relation to colleagues), such as acting as an educational leader. In this chapter we discuss the role of teachers in challenge-based learning (CBL) at Eindhoven University of Technology (TU/e), by reflecting on the role of teachers as innovators, teachers as learners, and teachers as practitioners (Stevens et al., under review).

1.2 Challenge-Based Learning

One current example of educational innovation is CBL (Malmqvist et al., 2015). In CBL, challenges are seen as self-directed work scenarios in which students engage. These challenges are often derived from real-life problems such as renewable energy, pollution, climate change or migration (New Media Consortium, 2009). The objective is to learn how to define and address the problem and to learn what it takes to work toward a solution, rather than to solve the problem itself. Students have to derive their question from the problem and develop a method and process to answer this question. The final deliverable can be tangible or a proposal for a solution to the challenge (Membrillo-Hernandez & Garcia-Garcia, 2020) based on four fundamental pillars: challenge-based learning (CBL. Central to CBL is that students develop and apply knowledge, skills, and attitudes by engaging in challenges. To develop a combination of in-depth knowledge in one's discipline and a broader knowledge of other disciplines and systems, students often work on challenges in interdisciplinary teams.

CBL is perceived as an educational concept rather than a teaching method (Van den Beemt et al., 2022). Because it involves all aspects of educational innovation, including pedagogical, technological and content aspects in an integrated way, CBL is a comprehensive type of educational innovation. CBL as a concept allows for flexibility in and experimenting with effective teaching and learning activities, rather than predefining them. The aim of these experiments is to translate the educational concept of CBL into practice, thus helping curriculum designers and teachers develop their courses and teaching and formulate support requirements. Hence the goal is to use and develop CBL as an instrument to improve education, rather than to integrate every possible aspect of TU/e education into CBL.

1.3 Educational Innovation at TU/e

Eindhoven University of Technology (TU/e) in the Netherlands is a European forerunner in the curriculum-wide implementation of and research on CBL. This focus on CBL evolved from design-based learning (DBL; see also Kohn Rådberg et al., 2020). DBL was introduced at TU/e to embrace the principles that real-life problems promote meaningful learning and that self-directed groups guided by coaches support the development of problem-solving skills (Malmqvist et al., 2015; Perrenet & Pleijers, 2000). The evolution from DBL to CBL emphasized small-scale and flexible education. The main external driver for these educational innovations is the fast-changing professional field for engineers, owing to technological developments and the urge to solve large societal problems (Malmqvist et al., 2015). This triggered teachers to look for new ways to prepare engineering students for their future profession. The internal bottom-up driver for innovation at TU/e is to enhance student motivation and enable the flexibilization of curricula. One important internal top-down driver is the continuous competition to attract students through good and challenging education.

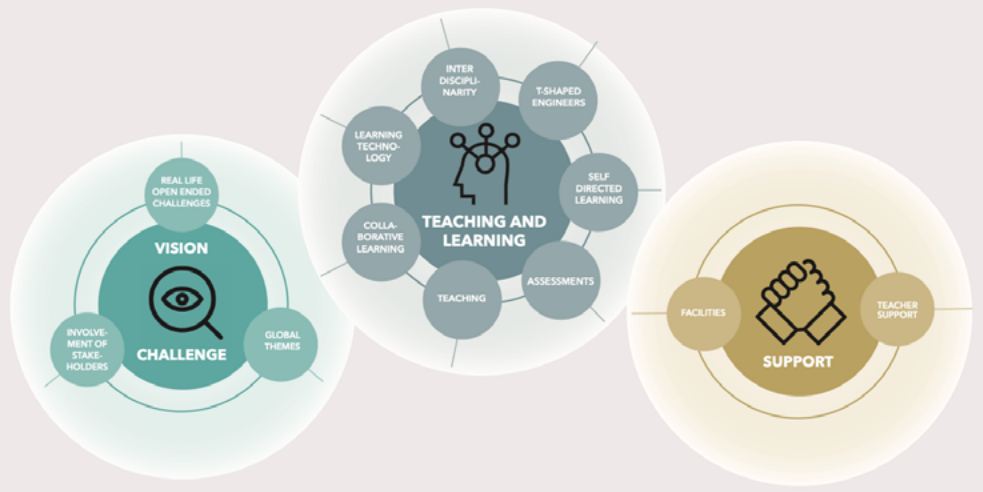
At TU/e, CBL is an exploration of possible answers to these drivers, thus it can be considered innovation as a means rather than a goal in itself. The approach is a curriculum-wide implementation of CBL based on an integrated program that combines bottom-up innovation projects with research and top-down policy and implementation requirements. The effects of the teacher-led CBL experiments and research projects on student learning behavior and learning outcomes are studied in an evidence-informed setup. This combination leads to evidence about what works in the context of this university, which in turn informs educational design and practice.

1.4 Dialogue and Reflection: the CBL Compass

Facilitating bottom-up innovation projects implies allowing teachers to have their own interpretation, which translates the educational concept of CBL into educational practice. Because educational practice aims to stimulate and facilitate student development, the need arises for a variety of challenges ranging from small-scale to open-ended, ill-defined and complex. This open approach is a constructive way to reduce reluctance to change among teachers. To support this process, an instrument labeled “CBL compass” was developed to map CBL characteristics in courses and projects (Van den Beemt et al., 2022).

CBL features in the compass instrument include aspects of educational vision, teaching and learning, and facilities and support. The instrument aims to start reflection and dialogue about implementing CBL aspects in a course or project, rather than benchmarking courses at their level of CBL. Design principles based on the CBL features help the implementation itself. These design principles establish a common ground among all CBL experiments without inhibiting teachers’ creativity. They offer a helpful framework for teachers to identify what is essential in their course (vision) and help them redesign their teaching and learning approach plus determine what sources of support are needed. Design principles are thus intended “to help others select and apply the most appropriate

substantive and procedural knowledge for specific design and development tasks in their own settings" (McKenney et al., 2006) p. 73), rather than being "recipes for success" (Doulougeri et al., 2022).



The CBL Compass

2. *Teacher Roles in Innovation*

Research shows that teachers can have different roles in educational innovations (Stevens et al., under review): teacher as innovator – teachers are stimulated to innovate their education (e.g. through a grant) and the learning process is a side effect; teacher as learner – teachers are supported in their professional development and work on an educational innovation (design, implement, evaluate) as part of a professional development program; and teacher as practitioner – the educational innovation is predefined and teachers are educated to bring the educational innovation into practice.

In the context of CBL, these three roles emerge from educational practice. For example, teacher innovation funds stimulate bottom-up innovation projects and support teachers in their innovator role. Teachers as learners investigate their own course, aiming to find out what works and why. Last, teachers as practitioners take a course to develop knowledge and skills on coaching students during challenges. Together, these roles play a significant part in the university-wide innovation of the curriculum. The roles are not always clearly distinct, for example when an innovation project includes a research part and some form of professional development.

2.1 Teacher as Innovator

At TU/e, an integrated program that combines bottom-up innovation projects with research allows for experiments in which teachers explore ways to integrate more CBL into their

academic components. With an evidence-informed setup the effects on student learning behavior of these bottom-up experiments are carefully studied, answering questions about didactical aspects such as coaching and self-directed learning, assessment, pedagogies, and design of challenges. Hence, teachers play a vital role in the design of the educational innovation (as innovators), as well as in the research to evaluate its effects (as researchers and learners).

An important instrument to stimulate practice-based innovation by teachers is the CBL innovation fund. Over 40 teacher-initiated CBL experiments are being conducted in various departments and institutes (Doulougeri et al., 2022). These experiments show different CBL features and implementations, ranging from small-scale assignments to curriculum-wide initiatives consisting of open-ended, complex challenges presented by stakeholders and focusing on self-directed learning and interdisciplinary skills. This flexible and diverse approach to CBL enables grasping different contexts and subject areas. The innovation fund provides an opportunity for teachers to address the challenges they experience in their everyday teaching practice with CBL elements. In this way, the CBL innovations are not just theory-driven but also practice-based, which strengthens the mutual reinforcement of practice and theory, and enhances teachers' engagement and sense of ownership.

Pedagogical input for teachers and advice on educational technology and tools is provided by a strong teacher support staff. Because we allow flexibility in CBL, this creates a wide variety in CBL implementations for each discipline. This variety is influenced by teachers' perceptions and operationalizations of CBL and responds to a conscious choice to adopt CBL and its characteristics flexibly. In return, support staff must understand the respective disciplines and intended CBL characteristics.

2.2 Teacher as Learner

The integrated CBL program facilitates and monitors CBL experiments and research. The variety of research questions on CBL called for a research agenda on student learning behavior and outcomes, plus didactical/pedagogical aspects of CBL, aiming to (Van den Beemt et al., 2022):

- Make CBL implementation evidence-informed.
- Make the implementation and research projects provide new evidence, which feeds iteratively into the implementation.
- Bring together/align all CBL research and projects.
- Give direction and guidance to the research and projects.
- Support scale and scalability of CBL as a unique selling point.

In general terms, a research agenda shows which themes and aspects of a specific topic are addressed by research and practice, and which are overlooked. The aim is a research-based grounding for developing CBL. For the university context, this grounding answers the

basic "what works and why" question, which in turn would allow teachers and educational leadership to take the next step toward a more systematic, less diffuse approach to CBL.

The combination of an innovation fund and research agenda gets teachers actively involved in research, as well as helps understand the challenges that distinct types of teachers in different types of education experience in bringing CBL to practice. It clarifies and supports teachers' professional learning and supports the development of a shared language needed for collective learning and knowledge-building.

2.3 Teacher as Practitioner

CBL requires teachers to engage in a variety of teaching roles, including expert, coach, and group facilitator. These roles are not fulfilled by one single teacher, but by teaching teams. Each teaching role requires different competencies, and teachers need to learn, develop and practice these competencies to fulfill these roles effectively. However, the change toward CBL requires much more than teachers learning and performing new teaching tasks. Roles are inherently relational and role transitions imply relational changes (Ashforth, B. 2000; Gedera et al., 2015). This means that the move toward CBL, which often involves multiple teachers, stakeholders and students, is a complex multiparty change process. Role expectations, such as the expectations of students about the role of teachers, can repel the role transition (e.g., students' uptake of self-directed learning). Since students need to adjust and get used to their new role, it is essential that teachers not just adapt their own teaching practices but also guide students through the process (to explain, reflect and manage expectations). Another implication of the relational nature of the change process is that each change process strongly depends on the people involved and the specific context in which the roles take shape. Hence a blueprint for the role division of tasks in CBL is not enough. The interactive process in which roles are co-constructed should be optimally supported, for example through weekly reflection sessions (as described under 3.1).

Key issues that teachers experience are related to these challenges. These issues include the lack of competence in moving from teaching to coaching, the struggle between openness and scaffolding students, and problems with assessment. Again, these issues might cause reluctance among teachers to get involved in the innovation process (Van den Beemt & MacLeod, 2021).

CBL research shows how students reported a need for a precise mapping of learning goals to activities and assessment because often it seemed unclear how and on what criteria they were being assessed. In this context, teachers reported that feelings of insecurity demand competence development in supporting students, especially when assessing and integrating disciplinary knowledge. This is strengthened by engineering students' need for clear signposting and scaffolding, especially for open-ended and complex assignments (Van den Beemt et al., 2020)teaching practices, and support. Purpose: We aim to show how IEE is conceptualized, implemented, and facilitated in higher engineering education

at the levels of curricula and courses. This aim leads to two research questions:. What aspects of vision, teaching, and support have emerged as topics of interest in empirical studies of IEE?. What points of attention regarding vision, teaching, and support can be identified in empirical studies of IEE as supporting or challenging IEE?. Scope/Method: Ninety-nine studies published between 2005 and 2016 were included in a qualitative analysis across studies. The procedure included formulation of research questions, searching and screening of studies according to inclusion/exclusion criteria, description of study characteristics, appraisal, and synthesis of results. Conclusions: Challenges exist for identifying clear learning goals and assessments for interdisciplinary education in engineering (vision).

Teachers also appear in need of competence development, especially on assessing integration and integrating disciplinary knowledge, and on supporting students with integration and synthesis. The siloed nature of academia plays a key role here, leading to the professional identity of teachers as experts in a specific discipline. The consequence would be a call for more collaboration between departments. CBL may serve as an accelerator to this end (see also Membrillo-Hernandez & Garcia-Garcia, 2020)based on four fundamental pillars: challenge-based learning (CBL).

3. *Implementing Challenge-Based Learning*

3.1 The E3 project as a Case of Implementing CBL

The Eindhoven Engineering Education project (E3) was launched in November 2020, under the premise of reimagining engineering education by adopting CBL as an educational concept for two courses. Features of E3 include self-directed learning of engineering knowledge, deepening of knowledge through research, multidisciplinary teamwork, working on real-life challenges, application of knowledge and creativity, providing online support and offline seminars, and coaching on expertise and teamwork (see Martin et al., 2022 for a detailed description, and Doulougeri et al., 2022 for a discussion of E3 in relation to the CBL compass and design principles).

The transition to CBL was new for both students and teachers. Students experiencing CBL for the first time need scaffolding, especially at the initial stages of the challenge, and they need to adopt an active learning attitude to navigate complex and open-ended problems (see also Van den Beemt & MacLeod, 2021; Van den Beemt et al., 2020) teaching practices, and support. Purpose: We aim to show how IEE is conceptualized, implemented, and facilitated in higher engineering education at the levels of curricula and courses. This aim leads to two research questions:. What aspects of vision, teaching, and support have emerged as topics of interest in empirical studies of IEE?. What points of attention regarding vision, teaching, and support can be identified in empirical studies of IEE as supporting or challenging IEE?. Scope/Method: Ninety-nine studies published between 2005 and 2016 were included in a qualitative analysis across studies. The procedure included formulation of research questions, searching and screening of studies

according to inclusion/exclusion criteria, description of study characteristics, appraisal, and synthesis of results. Conclusions: Challenges exist for identifying clear learning goals and assessments for interdisciplinary education in engineering (vision). This requires teachers to adopt a coaching role. In the process, teachers struggled to achieve a balance between scaffolding and guidance and expressed their need for additional support. This insight was considered by offering training to teaching assistants plus weekly peer feedback sessions, where all teaching staff of E3 met to share good practices and offer mutual support.

The CBL compass results for the E3 courses allowed teachers to assess what was achieved and how. The CBL compass results thus fostered the dialogue about redesign of the courses. Reported relevant questions included:

- What are the features of a good challenge for first-year engineering students?
- How to prepare teaching assistants for their role as CBL coaches
- How to encourage students to be in charge of their learning (self-directed learning)
- How to develop good assessment practices for CBL for individuals and groups, products, and processes

These questions highlight the need for teachers to use theory-driven insights before designing or redesigning a CBL course. One way to address this need is by using design principles as a starting point for discussion. For example, the need for alignment was considered essential between learning objectives and assessment practices. Deep learning of course content was a central objective in the course, but this learning goal was not aligned with the assessment practices. However, the course coordinators reported that although the design principles helped develop learning materials, resources and learning activities, this exercise would require collaboration between a multidisciplinary group of professionals.

3.2 TU/e Innovation Space

The efforts toward CBL at TU/e do not operate separately but interact as part of an organizational ecosystem. The essential elements of the CBL program come together in the TU/e innovation space (Reymen et al., 2022). TU/e innovation Space is a learning hub and expertise center for CBL and entrepreneurship education. Its approach and ecosystem facilitate an open and interdisciplinary community where students, teachers, researchers and stakeholders create and share knowledge on the design and solution of challenges and CBL research. The culture and attitude at innovation space stimulate experimentation and the willingness to fail, all with the aim to learn what works and why.

3.4 Future Directions

The flexible interpretation of CBL at TU/e has opened avenues for future directions. First, the flexible embedding in the curriculum enables CBL to be molded to each engineering discipline, allowing for different flavors of CBL. The CBL program, providing

direction and structure to university-wide CBL activities and together with the bottom-up implementation of CBL, has facilitated acceptance and dissemination of CBL throughout educational programs and in all layers of the university. The over 40 pilots and experiments at the time of writing boost a fruitful proliferation of educational experiences with CBL, allowing for a meaningful construction of CBL as a concept. The bottom-up stimulation of experiments, together with instruments such as the CBL compass and design principles, assures acceptance and lessens feelings of a top-down process. Last, the broad approach to carrying out innovations on CBL has created a sound platform to introduce innovations, even if they imply drastic changes, for instance in assessment for learning and as learning itself.

In conclusion, teachers not only put educational innovations into practice as educational practitioners, but they also use their practice-based knowledge to shape the educational innovation (as innovators) and contribute to the collective and organizational learning process by engaging in research and reflection (as learners). Overall, we plead for a process-oriented approach in which the educational innovation is seen as an instrument rather than a goal. In this process it is important to connect teachers' research-based learning to evidence-informed innovation. This can enhance a sense of ownership and autonomy among teachers and supports the development of suitable innovations. In this process-oriented approach, teachers are the key change agents. Not the educational innovation itself, but the challenges that teachers experience should form the starting point of the process. The question is how the educational innovation, as a flexible concept or tool, can help address these challenges. At TU/e instruments for dialogue, including the CBL compass and design principles, serve as promising solutions.

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10.

Learning by app

Ludo B.F. Juurlink

Abstract

Can we successfully outsource some of our university teaching to an AI-based mobile phone app that also claims to counter unwanted cramming for exams? A Comenius Leadership Fellow Award funded a three-year pilot study at Leiden University. We intended to investigate implementation and learning effects. As it is being built on accepted learning strategies, i.e. spaced repetition and retrieval practice, we opted for the Cerego app. Within Cerego, students study and practice content that is created by their own professors. While implementation initially suffered from logistical problems, we succeeded in having over 3000 students register to use the app between 2019 and 2022. About ten BSc and one MSc programs from three faculties used it. Technology acceptance seemed to vary between programs, while all surveys overwhelmingly indicate that students believe the app helped them in their studies and would like it to be implemented in more courses of their programs. Results from a retention study point to a selection bias in the data. Circumventing this effect, we show better retention with increased use of Cerego, even after a 5-month time span.

Introduction

Academic curricula are groups of courses and assignments that are taught both in parallel and sequentially. The independent description of such courses and assignments in program guides and their independent assessment pave the way for students to consider them as independent parts in their complete academic program. Courses seem like shapeless pieces in a puzzle for which students do not have a clear total exemplary picture. To educators, however, there are clear lines of knowledge development and skill construction running through the program. Curriculum items build on knowledge attained in previous courses. The pieces are not just shapeless parts of a puzzle, there is an order to it.

Although compounding knowledge and skills is essential, in practice many students approach their studies as a hurdle race. The hurdles are the assessments following individual curriculum items. An assessment may be a midterm, final exam, report, essay, or one of many other modalities. Particularly in the case of written examinations, many students only start studying and memorizing when the exam is not too far off. In their experience, the resulting cramming of knowledge is often an effective means to get over the hurdles. However, we also know from over a century's worth of research that cramming is ineffective for building long-term retention. {Mcintyre 2008} So in effect, there are two linked problems here. Students are not aware of the connectivity of elements in the curriculum that may be spaced in time, nor do they realize that required proper compounding of essential knowledge that transcends individual curricular elements is hindered by poor study skills.

To pilot a promising method that may counter unwanted cramming, a group of educators at Leiden University implemented an AI (artificial intelligence)-based adaptive learning platform in their teaching. This platform, called Cerego, uses two learning strategies that are efficient, i.e. spaced repetition and practice testing (aka retrieval practice). {Dunlosky 2013} Much like many other learning platforms that have students use their mobile phones, Cerego uses push technology. Via push messages individual students are enticed to study specific learning content at the most appropriate time intervals to efficiently build long-term retention. The timing of the push messages and what content is offered/re-offered through practice testing is determined by an AI-based algorithm and tracking each student's individual performance. The algorithm attempts to optimize the individual's study efficiency and reach retention goals as defined by the teacher for each set of study content. Although there are some earlier studies of positive learning effects for this particular system {Sirin 2018, Warshaw 2018}, independent research was lacking so far, and in the Dutch educational system there is limited experience with implementation of such EdTech (Education Technology). In our pilot we did not place any focus on students' lacking insight into curricular structure. In hindsight, the adoption of the platform may be facilitating such insight, especially when the platform is used repetitively and in multiple courses of the same curriculum.

Here we describe our approach to implementing this AI-based technology and what we have learned so far through student surveys, discussions with educators, and interventions that attempt to quantify learning effects. The project was funded by a Comenius Leadership Fellow Award from the Netherlands Initiative for Education Research (NRO). Research on student data obtained from Cerego and grades for examinations and retention tests has been conducted in accordance with ethical standards set by Leiden University and are in agreement with both Dutch and European privacy legislation (GDPR).

Some aspects of implementation

In 2019 Leiden University purchased a three-year university-wide license to use Cerego. The license went live after significant effort dealing with privacy issues, primarily resulting from Cerego being headquartered in the US and not having a server on EU soil. After performing a DPIA and with all contracts in place, a few introductory courses at three faculties started implementing the mobile phone-based app in the first of our three-year pilot study. Both the Faculty of Archaeology and Leiden University Medical Center started with a single course. The Faculty of Science started with three courses: one in a BSc Chemistry program, one in an MSc Chemistry program, and one in a BSc Biology program.

While it may be obvious that medical students need to memorize considerable knowledge about anatomy, practicing and memorizing was also found useful in courses of the other programs. For example, in Introductory Chemistry students need to memorize names and charges of complex ions in order to provide proper chemical names and structures of ionic compounds. They are also expected to recognize or name three-dimensional molecular structures, practice with validity of combinations of sets of quantum numbers, and so

forth. The same applies for Archaeology, where students need to be able to recognize types of materials used to make artifacts found at archaeological sites.

Creating course content that allows for memorizing and practicing using multiple-choice questions, fill-in-the-blanks content, and clickable items all seemed very easy with Cerego. Instructing teachers and their student assistants in the development of the learning content took little time. The platform's interface for educators is rather intuitive and was found to be manageable with little instruction. A Cerego representative trained a few educators online. This knowledge was then passed on by teachers and student assistants in subsequent years. Hence the first thing we learned was that the time and effort required to enable educators to create content was rather limited. The time required for the creation of study content itself mostly relied on the availability of the proper materials, e.g. images with good resolution.

The availability of the platform to students was announced both in class (generally during the first class) and via Leiden University's digital learning environment, Brightspace. It only required that individual students sign the right consent form, which was presented in class in the first year and via digital forms in subsequent years. After signing consent forms, Cerego invited students to register using their university email address and study the online course contents. After having consented once, students could register for other courses in subsequent years if their study programs used Cerego in more courses.

The first differences between the implementation in various programs became clear during the process of registration. For example, we tracked when students registered to use the platform after its availability was announced. Results for three BSc courses from the Science and Medicine departments in the second year of our pilot are shown in Figure 1. For Bachelor's programs in the sciences, we found a rather slow increase in the number of registrations that continued nearly linearly up until the written examination at the end of the course (orange and blue lines). In the medical program, most of the students that registered did so in the first couple of days after the optional use of Cerego was announced (green line). Registration numbers kept increasing steadily but with a much lower frequency after the first few days. Clearly, the initial rate of registration may depend strongly on how the benefits of the app were advertised by the teachers of the individual courses, but it likely also reflects students' mentality toward the need to memorize and practice for their studies as well as variations in technology acceptance between different groups of students. Note that class size varied for these three courses. Fractional registration will be discussed below.

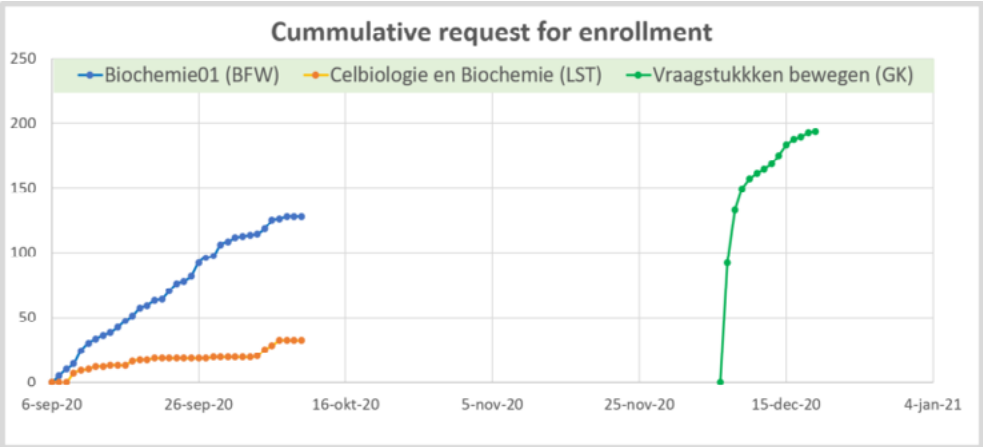

Figure 1 *Cumulative requests for enrollment for three courses. BioChemie01 (BFW) = Biochemistry course in Biofarmaceutical Sciences (BSc); Celbiologie en Biochemie (LST) = Cell biology and Biochemistry course in Life Science and Technology (BSc); Vraagstukken Bewegen (GK) = Anatomy in Medicine (BSc).*

Beyond the origins of variation in initial registration rates, there are multiple possible reasons for the continuing registration up until the actual exam. A first explanation is that the arguments provided to sign up for using the app – the expected benefits were advertised with the announcements in class – were lost to students. Registration only a few days prior to an exam suggests that the student did not understand the relation between the construction of long-term memory and the required time for spaced repetition. These "late" students apparently believed that the app could also help them cram effectively in the last minute. A second explanation for late registrations is that students had been spreading the word about an "apparently useful tool" to help one study for the exam, but especially during the years when coronavirus regulations limited on-campus teaching, such word-of-mouth advertising of introductory courses between students may have slowed down. A third, less likely explanation is that some students only became aware of the optional use of the app rather far into the course. Although we have no definitive explanation for this observation, it is clearly an important aspect of the implementation of an AI-based study tool that attempts to optimize learning efficiency through spaced repetition. It can only produce the intended effect if students start using the tool early on in a course. Gradual adoption shortens the time left for students to use the platform and may be expected to negatively affect attained retention, especially if courses run for only a few months.

Another difference we became aware of was the fractional registration for Cerego. While the way in which the app was advertised and the required effort to register were rather similar, the fractional registration varied from a few tens of percent in an Introductory Chemistry course to nearly all students in an Anatomy class. Similar larger variations were found in subsequent years. Although we made no significant effort to research the origin of these rather large differences, we expect them to be predominantly the result of differences in study culture. When educators do not feel that memorization and repetitive practicing is useful and necessary to build a knowledge base and, instead, move rather quickly up Bloom's taxonomy in designing their assessments, the need to practice and memorize basic knowledge will not be instilled upon students. Congruent test items will be lacking on examinations. As the incentive is to pass exams, students of programs with such cultures are, logically, less likely to adopt a digital tool that helps build long-term retention of factual knowledge. From many conversations with colleagues across university programs over the years, we believe there is a large variation in this aspect of academic culture. Especially in the natural sciences, like physics and chemistry, it appears that learning basic knowledge by heart is considered (at least relatively) much less important than developing higher-order skills compared to programs such as biology and medicine.

After the first trial year, advertising of the availability of the app and license through various educational meetings helped rapidly disseminate its use. By the second year Cerego was being used in multiple programs in the Faculty of Science, such as Computer Science, Biopharmaceutical Sciences, Molecular Science and Technology, Life Science and Technology, and Biology. In the medical program, two additional courses – one in Brain and Control and another in Radiology – implemented Cerego. Halfway into the third year, well over 3000 students had registered to use Cerego for at least one of the courses offered in their program. At the end of the third year, Tilburg Law School was the fourth faculty to implement Cerego. This opened the prospect of having between 2000 and 3000 new student registrations for the app every year.

Student surveys

The results of student surveys likely helped the rapid growth of the app's use. In the first and second year, we conducted several student surveys using Cerego's own available survey tool. Cleary, this only reached students that used the app. Within our limited time frame, we weren't so much interested in why students opted not to use the app, but more in student opinion on the app itself and its usefulness to their studying. Hence most surveys only contained a few questions on such points. We opted to use a Likert scale (1 = strongly disagree, 5 = strongly agree) and generally no more than five statements. To illustrate, the four statements described below were used in the 2020-2021 survey taken by first-year chemistry students who had used Cerego in a 6 EC Introductory Chemistry course, of which only the first half was supported by Cerego content.

- I liked that Cerego was offered as an extra study resource in General and Inorganic Chemistry.
- I believe that studying through Cerego helped me in General and Inorganic Chemistry.
- I would also have liked to have been offered study material via Cerego for the second half of the General and Inorganic Chemistry course.
- It would be good if studying with Cerego was offered in more courses of my Molecular Science and Technology program.

We found rather encouraging results from these and similar surveys amongst other courses and programs. Figure 2 shows a representative selection of four courses offered at the Faculty of Science for four academic programs. In particular, the score on the last statement may have helped us convince colleagues to also try out the adaptive learning platform.

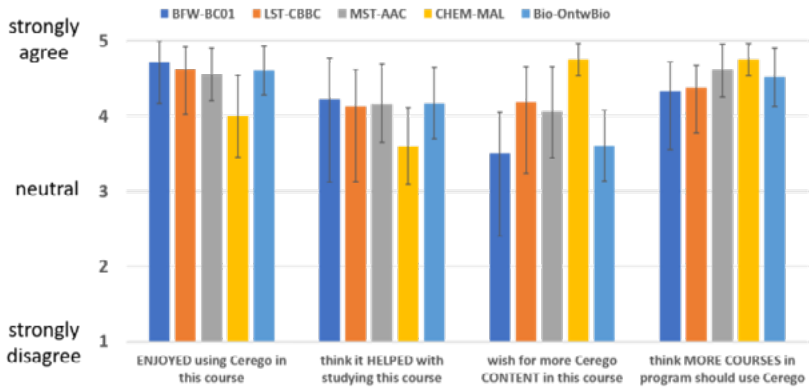

Figure 2 *Agreement scores on statements in student surveys following four courses. BFW-BC01 = Biopharmaceutical Sciences (BSc), BioChemistry 1; LST-CBBC = Life Science and Technology (BSc), Chemical Biology and BioChemistry; MST-AAC = Molecular Science and Technology (BSc), General and Inorganic Chemistry; Chem=MAL = Chemistry (MSc), Metals and Life.*

In the third year of our pilot, Leiden University's large medical program with over 300 new students annually also conducted a survey following an Anatomy course. The statements and scores were:

- The Cerego app is a great addition for learning the anatomical structures. (av. = 4.7)
- The Cerego app is an addition to the existing education. (av. = 4.6)
- I would recommend the Cerego app to fellow students. (av. = 4.7)
- The Cerego app was easy to use. (av. = 4.5)
- I liked the fact that Cerego was offered as an extra study resource in Anatomy. (av. = 4.8)
- I believe studying through Cerego has helped me with Anatomy. (av. = 4.6)

- I would have liked to have been offered more study material via Cerego at Anatomy. (av. = 4.4)
- It would be good if studying with Cerego was offered in more subjects of my study program. (av. = 4.8)

While a parallel study on learning effects was still ongoing at this point, the results of all student surveys conducted thus far yielded the same overall picture. Students appreciate being able to study on their mobile phones with this adaptive learning platform and would like to see it implemented in more courses of their programs. The same general picture emerged irrespective of program and the large variation in fractional registration and use.

An initial study on retention effects

The initial study on retention effects was conducted on the General and Inorganic Chemistry course (AAC). This is a 6 EC course offered as the first chemistry-related course in the program Molecular Science and Technology (MST). It generally starts in the first week of September and lasts 10 weeks. It includes a midterm exam (in week 4), a final exam (in week 9) and a resit of the final exam (in week 10). Learning goals are, in principle, tested cumulatively on these examinations. In practice, the midterm predominantly tests learning goals from lectures in the first half of the course and the final predominantly tests learning goals from the second half. While the final examination focuses on the application of knowledge and analysis, the midterm exam contains a significant fraction of items explicitly testing for factual and procedural knowledge. Hence use of the adaptive learning platform Cerego in parallel to studying for this course mostly affects the midterm grade, if at all.

Cerego content was developed using 14 sets of learning items ("assignments") in 2020-2021 and 25 sets of items in 2021-2022. Items in a single set are related and generally revolve around a few concepts only. Such sets can contain flash cards, multiple-choice and multiple-answer questions, ordering questions, and clickable items. While some sets offer help in memorizing, other sets allow for practicing. These sets were made available sequentially, the timing matching the discussion of related topics in class in the first half of the course.

In both academic years, over 150 students registered for the course, with 57 students in 2020-2021 and 135 students in 2021-2022 voluntarily registering to use Cerego as an additional study aid. In both years only a fraction of them also actively engaged with Cerego to any significant extent. We expect this to be related to a dominant factor in technology acceptance amongst chemistry students – its "perceived usefulness" (Davis 1989}, later called "performance expectancy" {Venkatesh 2003}. The fact that many more students registered in the second year may be a consequence of "result demonstrability". {Venkatesh 2000}. Initial positive results of study effects were shown to students in the second year as part of the announcement of the availability of Cerego.

A retention test was offered five months after the final AAC exam. In the interim, MST students do not repeat course content from AAC in other courses to any significant extent. The test was unannounced and voluntary. It contained 30 test items, 21 designed to relate strongly to learning content from AAC that was also offered within Cerego. The remaining nine test items also related strongly to AAC content, but had no relevant learning content offered within Cerego. In both years, over 100 students took this retention test.

We compiled final exam scores, data from Cerego, and the scores on the retention test into a single spreadsheet. The relation between every test item of the retention test and learning sets within Cerego was added. If answering a particular retention test item could clearly be related to any particular set in Cerego, this connection was also indicated. Table 1 summarizes characteristic numbers from data collected for 2020-2021 and 2021-2022. From cohort sizes of about 160 students, 57 registered in 2020-2021 to use the AI adaptive platform but only 48 used it actively, i.e. scoring at the end of the AAC course over 0% progress toward retention goals. In the following year, 135 students registered but still only 45 used Cerego actively.

Table 1 *Student numbers for the class and Cerego, and retention test scores*

	2020-2021	2021-2022
MST Freshman	167	158
Registered for Cerego [1]	57	135
Active within Cerego [2]	48	45
Retention test candidates	118	102
Average normalized score (s)	0.532 (0.137)	0.537 (0.141)
Took retention test and registered for Cerego [1]	37	70
Took retention test and used Cerego actively [2]	35	43

[1] Registered is defined as being registered for use of Cerego after filling out the proper form for the AAC course.
[2] Active is defined as having scored over zero percentage on progress goals over the entire course within Cerego.

The results of the retention test itself and its relation to Cerego use by students are shown in Figure 3, which plots the normalized retention test scores for students that opted to register for Cerego and use it to any extent larger than zero ("active Cerego students") as a function of the average progress toward retention goals within Cerego. The group size is indicated in brackets. The average normalized score of all students is indicated by a dashed horizontal line (0.54 ± 0.14 in both years). The averages for the students that registered to use Cerego are also indicated (0.51 ± 0.12 and 0.48 ± 0.15, respectively). For both years, we find that Cerego users mostly score significantly above the class average. Their normalized retention test scores scale roughly linearly with the retention goals reached in all Cerego sets.

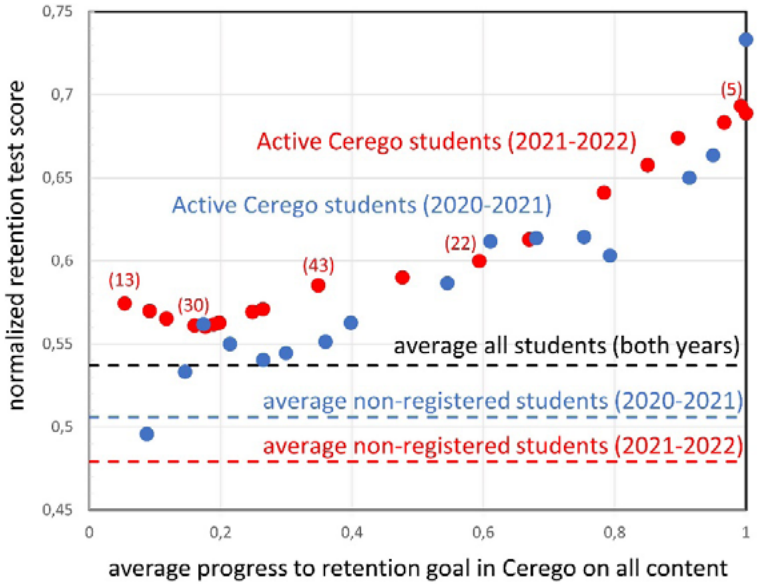

Figure 3 *Normalized scores on the retention test as a function of the average attained retention goal on all sets within Cerego for 2020-2021 (in blue) and 2021-2022 (in red). The average score on the retention test of all participants and the average of only the non-registered students are indicated by horizontal dashed lines. Red numbers in brackets represent the sample size for the nearest point.*

Regardless of how attractive and clear the relation seems, the possibility of it suffering from a selection bias keeps us from drawing any direct conclusions regarding use of Cerego and its effect on long-term retention. We offer the adaptive platform as an optional way to study. A volunteer bias is well known, e.g. in clinical studies, where participants have intrinsically different characteristics than the general population. {Jordan 2013, Tripepi 2010} We may be selecting a group of students with more intrinsic motivation to study hard and obtain high grades. Their willingness to do so may be reflected in their use of the adaptive learning platform and cause the apparent relation between the retention test results and the progress toward Cerego retention goals.

We took two steps to shed better light on possible retention effects in our data. First, we removed poor test items from the test results. We used the discrimination index (DI) as a measure of validity of test items and checked the difficulty of all items. The test items of questionable quality or difficulty overlap to a large extent. Nine questions were discarded. Second, we devised two means to circumvent the influence of an expected selection bias, with a simple and a more complex scheme.

In the simple scheme, we identified a group of "avid Cerego users", i.e. users that scored over 50% on the reached goals in Cerego on sets that had a relation to retention test items. From these we also obtained AAC final exam scores and retention test scores. There were 18 such students. We then hand-selected for each of these 18 avid users another student that had not or hardly used Cerego ("non-users and weak Cerego users") but scored nearly identically on the AAC final exam. The comparison of these two groups' average scores on the retention test is shown in Figure 4. Qualitatively, the graph clearly shows that the group of avid Cerego users (red markers) performed better on nearly all test items than the non-users and weak Cerego users (blue markers), who obtained nearly identical AAC final exam scores five months earlier. Using all 30 test items, avid users scored 20% higher. Omitting the previously mentioned nine test items of questionable quality, avid users scored 13% higher.

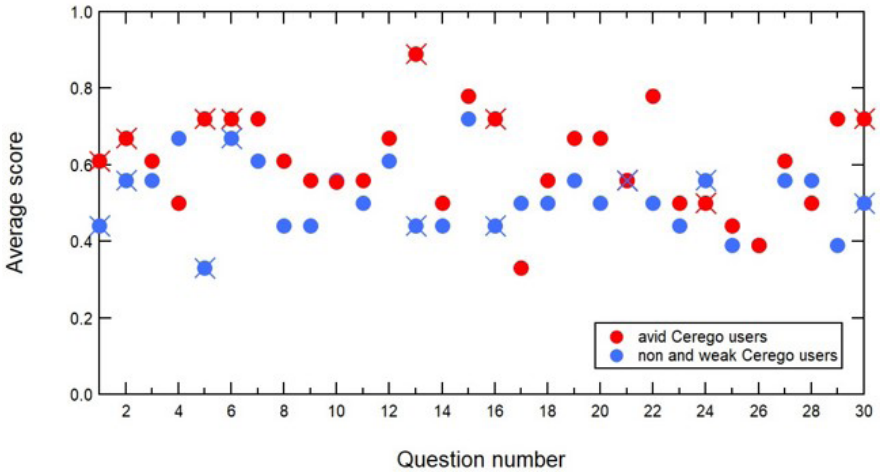

Figure 4 *Normalized average scores on the retention test for a group of avid Cerego users (red symbols) and the best comparison from non-users and weak users (blue symbols) for 2021-2022. Crossed symbols are those that may be omitted based on the item score lying >2s from the average test score or a DI < 0.2.*

Our more complex scheme builds more rigid data not by comparing the avid users to a single, hand-picked selection of weak users/non-users, but by creating many comparison groups using two variable intervals. The first variable interval is the allowed difference between the AAC final exam score of an avid user and any student from the remaining group. In the simple case described above, we minimized this value manually by hand-picking. In this more complex scheme, we allowed the difference to rise to 0.25, 0.5, 0.75 and 1.0 points on the exam (on a scale of 1 to 10) to allow for increasing numbers of groups. For each difference value, we created up to 500 comparison groups instead of one. The second interval is the minimum score on Cerego goals we use to define the avid

users group. This Cerego cut-off was set to 50% in this simple scheme, now varying it to 10%, 20%, etc. up to 90%. Clearly, for the latter the number of students in this avid users group is small just as for each relevant Cerego study set, with only a few students reaching >90%. For each of the nine minimum Cerego cutoff values, we varied the allowed AAC final score interval as described above.

The results using the 21 "valid" test items only are shown in Figure 5. On the left, a table specifies the computed difference score including the factor that specifies to what extent the avid users group actually used Cerego more than non-users or weak users. A value of 0 in the weighted test difference indicates that we found no increase in retention test score between the avid users group (whatever the cutoff value for the definition of this group was) and 500 comparison groups. Any value larger than 0 indicates that Cerego users do better at the retention test. As the average score on the retention test for the non-users/weak users generally ranges between 10 and 11 (out of 21 test items), a 1.0 difference in this table and graph means that Cerego users do about 10% better. This is to be compared to the 13% that we found in the simple scheme (described above). The graph, on the right-hand side in Figure 5, visualizes the same data. It more easily shows that the difference in the retention test score predominantly appears for students who reached more than 50% of the Cerego learning goals. Between 0 and 50%, the difference score is clearly small, ranging between 0 and 0.5.

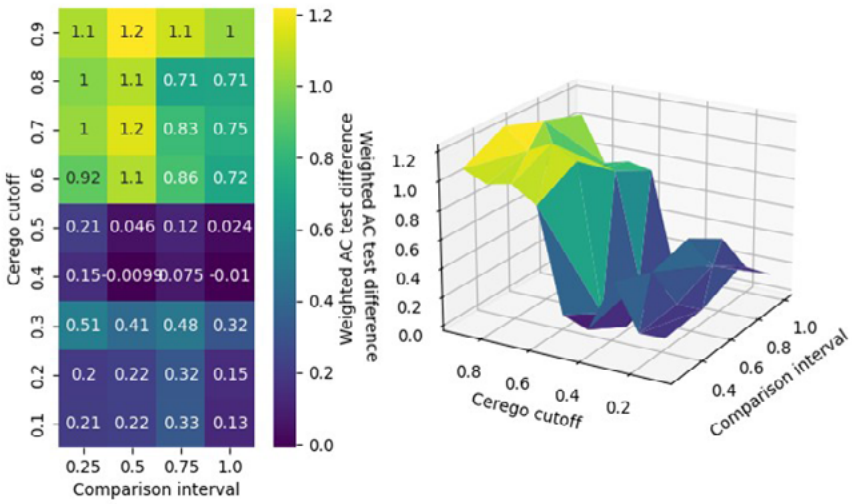

Figure 5 *Weighted average test score differences of avid Cerego users and 500 comparison groups for each of 36 combinations of a Cerego cutoff, which defines the avid users group per test item, and the allowed comparison interval, which defines the allowed difference between scores of avid vs non-users/weak users in their AAC final exam score.*

Conclusion

The analyses of all data from the project allow us to draw several conclusions. First, we confirm that technology acceptance varies between academic programs. The intended outcome of having students register and use this type of EdTech to replace cramming prior to exams with better study skills seems more easily attained in programs that advocate memorization as an essential part of studying. Second, our data support that voluntary subscription to EdTech opportunities leads to a selection bias, which also affects estimates of learning effects. It warns against studies that omit such biases in their data analysis. Third, students' long-term retention clearly benefits from using the adaptive learning platform. Even after a five-month time span we found rigid differences between identical groups of students, with the most significant difference appearing for students that reached at least 50% of the learning goals within the platform. With students overwhelmingly indicating appreciation of the technology, these findings strongly support its application in higher education. Still, we advise considering variations in academic culture and technology acceptance.

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