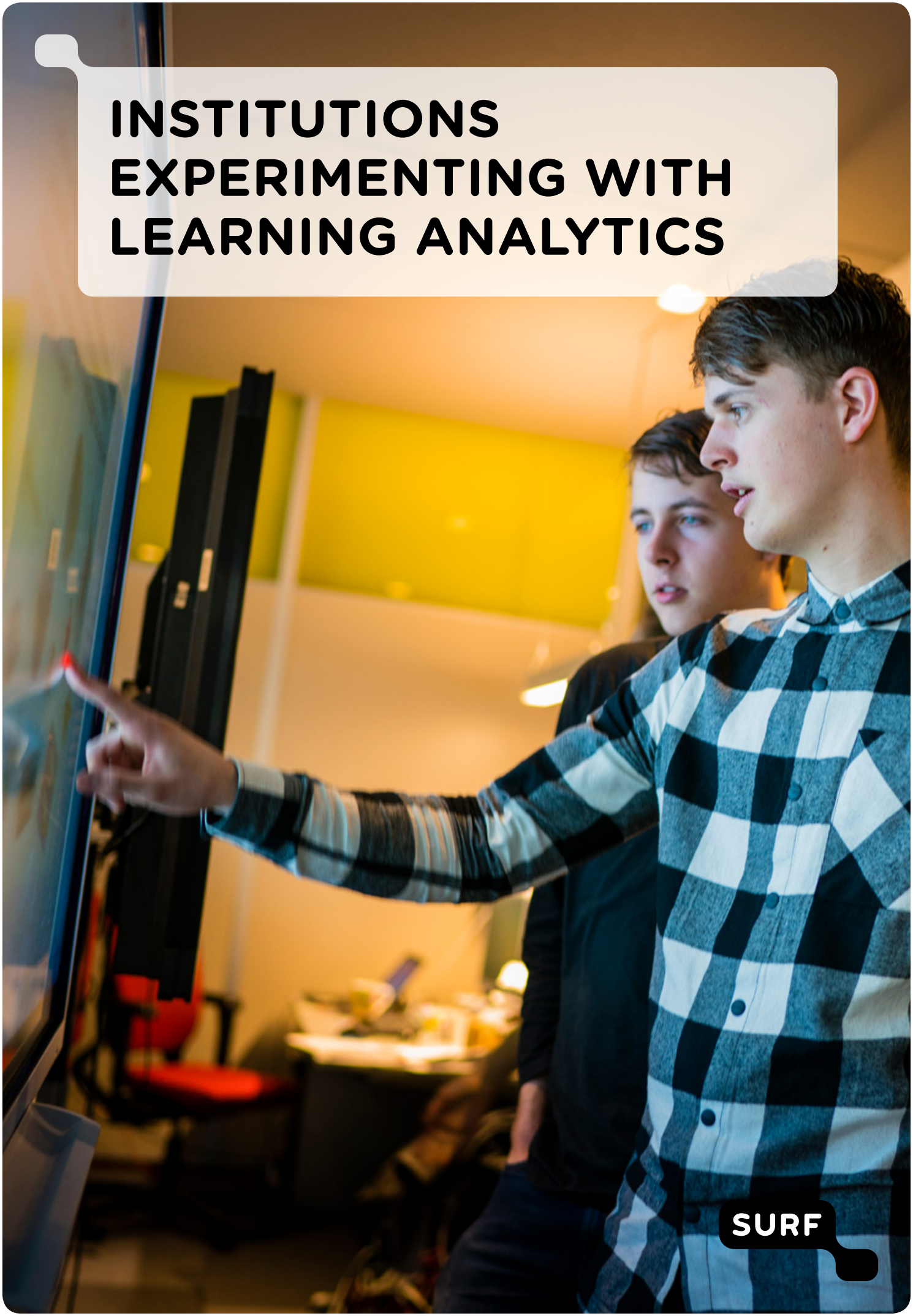
INSTITUTIONS EXPERIMENTING WITH LEARNING ANALYTICS



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INTRODUCTION

Better insight into the teaching process, targeted feedback to students and, ultimately, an improvement in education; that is the aim of learning analytics. The opportunities are huge, but how does a course or a lecturer apply them successfully? This stands or falls depending on the way in which learning analytics are implemented in education in practice. SURF therefore carried out experiments between 2016 and 2018, working with twelve lecturers at six education institutions to collect some hands-on experience of learning analytics.

The infrastructure

SURF developed a learning analytics infrastructure, an experimental environment within which the institutions could take their first steps in the area of learning analytics.

With the help of this infrastructure, the lecturers could answer the following questions:

- Which materials are frequently used?
- When does a student carry out learning activities?
- Has the student submitted the assignments and when were they submitted?
- How often does the student take formative tests during the course?
- Is the student tracking its own progress?

Prior to the experiment, lecturers defined which data was needed to be able to answer their questions. In the experimental environment, they created a recipe that belonged to the question. From this, they received a code, a so-called tracker, that they needed to insert into their own digital learning environment in a number of places so as to measure the learning activity. In SURF's experimental environment, the results were fed back to the lecturers in the form of a diagram in a dashboard. You can read more about the process in the blog 'Learning analytics experiment'

Agreements and permission

The students signed a statement of consent before participating in the learning analytics experiment. This was developed and provided by SURF and ICTRecht.

The experiments during 2016 and 2017

The first round of experiments took place in 2016. Lecturers at both the VU Amsterdam and the HU University of Applied Sciences Utrecht were the first to experience learning analytics in SURF's experimental environment. In the second round in 2017, lecturers from the VU Amsterdam, Windesheim University of Applied Sciences, TU/e Eindhoven University of Technology, Zuyd University of Applied Sciences and Noorderpoort were all involved.

Initial conclusions

This publication describes the institutions' most important findings. The participants were positive about the opportunities offered by learning analytics. They saw the experiments as an initial step towards gaining more insight and more options for interventions. In the words of Ilja Cornelisz, Statistics lecturer at the VU Amsterdam: "Before, we had no idea what the students were doing in the digital learning environment. Now we do. That raises new questions for us: how do we interpret the clicks in terms of learning? What feedback can you give? Will it help provide warnings? It will be a while before we figure this all out."

VU Amsterdam

GIVING STUDENTS A BETTER GRASP OF THE LEARNING PROCESS

Lecturer
Ilja Cornelisz, *Statistics*

BACKGROUND

LEARNING ANALYTICS HAS AN IMPORTANT PLACE WITHIN THE VU

VU Amsterdam believes that learning analytics – if properly designed, implemented and evaluated – can help improve the feedback given to students and lecturers. Learning analytics can help to make curricula more effective, personalise education and provide early warning of the risks of dropping out. At our Amsterdam Center for Learning Analytics (ACLA), created in 2016, we are carrying out research into the application of learning analytics. Ilja Cornelisz, co-founder of ACLA and Statistics lecturer at the VU, was involved in the development of SURF's experimental environment for learning analytics. He took part in the experiment twice as a lecturer.

GOAL

GAIN MORE INSIGHT AND RESPOND BETTER TO STUDENTS' NEEDS

The VU's aim was to obtain better insight into the learning process, and thereby improve the relevance of what was offered to students' needs. Ilja Cornelisz says: "In higher education a lecturer sees a student for about three hours a week, of the twenty hours a week that they need to dedicate to the subject. With a better insight into the learning process, you can get closer to what the students need. We also devote a lot of time, for example, to knowledge clips, but are they actually used?"

HOW

ONLINE STUDY ACTIVITIES WERE RESEARCHED IN TWO EXPERIMENTS

Two experiments looked into the online study activities of two groups of 135 and 494 students. For the first one, the lecturer placed trackers in Blackboard, and for the second one in Canvas, because the institution had moved over to a new digital learning environment.

EXPERIENCE

A NICE TOOL WITH ROOM FOR FURTHER DEVELOPMENT

According to Cornelisz, lecturers will certainly gain insights from the analyses. He stressed that learning analytics raises issues, but does not provide an actual solution. "With the help of the information from the learning analytics, you can start the discussion." It revealed that many students only do the formative assessments just before the exam, and then discover that they have not fully absorbed the subject matter. This stresses the students and creates pressure on the lecturer, who then has all kinds of questions fired at them in a short space of time. With learning analytics the lecturer can anticipate this, for example by drawing attention to the formative assessments.

The time investment required from the lecturer is substantial. That is one reason for preferring simpler solutions. What's more, students do not automatically work with learning analytics. "They are very willing if you devote extra attention to this in the seminars", says Cornelisz. He believes the dashboard needs to call to action more. "What do the visualisations mean to the student? How does the activity dovetail with their goals and learning strategy? For now, this is too much of a tool for lecturers."

CONCLUSION

IT COMPLEMENTS WHAT THE DIGITAL LEARNING ENVIRONMENT CAN OFFER

SURF's experimental environment offers extra functionality to what is available as standard in the digital learning environment, Cornelisz notes, such as the option to study sequences (do students look at the slides first and then the video, or vice versa?). What is still missing is the functionality to go beyond just the click behaviour. What does a student do on a page with teaching materials once they have clicked on it? That would give the lecturer a better grasp of the learning process.

HU University of Applied Sciences Utrecht

MORE DATA, MORE INSIGHTS

Lecturers:
Justian Knobbout, *Technical management*
Nanda van der Stap, *English teacher training*
Stefanie Edwards, *English teacher training*

BACKGROUND

LEARNING ANALYTICS REVIEWED AND RESEARCHED WITHIN THE HU

Justian Knobbout, lecturer and researcher at the HU University of Applied Sciences Utrecht and one of the participants in both rounds of experiments with SURF, is working on a vision of learning analytics for the whole of the HU. In addition, he is researching the options offered by learning analytics in practice, within Canvas. During the experiments, students and lecturers were also still using their own digital learning environment, HUbl.

GOAL

TO GAIN INSIGHT INTO WHAT STUDENTS DO AND HOW EDUCATION CAN BE IMPROVED

The HU is researching the contribution that learning analytics can make to improving the teaching process. Knobbout explains: “So far, we have only collected limited data, for example, for a single class or an isolated study activity. With this experiment we are stepping up to a larger scale. We are finally applying learning analytics in practice, in a way that is simple for lecturers to do.”

HOW

THREE LECTURERS PLACED TRACKERS AND EITHER DID INTERVENE OR DID NOT, INTENTIONALLY

For Statistics, the online study activities of around 200 students on the Technical Management course were researched. In addition, around 50 students on the Curriculum Design and ICT focused courses within English teacher training were also involved. The lecturers focused on different aspects in the experiment. While Van der Stap and Edwards started on a small scale, Knobbout decided to immediately insert trackers everywhere. Knobbout deliberately did not intervene, because he did not yet want to influence the results. Van der Stap did intervene. When there was a low level of activity, she encouraged the students to get involved in more learning activities.

EXPERIENCE

IT TAKES TIME, BUT PROVIDES SOME INTERESTING INSIGHTS

Knobbout’s approach took a lot of time, but he claims it delivers invaluable data. By way of example: “Within teaching there is a myth that you only need to release further information about a task after that specific task has been discussed in a lecture. Otherwise students won’t learn anything. Now all the information is made available immediately. The dashboard shows that it makes no difference, because no-one has looked at that information yet.”

In HU’s experience, SURF’s experimental environment is simple to use, but does give lecturers a lot of work in the start-up phase in particular. Van der Stap and Edwards would add more tracking codes next time, in many more places, to get a more detailed view of the students’ learning behaviour.

Students do not take part in experiments in learning analytics just like that. Knobbout has involved about 40% of his students so far. He concludes that more information and communication are needed.

CONCLUSION

MORE DATA LEADS TO MORE INSIGHTS

Lecturers say that the experimental environment is a great way of monitoring teaching. Van der Stap says: “It is interesting to see how students interact with the teaching materials and what they are interested in.” It does not work perfectly of course, but there is still a lot to learn about students’ and learning behaviours. All three are convinced that more diverse data, and data from more students, would lead to more interesting insights.

Windesheim University of Applied Sciences

TALKING TO STUDENTS ABOUT THEIR ONLINE LEARNING BEHAVIOUR

Lecturers:
Yvonne van Vooren, *Speech Therapy*
Erik Bolhuis, *ICT and Innovation (pilot coordinator)*

BACKGROUND

WINDESHEIM WANTS TO TAKE MORE INFORMED DECISIONS

Windesheim University of Applied Sciences participated twice in the SURF learning analytics experiment. Learning analytics is closely related to the Study Success programme at Windesheim, where lecturers learn how to take more informed decisions in order to improve education.

GOAL

BETTER INSIGHTS INTO STUDY BEHAVIOUR

In 2017, Yvonne van Vooren, a lecturer in Speech Therapy, wanted to gain better insight into her students' learning behaviours. Do students study in the way that lecturers expect them to? She therefore wanted to research whether a discussion with students about their study skills led to any changes in study behaviour. Where possible, she wanted to make immediate adjustments to the next preparatory assignments or lesson content.

HOW

DISCUSS WITH STUDENTS AND MAKE CHANGES

By placing trackers in the learning environment, van Vooren gained insights into her students' online learning behaviour. During the 7 weeks of the course, she made screenshots of what she saw on the SURF dashboard. These formed the basis for a discussion she then initiated with the students. Did they recognise this data? What conclusions did they draw? What could the lecturers do differently? And the students too?

EXPERIENCE

ACQUIRING INSIGHTS AND IMPROVEMENTS TOGETHER WITH STUDENTS

"Sometimes it turned out that students did not know that certain teaching materials existed", says van Vooren. "Many tasks had not been opened because nobody actually found them." The volume of work between lectures was simply too much. The students therefore provided input about how to make the course and the digital learning environment easier to access.

Not everyone was involved. A sizeable group of students felt that they would be helping the institution by taking part in the experiment, but not themselves. They also raised doubts about the reliability of the figures and diagrams, for example because they were working together on the same computer.

Pilot coordinator Erik Bolhuis emphasised that setting up the trackers is not difficult, but it is time-consuming. "We therefore think it is important that placing the trackers (drag and drop) is integrated within the digital learning environment. In addition, the lecturers must be able to create their own formulae."

CONCLUSION

A GOOD TOOL FOR INITIATING DISCUSSIONS WITH STUDENTS

Both lecturers agree that learning analytics offers an opportunity to be better informed when initiating discussions with students about learning behaviour and skills. They regard this as a clear plus.

TU/e Eindhoven University of Technology

LOOKING FOR INTERESTING LINKS IN A LARGE VOLUME OF DATA

Lecturers:
Hans Cuypers, *Calculus*
Inez Lopez, *Dynamics and control of mechanical systems*

BACKGROUND

TU/E LOOKING AT THE POTENTIAL OF LEARNING ANALYTICS

At the time of the experiment, the TU/e Eindhoven University of Technology was reviewing what it wanted to do with learning analytics. They were looking at a policy framework which paid attention to legal aspects and technology. As a result, it was extremely interesting to take part in the learning analytics experiment. Collecting data about students' learning activities was not something completely new for TU/e. In the past, some subject areas used their own digital learning environment based on Moodle, enabling all kinds of data to be collected.

GOAL

WHAT DO STUDENTS DO (AND NOT DO) ONLINE FOR THEIR STUDIES?

The switch to the Canvas digital learning environment was the trigger for TU/e to try out other ways of collecting data. The lecturers hoped to gain better insights into the use of online teaching materials within the subject of Calculus, a course taken by 3,000 students.

HOW

COLLECT AS MUCH DATA AS POSSIBLE USING TRACKERS

The lecturers decided to collect as much data as possible, and then seek out the interesting links. For this, trackers were placed in Canvas on pages with teaching material.

EXPERIENCE

MORE WANTED

The functionality of the experimental environment was very limited, according to the PhD students who helped Inez Lopez: "You can only see that someone clicked on the page containing course material, but not what happened next. You know that someone watched a video on YouTube, but not how much of it." The time required was also criticised. "If you create 500 assignments, you also need to insert 500 trackers. That is very time-intensive." The lecturers said that they did not have enough time to go looking for correlations in the data.

CONCLUSION

INPUT TO THE POLICY FRAMEWORK

The experiment appeared fairly intensive. It took a lot of time and delivered little information. It did, however, provide input for the TU/e's policy framework. It also put the lecturers in a position where they could reflect on different aspects of learning analytics, such as the unwillingness of students to take part in the experiment. Only 500 of the 3,000 students took part. The lecturers offered their own solution: "You really need to regulate the collection of learning data up front, not for each subject using a statement of consent." TU/e also stated it would rather use a learning analytics system within Canvas.

Zuyd University of Applied Sciences

AN INITIAL INTRODUCTION TO LEARNING ANALYTICS

Lecturers:
Marcel Schmitz, *lecturer and education coordinator at the ICT faculty*

BACKGROUND

LEARNING ANALYTICS IS UNKNOWN TERRITORY AT ZUYD

For most lecturers in the ICT faculty at Zuyd University of Applied Sciences, learning analytics is something new. Along with the VU, Zuyd is taking part in a project run by the National Steering Body for Educational Research (NRO). Based on the data from the SURF experimental environment, the project is researching the relationship between the use of teaching materials and formative and summative assessment.

GOAL

FAMILIARISATION AND PART OF A RESEARCH PROJECT

The goal of the Zuyd experiment was to give lecturers exposure to learning analytics. In the above project, there was also reference to a research goal. Supported by a questionnaire, it was investigated whether the use of learning analytics helped to motivate students. Interviews were then held with lecturers.

HOW

LECTURERS THEMSELVES INSERTED TRACKERS IN THE DIGITAL LEARNING ENVIRONMENT

The preparations were made by 8 lecturers in the subjects of Communications and Logic. Within the Communication subject area, learning analytics was applied by 2 lecturers for 18 students. The lecturers themselves inserted the trackers in the parts they wanted to measure in the Blackboard digital learning environment. The Logic subject area suffered technical problems and withdrew from the pilot.

EXPERIENCE

ENTHUSIASM ABOUT THE INITIAL INSIGHTS

The goals were achieved, says Marcel Schmitz, lecturer and researcher in the ICT faculty. “The lecturers were all enthusiastic about the insights. It was noticeable, for example, that students mainly viewed the PowerPoint presentations during lectures, even when we deliberately had them ready beforehand so that they could prepare themselves.” It also was clear that the formative tests were hardly used at all. Schmitz: “This was just a sample. If it turns out that a larger group of students also do little with the practice tests, we will need to review the need for them more closely.”

CONCLUSION

IN FUTURE, PAY MORE ATTENTION TO WHAT YOU WANT TO MEASURE

The most important recommendation to come out of the experiment is that learning analytics needs to be applied on the basis of known questions. “We started with an open mind”, says Schmitz. “We needed to define more clearly what the question was, what we wanted to measure and what data that required.” But learning by doing also yielded results in this case. “Lecturers became really inspired and started thinking: if we can do this, then we can probably answer other questions, too. That’s the power of an experiment like this.”

Noorderpoort

MORE INSIGHT INTO THE RELATIONSHIP BETWEEN STUDY ACTIVITIES AND RESULTS

Lecturers:
Jacob Poortstra, *Digital Skills*

BACKGROUND

ONLINE LEARNING AND COLLECTING DATA IS NEW WITHIN VOCATIONAL EDUCATION

Noorderpoort is the first senior secondary vocational education institution to gain experience of learning analytics in the SURF experimental environment. Online education is still very new at Noorderpoort. As part of the SURF experiment, lecturer Jacob Poortstra used learning analytics with 32 students on the Digital Skills course, providing him with a wealth of information. The experiment was also being followed with great interest at Noorderpoort and at other senior secondary vocational education institutions.

GOAL

DISCOVER HOW TO COACH FOR ONLINE EDUCATION

The goal of using learning analytics was a didactic one. Poortstra explains: “I wanted to find out how you can coach online courses as a lecturer. In the classroom you get an impression of how hard a student is working. With online education you only have the end result, but not what was done to get there. I wanted to fill in this blank by using learning analytics.”

HOW

GAIN INSIGHTS INTO THE RELATIONSHIP BETWEEN EFFORT AND RESULTS

Trackers were placed in the Wikiwijs digital learning environment. When and how often did students look at the teaching materials? Did they submit tasks on time? Based on the data from the experimental environment, Poortstra calculated an effort coefficient, which he then compared to the results. This gave him a better insight into the relationship between study activities and results.

EXPERIENCE

AFTER A DIFFICULT START, CONFIDENCE GREW

The lecturer could look back and see that students who frequently consulted the online teaching materials achieved good results. Those who did not look at them very much, failed, with one exception. Poortstra says this is an important conclusion. The image that came out of the experiment closely matched the image that he gained from the classroom. “That creates confidence that you can rely on the data from learning analytics and use it in your role as a lecturer in online education.”

Getting the experiment up and running was challenging, but Poortstra is satisfied with the technical and legal assistance SURF provided. The time investment required was acceptable for him.

CONCLUSION

SUCCESS

In future, Poortstra would be happy to try more, and to start taking action. He hopes to involve more students and colleagues in experiments with learning analytics.

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