UNIVERSITY OF AMSTERDAM

# Blend IT & Share IT

**Advisory report issued by the Innovation in Education / Blended Learning Task Force**

Date
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*Disclaimer*: Every effort has been made to provide an accurate translation of the text. However, the official text is the Dutch text: any differences in the translation are not binding and have no legal effect.

**Contents**

*Appendices*

**Management Summary**

The university has the honourable and responsible task of educating talented people and preparing them to take on roles that will shape the future course of society. The responsibility therefore falls to the University, more than any other organisation, not only critically to keep pace with, but to stay ahead of, developments taking place within society.

This is a significant challenge. Digitalisation and other significant societal changes too are leading to what we refer to in this report as an unbundling of academic practice in general and of academic education in particular. At the same time, high standards are being imposed on education and research even as quality is coming under pressure owing to decreasing government funding and the massive scale of higher education.
In this advisory report we will first outline these changes and then set out in which direction education at the UvA should change and which measures should be taken to achieve this. To this end, we have adopted a blended learning perspective. Blending learning is not a technology. Blending learning primarily has to do with seeking new combinations of online and face-to-face teaching and learning activities underpinned by a sound educational perspective. Its innovative strength in education lies not in widely available, advanced digital technologies but rather, as the Austrian-American economist Schumpeter pointed out many years ago, 'in implementing new combinations'. The Task Force believes that blended learning offers many opportunities to achieve a meaningful and innovative re-bundling in education.

The Task Force has found that while a great many exciting ICT education projects have been launched and implemented at the UVA in recent years, they have failed to be integrated into a long-term, innovative UvA-wide education strategy. We also believe that the current Vision on Teaching and Learning should have greater depth and breadth. Depth involves strengthening the relationships between studying and teaching, and between students and lecturers. These relationships have come under significant pressure on account of various developments and threaten to compromise the quality of education. Breadth relates to the University's ties with the wider society. Blended learning offers many opportunities for deepening and broadening education at the UvA.

The UvA has not been a frontrunner in innovation in education in recent years, nor in widely integrating ICT in education for the longer term. For the reasons outlined above it is essential to develop an integrated education strategy (depth and breadth) in the short term, concentrating on a student-centric Vision on Teaching and Learning, with blended learning becoming the default situation in education.

A strategic reorientation and the development of a long-term dynamic innovation capacity for education constitute the two pillars of our advice. At both the central and decentralised level, important choices must be made and initiatives undertaken.

At the central level, these choices mainly concern the following:
1. deepening and broadening education;
2. aligning the central and decentralised blended learning infrastructure;
3. aligning and managing various decentralised initiatives;
4. collaboration with university and non-university partners;
5. financing blended learning;
6. the use of and participation in open educational resources/open courseware;
7. revision of the contact hour system.

At the decentralised level, choices must be made regarding the following:
1. developing a blended learning faculty plan;
2. making resources available (funds and expertise) and developing an effective incentive structure for lecturers;
3. the development of blended learning at curricular level;
4. developing in-house or procuring digital teaching resources;
5. costly education productions (e.g. MOOCs, digital workbooks).

Several initiatives at the central and decentralised levels are pivotal to developing long-term innovation capability in education.

At the central level we propose:
1. launching a Blended Learning research programme and appointing a professor with this remit to facilitate the development of evidence-based blending learning (see the UvA Strategic Plan 2015-2020);
2. developing multidisciplinary expertise (educational theory, didactics, instructional design, educational software engineering, project management);
3. setting up a UvA-wide Blended Learning Platform for exchanging and sharing knowledge and experience, and for developing new education products;
4. appointing a dean of blended learning to oversee the platform and the decentralised blended learning initiatives.

At the decentralised level we propose:
1. making professional development in blended learning the number one priority for lecturers;
2. appointing a blended learning coordinator to align and support initiatives undertaken by the faculties and departments, and between central and decentralised initiatives;
3. emphasising teaming up to produce digital teaching resources rather than producing these resources individually;
4. setting high standards for the quality of the production, use and purchased digital teaching resources;
5. if possible, developing digital teaching resources within a modular architecture to ensure greater flexibility in terms of production and use;
6. strongly advocating the development and use of learning analytics.

## Chapter 1. Introduction

The importance of e-learning and blended learning has never previously generated the interest it has received in recent years. There have been many developments in the area of e-learning in university education in recent decades but they have left most universities unmoved.
This situation appears to be changing. Universities, at the national and international level, are increasingly preparing an explicit digital education strategy in response to more recent, fast-moving developments in the area of information and communication technology (ICT). This has everything to do with the nature of ICT and the degree to which it has penetrated virtually all sectors of society – including university education. The expectation is that digitalisation of the infrastructure and of content, objects and processes will, in due course, create a flow of (digitalised) information. This will involve, among other things, digitalised educational material. There are now virtually no technical constraints to prevent its global spread. Supporters of open educational resources and open courseware are also committed to eliminating legal and institutional obstacles. The open nature and concomitant public access to educational material is helping to blur the boundaries between universities and the public domain (Floridi, 2007).
The use of computers in whatever form (laptops, mobile telephones, tablets, etc.) has become normal practice. Situations where no digital equipment and digitalised data are used have increasingly become an exception (Dahlstrom et al., 2012). In that context, the Netherlands Institute for Social Research (SCP) Central Social Planning Office (2000) noted fifteen years ago that the digitalisation of everyday life was in progress – a development that has intensified, broadened and deepened as a result of the social media revolution. Digital everyday life is the default living environment of today's generation of students.
This cannot yet be said of the teaching and learning environment. However, according to many recent reports on technology trends, new digital technologies, digitalised data and course materials can have a disruptive effect, i.e. they can transform higher education in a revolutionary way. According to De Bruijn et al. (*Trouw*, 30 May 2015) this remains a silent revolution for the time being, and much is still taking place under the radar. Barber et al. (2013) describe an avalanche where many developments in higher education are taking place relatively independently and will remain invisible for some time until a certain momentum arises after which the avalanche will thunder towards higher education at full tilt.

The digitalisation of higher education also features on the national political agenda. In a recent letter (8 January 2014) to the Lower House, Minister of Education, Culture and Science Bussemaker indicates she is fully promoting open and online teaching and learning and is calling on higher education establishments to find out more about these developments. In her 2015-2020 Higher Education and Research Strategic Agenda titled 'De Waarde(n) van weten' (The Value(s) of Knowledge), the minister describes the inspiring direction higher education is set to take in the next ten years.
Substantial knowledge has been developed in the area of ICT in higher education in the Netherlands over the last three decades. Dutch universities are collaborating closely in the area of ICT innovations in education, primarily within the SURF network (SURF 2015-2018). Many initiatives have also been developed in the area of open and online learning and teaching within our own University in recent years. This has not so far resulted in an explicit digital education strategy.

A key reason for this is that online education, in the course of its development over recent decades, has not fitted in particularly well with the education on campus provided by traditional universities. This also applies to the UvA. Online and distance education belonged primarily to the domain of open universities. Blended learning, combining of offline and online education, by contrast, is a better fit with university education provided on campus because it would include the value of the physical campus and the effect of face-to-face education.[1] Blended learning is therefore regarded by many as 'the best of both worlds'.

At the same time, blended learning is still raising many questions. The key questions are: 1) how fundamental are these changes and 2) what are the implications for education at the UvA? At the request of the Rector Magnificus, an Innovation in Education/Blended Learning Task Force was set up to answer these questions. The following assignments were put to the Task Force in the terms of reference:

1. Reflect on the current Vision on Teaching and Learning (*Onderwijsvisie*) and examine how recent developments could be integrated into the curricula.
2. Develop a didactic concept for blending learning curricula where there is a good balance between online and offline learning and which is in line with the learning outcomes of degree programmes and the general objectives of education at the UvA (research-intensive education and student-activating education).
3. Provide an overview of empirical evidence concerning blended learning.
4. Examine whether, and how, blended learning can contribute to flexible learning pathways for non-traditional groups of students (part-time students, continuing professional education, etc.).
5. Prepare a list of the online forms of education at the UvA and specify which of them lend themselves to being scaled up.
6. Provide an overview of the financial consequences and technical preconditions.

The Task Force is made up of the following members:

- Peter van Baalen (Faculty of Economics and Business, chairperson)
- Brigitte Widdershoven (Academic Affairs, Task Force secretary)
- Klaas Visser (Faculty of Social and Behavioural Sciences – Psychology)
- Arthur Salomons (Faculty of Law)
- Etienne Verheijck (Faculty of Medicine, AMC)
- Andy Pimentel (Faculty of Science)
- Leon Raijman (ICT Services) until 1 April 2015
- Annemarie Zand Scholten (Faculty of Medicine – Child Development and Education)
- Nynke Bos (until 1 March 2015)
- Ilse Blomberg, student member from May 2015
- Lina van Hirtum, student member from May 2015

*Procedure and limitations*

In preparation for these recommendations, the Task Force concentrated extensively on the area of innovation in education and blending learning within and outside the UvA. Presentations of developments were given within the UvA's faculties and by representatives of other universities. Conferences on e-learning, MOOCs and blended learning were attended. In addition, literature was studied in depth to identify the various aspects of blended learning, where the primary emphasis was on the empirical underpinning of research in the area of blended learning and associated topics. This literature study is appended to the advisory report as a separate appendix and was used as a source document when the recommendations were prepared.

[1] There are many different definitions of Blended Learning. These differences will be dealt with later in the report.

The Task Force limited itself to the educational aspects of blended learning and in particular the implications its implementation will have for education. Other task forces within the UvA are currently working on areas closely related to blended learning: information strategy, the electronic learning environment, knowledge sharing and learning analytics. Various consultations on substance took place during the Blended Learning Task Force's activities. The various recommendations will have to be coordinated further with one another at a later stage.

*Structure of the report*

The report consists of four chapters and a series of appendices. In the interest of readability, the main text has been kept relatively brief. Examples, digressions and the literature study are included as appendices. In chapter 2 we deal with the question of 'why blended learning?'. We describe a number of key technological developments and developments within higher education which have fuelled the interest in blended learning. Chapter 3 deals with the question of what blended learning is. In chapter 4 we state how the UvA's current educational approach will have to be changed to make education future-proof.

## Chapter 2. Why blended learning?

### *2.1. Developments in the area of e-learning to date*

A host of new technologies has filed past universities during the last three decades, without, however, this resulting in their being broadly embraced. E-learning platforms (e.g. Blackboard), which were implemented by most universities from the end of the 1990s, are an important exception. That said the use of those e-learning platforms is mostly limited to the provision of information and communication between students and lecturers. Some of the major causes of universities' limited use of e-learning technologies are:

1. The fact that e-learning projects were mainly initiated by lecturers who are enthusiastic about a particular technology. Using a new technology does not always mean it will be possible to show a particular effect (better learning outcomes, academic success rate, efficiency, etc.) straightaway. The discussion among e-learning researchers about the inability to show significant differences between online and offline learning is known as the 'no-significant-difference-debate' (Russel, 1999).
2. The absence of concrete results from the use of e-learning activities. This is an obstacle to their being widely accepted within universities (Van Baalen et al. 2011).
3. The fact that universities had low expectations of the effects of ICT in higher education: 'change is low, not radical' (Van de Wende and Collis, 2002). The usual ICT applications (e.g. e-learning platforms) have not changed education drastically.
4. The fact that lecturers showed little interest in bringing about innovation in education with the aid of ICT. Nor were there any incentives (time, money) for lecturers to start using ICT applications.
5. The fact that there was still little concrete information on how e-learning applications could be integrated into education (educational embedding).
6. The fact that not everyone is convinced of the need to have ICT play a greater role in higher education. The fear that education will become standardised and automated is preventing acceptance of e-learning in education (see the well-known and characteristic article by David F. Nobel (1998) *Digital Diploma Mills: The Automation of Higher Education*).

At that time, Van de Wende and Collis (2002) concluded that most universities were applying a 'stretching the mould' strategy. In other words, e-learning activities had slightly stretched current educational practices without changing education in any fundamental sense. The annual survey of the Babson Survey Research Group (2014) into developments in online education reveals the same picture. In 2002, less than half of the higher education establishments surveyed stated that online learning was of strategic importance to long-term development. In 2014, however, that proportion had risen to nearly 70%. This increase goes hand in hand with a growing belief that online courses are at least as effective as offline courses.

This picture is confirmed in a recent survey by the European University Association (2014) of 249 higher education establishments in 38 European countries, which shows that the majority of establishments surveyed (91%) have implemented a form of blended learning.

In addition, 82% stated they also offer online courses. Establishments are increasingly collaborating in partnerships. Digitalisation is also extending to other educational processes.

### *2.2 Digital challenges for universities: the debate*

The attention given to e-learning has for a long time been limited to specific education and research communities. The role of digital technologies barely featured in major strategic debates on higher education (e.g. the Bologna Declaration). The emergence of Massive Open Online Courses (MOOCs), which took the world by storm – the *New York Times* named 2012 'the year of the MOOC' – launched a broad debate both at the national and international level.

The debates on MOOCs are a good illustration of how the playing field is changing for universities. The potentially revolutionary nature of MOOCs is reflected not so much in the digital form in which education is offered, but primarily in their openness, the fact that certificates are awarded and the mass participation in MOOCs. Naturally, the idea that high-quality courses at the best universities in the world can be taken by very large groups of people, who will also be able to obtain a certificate, hits at the very

core of the traditional university which offers education selectively and has a ‘monopoly’ on awarding academic degrees. De Bruijn et al (2015) go one step further. The authors envisage a development where, in future, international students, rather than looking for top universities, will seek top lecturers who offer their courses in MOOCs. In this context, they refer to MOOCs having a de-institutionalising effect, where the reputation of the university becomes less important than the reputation of individual MOOC lecturers.

Moreover, MOOCs can be incorporated readily into blended learning programmes. A subject is then learned through a MOOC, whilst various aspects from the MOOC can be explored by lecturers and students in an offline learning situation.

For this reason, it is no surprise that MOOCs are provoking many fierce debates. The following dialogue between two executive staff members of a German university is a striking example of two extreme positions in the debate between the two university executive staff members. Schmidt is the chairperson of the university’s board and Meier the vice-chairperson (she is responsible for education).

| | |
|---|---|
| Meier: | ‘MOOCs are a revolution for universities. They will change teaching like a tsunami, particularly in higher education and make Harvard for everyone possible!’ |
| Schmidt: | ‘I don't see it like that. MOOCs are nothing new. We need education, not cartoons. We can mess up with MOOCs.’ |
| Meier: | ‘MOOCs use the opportunities offered by social media. Interactive formats allow peer learning and thus the learning community can regulate itself.’ |
| Schmidt: | ‘You are overestimating them. Self-regulation leads to a herd mentality, making quality assurance impossible. Education can only be provided through personal interaction. It’s not surprising that the drop-out rate is so high.’ |
| Meier: | ‘That’s not the right way to look at them. MOOCs offer new opportunities for education. Any participation is a positive gain. MOOCs are contributing to the democratisation of education.’ |
| Schmidt: | ‘How would you hold legally incontestable examinations and award grades? And it wouldn’t be possible to give or credit ECTS points on such a weak basis.’ |
| Meier: | ‘New methods such as Signature Track, self-grading, peer-grading and badges are being developed. It is also possible to combine MOOCs with clasroom examinations. And ECTS credits can be awarded.’ |
| Schmidt: | ‘Where are we supposed to get the resources? It takes two years and costs €500,000 to produce one MOOC. At the same time we need to offer teaching via conventional routes. That’s why MOOCs are often teaser offers with considerable subsequent costs.’ |
| Meier: | ‘You are exaggerating. 6 months and €25,000 are enough. There are also sustainable, fair business models where participants, external funders and companies contribute to finances.’ |
| Schmidt: | ‘And anyway, MOOCs are not compliant with copyright, higher education and funding legislation or with data protection.’ |
| Meier: | ‘That’s not true. The law reflects structures that have existed hitherto and must be adapted to innovation in society.’ (HRK, 2014). |

The above dialogue shows that the use of MOOCs (but in fact of all digital educational technologies in education) raises relevant questions about the possibilities they offered (Harvard for everyone, personalisation and democratisation of education, new education methods), but also to do with the lack of an adequate educational theory, the high production costs and insufficiently substantiated revenue models, the value of tests and certification and the absence of copyright. It provides a reliable picture of the situation in which universities find themselves and of the debates taking place at many universities. The possibilities and challenges are very attractive, but at the same time a solid educational, financial and legal basis which would allow MOOCs (and other digital education technologies) to be embraced fully is often lacking.

The debates on MOOCs in higher education are interesting, but the digitalisation of higher education is much broader and probably has many more consequences than have come to light in the debate on MOOCs (mobile learning, informal learning using social media networks, personalising higher education and making it flexible, gamification in education, 3D-printing, Big Data/learning analytics (see: *NMC Horizon Report*, 2014 for an overview).

*2.3 Non-technological developments*

However, this is not merely about the opportunities which the new digital technologies offer, but also about the extent to which the university education we offer today is able to respond to other, non-technological developments, such as:

1. *Increase in student mobility*. Students are becoming more discerning because options for students are increasing. Added to that is the fact that they often have to finance their studies themselves. They want value for their money. The quality of the education and the university's reputation, employment prospects combined with the amount paid in tuition fees are important factors, and an attractive campus and opportunities to study online determine to a large extent which university a student will choose (Deloitte, 2014). This is forcing universities to raise their profiles.
2. *Increase in heterogeneity*. As mobility increases so does the diversity (nationality, cultural background, level of previous knowledge) of the student population (Biggs and Tang, 2011). Diversity is a complicating factor in higher education. The learning outcomes of the Dutch pre-university examinations can no longer be used as the sole basis for university education. A large array of (relatively expensive) pre-Master's courses or programmes which will enable students to enter mainstream education will have to be developed.
3. *Personalising and creating flexibility*. Mainstream university education offers students limited opportunities to pursue a self-selected study pathway. The organisation and funding of universities is only partially equipped to deal with this. Interest in personalised study programmes could well increase, with students taking courses which they have selected themselves, at their own pace. Craig (2015) describes the emergence of what are known as intelligent competency platforms where students upload their education profile and their wishes as regards a job or career. They are matched, after which a 'competency gap' is identified and a study programme recommended. Students then choose a study pathway, part of which will involve university attendance and another study programmes offered commercially (online). It remains to be seen whether this is a realistic scenario and an example which will be followed enthusiastically, and it will largely depend on the quality and flexibility of today's mainstream education.
4. *Massification of higher education*. The rapidly rising number of students and falling contribution by the government to higher education are placing considerable pressure on the quality of education. In the period between 2001 and 2002, the government's contribution per student fell from €19,300 to €14,200. In the period between 2007 and 2012, the number of students rose from 200,000 to just below 250,000. The number of students is expected to rise further still in the years to come. The simple conclusion, therefore, is that universities are going to have to do more with less money. Further standardisation, less flexibility, bigger classes, postponement of investments and the use of less expensive lecturers are often obvious solutions. The VSNU (association of universities in the Netherlands) therefore fears universities becoming 'teaching factories' (VSNU website). The massification of higher education combined with falling government funding is not a problem peculiar to the Netherlands. Some authors anticipate a 'debt crisis' arising for colleges as a result of comparable developments in the United States.
5. *Quality of higher education*. Complaints – from students and lecturers alike – about the declining quality of higher education recur at regular intervals throughout the history of higher education. The recent protests by students and lecturers of the UvA but also elsewhere in the country reiterate the serious concern over the quality of education (see, among others, ReThink UvA: Position Paper on Teaching and Research, 16 May 2015). The undue emphasis on study success rates (metrification of quality), increase in the red tape involved, huge classes, decoupling of education and research, and the heavy teaching load of lecturers are the complaints most commonly heard. Concerns about the quality of education are forcing reflection and a change of approach in academic education.
6. *Global competition among universities themselves and with commercial providers*. As a consequence of student mobility, combined with steadily decreasing government budgets . for higher education, global competition among universities is set to increase. This is forcing universities to position and reposition themselves dramatically and develop or redevelop their profiles. Competition with commercial providers of high-quality (online) education will also

increase.

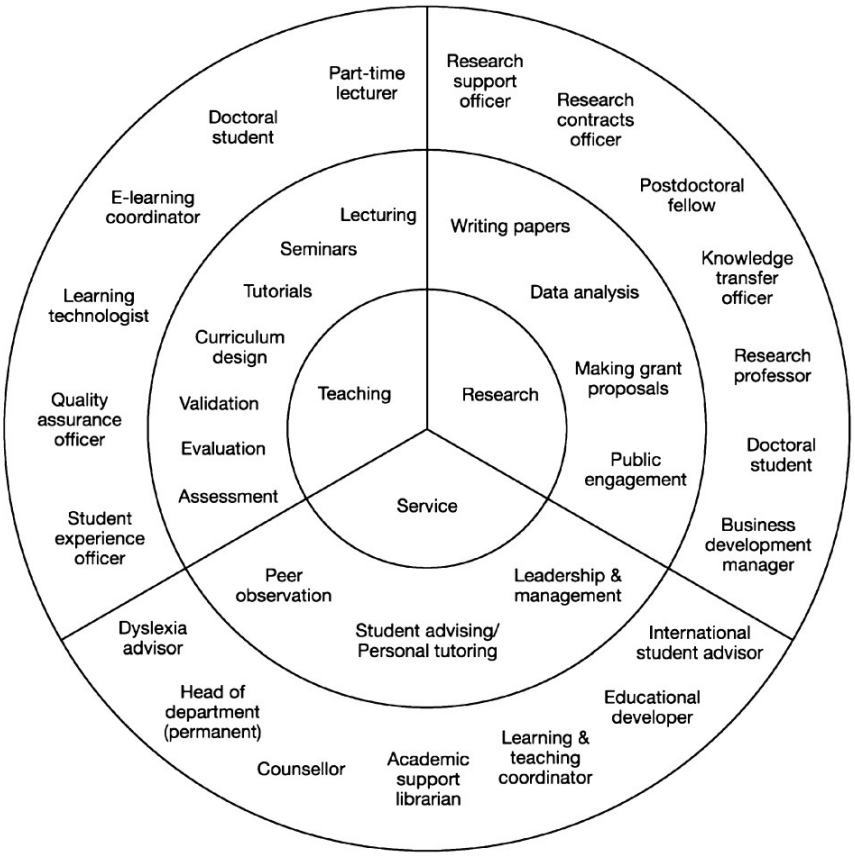
*2.4 Unbundling and re-bundling in education*

Academic practice can be seen as a bundling of research, teaching and service activities. In the traditional idea of the university, that coherent bundling was regarded as the essence and strength of the university. The all-round academic is presumed to fulfil that tripartite role. As a result of the massification of higher education, the use of ICT in education and the increasing specialisation in research, the coherent bundling of activities finds itself under pressure and there is an increasing disaggregation of these three different roles (Macfarlane, 2010). This is called unbundling. The unbundling of academic practice is continuing in each of the three separate roles (see figure 1).

The debate on the unbundling of university tasks is not new and not unique to university education (Wang, 1975; Hagel III & Singer, 2000). Probably the best-known example outside university practice is the unbundling of the music industry, where the sale of the traditional bundled music album (the LP or CD) made way for the provision of individual tracks in digital formats through music services such as iTunes and Spotify to which new digital services have also been added (e.g. other track recommendations). This process is called re-bundling. An important factor in this regard is that the unbundling of the product (the LP or CD) has also led to an unbundling of supply chains (organisational unbundling) which allowed new parties to enter the music industry.

Comparing the processes of unbundling and re-bundling within the music industry and the university appears trivial and is probably meaningless in some respects. Nevertheless, comparable processes in university education are already clearly visible. The call for a more flexible education system which is better suited to personalising education and is more accessible for non-mainstream groups of students is becoming ever more pressing.

*Figure 1. Unbundling of academic practice according to Macfarlane (2010)*



A good description of these developments is given in MIT's vision for the future, *Institute-wide Task Force on the Future of MIT Education* (2014). In it, the unbundling of education is taken as a starting-point and a new, flexible and varied portfolio of courses and degree programmes is developed using large-scale digitalisation and modularisation of education (re-bundling). Annex 9 describes the key features of digitalised teaching material, the impact those different options have on educational practice and the criteria which can be applied to the unbundling and re-bundling of education processes.
The unbundling of higher education is also provoking critical responses. Macfarlane (2010) refers to an 'eroding effect' on the all-round academic function, which is being displaced by a growing number of what are known as specialist para-academic functions (student skills adviser, management, e-learning professional, examination expert, etc.). The debate on unbundling in higher education is not limited to the disaggregation of the three core functions – teaching, research and service – but also relates to the significance of the academic community and the campus ('magic of campus'). What role will the campus have if large parts of the education provided are offered online?
In our view, the unbundling of higher education is a collective term for the results of a few major technological, economic and societal developments. It is both a threat and an opportunity for universities. It is a threat because finding a new alternative mechanism which is sufficiently robust to hold together the various components of tripartite academic practice is no easy matter.

Minister Bussemaker rightly notes in her Strategic Agenda (2015) that unbundling higher education cannot take place without a loss in value. After all, the university claims to be more than the sum of the courses it offers, or a physical location for housing researchers.
Unbundling is also an opportunity because it offers the opportunity, in particular with the aid of blended learning, to reorganise education and establish links with new student populations, companies, local authorities and other educational establishments which were hardly possible before. Success here depends on universities' capacity to effect a meaningful re-bundling of research, teaching and service activities in order to meet the new challenges.

## Chapter 3. What is blended learning? 'The best of both worlds'

Education is a bundling of activities and processes involving lecturer and student which traditionally take place at the same time and at the same location. Constraining the bundling of learning and teaching activities by time and place can be very valuable but also has its limitations. One major limitation is the low level of flexibility caused by the fact that teaching has to take place at the same time and place. Another limitation is that education constrained by time and place is not particularly scalable; the physical scope and opportunities for intensive contact between students and lecturers are limited.
Universities have long seen online learning as a supplement to traditional offline education. The advantages of online learning as compared with offline are not just that it is not constrained by time and place (flexibility), its scalability and the potential it offers for reducing costs, but also include didactic aspects such as the opportunity to offer and study course material synchronously and asynchronously, personalise content and feedback, the new opportunities for collaboration between students and the use of simulations and games (see, among others, Garrison and Kanuka, 2004; Clark and Mayer, 2003; Mayer, 2009). The disadvantages of online learning have been discussed thoroughly in recent decades in educational practice and research literature. The most significant are the absence of a 'sense of community', the relatively high drop-out percentages in online courses and the relatively high development costs for multimedia teaching materials.

### *3.1 Best of both worlds*

In its simplest form, blended learning can be described as a combination of offline and online learning activities. As described earlier, both forms (modalities) have their own advantages and disadvantages.
The rapidly growing popularity of blended learning is mainly the result of the opportunities it offers to integrate the advantages of offline and online learning. The advantages of the online modality, such as greater accessibility, flexibility and cost efficiency, can be combined with the advantages of the offline modality (face-to-face interaction) (Stracke, 2007; Boccomi and Trentin, 2015). Most authors therefore see blended learning as 'the best of both worlds'.
Such combining appears simple but is complex in practice owing to the virtually endless number of potential combinations of transfer media, instruction methods, technologies and pedagogical approaches (Snowball, 2014). Not all combinations truly capitalise on the strong elements of offline and online forms of education.
In the debate on blended learning, it is often implicitly accepted that the combination selected must deliver additional value.
Furthermore, blended learning involves not only combining learning activities from online and offline education, but also a fundamental qualitative change in higher education (Graham, 2004). In this context, Garrison and Vaughan (2008) therefore refer to a new education paradigm and Garrison and Kanuka believe that it is primarily '…about rethinking and redesigning the teaching and learning relationship' (p. 99). The use of (new) educational technology is not a bonus, not a luxury addition, but an integral element of the educational method.
Designing a blended learning course or curriculum requires knowledge of several disciplines. It often takes place within teams of lecturers with subject matter expertise, educationalists, instructional designers and developers of educational software.

When a blended learning programme is designed, the technology selected must match the content and didactics and vice versa. The TPACK framework (Mishra and Koehler, 2006) successfully describes this interaction between content, didactics and technology and is a very helpful tool to use when designing a blended learning programme.[2] A brief description of the TPACK framework is given in Annex 3.

*3.2 Definitions*

The definition of blended learning remains the subject of much debate in the literature (see Annex 8). For instance, Allen and Seaman (2007, 2014) apply four categories where 0% is regarded as traditional, 1% to 29% as web-facilitated, 30% to 79% as blended and 80% or above as online education. Such a distinction is relatively arbitrary and difficult to determine precisely in practice.
Some authors opt for a broad definition of blended learning where the 'blend' relates not only to the combination of offline and online learning but also to the choice of various forms of education and instruction methods (see, for example, the UvA's New Bachelor's degree in Medicine). We have opted for the following definition in this report:

'Blended learning describes learning activities that involve a systematic combination of co-present (face to face) interactions and technology-mediated interactions between students, teachers and learning resources.' (Bliuc et al., 2007, p. 234)

We have deliberately opted for a fairly minimal definition of blended learning so as to allow a wide variation in combinations. Admittedly, in opting for this definition we are limiting ourselves to the combination of offline and online learning and ignoring the combination of different instruction methods and ways of working. At the same time, by including the term 'systemic' [sic] in the definition, we wish to stress that a high-quality educational design should always be used as the basis for a blended learning programme. After examining the literature on the effectiveness of blended learning, we conclude that blended learning does not always lead to better results. The quality of education does not first and foremost depend on the modality used (online or face-to-face) but primarily on the quality of the learning activities and the way in which they are harmonised, the interaction with the lecturer, instruction methods and the instruction materials that encourage the student to process the study material actively and in depth. In their meta-analysis of the research into the efficiency of blended learning, Spanjers et al. (2014) therefore conclude that 'blended education is no silver bullet for improving education' (p. 36).

[2] TPACK stands for Technological Pedagogical Content Knowledge

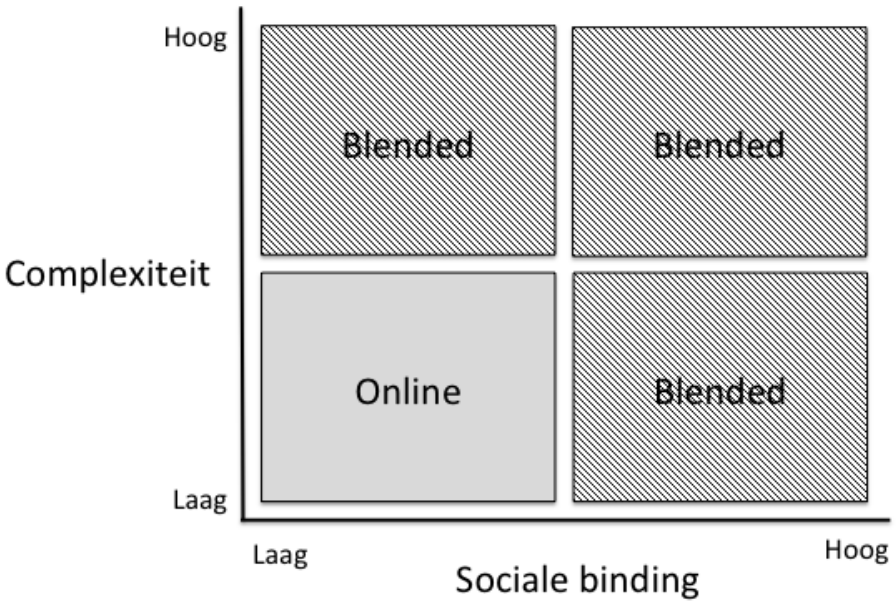
*3.3 Is there an ideal mix for blended learning?*

The number of combinations of online and offline activities in blended learning is virtually unlimited. Combining online and offline learning activities is determined first and foremost by the educational objectives, the student and the learning needs. For this reason, it is impossible to name an optimum or ideal mix of online and offline learning activities. However, different criteria or dimensions can be applied when designing a blended learning activity (Rossett et al., 2003), such as stability of content, costs of developing digital study materials, the student's knowledge and experience of online learning and the need for coaching.

The most obvious dimensions are the complexity of content and the desired level of social bonding.

It is simpler to transfer content of low complexity online than content of high complexity. Where there is a great need for social bonding in education, blended forms of learning are preferable. For example, first- year educational activities can readily be offered online in terms of volume. However, it is particularly important for first-year students that they bond socially with their fellow students and the university. For this reason, a mild form of blended learning should be selected. A different mix can be chosen in subsequent years of the degree programme. This is why we would advocate opting for the mix of online and offline learning activities at *curriculum* level rather than at course level (Snowball, 2014).

Figure 2. Preferred areas of online and blending learning




Our argument for a curriculum-based approach when blending learning is introduced applies also to other aspects of education. An important characteristic of a vigorous learning environment is that students are encouraged to take responsibility for their own learning process. This requires much self-discipline. That is why Kumrow (2007) says it is important, when introducing blended learning, to find out whether students have the required self-regulating skills.

This cannot automatically be assumed to be the case, hence the need to start gradually reducing guidance by the lecturer, computer or other external source only when the student is capable of a greater degree of self-regulation (Spanjers et al., 2014; Kirschner and Van Merriënboer, 2013).

*3.4 Research into blended learning*

Research into blended learning is still in its infancy. When researching the literature we looked at the different effects and aspects of blended learning. The general picture is that blended learning offers many opportunities to innovate education owing to the fact that its online component is not constrained by time and place. As for efficiency, most research points to a slightly positive link between blended learning and academic performance. However, not all of this research is of good quality, nor can it always be

generalised, partly as a result of the great variation in combination options. In addition, it remains difficult to obtain a more or less complete picture of the relevant factors having an impact on the efficiency of blended learning.

The consequences of blended learning for students and lecturers can be significant, depending on the way in which blended learning is introduced. Major consequences can be expected in particular where the educational process is redesigned in its entirety (e.g., in the case of flip the classroom). Assumptions which are not (yet) scientifically proven should be treated with caution (e.g. as regards digital natives).

As far as we are concerned, the popularity of MOOCs is justified. At the same time, though, it is clear that much research is still required into the pedagogical, legal and financial support and conditions for their successful use in the practice of blended learning.

Research into the use of web lectures in blended learning has produced a nuanced picture. The comprehensive and consistent introduction and use of web lectures in education appears to produce the best results. We have provided a list of a few key conclusions in the following table.

*Table 1. Some conclusions from the literature-based research into blended learning*

| Conclusions |
|---|
| - **Research findings are hard to assess because RCTs are difficult to implement and blended learning is still in the development phase. Added to that is the fact that blended learning research is so varied that differences in impact can easily be explained by differences in subject matter, intervention, design and student population.** |
| - **There are indications that there is no difference in the effectiveness of traditional and online education.** |
| - **There are indications that blended education works better than education delivered entirely online.** |
| - **There are indications that blended education works just as well as, and sometimes better than, traditional education.** |
| - **There are indications that education delivered entirely online produces a poor outcome for less able students who are behind with their studies.** |
| - **There are indications that blended education can work well for students who are behind with their studies in certain circumstances (sufficient incentives).** |
| |
| - **There are indications that more intensive student-content, student-student and student-lecturer interaction produces better educational achievements, with the effects being the greatest where there is student-content interaction.** |

*3.5 Redesigning education: Flip the Classroom*

With high-quality educational design as its starting point, blended learning offers many opportunities to combine 'the best of both worlds' of offline and online education. In practice, this requires the unbundling of education and its wholesale redesign. Video lectures (and/or other e-learning technologies) are therefore not added to existing online lectures or offered as an additional service to students. An integrated redesign where online and offline learning activities reinforce each other is at the heart of blended learning.

Simply translating the present course design into a blended learning design is rarely successful. One example of a radical redesign is the flip the classroom concept. The basic idea behind flip the classroom is that the 'face-to-face' lecture and homework elements are reversed:

'…that which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class' (Bergmann & Sams, 2012, p. 13).

There are many variations of the flip the classroom principle. The best-known model is probably that of two American high school science teachers Sams and Bergmann (2008, 2012). Here, the lecturer records in advance short video clips (max. ten minutes) of the course material he would otherwise deal with in the lecture. The video clips may be accompanied by a short quiz or other assignments which test whether the student has understood the material. Student receive feedback immediately after completing the quiz or assignments, and are expected to view those video clips and assignments, alongside the other course material, before the lecture. During the face-to-face lecture the lecturer deals with students' questions about the material they are studying, issues assignments to enable students to apply what they have learned (possibly in teams), discusses solution strategies, books a guest lecturer or organises an open discussion between the students on the course material studied.

Flip the classroom has some significant advantages. The first is that the video clip can be viewed anytime and anywhere. The second advantage is that the video clip can be replayed (including in preparation for an examination). This way, parts of the mini lecture which were not understood straight away can be viewed again. A third advantage is that students can follow the lecture at their own pace. During the face-to-face lecture students are expected to listen and also make notes, which sometimes results in key parts of the lecture being missed. For many subjects this means it is very difficult for them to follow the remainder of the lecture. The most important advantage is probably the fact that intensive interaction between lecturer and student can take place during the (rare) face-to-fact contact, which can result in a better and deeper understanding and active processing of the course material studied. In their research, Van Vliet et al. (2015) show that the flipped classroom teaching method has an impact on the quality of learning (please see the literature study for a description of the research).

Flip the classroom has major consequences for students and lecturer alike. Students are expected to prepare by viewing the video clips and studying the course material. Flip the classroom generally requires more effort on the part of the students, who are also expected to participate actively in assignments, quizzes and discussions during the face-to-face lectures. Since there is no pure knowledge transfer during face-to-face lectures, there is little point in attending one without preparation.

For the lecturer, flip the classroom initially requires more preparation, in particular because of the large number of video clips which needed to be recorded. He or she will also have to make sure the offline and online learning activities are properly integrated to guarantee a coherent course design.

The description of flip the classroom set out above also illustrates the importance of integrating (digital) tests into a blended learning programme. We will not go into the many forms and aspects of (digital) tests in any further detail here. However, it is important to note that ICT offers many opportunities to integrate various test elements, which will enliven the study programme and encourage active learning, into the design fairly simply and quickly. A flip-the-classroom example is discussed in Annex 6. The flip-the-classroom concept shows, above all, that the focus is not primarily on an alternation of online and offline learning activities, but on a reconfiguration (re-bundling) of the various activities in the education process.

*3.6 The value of university campus education in blended learning*

Opting for blended learning does not imply simply integrating digital technologies into education, but also a re-evaluation of the way in which the campus (including its facilities) is used.

This means greater use being made of the campus, requiring physical contact between students and lecturers, which is necessary and desirable, but also reducing the use of the campus for activities which can take place digitally. The consequences of this can be great. The demand for lecture rooms (both in terms of quantity and in type) will change as a result of the introduction of blended learning. Depending on the extent to which faculties and departments opt for blended learning combined with small-scale teaching in the teaching strategy, the demand for large lecture rooms will fall and demand for smaller lecture rooms will increase.

## Chapter 4. Blended learning at the UvA: depth and breadth

Ultimately, the question is whether and how blended learning can be integrated into the UvA's Vision on Teaching and Learning and educational practice. To answer this question, we shall first discuss that Vision in further details.

The UvA's Vision on Teaching and Learning (2012) offers a perspective on the desired development of education in the future. The Vision is summarised in the following seven ambitions.

1. *Increasing the quality of education*. To achieve this, we are concentrating primarily on the introduction and development of a quality control, quality improvement and quality assurance system.
2. *Improving study success*. In response to the Study Success at the University of Amsterdam report (2009), specific objectives were formulated and measures taken to minimise failure and increase the pace of study.
3. *Academic development*. This mainly means learning how to think critically and analytically.
4. *Research-intensive education*. This mainly involves strengthening the link between research and education.
5. *Stimulating learning*. Here, the emphasis is principally on adjusting the curriculum to encourage students to adopt a more active approach to learning.
6. *Ambitious study culture*. Both students and lecturers contribute to an educational environment which combines performance and ambition with involvement in the university and ties between lecturers and students.
7. *Differentiation*. The student population will become more heterogeneous. This will also translate into a greater demand for degree programme differentiation.

The Task Force believes that these seven ambitions remain important to the UvA. Nevertheless it is not clear, having regard to the developments we have outlined above, whether this Vision on Teaching and Learning is sufficiently future-proof. Although it describes the revolutionary role of IT and criticises the lack of innovation capacity within higher education, it does not translate these concerns into concrete ambitions for the university. Information technology is primarily seen as a major cause of change but not yet as an instrument to be used for the re-bundling of education. Many e-learning initiatives have been launched within the UvA (see Appendix 2, Recent e-learning initiatives at the UvA), but they have only a limited connection to the ambitions set out above.[3]

The Task Force also believes that the present Vision on Teaching and Learning requires *depth* and *breadth*. Depth involves strengthening the relationships between studying and teaching, and between students and lecturers. Those relationships, and therefore also the quality of education, have come under significant pressure on account of the developments outlined in chapter 2. The recent protests of students and lecturers from within and without the UvA have drawn attention to the growing concern about the quality of education.

Breadth relates to the university's ties with society at large. The present Vision on Teaching and Learning has a strong focus on raising the quality of research-intensive education. It gives much less attention to the links between education and the labour market, future

[3] In the recently adopted 2015-2020 Strategic Plan *Grenzeloos Nieuwsgierig* [Limitless Curiosity] the objectives and strategy are explicitly focused on using evidence-based ICT innovations in education, for example by advocating Open Educational Resources and blended learning.

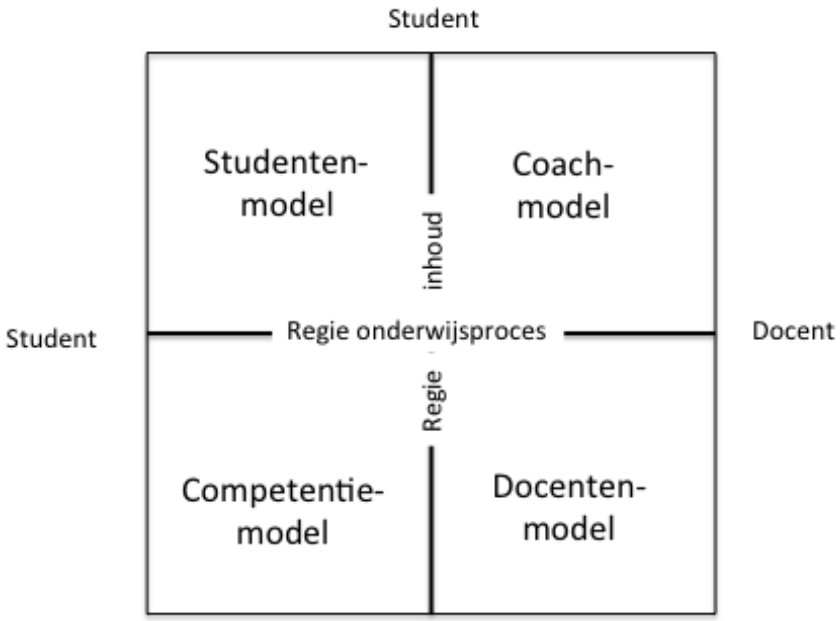
employers of our students, other universities, non-university partners, etc.
As stated in chapter 3 (and Appendix 8), blended learning is not a holy grail, but it does offer many new opportunities to redesign (re-bundle) education and to use educational materials differently and reach out to new student populations. We shall start by outlining our idea of what lies at the heart of the Vision onTeaching and Learning and what should serve as the basis for deepening and broadening it. We will then describe how blended learning can help to deepen and also broaden the Vision on Teaching and Learning. Finally, we will provide recommendations for strategic choices in respect of blended learning and for the development of lasting educational innovation within the UvA.

*4.1 In-depth learning in the Double Helix*

A vision on learning and teaching requires not only a description of the desired learning outcomes but primarily a vision on a student's learning and how such learning is supported and supervised by the lecturer (teaching). Online learning and blended learning are generating much debate on the changing role of lecturers and students in the learning process.
Terms such as personalising education and making it flexible, made-to-measure education, Education as a Service, the lecturer as a 'guide on the side' etc. point to a changing relationship between lecturers and students. In figure 3 a distinction is made between two management dimensions: management of the content and management of the learning process. On this basis, a distinction is made between four possible types of management in education. In the recent debates on changes within higher education there is a steady move away from the lecturer model and towards one of the other management types. In our opinion, however, none of the types of management provides the necessary deepening and broadening of the Vision on Teaching and Learning.

Learning is a personal experience which results in a (conceptual) change in the student's learning schedules. However, not all learning results in a conceptual change and not all conceptual changes result in behavioural changes.

*Figure 3. Coordinating content and learning process*




Source: adapted on the basis of Nieweg, 2014

Hattie (and many other education experts) distinguishes between three different levels of learning: surface, deep and conceptual understanding and learning (2009). Surface learning has to do with familiarity with (knowledge of) facts and ideas. Deep learning involves a student independently linking facts and ideas without their having been presented to him or her as being related. The student is

expected to apply a relational structure which links the facts and ideas to each other, has a generic character and can therefore be applied in several contexts. With conceptual learning the student develops new knowledge and ideas and formulates hypotheses, makes predictions or makes models which can be applied in different situations. Conceptual learning in this sense results in the construction of a 'conceptual artefact'. The different learning levels therefore vary in the extent to which an active conceptual role is demanded of the student. Conceptual learning does not exclude repetitive elements. Indeed, a certain degree of 'over-learning' is necessary to achieve a high level in conceptual learning (Hattie, 2009).

A comparable distinction in terms of levels can be made for teaching: surface, deep and conceptual teaching (see Biggs and Tang, 2011 for a comparable distinction). Teaching is a deliberate intervention in the student's learning process (Hattie, 2009). With surface teaching, the lecturer restricts himself or herself to presenting ideas and facts which can then be memorised by the student. With deep teaching, the lecturer encourages the student to establish links between ideas and/or facts and to formulate a relational structure. With conceptual teaching, the student is expected to develop a conceptual artefact. Conceptual teaching does not necessarily entail lecturers discussing highly complex matters, but rather the lecturer helping the student to construct a conceptual artefact. The various teaching levels vary in the extent to which the lecturer activates the students and encourages them to play a conceptual role. The distinction between lecturer-centred and student-centred education runs more or less parallel to this distinction between learning and teaching levels. With lecturer-centric education, the presentation and memorising of the lecturer's expert knowledge is the key element, whereas student-centric education is aimed primarily at the construction of a conceptual artefact by the student.

Learning and teaching should ideally be two aligned activities. In this context, Hattie (2009) refers to 'visible learning'. This can be described quite effectively as the lecturer establishing that the student has understood the course materials and the student continuously seeking feedback:

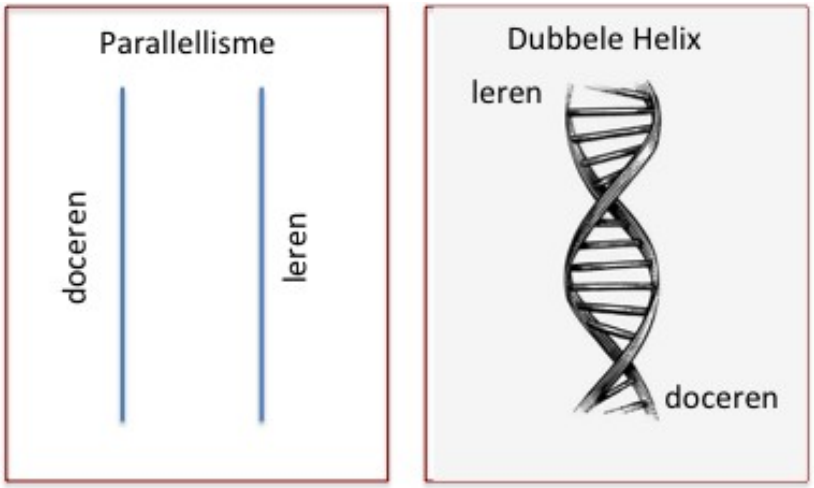
> "What is most important is that teaching is visible to the student, and that learning is visible to the teacher. The more the student becomes the teacher and the more the teacher becomes the learner, then, the more successful are the outcomes." (Hattie, 2009: 25).

From the visible learning perspective, student and lecturer are actively involved in each other's learning and teaching activities. Both the quality of the learning and that of the teaching are, so to speak, co-productions of students and lecturers. This perspective is a clear indicator of the mutual responsibilities of lecturers and students in the learning and teaching process. Learning is not the responsibility of the student alone; nor is teaching the sole responsibility of the lecturer.

Naturally, dynamic harmonisation between learning and teaching is far more complex than described here. However, what we are primarily concerned with is that the mutual active and engaged student-lecturer relationship and conceptual learning should have a central position in the Vision on Teaching and Learning and in educational practice, and that the learning environment must support that relationship in all conceivable ways.

This would appear to be self-evident as far as education is concerned. Unfortunately, though, this is not always the case. The developments which together have led to a far-reaching unbundling of education (see chapter 2) have also ensured that learning and teaching have become reasonably independent of each other. The massification of higher education, falling government funding for higher education, heavy teaching load of many lecturers and pressure to perform in research are preventing intensive interaction (visible learning and teaching) between lecturers and students. As a result, learning and teaching often work along separate tracks, like parallel lines.

*Figure 3. Learning and Lecturing*




In the visible learning perspective, the active and engaged relationship between learning and teaching can be presented as a double helix.

Learning and teaching are very different activities but closely related to each other because of the continuous interactions.
The double helix metaphor is applicable not only to the specific learning and teaching situation, but also to the relationship between lecturers and students within the university in general, from the moment the students join the first year until the moment they graduate (and even after they have left the university).
Choosing the double helix as the core of the Vision on Teaching and Learning is not contrary to the ambitions in the UvA's present Vision on Teaching and Learning, but rather places it within the perspective of the double helix. It means the ambitions, for example in the area of study success, research-intensive education and ambitious study culture, will have to be realised from the perspective of mutual active and engaged learning and teaching interaction. This applies to the development of new curricula, degree programmes, and also to internationalisation, postgraduate continuing education and alumni policy initiatives.
Choosing the double helix as the core of the Vision on Teaching and Learning also has its limitations. Massification in education and decreasing government funding are often detrimental to small-scale education, intensive interaction and supervision of students. In practice, this almost invariably means universities will opt for mass lectures where interaction between lecturer and student tends to remain limited.

*4.2 Depth with blended learning*

When we refer to a 'depth strategy' we mean an intensification of teaching and teaching interaction, i.e. where there is a mutually active, engaged co-production of the learning outcome for the student and parallelism in that relationship is avoided. Blended learning can contribute towards this in a number of ways.

a. *Small-scale education.* Restoring the small-scale concept within education will initially require greater, and different, use to be made of the teaching and lecture room capacity available. It will also be possible to reduce the number of large-scale lectures where there is little interaction between student and lecturer and which mainly involve the transfer of knowledge. They will be replaced by a combination of video lectures (a series of videos each lasting between 5 and 15 minutes) and (small-scale) interactive sessions. Teaching will be supported further by an interactive platform for communication and feedback between student and lecturer and for collaboration between students.

b. *Flip the classroom.* A major problem is that traditional education provides students with insufficient incentive to take an active part in their education. The flip-the-classroom principle (see chapter 3) compels students, through video lectures, to prepare for the interactive sessions with the lecturer or tutor. Preparation is a necessary, but not yet sufficient, condition for high-quality interactive education. Specifically, this means that students are also encouraged to take part in the class, through quizzes, discussions, assignments and presentations.

c. *Research-intensive education.* There are different ways of implementing research-intensive education (see UvA, Vision on Teaching and Learning, 2012; Healey en Jenkins, 2005). We would emphasise primarily the form where the students themselves work as researchers and participate as a novice in communities of researchers. They are also expected to make their own contributions to the research in the form of essays, discussions, models, analyses, software, etc. The digital form of many research data and researchers' communication platforms enables students to participate actively. Student Research Labs, where students and lecturer researchers carry out research in a (virtual) research space, is an alternative to participating in communities of researchers.
There is a rapid growth of digitalised data (Big Data) in virtually all scientific disciplines. Compiling, processing and analysing large digital data sets require new ICT skills of both students and lecturers. Big-data courses are eminently suitable for online learning, where lecturers and students can work together on large, digital data sets.

d. *Wealth of digital research material.* The availability of digital, multimedia educational products through open educational resources or other digital sources and networks enriches the set of educational products which can be drawn on. Digital educational products lend themselves not only to passive consumption but, above all, to the production of conceptual artefacts. The combination of consumption and production ('prosumption') makes multimedia educational material very suitable for co-productions in the learning process.

*e. Personalising, differentiating and creating flexibility.* Students vary in the topics which interest them within a study programme and the pace at which they are willing or able to study. The differences increase as the student population becomes more diverse. This is creating a greater need for flexible learning pathways and made-to-measure education. For many degree programmes, it is difficult to organise this demand for varied and diversified education. With the aid of a blended learning strategy, the demand for varied education can be better organised. For instance, in-house or existing online courses (e.g. MOOCs) or modules can be used to put together pre-Master's programmes for individual students and groups of students.

f. *Learning analytics.* Learning analytics can be used to personalise and deepen learning and teaching interaction further still. Learning analytics offer detailed information to students about their own study habits. This detailed information also enables the course management to intervene in the study programme at individual and group level (e.g. academic counselling). Learning analytics can also give an insight into the competences students acquire in the course of their studies.

g. *Peer learning.* The value of student-student interaction (peer-to-peer and 'collaborative learning') in higher education in terms of acquiring relevant knowledge and skills is undisputed. Peer learning largely takes place outside the formal learning pathways. Students' mass participation in informal networks via social media shows the great potential of peer learning. We are not arguing for the formalisation of informal learning, but rather for peer learning and peer assessments, managed by the lecturer, to be used in formal learning pathways.

h. *Role of the campus.* Blended learning is not just about applying ICT in education but has just as much to do with the role of the campus and the educational facilities it offers. The introduction of blended learning will change the scale and nature of the demand for educational facilities (lecture rooms, ICT facilities). The possibilities for a depth strategy supported by blended learning are much greater than outlined here. Each faculty or department will have to develop its own depth strategy, inspired by the many best practices existing in the aforementioned areas.

*4.3 Broadening with blended learning*

In addition to deepening, blended learning can also help to broaden the teaching and learning strategy in the sense that connections are established with new groups of students, alumni, the job market, other educational establishments (university and non-university), companies and local authorities, etc.

a. *Accessibility.* The effects of the Bachelor's-Master's degree structure are becoming ever clearer. It is increasingly less a matter of course that Bachelor's students will pursue their Master's programme within the same faculty or study programme. Furthermore, there is a large influx of higher professional education graduates. The Master's programme intake is highly diverse. Many Master's programmes last one year and offer little opportunity to accommodate outside entrants. Online courses and modules could be offered during the preparatory study phase for incoming students to ensure they can complete the Master's programme without much delay. Video lectures and other online material can also be consulted during the degree programme to eliminate any deficiencies or to brush up students' knowledge of particular subjects.

b. *Internationalisation.* A key objective of the UvA is international student exchange (both inbound and outbound). Inbound exchange brings about a sharp increase in diversity (level, culture, language skills) in the study programmes. Here, too, online pre-Master's programmes and modules can be developed, or existing courses and modules used, to eliminate deficiencies relating to knowledge of subject matter, or to prepare students for the cultural gap between the home country and the guest country. In consultation with exchange partners, comparable modules can be developed or selected for our own (outbound) students.

c. *Lifelong learning.* Lifelong education is a long-held ambition of the University but is proving difficult to realise. Our own alumni will not automatically choose to return to their alma mater as part of their professional development either. The huge quantity of scientific, innovative knowledge within the UvA can readily be tapped by our own alumni and other interested parties through online courses (combined with offline sessions on campus).

d. *Cooperation with the business sector and local authorities.* In the Dutch National Student Survey, our teaching scores relatively poorly on the topic of careers counselling. Closer alignment to, and better preparation of our teaching for developments in the business sector and government will not only increase the job market prospects of our students but will also contribute directly to strengthening the University's role in society. The TESLA minor offered by the Institute for Interdisciplinary Studies is an innovative example of collaboration between the University and a company. With increased cooperation between University, the business sector and local authorities, for example in the area of work placements, digital platforms can be developed which on the one hand align supply and demand and, on the other, facilitate substantive cooperation.

e. *Cooperation with universities and non-university educational institutions.* Producing digital educational materials is expensive, takes much time and requires a great deal of expertise. Cooperation between UvA faculties and departments will have to be encouraged for such educational materials to be developed. This will probably not be enough, though, and cooperation will have to be sought with other universities and non-university (and sometimes commercial) institutions. A careful selection of national and international cooperation partners is very important here. At present it remains uncertain how such cooperative arrangements will be created and how they will develop. In addition, new providers of digital educational products will appear on the higher education market and those parties will have a different approach as regards cooperation with universities, prices, certificates and services. Strategic orientation towards this market entry of new providers is very important because, in the end, there is only a limited amount of new digital educational materials which can be developed through the UvA's own study programmes.

f. *Open educational resources and online courseware*. In her 2015-2025 Strategic Agenda for Higher Education and Research the minister states that 'in 2025 all lecturers at Dutch higher education institutions will provide access to their educational materials (Higher Education Open Access) and that we will thus be at the cutting edge of developments worldwide' (p. 30). The basic

premise of that ambition is that educational materials are a public good which should be made as widely available as possible to society, both nationally and internationally.
The UvA will also have to formulate a policy in this regard. If it decides to pursue the minister's ambitions, this will have major implications for lecturers. At present, there is dissatisfaction among many lecturers over the 'illegal' dissemination of their course materials and examinations among students and commercial agencies which provide assistance with take-home assignments. Added to that is the fact that the public availability of online course materials is placing considerable pressure on quality requirements. Lecturers are creating their PowerPoint slides not only for their own students but for the whole world. According to LERU (the League of European Research Universities), of which the UvA is a member, research-intensive universities will have to take the lead as regards the production of educational materials and their quality assurance.

With the blended learning breadth strategy the University is establishing links with different elements of society. They involve far more aspects, and are more complex, than outlined above. The UvA and its faculties and departments will have to start making their own strategic choices in this respect.

*4.4 Urgency, Strategy and Innovation*

Digitalisation and all the other developments discussed above touch on virtually all aspects of education. We have outlined directions and given examples of how we think the University should respond to those developments from a blended learning perspective.
Blended learning is not a teaching method, educational psychology or technology but rather a potential means of delivering combinations of offline and online educational interventions to meet the challenges arising. Those challenges are wide-ranging and pressing. The UvA has not been a frontrunner in the development of a digital education strategy. It should be noted that this does not apply to all faculties and departments within the UvA. There are several innovative blended learning initiatives within the UvA. Some of them are described and included as an appendix to this advisory report (see Appendices 2 to 7). The advantage of being relatively behind the times is that much can be learned from experiences elsewhere in the Netherlands or abroad.
Our report does not provide a blueprint or milestone plan for the way in which the UvA should change to meet the digital and non-digital challenges. We do not believe it would be useful to mark a clear end point for the transformation. Any such end point would wrongly suggest that we can predict which challenges will arise five or ten years from now (Scientific Council for Government Policy, *Naar een Lerende Economie* [Towards a Learning Economy], 2013).

We need to understand and apply the possibilities offered by digital technologies for education in order to realise our ambitions as a University. Online learning, and digital technologies in general, are 'part of the landscape for everyone' (LERU report, June 2014). As philosopher of technology Verbeek writes (2014), we also need 'an intimate knowledge of the technology itself' (p. 18) in order to understand it. Anyone who refuses to accept the use of digital technologies in education is ignoring the major impact those technologies have as an intermediary in our daily lives, and therefore in education, too.
However, we believe the challenges to be so great as to require a strategic reorientation of education (see also LERU report, June 2014). In their much-discussed report titled *An Avalanche is coming* (2013) Barber et al. describe the need for a radical transformation of universities. That said, given the uncertainties involved, the temptation to pursue a 'steady as it goes' strategy or to postpone strategic choices is great. The Task Force does believe, however, that those choices need to be made now.
Specifically, this means that a rapid start will have to be made with the development and introduction of a digital education strategy for the UvA in close collaboration with the faculties and departments.
Developing several future scenarios is one way of dealing with the unpredictability of these developments. An analysis of such a scenario can be used to estimate the likelihood of its occurring, and the impact and desirability, or undesirability, of the various scenarios for the UvA (and faculties) (Barber et al., 2013; LERU, June 2014; Capgemini – SURF, 2013). We have opted for a breadth and depth strategy in this regard.
An alternative way is to develop a *lasting and dynamic capacity for innovation* where innovation in education does not retain an ad hoc and fragmentary character but rather becomes a constant within the UvA. The strategic reorientation of education and the development of a lasting and dynamic capacity for

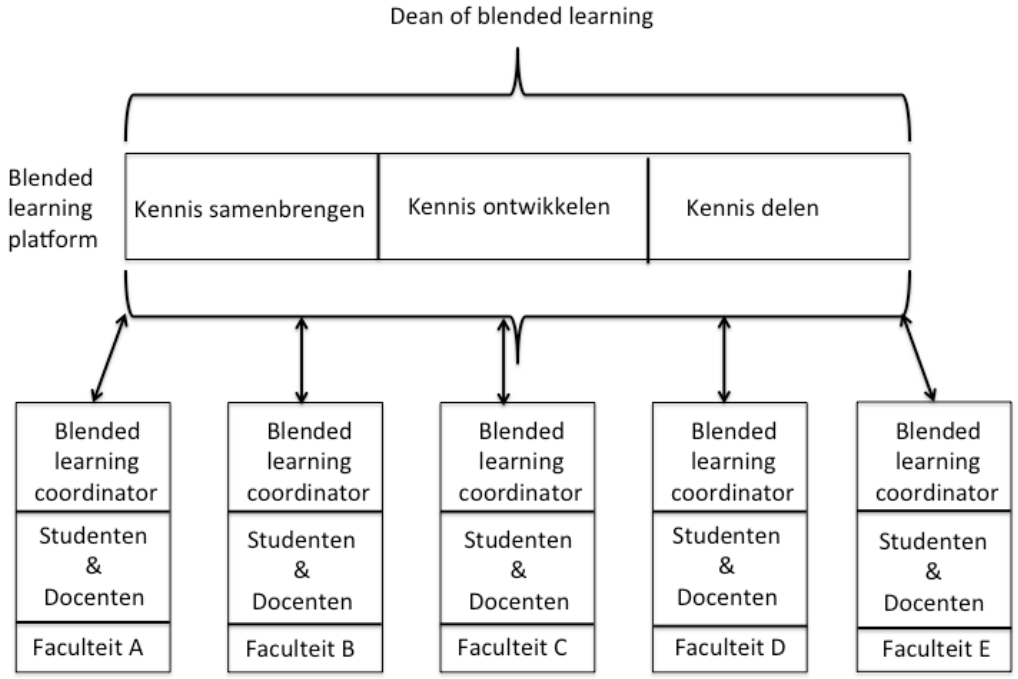
innovation in education are the two pillars of our recommendation.

*4.5 Platform for blended learning and dean of blended learning*

There is no shortage of initiatives which seek to improve education with the aid of ICT. What is lacking, however, is coordination and synchronisation between the many initiatives on the basis of a clear educational vision. For that reason we suggest setting up a platform structure for blended learning within the UvA. We also suggest appointing a blended learning coordinator for each faculty or department who will coordinate blended learning initiatives within the faculty or department. This could be a lecturer with knowledge and experience of ICT and education projects. It could also be a professional with specific technical or educational expertise. Another recommendation is that students should be closely involved in the making of strategic choices and the development of new initiatives at the decentralised level.

The blended learning platform should function as a network organisation within the UvA, where the blended learning coordinators and lecturers involved participate actively within the network. This will ensure that blended learning initiatives are controlled from the faculties or departments. To ensure the efficient functioning of the platform, we recommend that a dean of blended learning be appointed who, together with the blended learning coordinators, will direct the initiatives. The UvA's Vision on Teaching and Learning acts as the broader framework within which guidance is provided for the blended learning initiatives. The blended learning platform performs three main functions: pooling knowledge, developing it and sharing it. The various roles of the platform, the blended learning coordinators and the dean of blended learning are outlined in the following diagram.

*Figure 4. Blended learning platform*




Innovation in education, in this case blended learning, is not a one-off activity but rather requires lasting attention. New choices will constantly have to be made, at centralised level and also at decentralised level. Initiatives will sometimes be launched at decentralised level and sometimes at centralised level. The platform or network will ensure constant coordination between these decentralised and centralised initiatives.

4.6 *Strategic choices in education: depth and breadth*

We have made a distinction here between depth and breadth in the education strategy with the aid of blended learning. As far as we are concerned, blended learning will become the default education situation at the UvA. The depth strategy always relates to choices in respect of the student-lecturer relationship and therefore always concerns the core of education. A breadth strategy may never be at the expense of the lecturer-student relationship in the depth strategy. These depth and breadth strategies will have to be developed at the UvA centrally and also at faculty or department level. Some important choices for the UvA and its faculties are set out in the following table.

*Table 2. Strategic choices for education provided by the UvA*

| | Strategic and organisational choices for education to be made at the central UvA level |
|---|---|
| 1 | *Develop a depth and breadth strategy* for education jointly with the faculties and departments. Depth involves the relationship between students and lecturers; breadth relates to links with society. |
| 2 | *Align the blended learning infrastructure*. Proper alignment between central and faculty-based learning infrastructure is crucial (see also the recent 2015–2020 Information Strategy draft report). See paragraph 4.6 and Table 4 for specific recommendations. |
| 3 | *Alignment between various initiatives*. Alignment within the UvA between different large-scale and related initiatives is also important. This concerns, among other things, alignment with the recommendations due to appear shortly in relation to the 2015–2020 Information Strategy, Electronic Learning Environment, Knowledge-sharing and Learning Analytics. |
| 4 | *The contact hour*. The present education policy and practice seeks an optimum ratio between contact hours and self-study hours. However, the contact hour is increasingly being used as a calculation unit. As a result, the intended objective is not being achieved because the number of contact hours between lecturer and student says little about what is done during that hour. The introduction of blended learning programmes will further undermine the significance of the formal contact hour, because 1) there is no fixed optimum ratio between online and offline learning for a successful blended learning programme, and 2) with the advent of virtual interaction between lecturer and student the old differentiation between contact hours and self-study hours appears outdated. For this reason, the contact hour system must be reviewed. |
| 5 | *Cooperation with university and non-university partners*. The development of digital educational materials requires a great deal of expertise and sometimes involves substantial costs. We suggest launching an active search for university and non-university cooperation partners. |
| 6 | *Funding blended learning*. The fragmented landscape of ICT and education projects is partly the result of today's project funding. To avoid such a situation recurring, we must find another means of funding. One alternative could be to incorporate the funding of blended learning into the allocation model and include agreements on this in the covenants between the Executive Board and the faculties. Project funding should therefore be limited to relatively small, innovative blended learning initiatives which are easy to scale up. |
| 7 | *Open educational resources, open courseware, copyright and licences*. We strongly recommend the use of high-quality, publicly available digital educational materials and open online courses. However, the UvA itself will also have to specify how and to what extent it intends to make an active contribution to the production of open educational resources and open courseware. At present, educational materials (including examinations) which were developed within the UvA's faculties are being exploited on a large scale, also commercially, often to the great annoyance of lecturers. It is important that a clear policy for this is developed soon.<br>Furthermore, there is an urgent need for clarity on the policy, possibilities and legal aspects of making the University's own educational materials publicly available. Lack of clarity as regards copyright, data governance and privacy is hampering developments in this area at the moment. |

*Table 3. Strategic choices for education to be made by faculties and departments*

| | Strategic and organisational choices for education to be made by faculties and departments |
|---|---|
| 1 | *Strategic Faculty Plan for Blended Learning.* To prevent blended learning projects remaining separate and isolated initiatives it is important that a blended learning strategy be developed at faculty level. That strategy will preferably include long-term planning, specify which goals are being pursued and identify the resources to be made available for it. It is recommended that specific performance agreements are made for this. |
| 2 | *Resources and incentives.* The provision of resources (knowledge, time and money, commitment on the part of the faculty board) is crucial for the successful implementation of a blended learning strategy. Until now, their absence has proved to be the key obstacle to broad acceptance and implementation of e-learning within higher education. We believe incentives need to be designed to encourage lecturers to develop blended learning courses. Those incentives could take the form of time compensation, financial compensation and career development. |
| 3 | *Make or Buy.* Much high-quality digital course material is available through open educational resources and open courseware. Before starting to produce its own digital educational materials, the University should investigate how much educational material is already available, establish whether it meets the relevant quality standards and under which licence it was released. Depending on the target group, the number of students and the quality of the material, the University could also consider using commercial educational products. |
| 4 | *Costly production.* Producing digital educational materials can sometimes be costly (e.g. MOOCs). For this reason, it makes sense to specify at faculty planning level which MOOCs or other costly productions are to be developed. A revenue model should also be developed for those productions (including non-financial costs and income). |

*4.7 Lasting innovation in education*

The second pillar of our recommendation concerns the University's capacity for innovation. The core of this pillar is permanent investment in the development of our lecturers and in the facilities, time, incentives and career prospects which make blended learning possible (including the campus). This is why we are arguing for investment also to be made in the area of blended learning and in a platform which will facilitate the sharing of knowledge and experience of blended learning initiatives. Research in the field of blended learning does not yet offer any solid starting points. Experimentation, research and learning in the field of blended learning will have to go hand in hand. We cannot emphasise enough that reforms in education with the aid of digital technologies should always be based on a vision on education (learning and teaching). We believe that in this context, the double helix always forms the starting point in higher education.

*Table 4. UvA blended learning initiatives*

| | Blended learning initiatives at the central UvA level |
|---|---|
| 1 | *Blended learning research programme.* To achieve good results in education it is important for research to be carried out into the effects of blended learning and to incorporate the results of that research into new blended learning initiatives within the UvA. We therefore suggest launching a research programme in the area of blended learning within the UvA. The design processes and the effects of blended learning should occupy a central position within the research programme. We suggest that staff members of the various faculties and departments participate in this research programme so that expertise is built up locally. It is self-evident that these will be staff members with a special interest in providing, improving and evaluating teaching and curricula. It would probably be appropriate to designate principal educators to keep in line with developments. We suggest appointing a professor to lead this research programme. |
| 2 | *Developing expertise* in the field of blended learning requires the use of various disciplines (educational theory, didactics, instructional design, educational software engineering, audio-visual expertise). In most cases, this multidisciplinary expertise does not exist at faculty or department level. It will have to be developed centrally and transferred to the faculties and departments. |
| 3 | *Blended learning platform.* Many new blended learning initiatives will be launched. In addition, a great deal of expertise has been built up locally over the years. It is important that such knowledge and experience is shared within the UvA. To this end, we propose setting up a blended learning platform, the primary objectives of which are to promote the pooling and development of knowledge and the sharing of knowledge between faculties and departments. It will create a University-wide blended learning network (online community). Consideration should also be given as to whether it is possible for faculties/departments to 'hire' each other's experts. Staff members who have developed certain successful products or implementations can be hired by other faculties or departments. It might also be possible to place digital products, applications and tools on the platform for others to use. |
| 4 | *Dean of blended learning.* The collaboration between faculties and departments in the area of knowledge pooling, knowledge development and knowledge sharing through the platform requires proper oversight. To provide such oversight we suggest appointing a dean of blended learning (comparable with the role of a dean of admissions). |

*Table 5. Blended learning initiatives for faculties and departments*

| | Educational innovation initiatives for faculties and departments |
|---|---|
| 1 | *Investing in lecturers.* If blended learning is to become the default educational practice, investment will have to be made in didactic competences and in the skills needed to develop educational materials. It is self-evident that this should initially be done through existing training programmes for lecturers (UTQ, Advanced UTQ and teacher-training programmes). However, consideration must be given to establishing whether a separate Blended Learning course should be developed for UvA lecturers. The TPACK model can be used as a framework here. |
| 2 | *Blended learning coordinator.* We propose appointing a blended learning coordinator for faculties and departments. That coordinator's role will comprise management within the faculty and also liaising with other coordinators and experts through the blended learning platform. |
| 3 | *Blended learning at curriculum level.* It is important that the plans for blended learning are developed at curriculum level. This has various advantages. First and foremost, it will avoid major differences arising between the courses (per year and among years). Since the introduction of blended learning will require a wholesale redesign of education, the roles of the lecturer and student will change (e.g. with flip the classroom). If blended learning is not implemented consistently as part of the curriculum, a potpourri of approaches and practices will be created, reducing the effectiveness of implementation. Following redesign at curriculum level, plans will be developed at learning pathway level and then at course level. This will also create consistency within the learning pathway and avoid undesirable gaps or overlaps in the courses within the learning pathway. Another advantage of designing at curriculum level is that the offline and online ratio can be varied per year and per learning pathway. For instance, we could opt to allow the offline component to be greater in the first year than in the second or third year to aid social bonding. |
| 4 | *Team production.* Developing digital educational materials and online courses requires different kinds of expertise. They also cost time and money. For that reason, it makes sense to work in teams including, in addition to lecturers, instructional designers, educational software engineers and education experts as well. |
| 5 | *Quality of digital educational materials.* It is important that high requirements are set for the quality of the digital educational materials developed within the faculties. In turn, that quality requirement will place high demands on the competences of the development team. |
| 6 | *Modular architecture.* Digital educational materials are ideally suited for re-use in different courses and forms of education. The opportunities for re-use are further extended by developing courses in relatively independent and self-contained modules. The modular architecture also makes it easier to refresh courses, or parts of courses. |
| 7 | *Learning analytics.* Learning analytics are expected to start playing a major role in the education policy of faculties and will offer students the opportunity to take greater control over their own studies. To ensure this is technically achievable, attempts to pool relevant data sources must be facilitated. Clear and formal agreements will also have to be made with students on the way in which such data will be used in teaching (see also point 7, Table 2). |

## Chapter 5. Conclusions

1. Far-reaching strategic choices will need to be made soon for the development of a digital education strategy where innovation in education is encouraged and developed by a Vision on Teaching and Learning which concentrates on blended learning strategies at faculty level. There is a need for this because offline learning and online learning are becoming increasingly intertwined, as are formal learning and informal learning. From the student's perspective, an interactive, network-based learning environment will be created, and the boundaries between online and offline will continue to blur. Furthermore, the formal and informal courses offered are often of an open and global nature. Advanced mobile devices and digital educational materials will offer the opportunity to study with no constraints on time or place. Non-university education providers will play an increasingly important role in the provision of high-quality educational materials and online courses. These developments are wide-ranging and will require a fundamental adjustment of the Vision on Teaching and Learning which will have consequences for present teaching practices.
2. The number of students is expected to rise further in the years to come. At the same time, there is an ever-increasing need for more student-centric, interactive and flexible education. This is accompanied by simultaneous criticism of lecturer-centric, inflexible mass education.
3. The present Vision on Teaching and Learning requires adjustment. More attention needs to be given to the student's learning (student-centric learning) and to the student-lecturer relationship. We have called this the depth strategy. Express attention should also be paid in the Vision on Teaching and Learning to the University's ties with society. We have called this the breadth strategy.
4. The present Vision on Teaching and Learning (2012) has a strong emphasis on improving academic training, study success, activating and research-intensive education. The importance of these elements remains undiminished. However, the question of the supporting role digital technologies can play a supporting role is overlooked. At the same time, many ICT projects have been launched within the UvA in recent years but it is not apparent how they relate to the Vision on Teaching and Learning.
5. Blended learning offers a host of opportunities to improve the quality of education and make it more attractive. It has the capacity to combine the advantages of offline learning and online learning ('best of both worlds') provided it is underpinned by a sound educational plan.
6. Multimedia, digital educational materials offer many opportunities to encourage in-depth and conceptual learning.
7. Blended learning is not based on an independent educational theory and therefore does not automatically lead to an improvement in the quality of education, or to an increase in accessibility, flexibility or cost-effectiveness. Research in the area of blended learning indicates that a redesign of education where offline learning and online learning are integrated is the most important precondition for a successful blended learning programme.
8. The added value of university campus education lies primarily in the combined provision of high-quality, research-based online and offline teaching. It should always be based on a sound educational design which takes account of content and the educational technology used. The primary purpose of offline learning is to strengthen contact between lecturer and student to foster in-depth and meaningful learning. The physical component (including the campus) is also important to the development and strengthening of an academic community of students and lecturers.
9. Redesigning education, developing digital educational materials and introducing blended learning require much knowledge, time and energy on the part of the lecturers concerned. As far as we have been able to ascertain, there are no structural incentives within the UvA for lecturers to motivate and encourage them to develop digital educational materials. The courses our lecturers take (e.g. UTQ, Advanced UTQ and teacher-training programmes) also contain little reference to blended learning.
10. Many e-learning initiatives have been launched within the UvA in recent years. Those e-learning projects lack a broader educational and organisation framework. Nor is there any facility enabling them to share knowledge gained and experiences of e-learning with each other.
11. Within the various faculties and departments of the UvA there are innovative educational

practices that employ e-learning intensively. The exchange of the associated knowledge and experiences has remained relatively limited.

12. Continuous learning by lecturers and an evidence-based approach are important for the development of blended education and its quality. Life-long professionalisation is necessary for the continuous development of lecturers. Peer-learning and the sharing of knowledge and experience among lecturers is of crucial importance in a life-long learning context. Traditional courses and learning platforms are not suitable, because social contact is hugely important in this type of learning. The use of a dedicated platform which can connect knowledge and people with each other in a manner tailored to individual needs could be a solution here.

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**Appendices**

**Appendix 1. The mandate of the Education/Blended Learning Task Force and a brief summary of the answers.**

| Questions and answers – Terms of reference | | |
|---|---|---|
| | **Questions** | **Answers** |
| **1** | Reflect on the current Vision on Teaching and Learning (*Onderwijsvisie*) and examine how recent developments could be integrated into the curricula. | The UvA's Vision on Teaching and Learning must be adapted. Blended learning must be given a key place in order to realise the ambitions set out in the Vision on Teaching and Learning. That Vision also requires greater depth (more attention to the student-lecturer relationship) and breadth (more attention to ties with society). |
| **2** | Develop a didactic concept for blending learning curricula with a good balance between online and offline learning. It should contribute to the learning outcomes of degree programmes and the general objectives of education at the UvA (research-intensive education and student-activating education). | An absolute judgment cannot be given as to the proper balance in blended learning. The Task Force believes that blended learning should be designed at curriculum level. The learning outcomes should always be the guiding factor in the design of a blended learning curriculum. |
| **3** | Provide an overview of empirical evidence concerning blended learning. | The Task Force has compiled a list of literature concerning research into blended learning. The main area examined was the empirical underpinning of results. The list is attached as an appendix to this report. |
| **4** | Examine whether, and how, blended learning can contribute to flexible learning pathways for non-traditional groups of students (part-time students, continuing professional education, etc.). | The Task Force believes that flexible learning pathways for non-traditional groups of students must be part of the breadth strategy (see 1). |
| **5** | Prepare a list of the online forms of education at the UvA and specify which of them lend themselves to being scaled up. | We refer first and foremost to the evaluation carried out by N. Bos (2015). The Task Force believes that judgments as regards scaling-up are meaningless until strategic, educational and organisation frameworks have been established. |
| **6** | Provide an overview of the financial consequences and technical preconditions. | Many strategic choices and choices concerning teaching content will have to be made at central and decentralised level before judgments can be made regarding the financial consequences and technical preconditions. The Task Force proposes heavy investment in lecturers, blended learning platforms, the substitution of the present ICT project financing with an alternative method of financing (e.g. through the UvA's allocation model which distributes resources among faculties). |

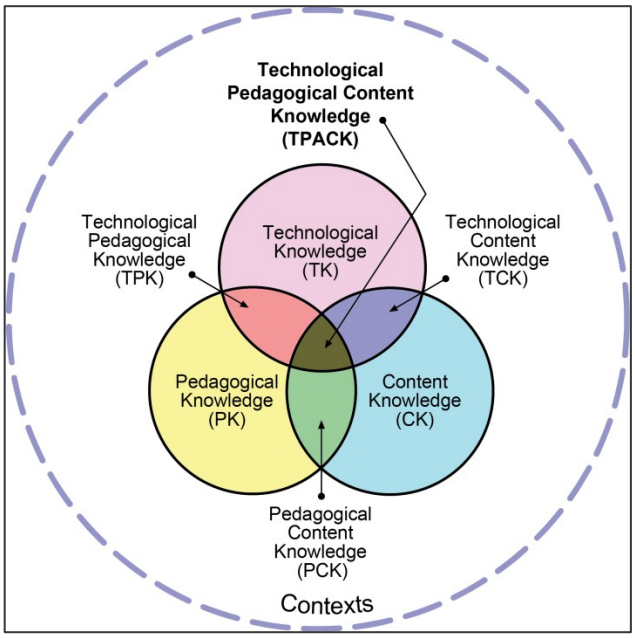
**Appendix 2. UvA e-learning initiatives**

At first glance, the UvA appears to be relatively inactive in the area of e-learning. However, this impression is incorrect. In recent years, a large number of innovative e-learning initiatives have been developed within our University. The ICT and Education Programme Board released funds every year to enable e-learning initiatives to be developed at local (faculty) level. In most cases, those initiatives had two objectives. The first was to professionalise lecturers as regards the use of ICT in education.
However, the extent to which the initiatives have actually contributed to professionalising lecturers is uncertain. To date, the acquisition of knowledge in the area of e-learning has barely featured in the UTQ pathways. The second objective was to increase knowledge of topics to do with ICT in education and thereby encourage the use of it.
The development and implementation of these initiatives has resulted in the accumulation of much knowledge and experience within the UvA concerning a great diversity of e-learning activities. However, only a limited number of initiatives has led to its being introduced into several degree programmes. Most remained a one-off project or activity. This has created a fragmented palette of e-learning activities within the UvA which lack clear management and strategic and educational frameworks. The same is true of other e-learning-related initiatives, such as those in the area of learning analytics. Here, too, there is a great deal of fragmentation and absence of clear management. It is essential that this situation is remedied if the benefits of various data sources are to be reaped for learning analytics. A good example of the need to bring the various ICT-related initiatives together in a coherent policy for education at faculty level is the Long-Term Plan (2014-2016) of the ICT and Education and Faculty of Science Programme Board. It defines three strategic topics which are important to the development of blended learning within that faculty: (1) Testing and test-driven learning (2) Independent and distance learning, (3) Learning analytics and Teaching Lab, making space for new educational concepts (ICT and Education and Faculty of Science, 2013) (https://ictofnwi.wordpress.com/2013/12/23/meerjarenplan-ict-en-onderwijsinnovatie-fnwi/).
In a recent recommendation (Bos, December 2014) many of the initiatives funded by the UvA were assessed and divided into eight topics, including advice on the question of whether, and how, the initiatives could be scaled up.[4]

[4] The eight topics are: 1) digital assessments; 2) formative assessments during the first year of a degree programme; 3) learning from and with videos; 4) collaboration and content creation; 5) internationalisation and distance learning; 6) depth & breadth of Blackboard; 7) writing process and academic writing; 8) online activities to aid students in selecting their degree programme.

**Appendix 3. Technological Pedagogical Content Knowledge Framework (TPACK)**

The method used for effective online teaching is different from face-to-face teaching; it requires a different teaching method and the course content will usually have to be adjusted as well. Shifting from a face-to-face course to the blended variant therefore requires more than the simple provision of one or more ICT tools. To be successful in blended format, a face-to-face course will have to be completely redesigned. To ensure success it is crucial that the redesign is aimed at solving learning problems within the existing course or problem areas of the course.
The TPACK framework of Mishra & Koehler (2006) explains how the quality of educational design where technology is used can be achieved and the knowledge the lecturer must possess for blended (and online) teaching. TPACK stands for Technological Pedagogical Content Knowledge.[5] The basic premise of TPACK is as follows: an appropriate teaching method (Pedagogy) must be chosen for the content of a course (Content) and a suitable ICT tool (Technology) selected for both whereby all three (content, pedagogy and the ICT tool) influence each other and, tailored to the course (educational objectives), must be adjusted to become an effective educational method. In the TPACK model (see diagram), an effective educational method occupies a central position. The circle surrounding it indicates the context in which teaching takes place and has an impact on the choices made. This means that in most cases a course cannot be adopted directly from another institution. Adjustments will always be necessary to ensure it suits the curriculum.




One example of how the TPACK model can be used to convert a course from a face-to-face format to a blended learning course is the Pathophysiology of the Nervous System course in the Bachelor's programme in Psychobiology. The traditional (face-to-face) course included conventional lectures and a weekly seminar where students were divided into small groups to discuss the material and ask questions. Most students delayed learning until just before the examination. The substantial rise in the number of students meant that, in terms of logistics, it was no longer possible to organise the seminars into groups.
The lecturer therefore decided to offer the course as a blended course. His redesigned course means it is no longer necessary to split students into groups. Weekly lectures are given to the whole group.
However, one session a week has been completely redesigned in terms of the teaching method: a flipped classroom design. Students are asked to think up conceptual multiple-choice questions on the basis of the week's lectures (also available on video) and submit them online (via Blackboard discussion) every week. An additional motivating factor for students is that the questions discussed during the flipped classroom sessions can be used as examination material. During the flipped classroom sessions, voting devices are used in accordance with the peer-instruction method. This means all students first answer a question individually by voting using their voting device, after which they discuss the question with a peer (person sitting next to them) and then vote again individually using the voting devices. If necessary, the lecturer will provide additional information or an additional explanation per question and the discussion will sometimes continue for longer. The knowledge students build up this way is deeper than during a traditional face-to-face lecture and the method encourages students to think critically.

[5] TPACK is based on the older PCK model (Pedagogical Content Knowledge) from the 1980s which specified that an appropriate form of teaching must be chosen for each topic or concept and that the teaching method should determine which content should be selected and how such a selection should be made.

This example shows how the lecturer applied TPACK when converting a course to the blended course format. He changed the teaching approach and chose and aligned the appropriate ICT tools for his teaching method. The course content also changed. The students are now involved in the choice of content. Students participating on the course are actively involved throughout it; they no longer delay learning until right before the examination. This redesign has also resolved the logistical problem and students are now achieving higher levels in accordance with the Bloom taxonomy (deep learning) than in the earlier traditional course. For more information on this course, see:
http://starfish.innovatievooronderwijs.nl/goodpractice/6/

**Appendix 4. Digital Workbook (Faculty of Law, UvA)**

With effect from the 2015-2016 academic year the Digital Workbook will be used for all first-year courses of the Bachelor's Law programmes. This means that students on courses which include tutorials will have to meet two additional requirements:

1. They will have to enter their answers to questions put to guide them in an answer form (in Word, to be found on Blackboard) and upload that completed form to a Blackboard folder of their tutorial lecturer before the tutorial. By using smart views, tutorial lecturers can see at a glance in the Blackboard grade centre whether the students have in fact submitted the forms. Anyone failing to submit a form more than once will be excluded from any further attendance of the tutorial. The answer forms submitted will not be marked in their entirety; sample checks will be made to establish whether serious work was submitted and to identify the most problematic questions so that they can be dealt with during tutorials. To this end, the lecturer will receive a file by email containing all the answers submitted per question shortly before the tutorial; the macro used for this also ensures that, with the aid of local plagiarism control software (open source), checks can be made to make sure students are submitting unique answers (anyone submitting copied work will be caught out).
2. Students will also have to sit a weekly online assessment comprising a number of multiple-choice questions about the subject-matter dealt with thus far. If a question is answered incorrectly, the question will be put again (with alternative answers jumbled up); the student must have answered all the questions correctly by the end. The student receives feedback after answering a question and also after completing the assessment in its entirety. The weekly participation in assessments does not give the student a 'bonus point' (because of the risk of fraud); anyone repeatedly failing to sit the online assessments however will be excluded from further tutorial-based teaching. In the meantime, a number of pilots have shown that the Digital Workbook has little or no effect if the tutorial lecturers do not strictly apply the sanction of exclusion from further tutorial-based teaching when students fail to answer the questions set to guide them or do not answer the test questions correctly.

The reason for using the Digital Workbook is to encourage students to prepare well every week so that they are in a position during the assessment week to pass the assessment at their first attempt. In the 8-8-4 system there is scant opportunity after the study weeks have been completed to repeat all the course material covered before the examination in the next assessment week. That is why it is essential that students of Law – which, after all, is a 'text-dense course programme' – study the course materials thoroughly week in, week out and have the opportunity to test whether they have done so sufficiently.

The Digital Workbook was developed a few years ago on the UvA Psychology degree programme and then taken over in an adapted form by the Faculty of Law (and others). So far, the experiences of the Faculty of Law have been moderately positive. In the 2014-2015 academic year the Digital Workbook was tested in various versions in five Bachelor's courses before a uniform protocol was drawn up for its mandatory introduction in all first-year courses, in September 2015. In the pilot all lecturers found that a large number of students did prove to be considerably better prepared than previously.

It meant that during the tutorials there was scope, after the questions set as guides had been discussed, to discuss other matters (e.g. a case not distributed in advance). The students themselves also made positive comments on the impact of compulsory uploading of answers to the questions; they were less enthusiastic however about having to answer test questions every week. The UvA Q-student evaluations show that students regard the Digital Workbook as useful, believe it prepares them better for tutorials and ensures they achieve better marks in their examinations. Whether the latter is indeed a structural benefit will have to be established after a few years have elapsed, but the initial indications look promising.

**Appendix 5. Blended Learning in the UvA-AMC medical Bachelor's curriculum**

In 2016 the UvA-AMC's Faculty of Medicine will launch a New Bachelor of Medicine degree programme. Blended learning, where face-to-face teaching and ICT are combined, is an important teaching method in the curriculum – not as an aim in itself,. but rather as an opportunity to use a wealth of educational methods which reflect a sound didactic concept during the learning process.

Paragraph 5.2.1 of the plan for the New Bachelor of Medicine degree (October 2014) states how blended learning is to be used in the new teaching programme. A passage from that paragraph is provided below.

The substantial share of self-study (70%) requires a learning environment which motivates students and also offers the opportunity to make maximum use of contact times. A possible option here is the 'flipped classroom' concept where preparation takes place through self-study and face-to-face teaching is used to achieve greater depth. In practice, the Team-Based Learning working method, which is set to play a major role in the New Bachelor of Medicine degree, also works along the lines of a flipped classroom. The following points of departure are required to make the blend of educational methods as effective, attractive and motivating as possible:

- The combinations of educational methods chosen are aligned with the individual students and their (educational) objectives, and also with the educational objectives of the degree programme and the subject or task.
- There is an option where teaching can be offered synchronously or asynchronously.
- Various ICT methods are used to organise teaching in a manner which is attractive and encourages active participation.
- Supporting information and 'just-in-time' information is used to organise teaching.
- The learning environment is organised in as adaptive a way as possible.
- A digital portfolio is used to keep up with educational developments and the resultant changing educational methods.
- Optimisation of the 'blend' is conditional upon the development of updates of (digital) content which fits in with the framework of 30% contact teaching and 70% self-study.
- The use of digital assessment methods is a supplement to the 'blend' of educational methods for formative and summative assessments.

As noted earlier, the lecturer will be given a more comprehensive task in the role of supervisor or coach where there is a broader use of self-study methods and in particular self-study methods through ICT or supported by ICT.

**Appendix 6. Flipped Classroom and MOOC in the Child Development and Education and Sociology and Political Science pre-Master's programme (Faculty of Social and Behavioural Sciences)**

The Sociology and Political Science and Child Development and Education degree programmes have a relatively large intake of pre-Master's students. In a pre-Master's programme involving a maximum of 60 ECTS, students who lack the proper prior education overcome any deficiencies. Half of the pre-Master's programme comprises teaching methods and techniques. Since the funding of pre-Master's degree programmes is under pressure, the Sociology and Political Science and Child Development and Education departments have been offering teaching methods and techniques jointly since 2013-2014.
The programme initially comprised general lectures attended by students from all four degree programmes, supplemented with discipline-based tutorials where the materials were dealt with using assignments related to the degree programme chosen. Owing to a change in legislation, however, the programme came under additional financial pressure and it looked as though it would no longer be possible to offer both lectures and tutorials.
The programme had been supplemented with tutorials precisely in order to offer greater support to pre-Master's students in the development of academic skills. That is why it was decided to make a one-off, large investment and produce video lectures which largely replaced the lectures.

To guarantee that video lectures were of high quality and could be used as broadly as possible, it was decided to offer the materials in a series of MOOCs. The full series of five MOOCs will become available in phases from 2015/2016, but the initial experiences were gained in 2014/2015 with the first course from the series.
Students are given access to the video lectures (YouTube videos embedded in Blackboard) at least one week in advance and are instructed to study them. In Q&A sessions there was scope for putting questions resulting from the video lectures. Practice questions from pilot examinations were also discussed. The lecturer tried, where possible, to have students answer each other's questions and acted mainly as the facilitator.

Although anecdotal, the lecturer's experience was as follows:

- The production of video lectures has improved the quality of knowledge transfer compared with lectures; the method makes you put more thought into finding the optimum way of transferring knowledge.
- The method offered the possibility of placing abstract concepts into the context of the educational practice of various disciplines through interviews with colleagues (which is not possible in lectures).
- Preparation for the Q&A session took a fraction of the time needed to prepare for a traditional lecture.
- Student attendance at the Q&A sessions appeared slightly higher and definitely not lower than in the previous year where the traditional approach was used.
- Students appeared better prepared and the level of debate was higher than in previous years.
- The students' attitude towards studying appeared to have improved; students took each other to task during the Q&A session if it turned out that one of them had not studied the video lectures sufficiently well.
- The approach offered the opportunity to deal with subjects for which there is normally no scope (application of topics discussed in practice, new developments and broader context).
- The drop-out rates and academic performance levels were comparable with the previous year and certainly not poorer.
- Student satisfaction was high; only a handful of students (out of approximately 250 participants) said they preferred a traditional approach to the video lectures.
- During a course later in the year where the traditional approach was applied, students said they preferred the design of the first course to the traditional design.

The initial experiences with this approach were therefore positive for students and also for the lecturer. The design will be adjusted a little further this year. Students will follow the video lectures via the Coursera platform in order to come into contact with a larger group of interested parties. This contact offers, on the one hand, the opportunity to obtain better feedback from other participants, for example, greater and faster response on the forum. On the other hand, it is hoped that the contact with a group participating wholly on the basis of an intrinsic interest will have a motivating effect. The platform also offers additional practice opportunities in the form of online quizzes and peer feedback assignments.

This year, in addition to its use on pre-Master's degree programmes, the material will also be used for Communication Science, Business Administration and the Faculty of Science at the UvA and at the EUC.

*Links*

Quantitative Methods Course:
https://www.coursera.org/learn/quantitative-methods/

Specialization Methods and Statistics in Social Sciences:
https://www.coursera.org/specializations/social-science

## Appendix 7. Blended Learning in the Bachelor's programme in psychology

*Scientific and statistical reasoning*

As part of the redesign of the second-year Bachelor's programme in Psychology, the Scientific and Statistical Reasoning module was designed along the lines of a blended learning model. The 15-ECTS course combines critical thinking with learning how to use SPSS and the associated methods and statistics. The course is provided on a part-time basis throughout the first semester and is compulsory for all 400 second-year students.

Blended learning is fully implemented and the flipped classroom partly implemented during the course. The course consists of four 5-week blocks. Figure 1 shows the structure of the *first block*, which is completed with an interim examination.

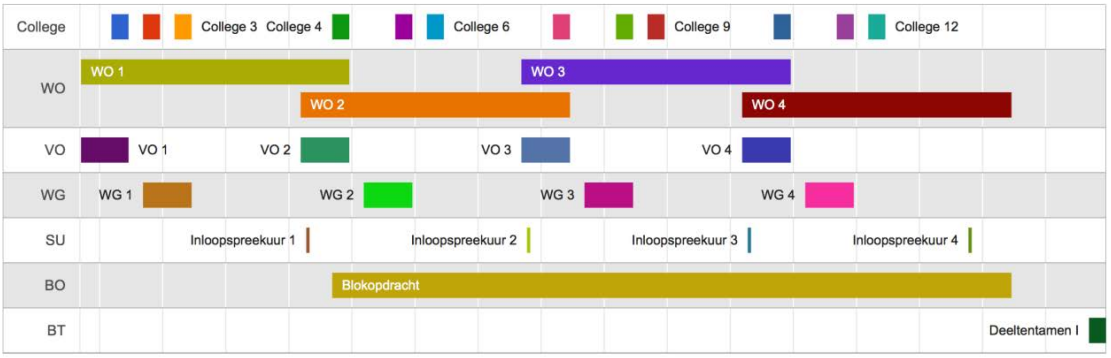



**Figure 1 Scientific and Statistical Reasoning including Test Theory, Block 1**

The above overview illustrates the degree to which digital teaching and face-to-face teaching have been integrated. The course comprises compulsory lectures or web lectures, digital formative assessments into which video and textual instruction has been integrated (WO), preparatory assignments for the tutorials (VO), tutorials where active participation is a condition, a large essay assignment (BO), walk-in hours (SU) and, at the end of each block, an interim examination (DT).

By integrating most of the instruction on the module into the digital formative assessments, there is scope within the lecture series to enable material to be examined in more depth. The lectures no longer include a discussion on how a particular analysis should be executed in SPSS; instead we can deal with the underlying premises and how we come to reject a zero hypothesis. A decision was made not to use lecture time for remedying problems and reflection, something which commonly occurs in flipped classroom situations. That part is carried out in the tutorials, where students are challenged to set to work on the materials they are studying. For instance, students have to give a weekly presentation on the characteristics of a specific statistical test (e.g. for what kind of analysis would you use an ANCOVA analysis?). The tutorial supervisors use the information from the digital formative assessments to monitor the students' study habits and find out where individual students are experiencing difficulty. Students can then be referred to the contact hour which, incidentally, is also available digitally through a 'Google hangout'. For peer support, we use a Facebook page specially designed for this purpose where students can ask each other questions and which a number of tutorial supervisors can also view.

Toetsafname – Universiteit van Amsterdam – RemindoToets Afspeelomgeving

WEEK 02: SPSS INTRO 2

**Kandidaat:** Sharon Klinkenberg

Toon alle vragen op één pagina

1 | 2 | 3 | 4 | 5 a b c | 6 a b c d e | 7 a b c d e | 8 a b c d e f g | 9 a b c d | 10 a b c

We gaan deze week gebruik maken van dezelfde casus als vorige week. We werken nu met een opgeschoonde dataset. Gebruik dus **niet** de dataset die je vorige week ook hebt gebruikt, maar download en open de dataset hieronder:

**Download "Immuunnormaal.sav"**

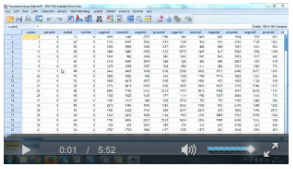
Deze opgeschoonde dataset is afkomstig van een onderzoek dat de invloed van angst voor het maken van tentamens op het immuunsysteem beoogde te meten. In het databestand zie je de scores op een aantal variabelen, een korte uitleg:

- id: id-nummer
- groep: Zit de proefpersoon in de experimentele (doet tentamen) of controlegroep (doet geen tentamen).
- sekse
- Immuunvoor: Hoe beter het immuunsysteem, hoe hoger de score
- Immuunna: Hoe beter het immuunsysteem, hoe hoger de score
- Statevoor: Score op de zelfbeoordelingsvragenlijst "State Anxiety" bij de voormeting (scorebereik 20-80)

Zorg dat je elke keer wanneer je iets in SPSS uitvoert, je deze bestanden ergens goed opslaat en bewaart, zodat je aan het eind van de week kunt nakijken of je het op de juiste manier hebt uitgevoerd.

Deze week gaan we oefenen met verschillende functies uit het menu 'data'. Ook komen er verschillende aspecten terug van de oefening van vorige week.

In de onderzoekspraktijk komt het wel eens voor dat je analyses wil uitvoeren over afzonderlijke groepen proefpersonen. Om dit mogelijk te maken, moet je je databestand splitsen. In het onderstaande filmpje zie je hoe je data kunt splitsen en bepaalde personen (cases) kunt selecteren. Dit heb je nodig voor de komende vragen. Klik **hier** voor de link naar youtube.




Splits het databestand op sekse (zie Field paragraaf 5.3.2.4). Wat is de gemiddelde leeftijd van mannen en van vrouwen? **Maak de splitsing na berekening ook weer ongedaan.**

- Gemiddelde leeftijd Mannen = 20, Vrouwen = 21,60
- Gemiddelde leeftijd Mannen = 22,33, Vrouwen = 25
- Gemiddelde leeftijd Mannen = 18, Vrouwen = 25
- Gemiddelde leeftijd Mannen = 25, Vrouwen = 28

Sluit de oefentoets af | Commentaar op deze vraag? | Oefentoetsinformatie | Antwoord opslaan

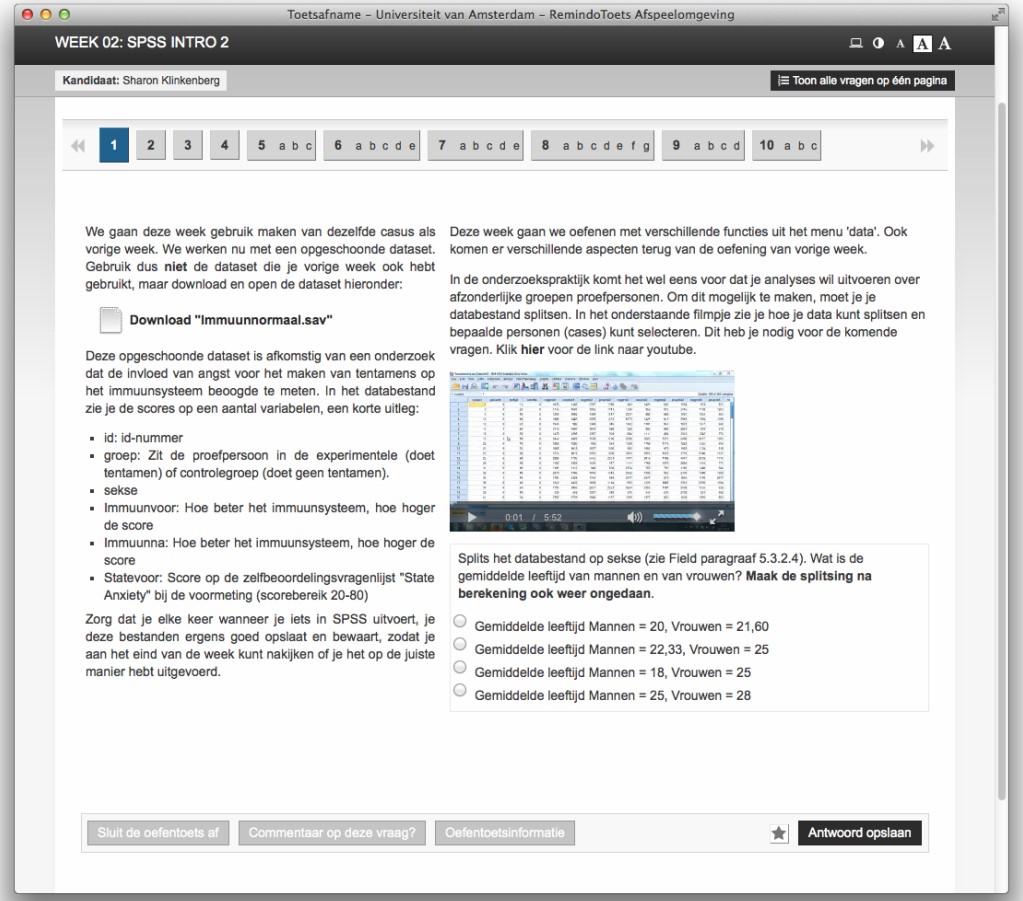



**Figure 2 Formative assessment**

Figure 2 shows a digital formative assessment into which a case, video instruction and an assessment are integrated.

Each block is completed with a digital summative examination in which the skills and knowledge acquired are tested against the learning outcomes of the Bachelor's programme in Psychology. The final assessment is based on the four interim assessments, the essay assignment and active participation in the other parts. For instance, no points are earned for the quality of the formative assessments but students are encouraged to devote time and effort to them.

**Appendix 8. Blended Learning in research literature**

Blended Learning Literature Review
Innovation in Education/Blended Learning Task Force
University of Amsterdam
September 2015

**Contents**

*1. Introduction*

Blended learning has become a popular concept in debates about the digitalisation of education. To gain a proper understanding of blended learning, the Task Force carried out a literature review, concentrating on evidence-based scientific literature.

*2. Definitions of Blended Learning*

There is still much debate over the correct definition of BL. The first thing to come to mind is the combining of online and offline education. Some authors make a distinction between online, offline and blended learning on the basis of the relative share offered by an online or offline component of a course. For instance, Allen and Seaman (2014) apply four categories where 0% is regarded as traditional, 1% to 29% as web-facilitated, 30% to 79% as blended and 80% or above as online education. Such a distinction is relatively arbitrary and difficult to determine precisely in practice.

According to Garrison and Vaughan (2008), blended learning is a coherent approach to teaching which integrates the strength of face-to-face learning and online learning to achieve educational goals. Oliver and Trigwell (2005) rightly note that, despite the rapidly growing importance of BL, there is still much uncertainty as regards the concept. Blended learning can relate to new combinations of instructional methods (lecture, discussion, coaching, simulation, game, case study), to the different educational technologies used, different pedagogical approaches (e.g. constructivism, cognitivism, behaviourism), different methods for knowledge transfer (online and offline), and the differences in chronology (synchronicity and asynchronicity) (Bliuc, 2007; Bocconi and Trentin, 2014). Combinations of different instructional methods and different methods of transfer are also possible. Blended learning therefore means different things to different people (Picciano, 2008).

*Table 1. Blended Learning dimensions*

| Dimension | Description |
|---|---|
| **Transfer mode** | Combining face-to-face learning with online learning |
| **Technology** | Combining educational technologies |
| **Pedagogy** | Combining pedagogical approaches |
| **Chronology** | Combining synchronous and asynchronous educational activities |

Based on **Smyth** (2011)

Oliver and Trigwell (2005) also say the term blended learning is in fact misleading because most descriptions do not have to do with blended learning but rather with blended teaching or 'learning with blended pedagogies'. According to the authors, many blended learning approaches are therefore lecturer-focused and not student-focused.

A clear definition of BL is important. We have provided a few definitions from recent literature in the following table.

*Table 2. Blended learning definitions*

| Author(s) | Description of Blended Learning |
|---|---|
| **Bonk & Graham (2003)** | Blended Learning systems combine face-to-face instruction with computer-mediated instruction. |
| **Bocconi & Trentin (2014)** | - Onsite learning refers to the learning process which takes place in a physical space (a classroom lecture, a collaborative activity, study in the library or at home).<br>- Online learning refers to an individual or collaborative learning process which develops instead in virtual spaces according to the canons of online edducation<br>education. |
| **Garrison & Kanuka (2004)** | The thoughtful integration of classroom face-to-face learning experiences with online experiences." |
| **Bliuc et al. (2007)** | Blended learning describes learning activities that involve a systematic combination of co-present (face-to-face) interactions and technology-mediated interactions between students, teachers and learning resources. |
| **Laster, Otte, Picciano, and Sorg, 2005** | - Blended courses integrate online with face to face instruction in a planned, pedagogically valuable manner; and<br>- Where a portion (institutionally defined) of face-to-face time is by online activity |
| **Garrison & Vaughan (2008)** | - Thoughtfully integrating face-to-face and online learning<br>- Fundamentally rethinking the course design to optimize student engagement<br>- Restructuring and replaced traditional class contact hours |
| **Spanjer et al. (2014)** | 'Blended learning falls on a continuum between these two extremes: face-o-face teaching with no online learning, and wholly online learning with no meeting in person.' |

The above definitions vary considerably in their descriptions of blended learning. Bonk and Graham refer explicitly to a learning system and to instruction, whereas Bocconi and Trentin talk about 'learning spaces' and the learning process. Garrison en Kanuka emphasise learning experiences, whilst Bliuc et al. talk about learning activities. The common distinction lies in the two different transfer media used in teaching: offline versus online. There are many other definitions of blended learning but they differ from each other in the same way as the above definitions.
We have initially limited ourselves to a minimum definition for the purposes of discussing some research into blended learning: combining online and offline educational activities within a course or curriculum.[6] We refer to them here as course modes. They relate principally to the transfer medium.

*3. Effectiveness of Blended Learning*

A key part of the research was aimed at measuring differences in effectiveness between offline, online (and later blended learning) course modes. The term effectiveness includes a host of different effects. These can be objectively measurable effects (e.g. examination figures, drop-out percentages, and pass percentages) and also subjectively measurable effects (e.g. student satisfaction, student involvement, course evaluation).

In a meta-analysis of research articles in the area of distance education (including ICT) factors having an impact on academic achievements were identified (Zhao et al., 2005). As far as the effects are concerned, the research showed there to be no significant differences between online and offline learning.

[6] In our recommendation we opted for the definition given by Bliuc et al. (2007)

The factors which influence the effectiveness of online learning – interaction with the lecturer, instructional methods, design of the programme, etc. – are the same as those which influence offline learning, but manifest themselves slightly differently. The researchers indicated that the greater the role played by the lecturer in online learning and the greater his or her 'live' involvement in online learning, the more effective it is. Interaction between student and lecturer is therefore crucial. It also emerged that certain content, for example that to be found in computer science, lends itself better to online learning than disciplines with less precise content. It was concluded that there are great differences between the various studies as regards the achievements and factors influencing those achievements, although this also held true in the research conducted into offline learning.

In another meta-analysis of more than 1000 empirical studies of online learning, conducted on behalf of the U.S. Department of Education, Means et al. (2010) examined the differences in effectiveness between online learning and offline learning, seeking to establish whether adding offline learning improves the grade point averages of online learning, which practices contribute to the effectiveness of online learning, and which conditions influence the effectiveness of online learning. To establish the level of effectiveness, a total of 50 independent effects were selected and the differences in effectiveness were expressed in effect sizes. The main conclusion from the research was that students on courses involving online learning (both completely online and also in blended form) performed better, on average, than students being taught offline only. The researchers also found that the effectiveness of blended learning could largely be explained by the opportunity it offers for offline interaction between lecturer and student. During lectures, lecturers spent less time on pure knowledge transfer, which meant more time could be devoted to direct interaction with students for clarification and explanations. The findings should be treated with some caution since there are many differences between the two modes as regards the various effects (e.g. time on task and method of instruction).

In the meta-analyse of Sitzman et al. (2006) the effectiveness of web-based instruction (WBI) and blended learning is compared with that of class instruction (CI). Seventy-one effect sizes were selected to determine effectiveness. They examined a total of 96 studies where 19,910 trainees were involved in 168 courses. The researchers also made a distinction between declarative and procedural knowledge. Declarative knowledge refers to information which can be elicited by a 'what' question, the memorising of facts and the underlying principles and relationships between the knowledge elements. Procedural knowledge refers to information which can be elicited by asking the 'how' question, information about how a task should be carried out.

This distinction is useful because not all forms of knowledge are readily transferable using the same medium.
In their research, Sitzman et al. found that online learning was more effective for declarative knowledge than offline learning (6%) and that both forms were equally effective for procedural knowledge.
However, when the same instructional methods were used in the two modes, both modes were equally as effective for declarative knowledge as for procedural knowledge. This means it is not the mode which determines the difference in effectiveness but the instructional method. The relative effectiveness of blended learning was also examined. Blended learning proved more effective than offline learning in the transfer of declarative knowledge (13%) than of procedural knowledge (20%). However, the researchers do say that the underlying features of the course could explain those differences. Blended learning courses may require more effort (time on task), resulting in better performance.

Zhao et al. (2005) reached similar conclusions. In their meta-analysis of 421 empirical studies on the differences in the effectiveness of online, offline and blended learning, the effect size was calculated for 51 of them. The researchers found no significant differences in the quality of learning between distance education (incl. ICT) and online education. In the Master's Information Studies course at the Faculty of Science, for example, no significant difference was found between the students who took up that Master's programme the traditional way and the students who first completed a full online Pre-Master's Information Studies course to remedy their shortcomings (Brouwer and Haven, 2015). At the same time, significant differences in effectiveness were found among the studies. For instance, for particular types of content and for particular types of student, online learning works better in an offline learning

environment. At the level of Bachelor's programmes, where the acquisition of knowledge and skills is the key element, online learning is highly successful and can take place on an individual basis. For example, when learning mathematical skills, test-based online learning works exceptionally well, particularly when the student is provided with automated feedback (Tempelaar 2015). Master's programmes have more to do with the development of ideas and interest in research, for which greater interaction with the lecturer is deemed necessary. The central role played by the lecturer in online learning is also apparent from this research: "interaction is key to effective distance education" and "live human instructors are needed in distance education" (Zhao et al., 2005). A good mix of offline and online elements ultimately produces the greatest effect. In this case, online learning should be a group process, which is why facilitating online communication and creating a cognitive and social presence using educational design is very important. The researchers therefore conclude that the factors influencing effectiveness in online education are no different from the factors determining the effectiveness of offline education. This does not mean that an offline course can be translated into an online course one-on-one; it will have to be redesigned for this purpose.

In their meta-analysis of 74 studies (from a total set exceeding 6000 studies) Bernard et al. (2009) do not primarily concentrate on the mode but on the effect of different forms of interaction on the grade point averages in online and offline blended learning forms of education. They make a distinction between three forms of interaction: student-lecturer, student-student and student-content. The main conclusion is that all three forms of interaction have a significant effect on the grade point average. The researchers found no differences for online and blended learning forms of education. As far as student-content interaction is concerned, it is also true that greater interaction produces a greater effect. On the basis of those findings, the researchers conclude that interactions, in particular with content, should be the key element in the design of a course.
As far as student-lecturer interactions are concerned, the researchers believe that they should primarily be directed at higher-order thinking skills and comprehension rather than the transfer of factual information, the acquisition of procedural skills or knowledge testing. Interactive multimedia (Mayer, 2009) can contribute to better grade point averages.

Dutch researchers have also recently conducted a meta-analysis of the differences between traditional education and blended learning (Spanjers et al., 2014). In the process, the researchers examined objective and subjective effectiveness and time students spent on studying. The studies examined did not relate to higher education alone. The results are summarised in the following table.

*Table 3. Overview of the results from the Spanjers et al. 2014 study*

| Concept | Number of studies (including the total number of students) | Average effect size for studies (interpretation) | $I^2$[7] (Interpretation) |
|---|---|---|---|
| **Objective effectiveness** | 24 (4155) | 0.34 (positive & small to medium) | 84 (large variation between studies) |
| **Subjective effectiveness** | 11 (950) | 0.27 (positive & small to medium) | 56 (medium variation between studies) |
| **Satisfaction** | 30 (3574) | 0.11 (negligible) | 57 (medium variation between studies) |
| **Investment evaluations** | 4 (312) | -1.04 (negative & substantial) | 91 (large variation between studies) |

Source: Spanjers et al., 2014

The results show a picture which is similar to that of the other meta-studies. As regards effectiveness, blended learning education scores slightly higher than offline education. The differences are negligible for student satisfaction, and blended learning receives a negative score for time taken. What is striking is the negative score for the investment evaluations. Blended learning education evidently demands more effort from the student. Moreover, the introduction of blended learning often goes hand in hand with other innovations in education, such as other instructional methods, additional time investment on the part of the student, intensified interaction between students (Means et al. 2013). The study conducted by Spanjers et al. (2014) did not include analyses examining the differences between blended learning and offline education combined with these other innovations.

The variation in effect sizes between the studies is medium to large, so the results should be interpreted with great caution. The great variation also indicates that blended learning does not automatically lead to better results.

The quality of education therefore does not depend on the mode but on the quality of the learning activities, instructional methods and instruction materials employed which encourage the student to process the course material actively and in depth. The researchers therefore conclude that 'blended education is no silver bullet for improving education' (Spanjers, et al., 2014, p. 36).

[7] The measurement for variation applied by the researchers here ($I^2$) has a scale of 0 to 100.
A I2 of 25 is seen as a small variation between studies, 50 as an average variation between studies and 75 as much variation between studies.

It is not possible within the framework of this advisory report to deal in greater detail with the comparative analyses of the effectiveness of the three course modes. On the basis of the meta-analyses discussed above we may cautiously conclude that the course method (online or offline) generally has a limited impact on the effectiveness of the education. Moreover, it turns out that there is much variation in the results of the analyses. That variation often arises as a result of differences in the design of the course, the nature and content of knowledge, student characteristics etc. Some studies indicate that interaction is the most important predictor of effectiveness. This holds true for offline education and also for online education. There is no unanimity on the question of which type of interaction is the most important. Discussing the theories of blended learning brings us back to the role played by the three forms of interaction. The TPACK framework gives points of reference as to how a lecturer and designer of education can make informed choices concerning the use of ICT in education (Herring et al., 2014) in order to achieve the best learning effect (see Appendix 3 for a description of the TPACK framework).
Otherwise most meta-analyses of the effectiveness studies show blended learning in a modestly positive light. Blended learning does indeed appear to live up to its promise, combining the 'best of both worlds'.

*4. The student and Blended Learning*

A frequently heard concern in debates about online learning is the falling satisfaction and involvement of the students, which can result in procrastination, high drop-out percentages and poor academic performance (Sikora and Carol, 2002; Pigliapoco et al., 2007). The lack of offline contacts can cause students to feel isolated and alienated. The main reason for those feelings of isolation and alienation arising is referred to in the research literature as *transactional distance*: the psychological and communication space between student and lecturer (Moore, 1993; Pigliapoco and Bogliolo, 2007).
Transactional distance and geographical distance prevent the development of a (psychological) 'sense of community'. For this reason, much attention has been given for some time now to strengthening the 'sense of community' in higher education. Incidentally, this applies to offline learning programmes as well as to online programmes (see Tinto, 1975, 1997).
The emergence of blended learning is accompanied by increasing interest in research into the importance of student satisfaction, student involvement and a sense of community in blended learning.
López-Pérez et al. (2011) examined the relationship between the experience of students in a blended learning programme and the grade point averages (drop-out percentage and percentage of students passing an exam). In total, 1431 first-year Business Administration students (17 groups) were involved. The researchers found a positive (causal) link with the blended learning experience for both the drop-out percentage and the pass percentage. However, the grade point averages were better explained by the control variables (age, academic background and lecture attendance).
In a small study, Rovai and Jordan (2004) examined the relationship between the 'sense of community' and the course mode (online, offline and blended learning). In the case of blended learning, the sense of community turned out to be greater than it was for online and offline teaching. Other studies show comparable results (Dziuban et al., 2005). However, the results should be interpreted with some caution because other factors, such as course design, clearly defined course objectives, interaction with the lecturer, type of study assignments, etc. have a much greater influence on student satisfaction than the sense of community.
Rovai and Wighting (2005) identify four dimensions of the 'sense of community': spirit, trust, interaction and shared expectations. Pigliapoco and Bogliolo (2007) used those dimensions to examine the extent to which the psychological sense of community differed in the online and offline mode of the same course. The online and offline versions differed in terms of the composition of participants. Only full-time students participated in the offline version, whereas the online version consisted mainly of students who were combining study with work (earner-learners). Interestingly, Rovai found no major differences in the sense of community between the two versions of the course. The reason is probably that the participants from the two versions of the course had different expectations as regards the sense of community. Moreover, no significant link was found between sense of community and academic performance. The differences in academic performance initially appeared to be explained by the differences in the course mode (online versus offline). However, it is more likely that those differences are explained by the differences in the composition of participants in the two courses. The earner-learners in the online mode devoted less time to studying and to preparing for examinations, with the result that their academic performance was poorer and the drop-out percentage higher.
The above shows that not all students perform equally well in an online or blended learning environment.

Jaggars and Bailey (2010) found that students from low-income groups and students who were less well-prepared for academic study had more difficulty adapting to online learning. A study by Xu and Jaggars (2013) showed that the same held true for African-American students and male students in general. When technology 'favours' certain groups over other groups, job market economists refer to a 'skill-bias technical change'. This effect also appears to occur in online learning.

Student satisfaction is a complex construct because it is influenced by students' expectations, goals and preferences (Graham, 2004). For example, a student who has no, or low, expectations as regards interaction with the lecturer will be more easily satisfied than a student with high expectations in that regard. Dziuban et al. (2005) examined the expectations of different generations of students in respect of the offline component in teaching. They distinguished between three generations of students in their study: Baby Boomers (1946-1964), Generation X (1965-1980) and Millennials (1981-1994). The study showed, among other things, that male Millennials had the lowest expectations in respect of interaction in teaching. Female participants from the Generation X and Baby Boomers groups, by contrast, harboured the highest expectations in respect of interaction in teaching. The study indicates that the characteristics and dispositions of students can influence satisfaction with course modes. According to the study conducted by Akkoyunlu and Soylu (2008), learning styles also have an effect on how blended learning is assessed. Assimilators (oriented towards information and ideas) turned out to favour an online learning environment more than Divergers (oriented towards people and feelings).
In an interesting study, Dziuban and Moskal (2011) examined how the course mode (offline, online and blended learning) influences students' assessments of a course, using more than one million course evaluations. In those evaluations, students were asked to give evaluation scores for a great many aspects of the course (e.g. feedback during the course, supervision during the course, overall appraisal of the lecturer). The researchers found that the course mode had no significant influence on how students assess a course: '…students do not consider course mode an important element when defining the dimensions by which they evaluate their educational experience' (p.239). The course mode is therefore not a good predictor of academic performance, according to the researchers. Students who perform well do so in all modes: '…a course is a course' (p. 240).
The Dziuban and Moskal (2011) study into the experience of students from the three course modes ultimately casts a different light on the debate on the influence of these modes on the various aspects of teaching. From the students' perspective, the boundaries between the online world and offline world are blurring in general and between course modes in particular: 'The class for many contemporary students is an increasingly complex network of interactions.' (p. 240).

*4.1 Urban Legends about the student*

The advent of new interactive, social media has resulted in new categorisations being used to indicate the differences between generations, for example the Net generation, iGeneration, Google generation, Homo Zappiens. The best-known is probably the distinction drawn by Prensky (2001) between digital natives and digital immigrants. Digital natives refers to the generation which was born in the Internet age (± after 1980) and, compared with digital immigrants, is said to have unique, advanced technical and information-processing skills (e.g. multitasking). Prensky even goes so far as to say that the brains of digital natives have adjusted to today's information-rich environment.
Many authors believe that the entry of the digital natives' generation into higher education necessitates a fundamental reconsideration of education. Bennett et al. (2008) note that the advent of digital natives has prompted an 'academic moral panic', but that there is little empirical and theoretical evidence to support assumptions made about digital natives.
In a recent review article, the significance attached to the differences between generations and between students' learning styles in terms of the way in which students learn and study in different course modes is placed firmly in perspective and criticised (Kirschner and Van Merriënboer, 2013). The authors describe the misconceptions in this regard as 'urban legends'. Research from various countries shows that the younger generation of students frequently lacks advanced technological knowledge and any they do have is often limited to a few basic ICT skills such as emailing, texting, use of social media, creating PowerPoint presentations, surfing the Internet. Furthermore, the digital natives' generation turns out not to be a homogenous group at all. There is much variation in IT literacy within the group of digital natives (Jones et al., 2010). Finally, digital immigrants often have more advanced ICT knowledge and skills than is assumed to be the case in literature on digital natives.

They also put paid to the idea that digital natives are better at multitasking (performing several cognitive tasks at the same time with the aid of various media) than digital immigrants. People are only able to perform several cognitive tasks at the same time when a number of them are performed unconsciously (and automatically) (e.g. walking and talking). As soon as several cognitive tasks have to be performed consciously, this is always at the expense of the actual performance thereof.
Kirschner and Van Merriënboer (2013) are also critical of research into learning styles and its significance in educational practice. By identifying and recognising individual learning styles, teaching, through personalising instruction according to learning styles, can be adapted, resulting in improved academic performance. The basic premise behind the research into learning styles is that the cognitive abilities of student can be clustered into separate categories. However, the differences in cognition between students are gradual rather than nominal (Kirschner & Van Merriënboer, 2013).

Most people's learning style therefore cannot be pigeon-holed into one of the learning styles identified in the literature. Furthermore, over the years, research has uncovered a huge number of different learning styles. In a review article, Coffield et al. (2004) identified 71 different learning styles in the literature, producing a huge number of potential combinations of learning style. This makes learning style categorisation a blunt instrument for designing education.
The third 'urban legend' debunked by Kirschner and Van Merriënboer in their article is that of the student as self-educator. The vast quantity of information on the Internet often gives rise to the notion that teaching (by way of instruction) is no longer necessary and students are fully able to find their own way. However, the problem is that the increase in the quantity of information is out of sync with the development of students' information-processing skills (searching, identifying, analysing, synthesising, organising). The fact that students are highly skilled users of digital devices does not make them competent processors of information. Miller and Bartlett (2012) note that many people are inclined to search for information which confirms the opinions they already hold. Knowledge we already have determines what we see and understand (Kirschner and Van Merriënboer, 2013). Modern search engines and social media filter and offer information on the basis of who we are and what we want. Whilst the Internet is often presented as a global, free and rich information environment, it would appear that it is increasingly becoming a unique, personalised information universe. Pariser (2011) refers to an 'information bubble'; Sunstein (2006) refers similarly to a virtually closed and personalised 'information cocoon' which excludes information that does not relate directly to the occupant's preference. Hannafin and Hill (2007) note in this context that '…while technology has been lauded for potentially democratizing access to information, educational use remains fraught with issues of literacy, misinterpretation, and propagandizing' (cited in: Kirschner and Merriënboer, 2013, p. 8).

In summary, we can again (cautiously) conclude that blended learning results in greater satisfaction among students and better academic performance. Blended learning can strengthen a sense of community, but its impact on academic performance should not be overplayed. The importance of a sense of community depends on the expectations we have in respect of education. On the basis of the research conducted by Dziuban & Moskal (2011) it can be concluded that, from the student's perspective, the clear-cut distinction between the three course modes is increasingly deemed less important.

We have paid generous attention to the 'urban legends' surrounding the new generation of students (digital natives). These 'urban legends' could lead to serious misconceptions concerning the significance of teaching and how it is organised. It turns out that there is still little empirical evidence to support the many popular assumptions about digital natives and their special skills. That said, the Internet is an overwhelming information environment which is increasingly set to form part of today's learning environment in higher education. This information environment emphasises the need to develop digital skills (digital fluency, digital literacy, 21st Century Skills). Digital fluency relates to technical ICT skills (using ICT correctly) and also to critical ICT skills (using the correct ICT) (Miller and Bartlett (2012).

*5. The lecturer and Blended Learning*

It is generally true that the pedagogical and didactic training of lecturers in Dutch university education is limited, certainly in comparison with colleagues from other sectors in education.

The lecturer's academic expertise was long considered a guarantee for the quality of the education.

The view that this is not sufficient has existed for some time. That is why, through the route of UTQ and advanced UTQ, attempts have been made in recent years to strengthen didactic and pedagogic knowledge and skills.
However, here, too, relatively little attention has been paid to online learning. In the meantime, online learning literature has devoted much attention to these new knowledge and skills requirements and to the various new roles of the lecturer in an online learning environment. The use of e-learning tools is contributing to a disaggregation (unbundling) of the various teaching tasks of the lecturer, where, in particular, the role of the lecturer as a producer or developer of digital educational materials and his role as a transferor of knowledge are being disaggregated (Gerbic, 2011). The unbundled content and pedagogical and technological knowledge are reunited and developed in what is known as the TPACK (Technological Pedagogical Content Knowledge) (see Appendix 3) which can be used to professionalise lecturers in the area of blended learning.
However, it is not merely a matter of acquiring new knowledge.
A much-cited pronouncement is that made by Blume (1971): 'teachers teach as they are taught, not as they are taught to teach' (cited in Taks, 2003). Rienties et al. (2013a, 2013b) demonstrated that lecturers' perceptions (teachers' beliefs and intentions) of good education and the use of ICT in education have a significant impact on what a teacher actually does when teaching. Professionalising lecturers in accordance with the TPACK model therefore has a motivating effect, where every lecturer is encouraged to find his or her creative solution. That is why it is important to take account of the beliefs or customary practices of the educational establishment when implementing a process to professionalise lecturers as regards blended learning. For instance, an existing professionalisation module (an MOOC or a module which was developed at another establishment) will not usually work well unless it is adapted and offered to lecturers in a customised form (Brouwer, Dekker, van der Pol 2013). In the changing field of blended learning, life-long professionalisation is required. In 2014, as part of a UvA ICT and Education Fund project, a proof-of- concept knowledge network, Starfish, was set up in the Faculty of Science (ICT and Education-Faculty of Science, Starfish). Starfish is based on the TPACK model and bundles knowledge of didactics, technology and content within a specific context of a community and links that knowledge with domain experts.

The TPACK framework is based on the assumption that a lecturer is able to develop content, pedagogy and technological knowledge in conjunction with one another. In many cases, though, that will not be possible. Developments connected with content, pedagogy and technology are sometimes swift, hence the need to organise teaching in teams. Smith (2008) describes various models (craft model, collegiate model, virtual assembly line model) for the 'production' of digital educational materials. It is probable that teaching will increasingly become a team production. For lecturers this will mean, among other things, that they become ever more dependent on the contribution of colleagues (with different areas of expertise). Lecturers will also have to start specialising in one of the roles within the team production set-up (for example, the production of digital educational materials, digital assessments, digital supervision, teaching in a physical lecture room, etc.)
The unbundling of education, use of new technologies and the changing roles and responsibilities will ultimately have an impact on the lecturer's academic identity (Hanson, 2009). Blended learning is reinforcing this trend because is assumes that the lecturer is able to teach in two different contexts (online and offline). We have already stated that blended learning is only truly effective when it is accompanied by a wholesale redesign of education. For instance, the flip-the-classroom concept involves not only alternating between the online and offline learning environment but also reorganising the educational process and different roles and responsibilities for the lecturer and the student.

*6. MOOCs in Blended Learning*

A review of the literature in the area of Blended Learning would not be complete without a mention of MOOCs (Massive Open Online Courses) – if only to indicate that, strictly speaking, MOOCs are not covered by the term 'blended learning' because they involve fully online education. That said, it is helpful to know something about the development of MOOCs because they have helped to generate interest in blended learning, could have significant consequences for the future of university education, and offer interesting insights and possibilities in the area of the joint and evidence-based development of high-quality education material. The following overview is partly based on an illuminating discussion on developments in respect of MOOCs by Means et al. (2014).

The history of MOOCs is short and turbulent. The first MOOC referred to by that name was a course on connectivism (a teaching theory) offered by George Siemens and Stephen Downes through the University of Manitoba in 2008 (Parry, 2010). With just 2300 participants, it later proved to be a modest start. In 2011 the artificial intelligence MOOC of Stanford professor Sebastian Thrun and Google Research Director Peter Norvig attracted 160,000 participants.
In 2012, which was referred to by the *New York Times* as the year of the MOOC (Pappano, 2012), Thrun launched the MOOC Udacity platform, which focuses primarily on engineering and natural science disciplines. In the same year, Daphne Koller and Andrew Ng, also from Stanford, launched the broader Coursera platform, which now has nearly 15 million users and offers 1122 courses, developed by 121 different leading universities and a few non-university educational partners (Coursera, 2015). Other large platforms include EdX, developed by MIT and Harvard, and Futurelearn, developed by the Open University in collaboration with a large number of universities, mainly British. Together with the University of Leiden and Erasmus University Rotterdam, the UvA participates in Coursera. Delft University of Technology is registered with EdX and Groningen and Twente are registered with Futurelearn.
The first MOOCs, later referred to as 'cMOOCs', were geared towards learning through collaboration and construction of knowledge. Later courses, known as 'xMOOCs', followed a more traditional delivery model where the lecturer transferred knowledge using short video lectures varying from 1 to 15 minutes in length (Siemens, 2012). The personalisation and differentiation possibilities vary per platform and per course. For example, the Coursera platform distinguishes between session courses and on-demand courses. Session courses are 'instructor-paced' with a start date and end date and strict deadlines. On-demand courses are always accessible and are 'student-paced' with recommended dynamic deadlines. Instant feedback is available through automatic evaluation of quizzes and programming assignments. Written assignments or video assignments can be assessed with the aid of peer-feedback assignments.

As is the case with any development viewed as being potentially disruptive and considered to be a hype, the expectations concerning MOOCs were initially high. MOOCs would give people from around the world with no access to higher education the opportunity to further themselves (Koller & Ng, 2012). MOOCs would make universities superfluous within a few decades, or at least cause them to make far-reaching changes (Wood, 2014).
Naturally, this development attracted criticism. It was not long before the very low pass percentages drew comment.
Based on a survey of 103 MOOC lecturers, Kolowich estimated the pass percentage in 2013 to average 7.5%. Now, the different types of participant – 'passive participants (lurkers, auditors), active participants and community contributors' – are taken into account when pass percentages are determined. What is more, pass percentages turn out to rise sharply – from 9% to 74% – as soon as participants pay to receive a course certificate (Koller et al., 2013).
Another area of criticism is that participants are usually tertiary graduates who often already have a Master's title. We also found this to be the case with the MOOCs offered by the UvA. On the one hand, this means the laudable mission of helping people with no access to higher education to further themselves is not being achieved, but, on the other, this large group of tertiary graduates provide an interesting group of peers for our own on-campus students.

In addition to criticism of the degree to which MOOCs are succeeding in their original mission, reference is also made to potential risks. The delivery model used in many MOOCs is being called into question and warnings are being issued as to the possible consequences for university establishments. The fear is that MOOCs will provide a reason to reduce the number of appointments for lecturers. Added to that is the risk that education will become standardised if the same popular MOOCs are used in many different locations (Leddy, 2013).

There are a number of potential benefits to counter these potential risks posed by MOOCs. First and foremost, lecturers say that creating an MOOC has improved the quality of the teaching they offer to on-campus students (Kolowich, 2013). Transforming the materials to make them suitable for online presentation and optimum use of online possibilities is making a far-reaching re-evaluation of educational objectives and course structure unavoidable. MOOCs can boost the quality of teaching and contribute to the professionalisation of lecturers (Kolowich, 2013). MOOCs also offer the opportunity,

using data gathered from large groups of users, to make specific improvements in educational materials on the basis of empirical evidence. Insights gained can be translated into on-campus teaching.

MOOCs usually offer video lectures using the 'delivery method' which can very easily be employed in a Flipped Classroom model. Added to that, exposure to a large group of motivated participants, who are usually tertiary graduates, can provide an 'international classroom' experience. International participants offer a different perspective and contribute to diversity.
The opportunity to create special cohorts (private communities) within MOOCs offers interesting options; for example, candidates for a selective (research) Masters' programme can be screened or prepared to ensure a homogenous entry level. Furthermore, the Minister of Education, Culture and Science has indicated that institutions are free to award credits for MOOCs (Bussemaker, 2014).

MOOCs can be employed to useful effect not just for recruitment and selection but also to make on-campus courses blended and thus to improve the quality of education (through better materials, personalisation, differentiation and greater diversity in student perspectives) and by offering distance courses to new groups of students, for example through minor programmes and pre-Master's programmes.
However, the production of MOOCs is a costly business. Their (cost) effectiveness remains difficult to determine, though, partly because MOOCs are a relatively new phenomenon and there is still little research available. The production of MOOCs will only be efficient where course material has a life span of at least four to five years, is modular and can be used for different purposes and programmes. Preferably, then, not all courses should qualify as one which can be offered as a MOOC; strategic choices will have to be made. It is also worthwhile entering into partnerships with other universities with a view to producing and offering MOOCs.

### *7. Theories about Blended Learning*

At first glance, blended learning appears to be a pragmatic solution which combines the advantages of the offline and online course modes. However, most authors indicate that blended learning will mean a fundamental change in the way the relationship between learning and teaching is viewed, and most importantly, in the way it is organised. We have said little so far about the way this should be done, though. Questions such as 'how components from online and offline teaching should be combined' and 'is there any such thing as a correct and optimum mix' remain unanswered. A theoretical framework or perspective is needed for those questions to be answered.
However, an independent learning or instructional theory does not yet exist for blended learning. Some authors fall back on well-known pedagogical approaches here, such as behaviourism, cognitivism, constructivism and social constructivism. Alonso et al. (2005) combine some of the elements from those approaches in their instructional model for blended learning. Blended learning is often closely associated with student-oriented learning where greater control over the learning process is left to the student. Also, the emphasis is on active, collaborative learning instead of individual, passive learning. In general, this brings with it a shift from a behaviouralist and cognitivist view to a constructivist view of learning and teaching. In line with this shift, there is a heavy emphasis in online and blending learning on the different forms of interaction in the learning process. The *Interaction model*, and above all, the *Community of Inquiry model* are perspectives which are much discussed and used in research into online learning. Those theories have recently been applied to blended learning, too.

#### *7.1 Three types of interaction*

The strength of online learning is that it is not subject to constraints of time and place. This is also its potential weakness. The physical separation of student and lecturer, and also among students themselves, threatens to limit learning to a single form of interaction, namely that between the student and the course material (content). In offline teaching, by contrast, discussion is often limited to student-lecturer interaction. Moore (1989) therefore theorised on three basic forms of interaction for the online learning environment. Those three forms are no less important for the offline learning environment, though:

- student-content interaction
- student-lecturer interaction
- student-student interaction.

Although Moore's article sparked the debate on the central significance of three forms of interaction in online education, his description of the different forms of interaction and of the term interaction itself is relatively brief. At the heart of the term interaction is its reciprocal nature which brings about a qualitative change on both sides of the relationship. Not all interactions are of educational value. In the context of formal education, interactions are designed which are intended to result in the realisation of the educational objectives. In the context of higher education, interactions must lead to deep and meaningful learning. Deep learning takes place when students apply greater cognitive skills and consequently genuinely learn to understand the material instead of simply being able to reproduce facts. Deep and meaningful learning can be said to have been achieved when a student is able to solve a comparable problem in a different context (Mayer, 2003, 2009).

*Student-lecturer interaction*

Based on the meta-analysis of Bernard et al. (2009) discussed above, we stated that all three forms of interaction are important for the grade point average and that there are no significant differences here between online and blended learning forms of education. It is not the medium itself, but the instructional design and the way in which technology is used which will determine the grade point averages. A better quality of student-lecturer interaction can also be achieved using 'lean media' (e.g. email) (Anderson, 2003).

A key concern as regards student-lecturer interaction is the increase of online interactions. As far as lecturers are concerned, this is a major impediment to offering teaching online.

That said, both the quality and the quantity of student-lecturer interactions depend on the instructional design and choice of learning activities. The correct choices can relieve the lecturer.

*Student-student interaction*

The value of student-student interaction (peer-to-peer and collaborative learning) in higher education when it comes to acquiring relevant knowledge and skills is undisputed. Being confronted with, and exchanging, ideas relating to the content of the course helps to improve grade point averages (Bernard et al., 2009). In the online, offline and blended learning forms of education this does, however, lead to greater mutual dependence to the detriment of flexibility and the opportunities to personalise and modularise education (see MIT).

*Student–content interaction*

Within the three forms of interaction the student devotes most time to interaction with the study material. This applies to offline, online and blended learning education. In principle, there is no difference in the nature of the study material in the three course modes. The digital and multimedia form of the teaching material offers more opportunities for collaboration among students, a deeper understanding of its content and independent production and processing of the content. Mayer's multimedia learning theory is encouraging in this regard (2003, 2009). Mayer works on the assumption that people have two different channels for processing information; one for visual representations and one for verbal representations. Both channels have limited capacity. Multimedia course material (visual and verbal representations), if carefully designed, offers more opportunities for stimulating, deep and meaningful learning. However, according to the cognitive load theory, if the material is not carefully designed, the working memory can become overloaded, resulting in limited learning.

### *7.2 Interaction Equivalency Theorem*

Moore's interaction model has been expanded and adjusted in a variety of ways (Tuovinen, 2000; Anderson, 2003; Bouhik & Marcus, 2006). In light of the debate on blended learning, one of the most interesting variations is Anderson's *Interaction Equivalency Theorem*. Anderson asks whether, and to what extent, the three different forms of interaction can be interchanged without influencing the grade point averages, or whether there is an optimum interaction mix.[8] The question is relevant both from the student's perspective and that of the lecturer or teaching management representative.[9] A student assesses how much time he or she will spend on lectures, how much time he or she will consult and collaborate with fellow students and how much time he or she will devote to studying the course material. Part-time students probably make different choices from ordinary students. For instance, lack of time will doubtless

cause them to opt for a low level of student-lecturer and student-student interaction and a higher level of student-content interaction. A lecturer or teaching management representative will make similar assessments. For instance, a lecturer may decide to shift part of the student-lecturer interaction to student-content interaction (e.g. by using videos, simulations, animations). The multimedia nature of today's course material allows that shift. Instructions are increasingly found in course material and are being integrated. The extent to which such substitutions are possible depends partly on the pedagogical approach chosen and the type of knowledge (declarative or procedural). In a constructivist approach, student-student interaction is essential and is difficult to replace with student-content interaction (as opposed to behaviourist and cognitive approaches).

[8] Anderson formulates the theorem in two parts:

a. Deep and meaningful formal learning is supported as long as one of the three forms of interaction (SS-SC- ST) is at a high level. The other two may be offered at minimal levels, or even eliminated, without degrading the educational experience.
b. High levels of more than one of these three modes will likely provide a more satisfying educational experience, although these experiences may not be as cist- or time effective as less interactive learning sequences.

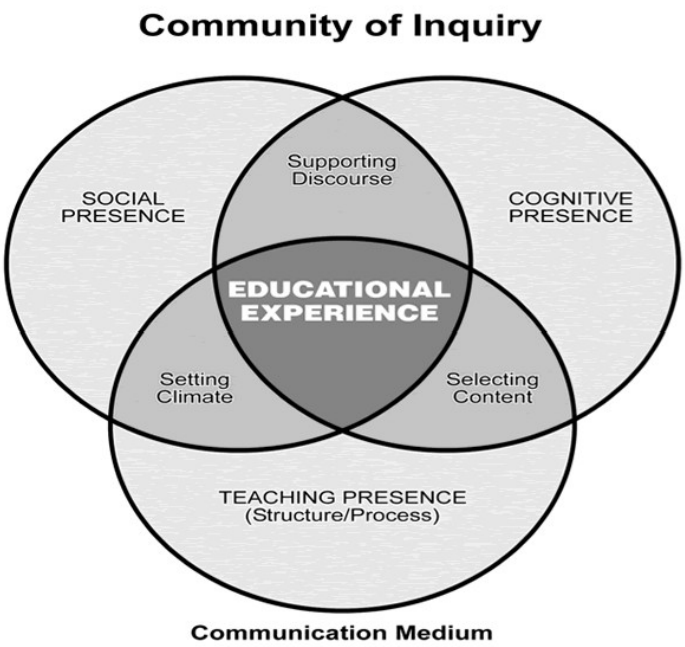
[9] For example, the law of Vos

The study of Bernard et al. (2009) discussed earlier confirms the value of the theorem as a basis for opting for a combination of the different interactions. The study revealed, among other things, that combinations of student-student and student-lecturer interactions do not result in improved performance or a change in attitudes towards learning. At the same time, it emerged that increasing student-content interaction does lead to improved performance. According to Bernard et al., the course mode does not influence those results.
Anderson's Equivalency Theorem is a thought-provoking basis upon which to design teaching in different modes. However, the term interaction is still too broadly defined to allow precise judgments to be made on the substitutability of different forms of interaction.

*7.3 Community of Inquiry*

The importance of the three forms of interaction in an online learning environment (and, in fact, any learning environment) is broadly acknowledged. **Garrison et al. (2000**) however believe that interaction in itself does not offer a guarantee of deep and meaningful learning within a higher education context. According to them, what is at issue is not whether there is much or little interaction but, above all, the quality of the implementation of those interactions. That is why they introduced the Community of Inquiry (CoI) which provides a comprehensive pedagogical framework for translating research and the practice of online higher education into concrete terms. The idea that a 'sense of community' is important to academic education is in line with older theories on social and academic integration (Tinto, 1973, 1997). Interest in it has revived recently, not just in online education but, owing to massification, in offline education as well.
The central premise of the CoI is that deep and meaningful learning is best supported in a 'community of learners', whose participants are actively involved in critical reflection and discourse. The CoI therefore has its roots in (collaborative) constructivist pedagogy. As the following figure shows, the individual experience of education, being the result of the interaction between three core elements: social presence, teaching presence and cognitive presence, occupies a central position in the CoI (see figure 1).

*Figure 1: Community of Inquiry*




Source: Garrison et al., 2000

With teaching presence the CoI identifies an active role for the lecturer in the design, facilitation and direction of social and cognitive processes within the community. In specific terms, this means that the

lecturer is responsible for developing the curriculum, content, learning activities and timelines. The lecturer is also responsible for monitoring and encouraging collaboration and reflection. Finally, the lecturer ensures that the educational objectives are achieved by continuously providing guidance and adequate information.
Cognitive presence refers to the joint research and learning process within the CoI.

To this end, what is known as the *Practical Inquiry Model* was developed within the framework of the CoI. The model identifies four successive phases (definition of the problem or task; study of relevant information; interpretation and integration of ideas; testing plausible solutions).
Social presence refers to the participants' ability to identify with the community, communicate purposefully within the community, and develop interpersonal relationships.
The descriptions of the three core elements are summarised in the following table.

*Table 4. Teaching, Cognitive, and Social Presence*

| Elements | Categories | Indicators (examples only) |
|---|---|---|
| **Teaching presence** | Design and organisation<br>Facilitating discourse<br>Direct instruction | Setting curriculum and methods<br>Sharing personal meaning<br>Focusing discussion |
| **Cognitive presence** | Triggering event<br>Exploration<br>Integration<br>Resolution | Sense of puzzlement<br>Information exchange<br>Connecting ideas<br>Apply new ideas |
| **Social presence** | Open communication<br>Group cohesion<br>Affective expression | Risk-free expression<br>Encourage collaboration<br>Emotions |

The various elements, and their causal interdependence, of the CoI have been examined in many different studies (see, among others, Anderson et al., 2001; Garrison and Cleveland-Innes, 2005; Garrison and Arbaugh, 2007; Garrison et al., 2010; Shea and Bidjerano, 2010; Akyol and Garrison, 2011; Rourke and Kanuka, 2009). A key finding is that social presence acts as a mediating variable between teaching presence and cognitive presence.

Although the CoI has broadly taken up as a model in research into, and in the practice of, online and blended learning education, its theoretical and empirical foundation is less solid than is often suggested. In a comprehensive review, Rourke and Kanuka (2009) analysed 252 studies from 2000-2008 that used the CoI framework. Empirical data were examined in 48 of those 252 studies. Only 5 involved attempts to measure learning within a CoI. In all cases this involved self-reporting (perceived learning) by the students on the degree to which learning had taken place within the CoI. Four studies were based on a single item in a closed-form survey. Rourke and Kanuka therefore concluded that students within a CoI believe they have learned a great deal, but that learning was superficial (reproduction of facts). This is a consequence of the fact that the four principles of cognitive presence (see table 4) do not necessarily encourage deep learning. To facilitate deep learning within a CoI, tried and tested educational principles must be used: better assessments (not merely based on participation in online discussions), content reduction (too much content leads to superficial learning) and identification and elimination of students' misapprehensions).

In their book *Blended Learning in Higher Education* (2008) Garrison and Vaughan describe in detail how the CoI can be used in blended learning situations. The key difference between the purely online CoI and the blended learning CoI is that the possibilities offered by the latter have greatly expanded. For instance, the sense of community can be reinforced by offline interaction between students and lecturers, and online lectures can be used to best effect to introduce a course topic, whereas the online environment lends itself better to the development of understanding and ability to give meaning to concepts studied.

There do not appear to be any fundamental differences between online and offline contexts, nor do there seem to be any clear criteria for choosing between an online or an offline environment.

Based on the discussion of the Interaction model and the CoI, we can conclude that a solid pedagogical foundation for blended learning is still lacking. The Interaction model offers a good, but abstract, basis for the further development of blended learning within education. Anderson's Interaction Theorem could extend that development further by highlighting the substitutability of the three different forms of interaction. Mayer's advanced multimedia learning theory could be integrated into it. The limitation of that multimedia learning theory lies in its emphasis on the cognitive dimensions of learning and its undervaluation of student-lecturer and student-student interactions.
In principle, the CoI meets the need for a comprehensive educational theory for online learning and blended learning which includes the three crucial forms of interaction. Added to that is the fact that the CoI is well aligned with the deep and meaningful learning ambition within higher education. However, Rourke and Kanuka specify which crucial components of the CoI could be improved. Finally, it appears that we still lack any solid design principles to show us how to choose which educational activity should be included in an offline mode or an online mode, and when that should be done.

*8. Flip the Classroom and Blended Learning*

Flip the classroom is a much discussed and used form of blended learning. The basic idea behind flip the classroom is that the offline lecture and homework elements are reversed ('flipped').

> "…that which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class" (Bergmann & Sams, 2012, p. 13).

There are many variations of the flip the classroom principle. The best-known model is probably that of two American high school science teachers, Sams and Bergmann (2008, 2012). Here, the lecturer records in advance short video clips (max. ten minutes) of the course material he would otherwise deal with in the lecture. The video clips may be accompanied by a short quiz or other assignments which test whether the student has understood the material. The student receives feedback immediately after the quiz or assignments have been completed. The student is expected to view those video clips and assignments, alongside the other course material, before the lecture. During the offline lecture the lecturer deals with students' questions about the material they are studying, issues assignments to enable students to apply what they have learned (possibly in teams), discusses solution strategies, books a guest lecturer or organises an open discussion between the students on the course material studied.
Flip the classroom has some significant advantages. The first is that the video clip can be viewed anytime and anywhere. The second advantage is that the video clip can be replayed (including in preparation for an examination). This way, parts of the mini lecture which were not understood straight away can be viewed again. A third advantage is that students can follow the lecture at their own pace. During the offline lecture the student has to listen and also make notes, which sometimes results in key parts of the lecture being missed. For many subjects this means it is very difficult to follow the remainder of the lecture. The most important advantage is probably the fact that intensive interaction between lecturer and student can take place during the (rare) offline contact hour, which can result in a better and deeper understanding and active processing of the course material studied. Van Vliet et al. (2015) show in their research that the flipped classroom teaching method has an impact on the quality of learning. The flip-the-classroom style of teaching was applied in a lecture where one of the five weekly sessions was replaced by a flip-the-classroom session.

Web lectures and voting devices for peer-instruction activities were used in it. The longitudinal monitoring of a group of Bachelor's students using the MSLQ instrument revealed that the flipped classroom style of teaching fostered the students' meta-cognition (critical thinking) and collaborative learning strategies (peer-learning and task value). This is important to the accumulation of understanding and to achieving deep learning. No change in the learning strategies and motivation was identified among the group of students who did not attend any flip-the-classroom sessions. The students who did participate in flip-the-classroom lectures also scored better in the cognitively more challenging questions in the assessment than the other group. The effect on the learning strategy and motivation of students is not maintained unless the flip-the-classroom style of teaching continues to be used.

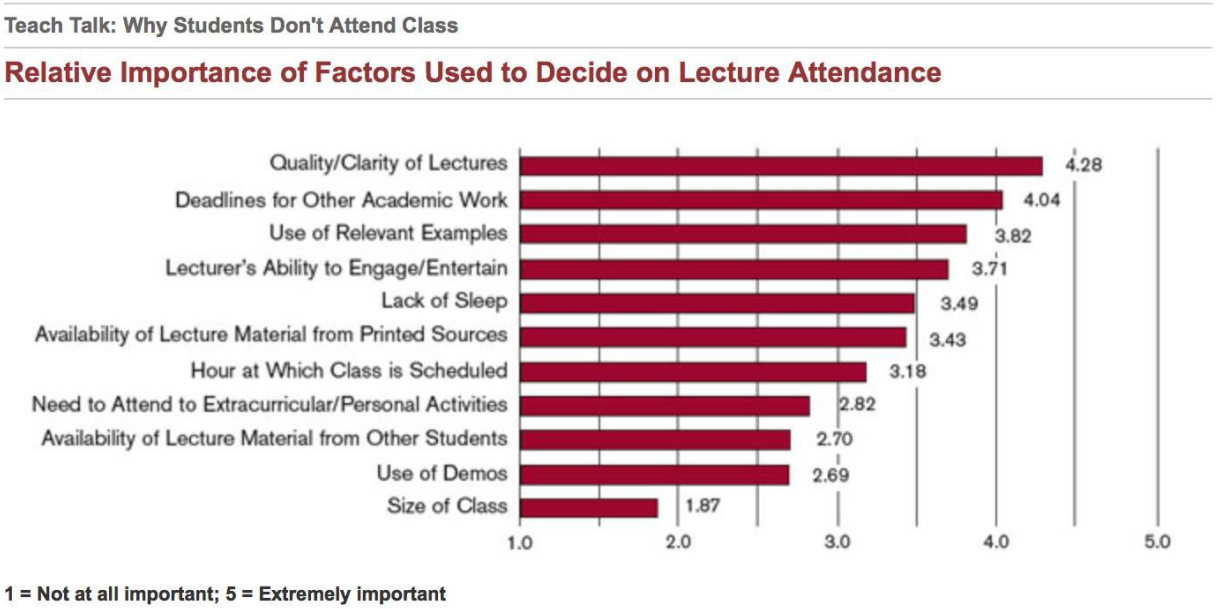
Flip the classroom has major consequences for students and also for lecturers. Students are expected to prepare by viewing the video clips and studying the course material. Flip the classroom generally requires more effort on the part of the students. They are also expected to participate actively in assignments, quizzes and discussions during the offline lectures. Since there is no pure knowledge transfer during offline lectures, there is little point in attending one without preparation.
For the lecturer, flip the classroom initially requires more preparation, in particular because of the large number of video clips which needed to be recorded. He or she will also have to make sure the offline and online learning activities are properly integrated to ensure a coherent course design.

*9. Lecture Attendance, Academic Performance and Blended Learning*

A key question for many lecturers and directors of Colleges and Graduate Schools is whether, and to what extent, the use of web lectures (entirely recorded lectures) in teaching influence students' attendance of offline lectures and their academic performance. Supporters believe that it increases students' flexibility, accommodates the different learning styles of students and that it presents the opportunity to review lectures and thus provide better preparation for the examination. Improved grade point averages are achieved as a consequence. Opponents, by contrast, believe that attendance of online lectures is falling and that students will tend to procrastinate ('I'll do the web lecture later'), and that is precisely why poorer grade point averages are being achieved (see Bos et al., 2015 for an overview of the arguments). However, the studies are far from unanimous in their findings. It is not only the opinions but also the empirical findings which differ. For instance, Nashash and Gunn (2013) found that providing web lectures did not lead to falling attendance of offline lectures. Among others, the study conducted by Babb and Cross (2008) shows how nuanced these differences are. Those researchers found that providing lecture slides beforehand led to an increase in the attendance of offline lectures.
Williams et al. (2012) examined the impact of the use of web lectures alongside offline lectures in a first-year Microeconomics course (26 lectures in total). The researchers found that the students using the web lectures as a substitute for offline lectures performed less well. Students who attended few offline lectures were unable to compensate for that by attending web lectures, whereas the students who attended virtually all the offline lectures clearly benefited from the complementary use of web lectures.
Konsky et al. (2009) examined the relationship between the use of web lectures, attendance of offline lectures and grade point averages in a third-year computer science course. The research showed that attendance of offline lectures did not fall as a result of web lectures having been provided. Students with high marks had used the web lectures primarily as a supplement to offline lectures.
The research conducted by Bos et al. (2015) into the voluntary use of web lectures by 396 psychology students in a first-year course shows a more nuanced picture. First and foremost, the researchers make a distinction between the different groups of users based on use intensity (non-users, visitors, viewers, supplementers). An important fact revealed in the research was that more use was made of web lectures than of offline lectures. It was also noteworthy that there was shift from the use of offline lectures to web lectures during the course. The first-year students evidently first had to become accustomed to using web lectures in a meaningful way. Another notable fact was that attendance of offline lectures clearly contributed more to the marks for the first assessment than attendance of web lectures. For the second assessment, not only did the difference between the two disappear, but the course mode (online and offline) had virtually no impact at all on the grade point averages. The researchers conclude that sparing and well-considered use of web lectures is a useful means of acquiring basic knowledge. However, when it comes to acquiring deep knowledge, web lectures fall short, although the same can also be said of offline lectures:

> "For learning objectives that deal with higher order thinking skills, recorded lectures seem to offer less value, though neither do face-to-face lectures." (not yet published, Bos et al., p. 15).

It turns out that there is no clear link between the offering of web lectures and students' attendance of them. In practice, there appear to be considerable differences between the various degree programmes. For instance, attendance of offline lectures at the UvA's Law faculty remains constant. This is probably because those students were offered web lectures from day one and, therefore, understood how to use them (mainly as a substitute for attending face-to-face lectures).[10] The research conducted by Bos et al. (2015) also shows that the link is of a dynamic nature. A small study carried out by two MIT researchers also shows that a large number of different factors can determine the decision whether or not to attend offline lectures and that such attendance therefore does not merely depend on the opportunity to attend web lectures (see below).




Source: Clayton and Breslow, (2006)

10 Email correspondence with Nynke Bos, 20 May 2015

The studies of Konsky et al. (2009) and Williams et al. (2012) clearly show that when students use web lectures as a substitute for offline lectures, the result is a lower final mark, whereas where web lectures are used as a supplement to offline lectures, higher final marks are the result.

*10. Literature review conclusions*

Research into blended learning is still in its infancy. When researching literature we looked at the different effects and aspects of blended learning. The general picture is that blended learning offers many opportunities to innovate education owing to the fact that its online component is not constrained by time and place. As for effectiveness, most research indicates that there is a slightly positive link between blended learning and academic performance. However, the quality and generalisability of the research is not always satisfactory, partly as a result of the great variation in combination options. In addition, it is still difficult to obtain a more or less complete picture of the relevant factors having an impact on the efficiency of blended learning.

The consequences of blended learning for students and lecturers can be great, depending on the way in which blended learning is introduced. This is more likely to be the case where the educational process is redesigned in its entirety (e.g., in the case of flip the classroom). Assumptions which are not (yet) scientifically proven should be treated with caution (e.g. as regards digital natives). At the same time, though, it is clear that much research is still required in this area. New demands are being made of lecturers, both in the area of pedagogy and in the area of ICT. It is probable that teaching will increasingly become a matter of team production.

As far as we are concerned, the popularity of MOOCs is justified. At the same time, though, it is clear that much research is still required into the pedagogical, legal and financial support and conditions for their successful use in the practice of blended learning.

Research into the use of web lectures in blended learning has produced a nuanced picture. The comprehensive and consistent introduction and use of web lectures in education appears to produce the best results.

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**Appendix 9. Digitalisation and digitalisation strategies in education**

Digitalised information can be endlessly manipulated, stored anywhere and distributed at low cost. This provides new possibilities for:

- Course material content. The content of course material can be developed in various forms (audio, video, text). Users have the option of choosing one of those forms or a combination thereof (multimedia). Combining them enhances the learning effect.
- Modularity and granularity. Teaching can be modularised. The content is presented in separate, stand-alone modules. The course structure or the curriculum forms the architecture.
- Reconfiguration of teaching processes. Teaching processes can be disaggregated (unbundled), reducing the importance of time /place. Physical contact is no longer a necessity but an option.
- Synchronicity and asynchronicity. Synchronous or asynchronous communication is selected depending on the need for interaction.
- Accessibility and distribution. Digitalised course content can, where there internet access, be consulted anytime and anywhere.

Digitalisation of study material and teaching processes does not mean courses simply being offered online, but rather the creation of many options, both as regards the content and the way in which teaching is organised, which did not exist in the traditional forms of teaching. On this basis, four different digital strategies can be identified. The strategies differ in the degree to which existing teaching practice is changed:

1. Substituting: here, the existing teaching process is substituted (full online version of a course for pre-Master's programmes)
2. Complementing: here, existing teaching is complemented with a digitalised teaching process (e.g. using digital assessments alongside ordinary written assessments)
3. Transforming: here, the existing teaching process is transformed into a new teaching process (e.g. blended learning – the teaching processes are disaggregated and designed within a format combining online and offline elements
4. Enhancing: new products and services which were not previously available are developed for target groups.

The question as to which digital strategy or combination of digital strategies to choose arises.

The following criteria could play a role here:

1. Vision on Teaching and Learning: effectiveness, efficiency, engagement
2. Effectiveness and scientific substantiation
3. Business model
4. Digital capability
5. Future orientation

1. Vision on Teaching and Learning

The development of a digital strategy for education should be based on the Vision on Teaching and Learning. Using digital technologies in education means the Vision on Teaching Learning must be set out in detailed and explicit terms and made operational.

2. Evidence

Much research has been carried out into the effectiveness of e-learning activities. Nevertheless, the findings are not always unanimous. It is crucially important that the use of digital technologies is properly integrated within a vision on teaching and learning. Learning analytics (e.g. in relation to study habits) can be helpful here.

3. Business model

The intensive use of digital technologies in education can have a profound effect on the income and expenditure ratio of a specific course, curriculum or programme. The types of income and expenditure

can also change sharply. For example, if it is decided to offer pre-Master's programmes fully online, the initial production costs for preparing the course will rise considerably, whereas the expenditure for distribution will be low, and fall to zero for room hire.

4. Digital capability

The development and introduction of a digital strategy for education requires not only knowledge of new digital technologies but also educational ideas. Such knowledge and skills will have to be developed at the level of lecturers, students and the organisation (ICT, management).

5. Future orientation

Many universities are presently concentrating on their role in society. New technologies are playing a dominant role here. It remains unclear how universities will position themselves. It is vital that we monitor these developments.