

# THEMATIC ISSUE INNOVATIONS IN DIGITAL ASSESSMENT

ASSESSMENT AS AN INTEGRAL PART  
OF THE LEARNING PROCESS

**SURF** NET

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# ASSESSMENT + LEARNING = MORE THAN THE SUM OF THE PARTS

Anyone who sets themselves the goal of creating a thematic issue about the role of digital assessment in the learning process for students will find themselves stepping into a multi-faceted and dynamic world. A world where lofty ambitions and high expectations go hand-in-hand with technical innovations, breakthroughs, new insights, pilots and projects, a strong dose of realism and plenty of collaboration, discussion, involvement and plain hard work. And all of the above coming from enthusiastic professionals who, at the end of the day, are all aiming at the same goal: ideal learning processes where students are actually empowered to get the best from themselves and from their education.

The goal on the horizon seems clear enough, but the road towards it is neither a fixed path nor a fait accompli. There are too many challenges and further steps, and they are too diverse. One of the challenges is bringing together the right data, learning analytics, that help both the student and the teacher to gain insight into the learning process, and that clarify what efforts are necessary. It seems that it is precisely the assessment results that are an important key to success.

In the meantime, assessments are increasingly being used as points for practice with an obvious place in the learning process. Practice results do not necessarily have to form part of the evaluation, but the student's efforts should also not lack commitment. Peer feedback is increasingly becoming an integral part of the learning process and that also applies when working in conjunction with professional practitioners. The whole learning process is increasingly becoming customised and more flexible and diverse in terms of time, place and device. We are seeing greater assessment expertise on content and technology coming out of more intensive collaboration between university teachers, ICT professionals, experts in education theory and assessment professionals. At the end of the day, all the efforts are leading us towards learning processes where assessment and learning blend together to provide customised education, where self-development and self-monitoring play a major role. The integration then becomes more than the sum of its parts.

In this issue, professionals from a variety of disciplines illuminate the innovations in digital assessment from different angles. And we also take a look at the practice, using the current SURF projects and practical examples. All of this with the aim of informing and above all inspiring you so that you (once again) can get back to work refreshed and eager to create customised education. United we stand is our motto and our opinion. The combined experience of SURF and the institutions for higher education over the last few years has shown that collaboration is one of the most important driving forces that make innovation and real progress possible.

Annette Peet, Project manager Digital Assessment at SURFnet  
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## Looking forward to an **exam-free** future

**Stopping assessments altogether is not yet an option. But the fact that we already need to test a lot less now, and above all in quite different ways, is as plain as a pikestaff to Filip Dochy. The enthusiastic advocate of High Impact Learning wants to integrate testing as far as possible into the learning process itself: 'We also call that assessment as learning. If we start down this road, it is entirely possible that after 10 or 20 years there will be no more exams.'**

Dochy has discovered over the last few years during intensive screening of around 25 education courses in the Netherlands and Flanders, that the number of formative assessments has risen sharply in the last 10 years. 'That is the good news. The bad news is that most of these have been realised in the form of exams. This means that a horridly high number of valuable learning experiences have been lost to students, because an exam is not a time of learning, but a time of stress.'

### **Hurdling one exam after the other**

At the moment the ratio of formative<sup>1</sup> to summative<sup>2</sup> testing within education is still around 20-80 per cent. According to Dochy that is the wrong way round. 'Research by Black and William in England shows that student results improve when you keep increasing formative testing. To get there you need to design a learning process where feedback is fully integrated and frequently used.' Dochy also believes that you need to judge students during a genuine learning process that is close to real life, with the help of tasks, portfolios, 360 degree feedback etc. 'That is how you stimulate their creativity and their ability to solve problems and develop new knowledge.'

This means that teaching gains in depth and you continue to move away from the exam-after-exam hurdles that education too often is today.'

### **Powerful fount of knowledge**

In Dochy's ideal world, the role of the teacher changes from that of supervisor and controller into that of engineer. A major upgrade for the profession and also an enormous substantive step forward. In the role of engineer, the teacher is continuously focussed on the (re)design and further development of his teaching. You need to be able to accept that you are no longer the powerful all-knowing and all-seeing presence. You hand over much more control into your students' hands. And you also need to accept that you will be judging your students on information that they collected themselves. You can only do this successfully if you believe in your own professionalism and if, as a teacher, you work from your own strength. But the most important thing is that you trust your students.'

### **Talents and control**

Trust is an important element in Dochy's philosophy. 'I do not believe in a high level of control,

1. A formative test is a test with a diagnostic purpose. It helps to determine what the student needs in order to learn more.  
2. A summative test leads to the student being assigned a level or a grade.  
3 <https://link.springer.com/article/10.1007%2Fs11092-008-9068-5#page-1>



punishment or repression. That is counter-productive. If you give students enough freedom in their choices and decisions, it increases their motivation and feeling of responsibility. That way you tap into their possibly hidden talents, and that is brilliant, because everyone has talents.' And that trust also applies to teachers. In Finland there is no school inspection, the educational climate and standard are excellent, many people want to work in education, and teachers are highly respected. That is no coincidence, says Dochy. 'When you keep checking and inspecting, you are basically telling people: I don't believe you are a professional. That kind of message is, of course, fatal. People feel they are being taken seriously when you let go of the controls and you just ask them to be open with their results. They then grasp their own professionalism and responsibility and will continue to develop them. And surely no-one can object to that?'

#### **Creating knowledge in the working world**

An important part of the learning process that Dochy advocates is the creation of new knowledge that does not yet exist; defined by Dochy as the ability to jointly think far into the future and come up with solutions for future challenges and potential problems that are as close as possible to the practice. 'Students, teachers, professionals in the field, and the authorities need to work together much more in order to create new knowledge about, for example, the future-proof hospital. This form of knowledge creation is an especially rich and valuable learning and development process for all parties. Within education, sadly, far too little use is made of professionals from the world of work, and the aspect of knowledge creation is often just paid lip-service.'

tion and assessment. Peer feedback, group work, blogs, work-experience, discussions, papers, 360 degree feedback, e-slides, personal coaching, meetings and simulations. All of this as much as possible 'hands on' and with others, both offline and online. The fact that students are increasingly studying and being assessed online, is also an important precondition for an exam-free future. 'Because then you can collect a whole range of data about their study habits, so-called learning analytics. And by analysing these, you find out what information has the best predictive value.'

#### **Exams become superfluous**

The area of education, according to Dochy, has a long way to go in the field of learning analytics. 'Systems like Blackboard are now used mainly for sharing information. The next step will be to also collect information and store it. And then you need to build another system behind this that brings all the information together and prepares it to enable conclusions to be drawn. If the predictive value of learning analytics does indeed become significant and accurate, then exams will actually become redundant, says Dochy. Then the analytics, combined with the interpersonal judgement of the teaching team, will suffice.

#### **Impact and urgency**

The first steps that we need to take, according to Dochy, are less testing and more freedom and responsibility for students. 'That trust will absolutely be paid back, and when that happens we need to immediately document the good practices and share them with each other as widely as possible.' Dochy believes that the way forward also depends on the choices the authorities make when it comes to more control or less, but the most important role is that of the teachers, he believes. 'They need to promote their own professionalism much more. That is where their strength lies.' And, in the end, that will inevitably lead to better educated students, who have obtained the maximum benefit, and who are now totally ready to put this into practice.' You create the impact for students primarily through learning processes and learning paths that are full of challenges, urgency and recognisable practical situations. The experiences you have as a student remain with you for ever. And that is more than you can say for the endless exams during your time as a student.'

'Exams will become unnecessary if the predictive value of learning analytics is high and accurate'

#### **In action and online**

The same cross-pollination between people and parties that Dochy sees in the ideal learning process, he also sees in the area of forms of educa-

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# Education can benefit from **flexible and non-flexible assessment**

**Flexible assessment is the exact opposite of everyone taking the same test in the same place at the same time. But, according to Cito's scientific director Anton Béguin, before you can assess value flexibly you need to first ask the question: what is your aim with the test? 'After all you don't test just for the sake of it.'**

'The secondary education council (VO-Raad) for example wants customised diplomas, but then I have to say: don't forget the social value of the diploma. Our education system is already fairly flexible compared to other countries. Because there are various ways of getting into higher education, and the different backgrounds of the pupils create even more customisation.' And here, says Béguin, it is important that you think through carefully up front just how far you want to go with customisation. Because the more complicated the source of information, such as a diploma, the more difficult it is for the person reading it to understand it. 'It is critical for progress and selection in education that diplomas and certificates provide clear and understandable information. If they fail to do that, then the next level of education will set up a new entrance exam.'

## **Ideal education**

For Béguin, formative assessment is the equivalent of flexible assessment. 'The lowest and most informal form is when a teacher asks a student during the class whether he has understood the subject. As you then scale up to a classic oral examination, the assessment moment grows more formal. You need to use that sparingly.' This reticence may help, says Béguin, to reduce

the perceived exam pressure. 'For me, the ideal education consists for the most part of evaluation of whether the subject matter and skills presented have been absorbed. So assessment becomes an integral part of education; a kind of continuous self-evaluation. If you look at it that way, in my opinion, even a summative final exam does not need to lead to surprises or a lot of stress and uncertainty.'

## **Practicing in the Maths garden**

Béguin has confidence in the future as far as the integration of assessment and learning is concerned. 'Technology enables us to collect more information as a basic part of the system, and to analyse it during practice and learning. A good example is the Maths Garden at Oefenweb (literally: practice web) where pupils in primary education practice sums in a game environment. While the children achieve automatism in their maths skills, their skill levels are monitored and the tasks are adapted to their level and their development needs. If you apply this idea more generally, you get a kind of constant stream of measurement and evaluation points during the whole education process, without the feeling of constantly sitting tests.'

### **Sophisticated system**

According to Béguin, the necessary initiatives do exist in this area, but many of the current digital teaching systems are basically driven by the technology. Depending on the content that you want to teach using the system, it does it more or less adequately. These systems are also complex in terms of content. You want to find out if the pupils are learning the material, and also what their own preferences are.

'This requires a very advanced and sophisticated system, where you can define things such as knowledge, skills and behaviour, and interpret them in a meaningful way. A well-known example is Knewton<sup>1</sup>. They have a fairly advanced system where third parties can supply their own content. But even they admit that a lot more research still needs to be done.'

and the provider of the teaching system, then they are setting themselves up as both judge and jury. Because although you end up knowing a lot with all the measuring and evaluation points 'en route', you may well decide you want to see the outcome confirmed by an independent exam. Especially an examination that gives a diploma.' This also immediately clarifies the roles and responsibilities of each of the parties involved, according to Béguin. 'You manage centrally and at a national level what you want an educational course to deliver, but courses can each define their own route to that destination. With a model like this, a final summative examination is a logical option.'

## **'The ideal education consists to a large extent of continuous self-evaluation'**

### **Fixed and personalised**

When it comes to evaluation and testing, Béguin's preference is for a good balance between 'fixed' registered measurement points, and the personal view of the teacher. 'You don't want to turn every assessment into an exam. Sometimes that's fine if you as the student are only as good as your last assignment.' This balance also contributes to the process of helping the students become independent. 'These are young people who are still in the middle of the process of defining and developing themselves. They need to be allowed to make mistakes, but they must also be given the opportunity to correct themselves. During a process like this, you must not keep measuring people and recording the results.'

### **Being judge and jury**

If we ever have the ideal educational situation of continuous self-assessment, then Béguin can well imagine a future without many exams. 'What matters most here is who makes the final decision about what a pupil needs to learn and to know. When that is only the teacher

1. [www.knewton.com](http://www.knewton.com)

## In practice

**CUSTOMISATION OF KNOWLEDGE AND SKILLS FOR INTERMEDIATE VOCATIONAL STUDENTS****Practice: Personal Learning Plans**

The Talent Development (Talentvol Ontwikkelen - TO) learning process of Landstede MBO Zwolle, is designed as a continuous career learning path that can be monitored at all times by the student and the teacher. The Educator student tracking system and learning platform has been converted into an integrated coaching system for TO. An important part of this is the Individual Learning Plan (ILP); that is a personalised curriculum for a student, selected jointly with the coach. During the training course, the student and coach regularly discuss the achievements and experiences in practice, with digital support from e-TO. In its practice-oriented education, Landstede creates a context for the student through integrated assignments that address the whole subject (a combination of learning and practice). The student applies what he has learned in these assignments or searches out the expertise that he is lacking. Landstede calls that TWIXX: the teaching is focussed on knowledge or exercises that develop skills. Landstede helps students develop their own sense of responsibility, self-confidence and self-knowledge, and uses a similar approach with (new) teachers, so that they can also develop their talents in their new role as coach and mentor.

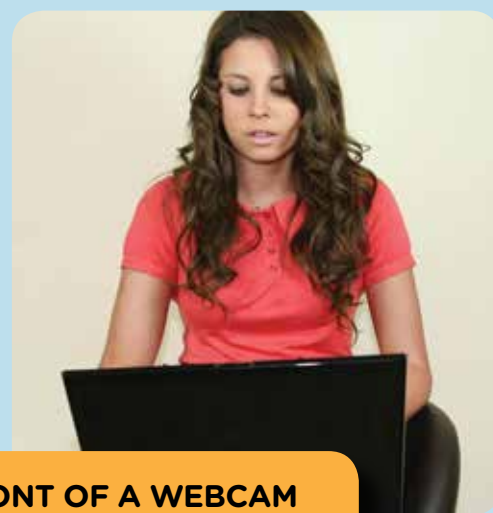
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More information: <https://data.landstede.info>



# In practice

**On this page you will find four examples, where digital forms of assessment, evaluation and feedback were used in innovative way in order to improve students' learning performance. About half of the examples have already found a place in day-to-day practice; other examples relate to projects that are being carried out in the innovation scheme Digital assessment for Customised education<sup>1</sup>.**



## Project

**STUDENT PRACTICES CONVERSATIONAL SKILLS IN FRONT OF A WEBCAM****Project: iSPOT**

The faculty of Psychology and Educational Sciences at the Open University is developing iSPOT, the interactive Self and Peer Observation Tool. With this, students will receive customised (peer) feedback on their conversational skills using short conversation extracts recorded with a webcam. With iSPOT, students can practise their replies, review and improve them, compare them with extracts of expert replies, and swap with fellow students to get peer feedback. The student decides the time, place and level of intensity for himself. The lecturer can use iSPOT to give feedback on students' answers. iSPOT is being tested and fine-tuned in the conversation training of the OU, and in future can be used not only for practicing, but also for assessing and evaluating conversation skills.

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More information:

<https://blog.surf.nl/en/talk-to-your-laptop-more-often-practice-communication-skills-at-home-in-a-relaxed-setting/>





## Project

## FORMATIVE FEEDBACK, FEED UP AND FEED FORWARD FOR STUDENTS

### Project: Standard customisation with formative feedback

In the project 'Standard customisation in formative feedback', the Windesheim University of Applied Sciences is researching the quality of feedback when this is given formatively. The feedback is examined quantitatively and qualitatively in relation to the students' success with their studies, and their opinion of the feedback. Windesheim intends to do this using the Grademark tool from Turnitin. This tool also supports creating a feedback database. Using this, teachers can easily select feedback and personalise it to fit the individual student. By building in several formative evaluation points and also by evaluating via feed up and feed forward, the project contributes to more customised education. Windesheim is carrying out this project with 3 teaching modules within grade 2 teacher training. In total, around 300 students are taking part in these modules. The lecturers involved receive a training on Digital formative feedback to prepare them for their new task.

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More information:

<https://blog.surf.nl/en/more-feedback-less-time/>



## Practice

## PERSONAL BROCHURE DISPLAYS STUDENTS' TALENTS

### Practice: A new way of evaluating skills by Zuyd University of Applied Sciences

Three lecturers at the Zuyd University of Applied Sciences, have carried out a pilot study in Social Work education with the help of Blackboard. As their final assignment, second-year students there created a glossy brochure where they had to showcase their skills, such as making connections, team (net)working, presenting a case, creativity, innovative capacity, social awareness and entrepreneurship. The lecturers used Blackboard intensively throughout the whole process. They gave students a simple, clear structure and made sure there was a detailed and easily understood timeline. They also gave the students guidance and feedback with the help of learning analytics, and formative and summative assessment. And they provided content in the form of web lectures and other digital sources, and stimulated communication and interaction via a number of forums. The three lecturers had fixed and clear roles throughout the whole process. One lecturer was responsible for content, testing and rubrics, the second for guidance, communication and feedback, and the third for layout, setup and acting as moderator. This allocation of roles worked well for both the lecturers and the students in terms of demarcation and identification. The students were very enthusiastic about the pilot and gave the various parts high ratings. And the lecturers were also satisfied, despite the large amount of extra time that they put into the project. The Zuyd University of Applied Sciences wants to provide structurally more free time in the future for this type of pilot study. According to the lecturers, a substantive step forward requires the development of a viewpoint on ICT, and increased professionalism of the lecturers, both in terms of resources and in the area of roles, responsibilities and skills.

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More information (in Dutch): <http://fransipani.blogspot.nl/2015/10/bijeenkomst-sig-digitaal-toetsen-over.html>

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# Adaptive assessment **proven to measure better**

**'With adaptive assessment we are able to take better, more honest and more efficient decisions about students, and we can also offer them support during their learning process.'** Theo Eggen has been an advocate of adaptive testing for a good 25 years, and has never stopped working on this subject. **'I think it is amazing that you can do something extremely practical using scientific models and a good theory with which you can demonstrably measure better.'**

Adaptive assessment or, in full, Computer-based Adaptive Testing (CAT) is, according to Eggen, really a kind of modern, digital and expanded variation on oral exams. 'Based on the answer that you give in an oral exam, the examiner determines your level, and uses that to decide on the next question. That is how CAT works too. During an assessment, its content is adjusted according to the performance of the user. You are presented with tasks depending on what you show. The main idea here is that this is the most efficient way possible to determine someone's skills.'

## **Always and everywhere the same**

When creating a CAT, the first thing is to decide exactly what you want to measure or assess. Based on this target, the right assessment items are selected from a database of items. The CAT is then started up with a question of medium difficulty, and depending on the answer it is followed up by an easier or more difficult question. 'This process keeps going until you know where you are on the rating scale, which is created from all the items in the database. This means that the CAT not only offers customisation for each user,

but because of the scaling it is also independent of the specific tasks that are completed. Compare it with the temperature scale on a thermometer that is always the same everywhere.'

## **Extensively labelled and documented**

Based on the previously determined level of the user, each CAT is automatically composed using the items in the database. 'From perhaps 500 items, CAT chooses the 50 items that can best show someone's level. This is not looking at extremes, because that is of less interest. Compare it with high-jumping. If you can normally clear 1.50 metres, then you do not practise at 1 or 2 metres, but rather at 1.49, 1.52, and maybe also at 1.55 metres.'

Creating an assessment item database is a serious and intensive process. The quality of the items needs to be high, and in addition they need to be rated and classified correctly by their level. In the item database, each item is therefore extensively labelled and documented with, for example, its answer, source document, subject matter, level of difficulty and average time taken to answer.' This way you can build up an extremely valuable and durable item database. If institutions of higher

education join forces and develop the necessary expertise and a new view of assessment, then they can also achieve this.'

### **Money, time and energy**

Because the items in the CAT are not made public, they can remain in use for much longer. For CAT it is sufficient to perform annual maintenance and limited updates, based on, for example, the answers given to the items, new understanding, and recent developments. 'We are currently legally required to publish all intermediate school exams as soon as they are completed. This means that each year we need to invest a huge amount of money, time and energy in thinking up and creating new assessment items.'

CAT was originally created for summative assessment, but Eggen believes that CAT is also superbly suited to assist, monitor and guide the development of pupils and students over a longer period, both broadly and in depth. 'With CAT you really can adapt to the level of every single student. However, CAT is not equally suitable for every subject. They need to be subjects or skills involving growth and development, such as language and mathematical skills. For topography or a driving test it makes less sense.'

student's level, with less effort from the student and the lecturer.'

### **Trusting Mr A and Ms B**

What lecturers know about modern forms of assessment, according to Eggen, plays an important part in the future of CAT within higher education. 'As a lecturer you need to believe in the system, which is based on a strong statistical theory. Because this is not very easy to explain, we are going to develop some demonstration versions for CATs.' Eggen hopes that this will increase confidence, and is surprised at how things are progressing. 'Now we have to rely on different exams by Mr A in the north and Ms B in the south. CAT cuts out any possible subjective bias and offers an independent standard. That is why it makes sense to develop national CATs together with your partners in education. That also saves money, time, energy and human effort.'

### **Intensive collaboration between domain expert lecturers and experts in evaluation**

'A sensitive point in the acceptance and introduction of CAT is also the question of the different roles and perceived responsibilities', says Eggen. Assessments are currently being prepared by the domain experts. These domain experts are of course absolutely necessary, but CAT also requires specific knowledge of test theories and assessment skills. And many lecturers still do not have these. 'In these areas we need to professionalise further. The arrival of the Basic Qualification in Examining (BKE)<sup>1</sup> is a good development here and I also expect great things of the Masters in Assessment Skills that I am developing with Desirée Joosten of Fontys.' Eggen hopes that collaboration between domain expert lecturers and assessment experts will become more intensive and more frequent. 'Both parties have a single common interest, which is optimising opportunities and options for students.' At the same time, Eggen realises that many lecturers have not yet accepted that testing can also be done based on models. 'To achieve this change in thinking, we need to publicly showcase as many good practices using CAT as possible.'

'Developing national CATs with partners in education saves time, money, energy and human effort'

### **The same precision with less effort**

In contrast to primary and secondary education, CAT is still barely used in tertiary education. 'The exception is the entry exam for language and maths for the PABO (basic teacher training) where it has been used successfully already for 10 years. In addition we are now developing a CAT for Physiotherapy training and we have just got a prototype CAT ready for the interuniversity progress test medicine.' This last was developed by Eggen in a SURF project in collaboration with the University of Maastricht. The test results with bachelors students were positive. 'Using this CAT you can give a result with the same precision using less than half of the original 200 questions. This means that you can better estimate the

1. The Netherlands Universities of Applied Sciences have agreed that all examiners should demonstrate their testing competence by obtaining a Basic, respectively Senior Examining Qualification (BKE/SKE).

## In practice

**STUDENTS SCORE BY PLAYING WITH STATISTICS****Practice: The Statistics Factory**

The Statistics Factory is a web-based online games environment where students can practice on around 2,000 statistical exercises. Because the system is adaptive, each student practices at their own level and is given more difficult assignments as he or she acquires more knowledge. During the exercises, the system measures both speed and level of accuracy. The system is set up in such a way that each student has a 75 per cent chance of getting a task right. This major likelihood of success increases the students' motivation. The Statistics Factory lets students track their own progress, their relative scores within the group, and their strengths and weaknesses, and also gives them feedback about the mistakes they make. The Statistics Factory gives lecturers a good view of how their students are progressing both individually and as a group. This means that lecturers can fine tune and personalise the exercises and teaching for the students.

The Statistics Factory works in any environment and on any device.

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# In practice

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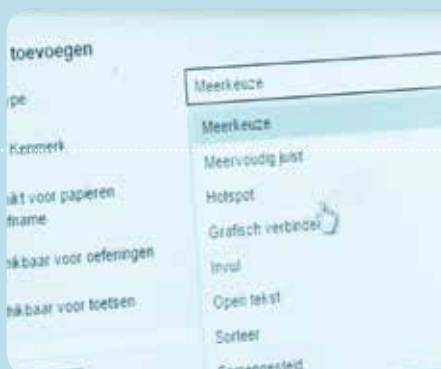
## Project

**FIRST YEAR STUDENTS PREPARED BY MEANS OF TAILORED MATHS EDUCATION****Project: Using MOOCs**

The VU University Amsterdam uses a combination of MOOCs with webinars and digital assessments to prepare around 700 first year economics, management, and international business administration students in a tailored way in the basic subject of maths before the start of their studies. Initially the students are given a diagnostic test as a reference framework, during their course a weekly webinar and an interim assessment as feedback and progress assessment, and then finally a digital test to see if the desired final level of the MOOC has been reached. Students must log in to a webinar so that their presence and time spent logged in can be recorded. There are no pass criteria attached to the project, but participation is mandatory for all students. By means of this project, the VU University Amsterdam brings all the students up to the desired base level, deals with the large discrepancies in the students' knowledge and motivation, and strives for the reuse of teaching materials.

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More information: <https://blog.surf.nl/en/higher-academic-success-guaranteed-online-summer-school/>



1. [www.surf.nl/innovation-scheme-digital-assessment](http://www.surf.nl/innovation-scheme-digital-assessment)



## Project

**RICH AND EFFECTIVE FEEDBACK FOR CUSTOMISED LEARNING PATHS****Project: The generation of learning feedback from digital maths testing**

The combination of learning analytics and formative assessment ensures rich and effective feedback to allow customised learning paths to be created and followed. This can be seen from a project for students who took part in the Introduction to maths and statistics course at the School of Business and Economics at the University of Maastricht. A very diverse group of students in terms of nationality and existing knowledge. A learning analytics experiment for this subject collected tracking data from BlackBoard and the digital exercises environment, survey data about student characteristics, and data from entry exams. The idea of this was to research which data was the best predictor for the final grade, and therefore suitable for deriving good learning feedback. The undoubted winner for the predictive ability seemed to be the performance in the formative tests in the digital exercises environment, provided these were not optional. Because formative tests that do not count are not very attractive to the target group that actually needs them. Maastricht resolved this by offering a small bonus for the scores achieved in the formative tests. This proved to be an inspired move, both in supporting the students in their efforts to catch up, as well as getting a good view of the very different levels of support needed by the students.

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More information:

<https://blog.surf.nl/en/the-power-of-formative-assessment/>



## Project

**IMPROVING STUDENTS' CLINICAL DIAGNOSIS WITH ONLINE SCRIPT CONCORDANCE TEST****Project: Online Script Concordance Test (O-SCT) Physiotherapy**

The physiotherapy training department at the HAN, together with Saxion, has developed a pilot project for an Online Script Concordance Test (O-SCT). The O-SCT was developed to assess students' level of clinical diagnosis (solving health problems) and will be used in the field for the first time this year. The O-SCT uses clinical cases that often occur in practice. A panel of domain experts define the model for the answers. This means that differences of opinion between experts, and thus different possible answers, are allowed. This fits well with professional practice, where decisions are often made on the basis of hypotheses that are created using limited information. Using the online feedback function of the assessment, both students and physiotherapists can instantly see how their score relates to that of the experts. Differences between students and those already working are taken on board, and on this basis learning tasks are developed that are aimed at finding an explanation for the differences. So the O-SCT contributes to learning and increasing the professionalism of students, lecturers and those working in this field. Once the project is complete, the O-SCT will be available to practitioners and all other physiotherapy training courses within higher education.

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## Training regularly at your own level

**When dealing with the integration of testing and learning, the ideal view of lecturer-researcher Sharon Klinkenberg (UvA) can be briefly summarised in four sequential steps. Step one is the digitisation of teaching, step two the integration of exercises and assessment, step three covers the diagnosis of the results, and step four is about effective treatment (improvement and recovery). How does this whole sequence work in practice and can all the steps be completed successfully?**

'I believe in the potential of every student, but it is not always immediately visible with each of them. You can improve it by better training in and practice of knowledge, just as you do with your body for sport. Then you can really bring out the potential.

When I started at the University of Amsterdam there was a printed workbook for my subject of scientific and statistical diagnosis, full of exercises and instructions. I immediately thought that there must be a better way. That is why we have been creating a digital version over the last few years. All the instruction we have has been brought together in a single assessment application. That is the place where students can find all the explanations, exercises and questions, and also the place where they need to answer everything. In this application, therefore, we combine all the students' results.'

### Re-use

Two important things in the digitisation of instruction are the fact that you as a lecturer are no longer the single fount of knowledge

and information, plus the requirement to convert your own knowledge wherever possible into digital products and content that can be re-used. 'As soon as I notice that I am repeating myself during a lecture, I make a mental note. That is the signal that this specific piece of knowledge needs to be standardised, for example by making a knowledge video myself, or by searching on the Internet for existing materials about this subject. There is a good chance of finding usable material.' An important benefit of working in this way is that, as a teacher, you have more time left to work on deepening of understanding, diagnosis and treatment.

### Not optional

Klinkenberg believes there are some important preconditions to achieving a successful integration of exercises and assessment. 'The exercises given to the students must have a didactic structure; a clear teaching purpose with a beginning and an end. In addition, it should not necessarily be graded, because students need to be allowed to make mistakes. 'At the same time, taking part

in the exercises is not optional. If you as a student do not do the exercises, or not enough, that will have consequences for your final grade. 'We discuss in advance with the students what those will be. That makes them share the responsibility and ensures their commitment.'

#### **Personal intervention**

Because the exercises are fully digitised, the results are available immediately. Reports are not prepared at the level of questions, but at the more in-depth level of a group of questions on the same topic. 'Then you can see straight away where the specific gaps are in the students' knowledge. Then you as teacher and student can deal with them immediately. And you can do it really quickly. If the test results are available on Friday, you can already use on them in the workgroup on the following Monday.' The reports are available to the lecturers, the students and the workgroup assistants. Klinkenberg also stresses that the reports are always accompanied by personal feedback to the student. 'The combination is particularly important to us.'

'If the test results are available on Friday, you can use them on Monday in the workgroup'

#### **Greater depth**

Klinkenberg is now working according to this principle with second year Psychology students, but thinks that the method can be applied generally in relation to knowledge transfer and the development of skills. 'The precondition for the digital style of diagnosis is of course that the size of the group is large enough. I have 400 students and that works fine, but with 10 to 20 students it is not cost-effective.' Klinkenberg is aware that this kind of analysis was far too time-consuming in the past. Now the technology has made it possible and there is also the expertise to do something with it. 'We can see how an individual student scores but we can also categorise students and place them in a relative position within the group.'

This means I can compare groups from different years within our course. And because we keep asking multiple questions on a single topic, we can go deeper into the content, currently in the area of reporting and diagnostics, and soon also for improvement and recovery.'

#### **Enough commitment**

Improvement is the next step that Klinkenberg wants to tackle. The search for effective and successful methods in this area is well under way. 'Among other things, we have experimented with the predictive value of the first interim assessment of first year students. If they scored badly in this, then we offered study skills training. And for this too, enough commitment and no optionality were important preconditions for taking part. This approach had a strong impact, in the second interim assessment the performance was significantly better. The next step that we want to look at, is whether the predictive value only applies to the assessment grade or also at the level of content.'

#### **Continual and regular training**

All efforts should ultimately result in more customised education leading to a higher level. 'We as lecturers must ensure that the potential of all students is fully developed, so that we maximise both what they bring to the table themselves and what they can get from their education.' To achieve that Klinkenberg uses, among other things, the insights and experiences from sports training. 'If you want to become physically stronger, then you need to train continually and regularly at your own level. Otherwise you fall back. The same is absolutely true of knowledge. Knowledge becomes permanent only if you keep practising it regularly.'

#### **Diversity**

In the near future, Klinkenberg wants to present a generally applicable model of the first three parts of his method to all interested colleagues in higher education. In this way the desired customised education will come a step closer. 'At present, differentiation in education is excessively concerned with what is on offer, honours courses and suchlike. Very relevant, but it ignores the diversity at student level, and that is definitely just as important.'



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## Peer feedback teaches students an academic style of working

**During her own time as a student the threshold for asking a professor for feedback was still very high. That gave Ineke van den Berg and a number of her fellow students the idea of creating a club to read and review each other's 'tryouts'. Suitably fortified with good food and drink. A kind of proto peer feedback and the start of a lifelong fascination with the subject. 'Peer feedback in a university contributes to creating an academic style of working and is also excellent preparation for later working practices.'**

'The sooner you show students what is required of their work, the better able they are to work towards it. Peer feedback is a very good form of practice here and is most effective if teachers tell their students a clear and positive story about it including a clear set of evaluation criteria.' According to Van den Berg, peer feedback is especially suitable for courses where the outcomes are not cut and dried and the students are at the same level and have the same understanding. 'Peer feedback is therefore mainly used for papers, masters theses and other writing assignments, and very often is used before a final version has to be submitted. As a student you sort of mark time, enabling you to distance yourself from your work.'

### **Professional and personal**

The students usually use the same set of criteria for their reviews that the lecturer uses, and that is done more and more often using scoring rubrics. 'Rubrics work well as a learning tool; as a student you can see at a glance where you score well and

what things you still need to work on.' Through peer feedback, students not only get a glimpse of each other's work, but also of each others struggles and uncertainties. The benefit is therefore both professional and personal. That leads to more depth and discussions in the workgroups and less distance between student and teacher. 'They acknowledge and recognise each other's roles and responsibilities better and also learn to trust each other. This way students and teachers both grow into their role better.'

### **Look each other in the eye**

When Van de Berg came to the University of Utrecht in the early nineties, she was very much on her own in the area of peer feedback. Since then it has become firmly rooted in the teaching model in Utrecht. Successful peer feedback stands or falls, says Van den Berg, by being well organised. 'Good peer feedback is also up close and personal; you need to be able to look each other in the eye.' A group size of 3 or 4 students is ideal, and students must not grade each other. Then the



socially desirable aspect becomes too important, and there is not enough of a learning effect. 'It is also important that the students actually have time to digest the feedback. As a teacher you stand aside as much as possible. Students must do as much as possible within their own group before seeking out the teacher.'

### **Interaction and guidance**

The digitisation of feedback offers many opportunities to students and teachers. 'Teachers can draw upon feedback items and comments in a large database and then place these items very easily into students' texts. What is more, they can link these items to evaluation criteria also held in the database.' For the digital form of peer feedback there are special applications such as Annotatiesysteem. And BlackBoard and Turnitin also have a special tool for this. According to Van den Berg that works well but there is always a risk that the peer feedback process rapidly turns into something that goes on outside the workgroup. Especially if the teacher does not follow up on it. 'Students quickly translate that as: the teacher does nothing with it, so it does not matter. It is precisely this interaction between students, where they discuss each other's work using the evaluation criteria and find ideas together and raise questions, that is significant. But as a teacher you need somehow to guide the process, otherwise nothing will come of it.'

### **Ideal combination**

The next step in Utrecht, as far as Van den Berg is concerned, relates mainly to the agreement, bundling and fine-tuning of what students and teachers want. 'For example, by creating a single application where students can collaborate, and teachers have access and can intervene in the process and the results.' Perhaps the application will come out of the subject area that the Univer-

sity of Utrecht is now stressing heavily: blended learning. 'I think it is a good challenge to find the best possible combination of digital and face-to-face education.'

To achieve this the educational experts from the centre for Education and Learning are working closely together with IT experts, among other things through the university-wide programme Educate-it. A crucial factor for the success of blended learning, according to Van den Berg, is support by and for teachers. 'They must not be given the feeling that they have to reinvent the wheel themselves in the technical and educational areas.' Educate-it helps and supports lecturers to further improve their teaching and to prepare it for the future. 'Via Educate-it lecturers are also making their own project requests for educational renewal and development. By sharing all our insights and experiences with each other we are making true progress in the area of new knowledge and tools.'

### **Sharing knowledge and professional practice**

Van den Berg also sees Educate-it in part as a successor to earlier SURF projects in the area of digital peer feedback, which were done in collaboration with the University of Amsterdam, the Free University and the Amsterdam University of Applied Sciences. A common theme across all these projects is the great importance of sharing knowledge and good practice. 'Those are really preconditions for moving forward, just as are the availability of sufficient money and time. Luckily the University of Utrecht fulfils both these conditions and blended learning is taken seriously here.' In the end, all this effort must lead to better students; and Van de Berg believes in this. 'In relation to peer feedback, students are better prepared for the professional world, where they will also need to give each other feedback and evaluate each other's work. In addition, peer feedback leads to far more substantive discussions, and I think this is a major benefit. It also fits with an academic style of communication. That must not only be about comparing grades.'

'I think it is a good challenge to find the best possible combination of digital and face-to-face education'

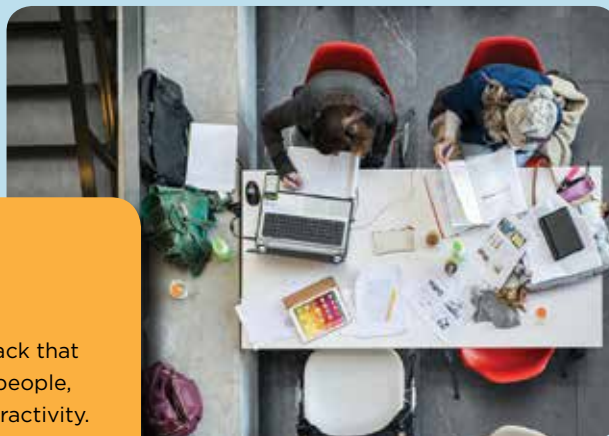
## STUDENTS HAND OUT LIKES AND MEDALS FOR PITCHES

**Practice:** Peer feedback with Pitch2Peer

Pitch2Peer is a contemporary tool for peer feedback that aligns well with the social media habits of young people, thanks to its game elements and high level of interactivity. Pitch2Peer claims to stimulate 'motivation and creativity with peer review by having large groups of students pitching to each other in videos, blogs, animations, slideshows and similar and then rating and motivating each other'. 'The rating is done using written text, and by handing out likes and medals, and by scores in a variety of evaluation categories such as presentation of arguments, originality and form of presentation. Students learn from each other because, among other things, they can rapidly see which pitches are reviewed and rated as good. Teachers create assignments in Pitch2Peer, and define which type of pitches students can submit and how the rating process is to proceed. Pitch2Peer is a Software As A Service tool; it does not need to be downloaded, installed or maintained by the teacher or the ICT department. Pitch2Peer works under the LTI standard and is easy to access from electronic learning environments such as Blackboard, Moodle or Canvas. The predecessor of Pitch2Peer was set up a few years ago as part of the psychology teaching at the University of Leiden. Now the tool is used across the whole of the university for a wide range of different courses. Reactions have been very positive, all the teachers who have worked with it for the first time would like to use it again.

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## In practice

**On this page you will find four examples, where digital forms of assessment, evaluation and feedback were used in an innovative way in order to improve students' learning performance. About half of the examples have already found a place in day-to-day practice, and other examples relate to projects that are being carried out in the innovation scheme Digital assessment for Customised education<sup>1</sup>.**



## FEEDBACK IN TEAMS: INCREASING STUDENT INVOLVEMENT

**Project:** Group Feedback for Creative Technology

The University of Twente (UT) is working on a project about group feedback using digital tools (that have yet to be selected) for the English language bachelors course in Creative Technology. The options of using ICT tools like WebPA, PeerWise, SparkPlus and PeerScholar are being reviewed for this. Currently, feedback is often organised in such a way that one individual student gives feedback to one or more individual students. Because this does not deliver the desired result, providing feedback is being tackled from a different angle in the Group peer feedback project. Results from individual students are reviewed and feedback is provided by one or more teams of students. With this project, the UT wants to involve students more actively and give them more responsibility for their own learning process, and thinks this will further increase students' motivation and their study results. Lecturers taking part in the project can gain experience of working in teaching scenarios that include group feedback and peer reviews. The conclusions from the project will also be widely shared outside UT.

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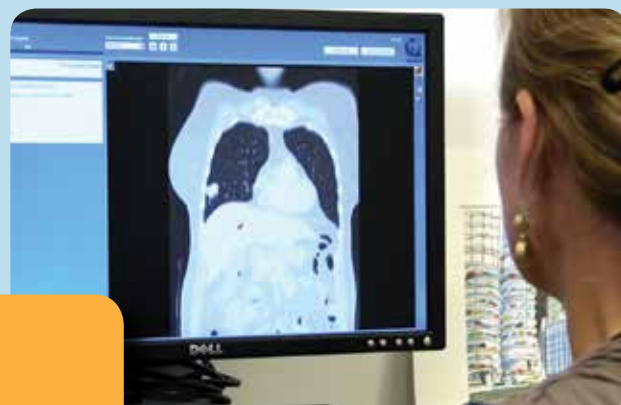
## In practice

**DIGITAL IMAGE EVALUATION FITS WELL WITH PRACTICE****Practice: 3D-evaluation in radiology**

Digital assessment using 3D images improves the quality of assessment and can be used safely and reliably on a large scale. This has been shown in the project 'Digital assessment with images, an extra dimension'. For the radiology course at the UMC Utrecht a qualification test in image interpretation skills has been developed using the digital assessment programme VQuest, with the help of real 2D and 3D image questions. This digital test scores better than the written version, those taking it find the test is much closer to real practice. And the examination committee also regards digitisation as an improvement in quality. Prior to the test some preconditions were defined for the design, organisation and ICT infrastructure, and lecturers were trained in preparing digital image questions. A structure was also created for a database of items, new feedback modules were developed, and written advice for the implementation was provided. The assessment has now been included as a fixed part of the regular testing programme for the national medical-specialism follow-on training in radiology.

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More information: Conclusions and results of the project Testing using images <https://www.surf.nl/en/knowledge-base/2014/conclusions-and-results-of-the-testing-visualised-project.html>



## Project

**GAME SETTING ENABLES LAB TECHNICIAN TO FIND SOLUTIONS****Project: Assessment: we can't make it easier, we can make it more fun!**

The VUmc has joined the project 'Assessment: we can't make it easier, we can make it more fun!' which is a formative case-based assessment with game elements for training as a radio-diagnostic lab technician. This assessment format puts the emphasis on problem-solving reasoning with case studies. Case studies are fundamental to the learning process at VUmc and confront students with real problems from the professional world. Case studies used in testing reinforce the level of reality, and the game elements place the student in a position to run through the case study in a visual, attractive, flexible and interactive way. In this project, the VUmc is trying to find a low threshold test format to help lecturers to further improve their online teaching, to motivate students more strongly, and that can also be used by other lecturers and courses.

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## Give teachers time to experiment with digital assessment

**Desirée Joosten-ten Brinke sees great examples of digital assessment with lecturers who are leading the way and infecting their colleagues through their enthusiasm. 'It's a pity that experiences are shared in only a limited way. Lecturers often shy off when they are asked to write down, evaluate and share their experience and conclusions. That results in extra work.' The result of this is that plenty of good ideas remain restricted to a small group of lecturers. 'And we really need all this good practice so badly in order to progress. Lecturers therefore really need to be given time and space for more pilots and practical research, including reporting back and measuring the effects.'**

Joosten-ten Brinke often sees that lecturers who take up digital assessment are experimenting in the classroom with formative assessment, for example using an app such as Socrative or Kahoot. 'An easily accessible, simple and almost playful form of digital formative assessment. It lets the students see that an assessment must be transparent and it is an important test area and playground for real, summative work.' However, some lecturers tend to see this formative form of assessment as extra work. 'Although it is simply a replacement for other forms of work such as asking questions in the class or old-fashioned paper-based tests.'

### Higher order

The challenge for lecturers who want to do formative assessments is above all to focus more on the goals that they want to achieve. 'In that way assessments become much more a part of your didactic approach.' According to Joosten-ten Brinke, a substantive challenge for teachers who use summative testing is how to word the test questions in such a

way that you set analytical and evaluative questions, so that you can then measure cognitive skills at a higher level. 'This requires the lecturer to think out from the beginning what they want to measure and at what level.'

### Improvement and streamlining of feedback

A major advantage of digital formative assessment is that you, whether lecturer or student, have a better insight into your own actions and results. You can see whether what you are doing is working well and is effective. 'We found out in Tilburg, for example, that our feedback to students was focused too much on the execution of the task and too little on the process. By adjusting that, using Turnitin we were able to improve the quality of feedback and better streamline feedback between lecturers.' During this improvement process, students were also asked what kind of feedback they wanted to receive. A great idea, says Joosten-ten Brinke, and also in a very practical sense. 'How do they work with a screen, what is a comfortable font, and what problems do they encounter?'



### Experimenting together

Carrying out large-scale digital assessments is more likely to work if it is done collaboratively. This can be done within a single department but also across a range of institutions. 'Institutions working together can create sufficient mass to try to qualify jointly for subsidies. That is necessary mainly in order to plan projects or pilot studies together and to experiment with new technical ideas and possibilities.' For example, the Eindhoven University of Technology is currently experimenting with Bring Your Own Device. The starting point for this is that each student will take assessments on their own laptop. That poses some specific requirements on the software and security. For example, when a student starts up an assessment application, you want all other applications to be blocked automatically. Many testing applications can now do this.

### From 'I want' to 'I can'

Digital assessment as an intrinsic part of all teaching and examination programmes is, according to Joosten-ten Brinke, not yet on the horizon. The next 5 to 10 years will be concerned mainly with the shift from 'I want' to 'I can'. 'On the wider stage things are moving really quickly; for example, within 5 years, the final primary school assessment will be taken completely digitally. In addition we need to carry out more large scale practical research and to share and apply the best outcomes of that. That can easily be done within the SURF association, because there is already much knowledge and information available. We need to continue making use of it, plus continue to share our knowledge and experience.'

assessments in their current form. The digital step comes some time after that.' A clear vision of (digital) assessment and a clear assessment policy at institution level can speed up this process, according to Joosten-ten Brinke. Also the fact that pioneers need to continue to be given time and space to experiment and to share their enthusiasm. 'That inner fire is extremely important in order to bring more and more lecturers on board.'

### User-friendly applications

Another thing that is necessary is raising professionalism in the area of digital assessment. A positive development is the introduction of the Basic Qualification in Examining (BKE) and the Senior Qualification in Examining (SKE). The BKE/SKE<sup>1</sup> expert group, of which Joosten-ten Brinke was a member, wrote a set of requirements. 'Lecturers with a BKE have shown that they can complete the whole assessment process for a form of assessment. Digital assessment is not yet a part of this, but is definitely a wish for the future.' As is the wish for closer collaboration between lecturers and ICT experts. 'ICT makes many things possible in the assessment arena. However, that can only be exploited if lecturers can work with really user-friendly applications. Making a digital test needs to be just as simple as writing a text in Word. Both for the developer, "How do I create a good assessment question?", and for the test user, "What information do I need to make the right assessment of the student?"'

### Faithful to practice

Another possibility for the future is the use of simulations and gaming in assessments. An intensive and complex process, but very attractive because it offers the possibility of measuring skills at a higher level. 'We want to prepare students who can operate as true professionals in practice. Game-like computer simulations are getting better and better at imitating real life. So these are excellent for practicing, especially for risky processes such as an operation on a patient. Working with the professional group, ICT experts and (game) developers, lecturers need to make sure that practice is represented as faithfully as possible, so that students are able to practice under ideal conditions, and are assessed in a reliable and valid way.'

'The creation of large-scale digital assessments is more likely to work if it is done collaboratively.'

### Vision and assessment policy

Joosten-ten Brinke expects that developments in the area of digital assessment at class or subject level will move forward slowly, because they partly depend on innovations at the level of schools, for example when it comes to procuring licences, or the ICT infrastructure. 'At the moment, the focus for lecturers is mainly on how to increase the quality of

1. The Netherlands Universities of Applied Sciences have agreed that all examiners should demonstrate their testing competence by obtaining a Basic, respectively Senior Examining Qualification (BKE/SKE).

## COLUMN

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# Digital assessment: looking forward to 2025

'I profoundly hope that in 10 years time all standard assessments will be digital and students will be able to just do them at home. I would rate this vision of the future as being quite feasible, but we still have a long way to go. This change actually puts heavy demands on such things as security, logistics, interface and costs. If the whole process of digital assessment and evaluation does not run without errors or hiccups people will lose confidence, and then we are back at the start again.

Another major challenge is to bring the learning analytics up to a much higher level. The data that we are collecting now are still severely limited in terms of information density about learning processes. Learning is a psychological process. In addition, data that give us insight into how students work together are very difficult to 'capture'. Collaboration, however, takes place primarily between people and in people's heads, outside the digital environment. The challenge therefore becomes how to register progress and results in this area. Currently there are many stand-alone applications and data sources in use, including in the area of feedback. I hope that in 10 years time we will have a set of applications and standards for exchange integrated in one programme, so that we can collect and link data in a structured way. Lecturers, designers of teaching material, and information technology experts need to jointly develop standards for this, in combination with education and assessment experts. Then we need to analyse the data so that we can monitor students' learning and effectively guide their learning behaviour. This is a big job, because it requires plenty of negotiation and there is also still little practical experience in this area. You want above all to deploy a programme like this as an instrument with which students can develop themselves further and not just as an unfeeling system for recording their grades and mistakes. The right balance in the programme between the summative evaluation side and the formative development side is key in determining its acceptance and its success.

At the end of the day, all our efforts need to lead to students ending up at the point where they perform at their best or want to be. We also need to recognise that each person is at his or her own, and therefore different, level, and has specific capacities to which future work or studies need to match as well as possible. That does not, of course, as such require us to use adaptive or personalised assessments and learning paths. It is precisely the standardised tests that measure very well each individual's skills or competences, and therefore provide personalised advice for future development. This insight on standardisation is probably not very popular, but I think that digital assessment and evaluation can be a great help in further developing our understanding of what we are capable of, and in increasing the acceptance of standardisation. Especially if we test frequently and precisely, maintain a good balance between evaluation and further self-development, and make assessment an integral part of the whole learning process. I am already looking forward to 2025.'

# CREDITS

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