

TEACHING TEAMS: a teacher can't do it alone

UTeachers Academy of the faculty EEMCS is calling for a professional team approach to course design

Nelly Litvak, Maurice van Keulen, Tracy Craig, Karen Slotman, Jan Buitenweg, Erik Faber, Luis Ferreira Pires, Arend Rensink

WHY BLENDED LEARNING HELPS STUDENTS?

This sounds familiar: students cramming for the exam, making long hours, last days before the test. They might pass the test, but most of the time, will not gain reliable long-term knowledge. Research shows that effective learning requires¹

- engagement (being active while learning),
- inconsequential error feedback (feedback, but no punishment),
- spacing (learning regularly in small portions), and
- sleep.

The conclusion is clear: cramming for the exam is the worst possible learning strategy! Yet, this is what our students do, time and again.

We often try to warn the students, but we all know: it does not work. In fact students are often unaware of ineffectiveness of their own learning². Then, how can we help students study effectively? How can we nudge them into good study habits?

The good news is that the answer is very well known. What we need is the course design that has a large variety of activities, weekly assignments, collaboration and discussions, and diagnostic self-testing with immediate feedback. Such course designs are well researched, and we have all means to create them. We can offer our students engaging courses with a healthy mixture of effective interesting activities, online and on-campus. This is what is called 'blended learning', and this is where our university wants to go.

WHY DO WE MOVE TO BLENDED LEARNING SO SLOWLY?

High quality blended learning is rare at the UT. In our opinion, the reason is that high quality blended learning is possible only through the integration of expertise. Already in 2006, three forms of such expertise were introduced in the TPACK framework³: technological, pedagogical, and content knowledge (a.k.a. TPACK). Given the large numbers of students, we want to add to this organisational expertise as well. Figure 1 schematically shows the integration of expertise in an effective blended course.

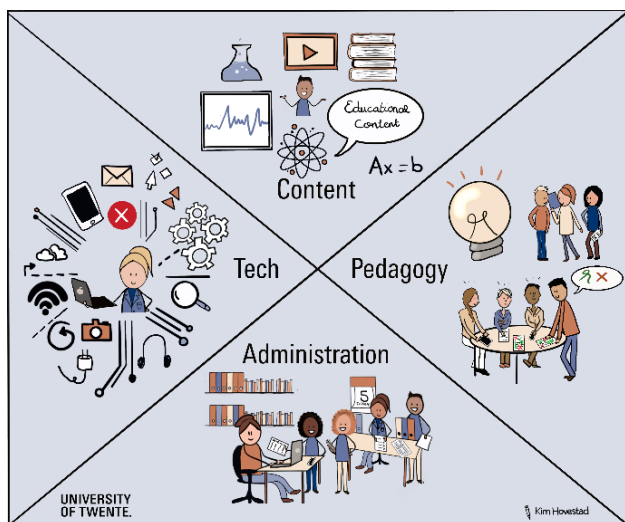


Figure 1. What is needed for blended learning.

Our current system builds on the implicit assumption that, a teacher is able to cover all these aspects of the course. Traditionally, perhaps, this was a valid assumption because the requirements beyond content expertise were very basic. Today, with the arrival of online tools, and steep increase in student numbers, the teachers' tasks have expanded way beyond the subject matter. Most university teachers are trained scientists in their respective areas. They are out of their depths in the domains of pedagogy, EdTech, and organization. The implicit assumption, inherited from the past, that the teachers can handle these tasks on the required quality level, is unfounded and must be urgently reconsidered.

¹ Dehaene, S. (2020). *How we learn: The new science of education and the brain*. Penguin UK.

² Deslauriers, L., McCarty, L. S., Miller, K., Callaghan, K., & Kestin, G. (2019). Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. *Proceedings of the National Academy of Sciences*, 116(39), 19251-19257.

³ Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, 108(6), 1017-1054.

HOW MUCH ARE WE LOOSING?

As an example, look at an honest self-profile of one author of this article (NL) in Figure 2. The size of the dark grey triangles indicates the skill and the motivation of the teacher in the corresponding areas. This teacher is devoted to effective education and is a winner of teaching awards. Yet, look at the light-green space in the figure. This is the measure of quality that the students are missing in her courses.

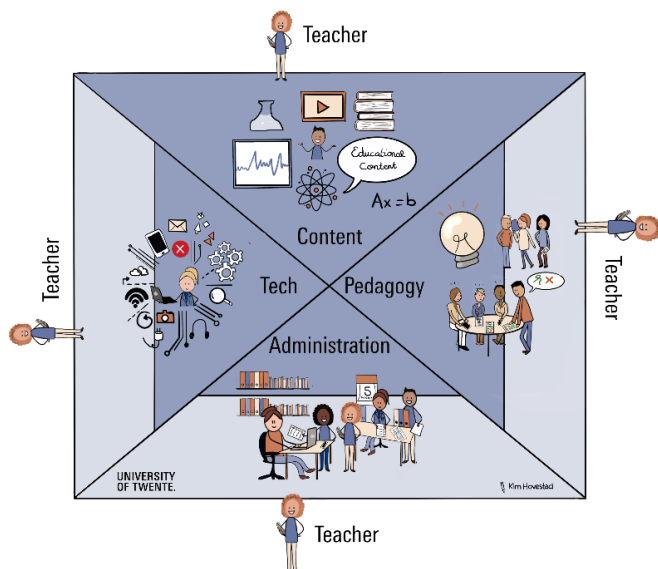


Figure 2. An honest self-profile of teacher's expertise

teachers are not qualified for implementing high quality blended courses, and it is unrealistic and undesirable for the universities to expect this from the teachers.

CAN WE TRAIN THE TEACHERS IN PEDAGOGY, EDTECH, AND ORGANIZATION?

The university provides training on teaching qualifications. This is definitely useful for the teachers' professional growth, and deeper understanding of education in their role as a content expert. However, no course, and not even life-long-learning, will bring teachers' expertise in pedagogy, EdTech, or organization, any close to a par with their expertise in content. It is unrealistic to train all teachers sufficiently to perform all tasks in a modern blended course, on the required high level of professionalism and efficiency. This is also undesirable for the university, to train a highly qualified and expensive personnel, for completely different tasks, basically from scratch.

BUT DON'T WE PROVIDE SUPPORT FOR THE TEACHERS?

The university provides support for the teachers, but this is not the answer. Figure 3 illustrates the problem in a typical workflow . Currently, the teacher remains responsible for all aspects of the course. We show this by placing the Teacher figure at all sides of the square. The red arrows show teacher reaching out for support. The support is available, but these red arrows are problematic for several reasons.

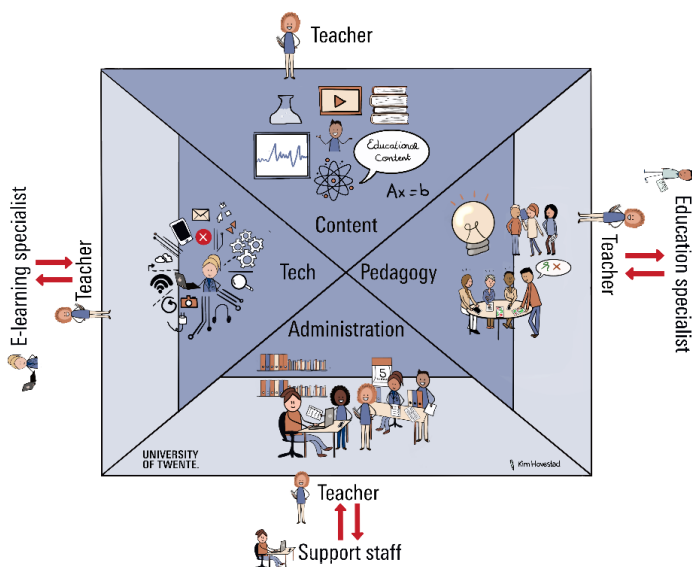


Figure 3. Current support for teachers

The light grey area in teachers' education profiles, is also a measure of inefficiency in the organization. This is how much time teachers spend on tasks that they execute slowly and unprofessionally, for example, reading manuals for online tools and resolving technical issues. This time is being taken away from other important academic tasks such as research and leadership.

It is time to redefine the teachers' formal roles and boundaries. What are the tasks that teachers do, but do not have to do? What do teachers like to do, what gives them energy? What is energy draining?

It is time to recognize that, in general, university

teachers are not qualified for implementing high quality blended courses, and it is unrealistic and undesirable for the universities to expect this from the teachers.

Currently, the teacher remains responsible for all aspects of the course. We show this by placing the Teacher figure at all sides of the square. The red arrows show teacher reaching out for support. The support is available, but these red arrows are problematic for several reasons.

First, the support is usually provided in the form of advice. In the end, the teacher must execute everything, from typing up the assessment scheme to making sure that all links work. This only increases the already very high workload of the teachers.

Second, the support is optional. It is up to a teacher whether or not to seek advice. This slows down the improvement of the courses, and the knowledge available in the organization remains unused.

Third, supporting staff don't carry the end responsibility for the course. For example, administrative supporting staff may prepare a list of grades, but they are not authorized to submit it to the exam office. The teacher must check and submit the grades, however, checking 50+ grades is as much work as preparing the grade list without any help. This diminishes the value of the support.

Fourth, the support is reactive. The requests come unexpectedly, and usually are urgent, for example, something didn't work in an online class today. This results in peak demands for support, which is difficult for both the teachers and the supporting staff.

Fifth, the current workflow is inefficient. Each red arrow costs time and effort. Often the teacher does not even know the right person to approach. As a result, teachers end up doing the work, for which support is available, often thinking: "I'd better do it myself, this is the fastest way to get it done." However, even if some teachers are skilled in online tools or organization, it does not mean that they like it or should do it.

Finally, teaching assistants (TA's) can be hired for the course to help the teacher. The help of TA's is invaluable, but they cannot, for example, help with effective course design, their knowledge of EdTech might be limited. Also, a large team of TA's comes with new organizational challenges. And the end responsibility for the course remains solely with the teacher.

To summarize, the current workflow is not suitable for massive transition to blended learning.

WHAT IS THE SOLUTION?

Citing a blended learning expert Barend Last, we should 'recognize that the role of the teacher has long since changed, and explore whether all those roles can still be captured in one person. Perhaps working in teams, with teachers, designers, technicians, and so on, is a better approach.'⁴

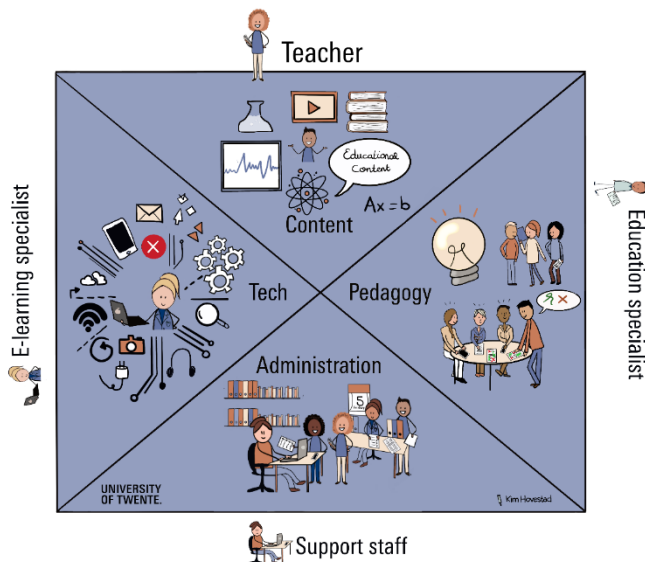


Figure 4. Teaching Teams

As UTeachers academy of EEMCS, we strongly advocate for such team approach.

We want to suggest a radical change in the workflow. Figure 4 shows this new workflow, *Teaching Teams*. In this new workflow, each course is developed and ran by a team. The teacher defines the learning goals and carries out the educational activities. The instructional designer is responsible for course design: pedagogy and EdTech. And in a large course, a manager organizes the team's activities and reporting.

Compared to the current set-up, the major change is that the efforts of educational specialists and e-learning specialists available at the university, are redirected: they are, like teachers, assigned to specific courses.

WHAT WILL WE ACHIEVE WITH THE TEAM APPROACH?

- The quality of courses will improve because all aspects of the course will be addressed professionally.
- The workload of teachers will reduce, at least medium- and long-terms. The teachers will spend a larger fraction of their time on teaching the course subject, will become more available for the students. This is what teachers love to do. Thereby, we can expect that the teachers' overall job satisfaction and performance will improve as well.
- It will be much easier for the teachers to start teaching a new course, because they will join a team that is already familiar with the course set-up. This is especially important for newly appointed assistant professors.
- It must be exciting for education specialists, e-learning specialists, and supporting staff to put their knowledge and creativity into practice and receive direct response from the students. This will also give them an opportunity to do research on effective learning jointly with the teachers.

⁴ Last, B. Is ["To blend, or not to blend?" de juiste vraag?](#) LinkedIn blog September 1, 2021.

- A team can be very effective in acting on students' evaluations. Together they will quickly come up with pedagogical and technical improvements, while a teacher alone might not even know about such methods and tools.
- The acquired knowledge and experience will quickly spread to other courses through the team members. This will fuel the overall improvement of education.

We should not forget possible obstacles in transition to such team approach. Inevitably, organization of a course will become more complex, the work on the course will require a stringent planning, as well as great collaboration and communication skills. This will require some investment from the teachers, definitely at the beginning, and some teachers may feel that such radical change makes their life only more difficult. Maybe the change should be gradual, starting with several pilots, then introducing the new approach into new courses, and/or the courses that have a new teacher. The universities will also have to invest in facilitating the new approach, from hiring specialists in EdTech and pedagogy, to communicating the new approach to staff and students.

DO WE HAVE THE EVIDENCE THAT THE TEAM SETUP WORKS?

Yes. Because this is exactly how the commercial online education is organized. But even in our own university, there are best practices of such teamwork and professionalization. Below are some examples.

Best Canvas site ever. In 2019, an e-learning specialist has set up a Canvas site for the course Statistics for Mechanical Engineering. The site has a very clear structure, the course information is organized in professionally looking clickable blocks. The students, in their 3rd year of BSc, said that this was the best Canvas site they had so far. The teacher now uses the same design in her other courses as well.

Module "Data & Information". Growing numbers of students in this bachelor module of 15EC (500+ in 2021) forced the teacher team to carefully design and organise the module for scalability. One decision that spurred several innovations was to invite an e-specialist on digital testing to the weekly teachers meeting. She educated the teachers about features of our digital testing environment "Remindo", helped solve problems, and took responsibility for the proper configuration of the system to, for example, distribute grading. Another decision was to appoint 'senior' teaching assistants and making them responsible for certain coordination and technological tasks, such as, TA scheduling, the on-line support environment "Discord" used in practicals, etc. Placing responsibility for certain parts of coordination and technology with capable people reduced the load on the teachers and module coordinator (also a teacher), taking away tasks that they are not especially good at or that do not belong to their primary role, resulting in a module that ran much more smoothly, efficiently and professionally.

Open book technology-mediated assessment in Vector Calculus. In 2022, drawing on our experiences of remote assessment in the previous two years, we shifted away from traditional closed book assessment of vector calculus and towards partly open book (certain notes allowed) assessment including access to the online tools GeoGebra (2d- and 3d-graphing) and Symbolab (powerful and versatile calculator). The team consisted originally of two teachers and an e-assessment specialist. Late in the process a fourth member joined the team, a student who observed security weaknesses and advised on fixing this problem. The assessment was considered successful by teachers and students, and would not have been possible without the joint skills and knowledge of all on the team working together. Reflecting on the process we found the framing of "roles" and the importance of making them explicit particularly helpful⁵.]

Metacognition in Module 2 "Software Development" (BIT Bachelor). In the programming part of BIT Module 2 a system was developed based on testing at regular intervals (weekly practical exercises and diagnostic tests) and tools for the students to monitor their own learning⁶. This system improved the general course results and the appreciation of the students towards this part of the module, which used to be a big obstacle for most BIT students. This system was designed and implemented by one teacher with the help of TAs, which were proficient in EdTech, and helped a lot with the technical issues. This is an example of both application of metacognition to improve learning, as using the help to cover the EdTech area. In this case, the teachers were very qualified in pedagogy, and even published on metacognition in an educational conference.

⁵ McKenzie, S., Hains-Wesson, R., Bangay, S., & Bowtell, G. (2020). A team-teaching approach for blended learning: an experiment. *Studies in Higher Education*, 1-15.

⁶ Ugulino, W. & Ferreira Pires, L. (2021) The Use of Metacognition to Develop Self-Regulated Learning Skills in Students of a Computer Programming Course. In: Heiß, H-U., Järvinen, H-M., Mayer, A. & Schulz, A. (eds.) *Proceedings SEFI 49th Annual Conference 2021: Blended Learning in Engineering Education: challenging, enlightening – and lasting?* Societe Europeenne pour la Formation des Ingenieurs (SEFI), p. 547-556 10 p.

ARE WE READY?

We do realize that changing the workflow requires considerable organizational efforts. We cannot expect that improvements in teachers experience and performance will happen overnight. Our experts in education and EdTech will also need to invest time and effort to transition from advisor to active designer of education. Yet, if we are serious about blended learning, or any other contemporary form of effective education, then we are convinced that such professionalisation is the future.