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09 – Evaluation of the second cycle of studies

Interventions at Artevelde University
of Applied Sciences,
University Medical Centre Utrecht &
Nottingham Trent University

RESPONSIBLE PARTNER:
ARTEVELDE UNIVERSITY OF
APPLIED SCIENCES

PARTICIPATING PARTNERS:
UMC UTRECHT
NOTTINGHAM TRENT
UNIVERSITY

Output 9 – Evaluation of the second cycle of studies: Summary

These reports of the three institutions will map the process of data-informed advice in the second year of the study.

A1. We will confirm with the new study subjects how we will work alongside them. This time however, we will have selected a new group of courses or degree programs to work with, or will be testing a new approach to using institutional data/ learning analytics in the advising and supporting process. This may include group tutorials, different types of alert or early warning, or advising using a particular pedagogical methodology.

A2. We will monitor and project manage the operation of the learning analytics resources.

A3. We will map how data (on each course and/or centralized) are used to firstly spot students at risk, how students are communicated to and how they are supported. Importantly, this year the reports will also include a summary of how we communicated with staff to set up the new round of interventions and challenges associated with the new cycle of interventions. The reports will also include recommendations for conducting the final cycle or research in 2020-2021.

A4. We will publish the resources to the website. AHS will take the overall responsibility for editing together the reports.

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1. Introduction

This report reflects the research conducted during the 2019-20 academic year by Artevelde University of Applied Sciences, Nottingham Trent University and University Medical Centre Utrecht to understand the practice of supporting students identified as at risk of failure or withdrawal. This process follows three key stages that form the basis of the 'Onwards from Learning Analytics'-project: prompt, communication, and intervention. These are defined as follows:

1. Prompt The indicator used to show that a student may be at risk of withdrawal, including warnings from learning analytics systems, low attendance and tutor-observed behaviours.
2. Communication The media and methods used to contact identified students such as email, formal letters, telephone calls etc.
3. Intervention The meeting, coaching session or problem-solving exercise – face-to-face or virtual – to help a student to reflect and, if necessary, change his or her behaviour or direction.

In theory, there is a clean break between these three stages. In practice, the stages overlap. For example, an alert generated automatically by a data system can be placed under 'prompts' (stage 1) because of the auto-generation, although the alerts can also be seen as a key part of the communication with students at risk. Furthermore, this type of 'communication' (stage 2) may be sufficient to change the student's behaviour (stage 3).

This year the interventions of the three institutions examined:

- Objective 1 how **students at risk can be detected** using static and dynamic institutional data and human interpretation of those data (cf. above: 'prompt');
- Objective 2 how institutions and their staff members can actively reach out to students, especially those at risk, and **which conditions communication with students must meet** to ensure that students are made sufficiently aware of their situation, that they are stimulated to take action to improve, and that they understand the importance of their actions (cf. above: 'communication');
- Objective 3 **how the intervention process can be optimized** to guide the student more effectively, learning from current good practices, challenges and policy recommendations (cf. above: 'intervention').

This report summarizes the interventions and mainly discusses the purpose of the different studies, the methodologies and the main results. For more details on the data collection process, the study methods, the institutional recommendations and the appendices, we refer to the individual reports that can be consulted online, via the OfLA-website. Artevelde University of Applied Sciences and University Medical Centre Utrecht have summarized their studies in one report, referred to as 'AHS 09' & 'UMCU 09'. Nottingham Trent University wrote one report per pilot, entitled 'Mid-term review' (later called 'NTU 09/A'), 'NTU student research' (cf. 'NTU 09/B'), 'Mode of communication' (cf. 'NTU 09/C'), 'Reducing the alert period' (cf. 'NTU 09/D') and 'Staff reflective diaries' (cf. 'NTU 09/E'). At the end of the review of each study, the report of the corresponding institution is mentioned. Furthermore, the reports refer to each institution through the following acronyms: Nottingham Trent University: NTU, Artevelde University of Applied Sciences (Arteveldehogeschool): AHS, and University

Medical Centre Utrecht: UMCU. Where relevant, references have been made to specific sections of the reports within the same brackets as the report (e.g. 'AHS 06/4.1').

2. Objective 1 – Prompts

The overall aim of the 'Onwards from Learning Analytics'-project is to best understand how we can use learning analytics and other early warnings to improve the quality of the support provided to students through staff intervention. A first step is to find out exactly what these warnings are: which data can institutions use to know that students are at risk, endanger their academic success or increase their chances of dropping out?

University Medical Centre Utrecht took a close look at this (cf. UMCU 09). The institution examined the characteristics of a student at risk and determined which student analytics variables were able to predict progresses and grades, based on available historical student data, existing knowledge in literature and prior ideas about the topic. Furthermore, the institution conceptualized a dashboard prototype for the learning analytics system to be implemented. Currently, their Learning Management System (LMS) is used as a storage facility. Although the system is being expanded with features related to student admission and course registration, LMS is not yet used to its potential. The system doesn't contain all relevant data – such as questionnaires or data from scoring rubrics that are completed as formative and summative assessment tools –, and an analysis of the existing data can only be done manually. The UMCU intervention therefore additionally wants to examine how this optimisation can be done.

Nottingham Trent University went a step further (cf. NTU 09/A). Their NTU Student Dashboard generates 'engagement' data for each student based on their interaction with the university, using already available electronic measures (see below). Previous research by the Dashboard team has found out that these engagement data have a relationship with student progression and attainment at NTU, and thus with students being potentially at risk. One way that NTU uses these engagement data is to combine them with tutor knowledge about each student in an intervention called the 'Mid-term reviews'. The importance of this last step should not be underestimated (cf. NTU 06/3.2). In the mid-term review meetings, the NTU-meetings in which student engagement data are discussed, staff members combine their existing knowledge about each student to decide which further steps need to be taken: which students are possibly at risk, which students would benefit from a communication from the institution, and what type of communication would be most appropriate for that student. This is seen as a crucial phase in detecting and helping students at risk, therefore it is important that these mid-term review meetings run in the best possible way. This is why NTU wanted to take a closer look at them during this academic year to explore what actually happens once schools receive the data, asking questions such as: 'who sees the data?' 'when?', and 'how are decisions made?'. While UMCU examined which data can be used to detect students at risk and how those data can best be presented, NTU explored how systematic, human interpretation of these figures adds the most value.

2.1 Methodology

2.1.1 Detecting students at risk

2.1.1.1 Prompts

The UMCU intervention (cf. UMCU 09) was carried out in the Graduate School of Life Sciences (GSLs) in Utrecht, a school that offers graduate programs in Biomedical (Life) Sciences and has 13 Masters' programmes that share common mandatory elements. Each academic year, approximately 1500 students enrol in Masters' education at GSLs; 25% of those students have an international background.

For the analysis, UMCU used a dataset of students that have obtained a degree in one of the 13 programmes and who started between 2012 and 2015.

2.1.2.1 Research & data

This year UMCU primarily focussed on data analysis to identify relationships between student analytics variables and progresses or grades, as potential triggers for a future learning analytics system. The **data-driven research** was conducted using unsupervised statistical/machine learning methods. 'Unsupervised' signifies that the technique aims to detect previously unknown patterns in a dataset without making prior assumptions as to their nature. The research intended to determine which variables collected in LMS can best describe the criteria of a student at risk, and which student analytics variables (best) predict progress and subsequent grades. Therefore, Hierarchical clustering, Principal Component Analysis (PCA), a combination of Hierarchical Clustering and PCA, and Self-Organizing Maps (SOM's) were attempted.

Subsequently, UMCU performed a quick **literature research** into existing body of knowledge about student characteristics that predict being at risk. This aimed to determine if the outcomes of the data-driven analyses (see above) are confirmed in literature, and to verify if other parameters were being overlooked and thus should be included.

Afterwards, UMCU conducted a **hypothesis-driven research**, using a combination of visual exploratory analysis and statistics. UMCU hypothesized that studying abroad or being an international student may affect students' grades in different projects and the total time to degree. They studied the effect on grades – asking questions like 'Are grades for international students different compared to grades achieved by students with a bachelor degree from Utrecht University?' and 'Are previously obtained grades predictive for grades obtained in Masters' education?'. They also looked at the effect on time to degree in Master's education at Utrecht University.

Finally, starting from the urge of **creating a dashboard prototype** that meets the needs of students and staff members, UMCU conceptualized a study progress dashboard. Therefore they used data that are commonly available in the institution's student learning management system Osiris, and constructed a dashboard view that tracks student progress over time. This view allows annotation and uses additional data resources such as qualitative data from rubrics.

The details of this intervention are discussed in the individual report of UMCU (cf. UMCU 09).

2.1.2 Interpreting the data on students at risk

2.1.1.1 Prompts

The first step in detecting students at risk at Nottingham Trent University is the Student Dashboard. This online tool focuses on **engagement** and thus generates 'engagement data' for each student based on their interaction with the university, using the already available electronic measures of attendance, library loans, log-in to NOW (the university's Virtual Learning Environment), accessing NOW learning rooms, card swipes to NTU buildings, use of e-resources, and coursework submissions (through the NOW dropbox)¹. Using these measures, the Student Dashboard algorithm provides an engagement rating for each student, for each day of the year, based on their activity levels. The more a student

¹ Since this research has taken place the Dashboard algorithm has been altered in response to students primarily working off-campus due to Covid-19. From September 2020 the two on campus measures (card swipes and library loans) have been removed from the algorithm.

engages with the resources, the higher their engagement rating: High (H), Good (G), Partial (P), Low (L), or Very Low (V).

Then the **mid-term review process** starts (see diagram 1). After schools have decided which data they will find useful and the Dashboard team has generated these data – using clear colour codes and additional explanatory documents – the data are sent to the schools and personal tutors are asked to provide any additional relevant information about their tutees that have been identified in these data. Next, a mid-term review meeting is organized. Usually this takes place in the eighth week of the first eleven-week term, in order to discuss data from the first four-five weeks. Course teams agree criteria that will inform whether students would receive a communication, and this varies by course depending on their local context. A course, for example might decide that students with below 50% engagement and below 50% attendance will be reviewed.

During the **meeting**, the course team reviews each individual student that falls within the criteria they have identified alongside the feedback gained from personal tutors and the course teams’ knowledge of the student, to decide which students would benefit from a communication, and if so what type of communication would be appropriate. Typically present at these meetings are the administration staff, who process the data within schools, and the course leaders.

Subsequently, the **communications** agreed at the mid-term review meetings are sent to the students and a record of these are made. This is usually done by the administrator, but there may be some instances in which the communication is from another staff member within the school.

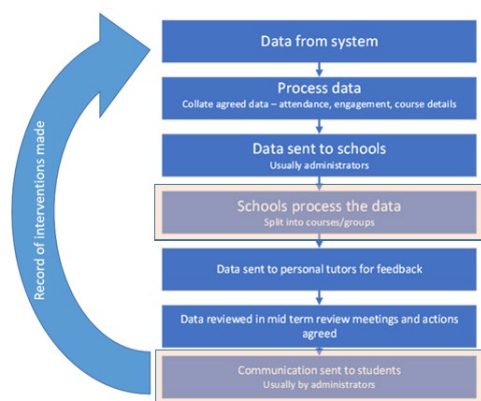


Diagram 1: NTU - The process of mid-term reviews

2.1.2.1 Research & data

As outlined above, the NTU intervention aimed to find out more about the **mid-term review practice** in order (1) to learn from good practice about how to identify students for subsequent action, using a combination of Dashboard data and tutor knowledge about the student, and (2) to identify improvements within this process. This includes data provision, staff resources and training, and understanding the time and resources needed for this within the schools of the institution.

The researchers proceeded as follows: they attended and observed mid-term review meetings in two schools within the university, four meetings in the first school, and two meetings in the second. Due to the different cohort sizes of the courses and the different criteria used by the course teams, the number of students discussed within each meeting varied. There were between four and ten members of staff at these meetings (including the two researchers) and this difference in size was related to the size of the cohort. Thereby the researchers focused on the processes 4 and 7 outlined above in the

diagram (cf. diagram 1 – orange), particularly monitoring the decision-making, the challenges, and the good practices. The researchers also attended a training session in the first school about the mid-term reviews led by the Student Dashboard team and had an informal meeting with a subject administrator of the second school to explore in more detail the time commitment needed from schools as part of this process.

The observations were recorded and subsequently analysed for each stage of the abovementioned process. The details of the studies are discussed extensively in the individual report of NTU, entitled 'NTU Mid-term reviews' (cf. NTU 09/A).

2.2 Summarizing results

- Review studies that focused on students being at risk primarily describe **low estimated grades and/or disengagement as outcomes for being at risk**, besides non-success rates in courses, knowledge retention rates and time to degree (Campbell et al. 2007; Hu et al. 2014). [cf. UMCU 09]
- To identify the underlying causes for these outcomes, researchers have looked into the use of **performance feedback, estimated grades, passing or failing a course, successful adaptation, and passing retakes** (Stewart et al. 2011; Sarra et al. 2019; UMCU 09). [cf. UMCU 09]
- UMCU confirmed that **previous performances** have the largest predictive value for future study success. The Grade Point Average (GPA) of previous education is predictive for GPA in Masters' education, and grades for projects within Masters' education are predictive for grades in subsequent projects. Besides the GPA, UMCU generally suggests to take the following overarching parameters into account: time to previous degree, age, and gender. [cf. UMCU 09]
- Students with an **international background** are not more likely to be at risk compared to students with a bachelor degree obtained at UMCU. Both groups of students have similar grades for projects and need comparable time to complete the degree. UMCU also determined that taking part of a programme abroad, is not a cause for delay. [cf. UMCU 09]
- Involving **human interpretation and contextualisation of data** that is automatically generated by learning analytics systems, such as the NTU Student Dashboard, remains crucial in detecting students at risk and helping them in the best possible way. Viewing data alongside personal knowledge of the students by tutors and the already existing contact with staff members within the school, ensures that students receive the appropriate communication in the appropriate way. [cf. NTU 09/A]
- Information from learning analytics systems can also be used to **support decision** making in the review process with issues that may be particular to specific courses or cohorts. [cf. NTU 09/A]
- It is important that schools are consulted about which data they will find useful for their NTU review meetings, in order to encourage buy-in to the process and enable local knowledge to be included in the data. It is recommended that engagement data are considered in a variety of ways, such as including percentage time spent in low engagement and attendance data, as well as alongside local information and knowledge. [cf. NTU 09/A]
- Information on data processing and communication with students must be recorded in an **easily consultable, central log** to ensure consistency and continuity in the case of staff changes. [cf. NTU 09/A]
- It is recommended that **different communications** are considered for different levels of engagement. In this case different criteria for each communication aid the decision making

process, although it is important that each individual student is still considered on an individual basis. [cf. NTU 09/A]

- When communicating to students, information about the **available support** must be included. [cf. NTU 09/A]

3. Objective 2 – Communication

Knowing that students are at risk is of course not enough. Institutions also have to act and go ‘onwards from learning analytics’. Students must be made aware of their status, know what that means for their study careers and be given the opportunity to act on it. Actively reaching out to students and communicating with them is therefore crucial. But what requirements does this have to meet? What is the best way to contact students? How should staff members address them? What content should the communication contain? And when is the best time? Artevelde University of Applied Sciences and Nottingham Trent University took a close look at these questions. They examined how institutions can communicate with their students at risk in the most effective and efficient way in order to re-engage their students and provide them the best possible guidance.

3.1. Methodology

3.1.1 Data on students at risk

There are several groups of students who are defined as 'students at risk' in former research conducted for the OfLa-project (cf. AHS & NTU 06). This year's interventions focused on three of these: (1) students whose adaptation to higher education was less successful, (2) students who were absent during classes, and (3) students who generally had a lower engagement. Research shows that poorer integration, absenteeism and low engagement are closely linked to early withdrawal (Tinto 1993, Foster 2018, Foster & Siddle 2019).

The first group AHS detected through **the FIT test** (cf. AHS 09), an instrument designed in collaboration with the University of Antwerp. First-year students complete an online questionnaire a few weeks after the start of the academic year about their experience in higher education. The FIT test measures their study effort, their social adaptation, their adjustment to new ways of teaching and their academic self-image. Subsequently, students can use their personal page on the student tracking system ('studentenvolgsysteem' or 'SVS') to find out how they have scored on each component, what that actually means, how their scores compare to those of other first-year students and which hints and tips can help them to improve their performances. A few weeks later, the results are discussed with a study coach.

For the second group, the group of students who attended less, AHS set up a pilot in the **course English for Business** (cf. AHS 09). English for Business is a semester course (September-January) in the first year, with 771 students within the programme Bachelor in Business Management (BEM). In this course, students are offered four 'integration classes' which include a digital vocabulary test and a group presentation. The classes are in the course to help students prepare for their examination and to encourage them to study regularly. There is a mock integration class after two weeks to make students ready. With the tests and presentations, students can earn up to 20% of their credit. The tests allowed AHS to identify who was present during the integration classes and who was not.

The 'low engagement group', the third group, was alerted by the **NTU Student Dashboard system** (cf. NTU 09 B,C,D). As mentioned above, the Student Dashboard generates 'engagement data' for each student based on their interaction with the university, using the already available electronic measures. Subsequently, the Dashboard algorithm provides an engagement rating for each student, for each day

of the year based on their activity levels: High (H), Good (G), Partial (P), Low (L), or Very low (V). If a student does not interact with the university for several consecutive days during term time an alert is automatically generated by the Student Dashboard and sent to the student’s personal tutor or academic mentor. To date, the alert period has been 14 days for all students. This academic year though the term was changed to 10 days for first-year students as part of an intervention (see below; NTU 09/D). In NTU each undergraduate student within this pilot school is assigned an academic mentor, a persons with whom they are scheduled to meet three times in their first year and also in their second year, and twice in their final year. It is the role of the mentor to provide the student with individual support for their studies, and to signpost them to central support where appropriate (NTU 09/C).

3.1.2 Communicating with students at risk

For this year’s interventions Artevelde University of Applied Sciences and Nottingham Trent University decided to communicate the outcomes of the three detection tests (see above) **directly to the students**. In order to see which strategy would yield the best results, both institutions used different media to communicate with, different content and different timing. On the one hand, the interventions focused on the perception of the students – what they thought of the communication and what the communication made them willing to do –, on the other hand on the effectiveness of the communication. This approach allowed NTU and AHS to formulate conclusions and recommendations concerning reaching out to students at risk , and its specific communication requirements (cf. AHS 09 & NTU 09/B,C,D).

3.1.2.1 Perception research

1) Communication

The first research topic was **the student’s perception**. For both institutions, the students were contacted by email, using the email address of their institution. They were informed about the alerts, the interpretation of the data and the actions that could be taken, respecting the criteria that emerged from the previous OfLA literature review (cf. O4/4-6). The NTU students all received the same email, with their tutor copied into the email (cf. NTU 09/B). The students of AHS were divided into groups that each received a different version of the email with a (slightly) different content (cf. AHS 09).

For the FIT communication, the students were randomly divided into three groups, per class. The first group received an email with the results: their personal scores, the interpretation of these scores and the comparison with their peers (further 'basic mail'). The second group received an email with some additional hints and tips accompanying their results (further: 'tips mail'). The third group was used as a control group and did not receive an email (further: 'SVS communication'). They could consult their results through the Student Tracking System (SVS), as usual. The other two groups also had access to this platform, which means all students received the same information but in different stages and in different ways.



Diagram 2: AHS - Conditions FIT communication, emails

For the English for Business attendance survey, the students were randomly divided into four groups. Each student, absent or present, was emailed twice: a first time after the mock integration class and a second time after the first, real integration class (see above). Each group received another email. The

students of two groups were addressed generally, using 'dear student'; the students of the other two were addressed with their first name. Two groups received an email which included learning analytics as additional, statistical evidence how absenteeism negatively correlated with examination results; the two other groups didn't.

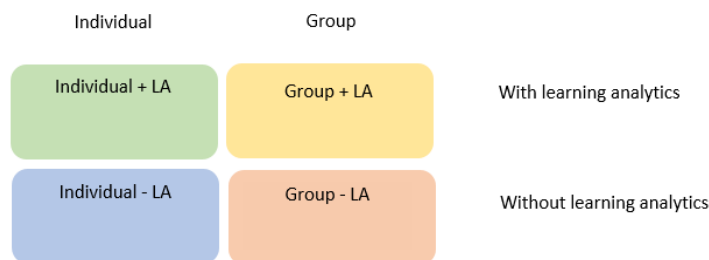


Diagram 3: AHS - Conditions English for Business attendance communication, emails

In total AHS contacted 1271 students: 500 students who completed the FIT test and 771 who enrolled in the English for Business course, both present and absent during the classes. NTU contacted 618 students from different courses and different years: first 423 students with very low or low engagement as measured by the Student Dashboard (see above, 'L' and 'V'), afterwards 195 students with partial, good or high engagement (see above 'P', 'G' and 'H'). NTU did this in order to prioritise those students with low or very low engagement that would like to take part.

2) Research data & analysis

Subsequently the students were asked what they thought of the communication. AHS therefore used a written and an online questionnaire, answered by 500 FIT students and 389 English for Business students (cf. AHS 09). NTU conducted interviews (cf. NTU 09/B). Fourteen students participated who received at least one alert from the Student Dashboard and spent a period of time with low or very low engagement (see above).

The written **FIT questionnaire** of AHS consisted of three parts, arranged randomly. In the first part, questions were asked about the students' opinion regarding the FIT communication, i.e. the added value of the FIT test, the way in which the results were communicated (plain, clear, extensive...) and the extent to which this information prepared them for the conversation with their study coach. In the second part, questions were asked about perception of and how they dealt with the hints and tips. The third part – based on the questionnaire of Lot Fonteyne (2017) – examined whether students were inclined to adjust their behaviour as a result of the FIT scores. After receiving the first answers, the questionnaire was slightly adapted in order to have a better factor structure for statistic analysis.

The **attendance questionnaire** of AHS was part of a more general (online) teacher evaluation. The students were asked to score on a Likert scale (strongly disagree - disagree - agree - strongly agree) to what extent the emails made them feel personally addressed, motivated them to come to class, put more pressure on them to come to class, and made them feel more aware of the positive effect their presence could have on their chances of succeeding. In addition, the students were asked to indicate which feeling(s) the email evoked. Eight emotions were offered as options, categorized along the dimension active/passive and the dimension positive/negative.

The **NTU interviews** were designed in order to gain feedback on the OfLA three stage model – prompts, communication and actions – and students were prompted to discuss their experience of each stage. First, they were asked what they thought of the alert itself and of the fact that they were contacted by the university. Secondly, they were given questions on how they experienced the communication:

what did the students think of the medium, the content of the email, and its timing? Thirdly, they were asked whether the alert had prompted them to take action, in other words, whether they had sought help, taken action themselves or still experienced some thresholds. Due to the Covid 19 epidemic, students were interviewed over the phone and through Microsoft Teams, an online meeting tool.

AHS examined the answers by conducting statistical analyses, using the programme SPSS. NTU used a thematic analysis (Braun & Clark 2006), focusing upon topics that were important in relation to the research areas (prompt, communication, and action), and students' current university experience. Additionally the institution used Nvivo to interpret the transcriptions of the interviews. The details of the studies are discussed extensively in the individual reports. For AHS the FIT and the English for Business research are discussed together in one report (cf. AHS 09). For NTU the report 'NTU student research' can be consulted (cf. NTU 09/B).

3.1.2.2 Effectiveness research

1) Communication

The second research topic focussed on **the effectiveness of the communication**. On the one hand Artevelde University of Applied Sciences and Nottingham Trent University wanted to see whether students were re-engaged after being contacted about the results of the detection tests or were actually looking for help. On the other hand the institutions examined whether this communication had an impact on the students' academic performances. AHS therefore used different communication content (cf. AHS 09). NTU used different media for one intervention (discussed first, see below; cf. NTU 09/C), and a different time frame for another intervention (discussed second, see below; cf. NTU 09/D).

For the effectiveness study, AHS departed from the above-mentioned **English for Business course**, in which 771 students were monitored during four integration classes (September-January) of which 700 students were added to the data set. Integration classes are classes in which students could prepare themselves for their final examination and could earn 20% of the credit (see above). The communication with the students took place 48 hours after the first two classes: after the mock integration class and after the first, real integration class. As mentioned above, the students were divided into four groups. Two received an e-mail with learning analytics, two without. Two groups were addressed personally in the email, two groups generally. By doing this, AHS was able to determine which content choices were most effective.

NTU had two effectiveness interventions, one aiming to find the most appropriate medium, the other aiming to find the right timing. For the first intervention (cf. NTU 09/C), NTU took a close look at those students the **Student Dashboard defined as 'very low engaged'** (see above, 'V'). They thereby focused on undergraduate students in one large academic school within their institution and on the communication sent as a result of mid-term reviews that take place in the first term within this school (see above). In order to identify those students with low engagement, students were firstly classified into quartiles, based on their daily engagement ratings. These quartiles were calculated on peers in the same year group, because engagement tends to differ between years. In total, 1153 undergraduate students were identified as being within the lowest quartile during this period in 2020. The course teams then met in the mid-term review meetings to discuss each of these students individually (see above) – alongside feedback gained from personal tutors and the course teams' knowledge of the student –, in order to decide which students would benefit from a communication, and if so what type of communication would be the most beneficial for him or her. Following the mid-term reviews within the school, it was identified that 865 undergraduate students would benefit from a communication. Subsequently these 865 students were randomly divided into two groups: one group that would receive a letter to their term time address and a second group that would receive an email, both

addressed from their course leader. The content of the communication was the same in both groups, but varied slightly according to the year of the student. First and second year students were advised that they would be contacted by their academic mentor to arrange a meeting in order to discuss any factors that the student may feel are affecting their engagement, and that this meeting would be recorded on the Student Dashboard. Final year students were advised that if there were any issues preventing their full engagement with their studies to contact their course leader or a member of the course team.

For the second intervention – the timing intervention (cf. NTU 09/D) –, **NTU changed the time frame for the traditional ‘no engagement’-alerts.** As mentioned earlier, the Student Dashboard learning analytics resource produces two main automated outputs: firstly, a daily engagement rating based upon each student’s academic activity and, secondly, an automated alert generated when there is no engagement for 14 days during term time. Although these 14 days were consciously chosen in the past, the period is not equally suitable for every student (cf. NTU 06). NTU therefore experimented with shorter and longer alert periods, starting from a statistical analysis of the Student Dashboard data for first, second and final year undergraduate students in academic year 2017-2018 who received an alert after the usual 14 days. All of those students were NTU-students, fully, temporarily or conditionally enrolled, studying on a non-collaborative course, having days of no-engagement occurring during term time; 1363 students in total.

2) Research data & analysis

Subsequently it was checked whether the students were going to change their behaviour in response to the communication. Therefore, the situation before the communication was compared with the situation after the communication

Firstly, NTU (cf. NTU 09/C) examined if communication **encouraged students to seek help** by checking whether the students contacted their academic mentor or another staff member within the university after they received a letter or an email from their institution. The information was collected via staff members and via the Student Dashboard. Staff members received a list of the students who were contacted. They were asked to record those students with whom they had made an appointment and those with whom they had met. Additionally, they could add notes to the Dashboard system to register any discussion or agreed action from this meeting. There they could record the way they communicated with the student – face-to-face or using another medium – once more. The staff members gave feedback on 226 students (of the 865). With 131 students they did not have contact; 31 students they reached by email or telephone, 64 students they met face-to-face. The Dashboard notes only mention 38 face-to-face meetings. However, 421 of the 865 students who were contacted by email or letter had one or more notes. Of 238 students, a note mentions a face-to-face meeting. Finally, NTU looked which communication method – letter or email – was most effective in establishing this contact.

Secondly, both AHS and NTU checked whether the students were **re-engaged**. AHS did this based on the attendance in the integration classes of English for Business (cf. AHS 09). The institution checked whether students who were absent in one of the first integration classes joined again after they received an email. Subsequently, AHS verified with which group (with learning analytics vs. without learning analytics, and personal contact vs. group contact) the effect was most significant. The data set contained 700 students.

NTU took a close look at the abovementioned students who had contact with their academic mentor or with another staff members and examined if their Student Dashboard recorded an increase in student

engagement as a result of that contact (cf. NTU 09/C). Subsequently, NTU looked which communication method – letter or email – yielded the best results and thus was most effective.

Thirdly, AHS examined whether the communication **positively affected the academic performance** of the students (cf. AHS 09). They examined if absence at the integration classes negatively correlated with the English for Business examination results and looked whether there was a significant difference in the student's results based on the condition to which they belonged. The data set contained 700 students.

Fourthly, NTU checked with their timing intervention whether shortening or extending the alert period had an impact on **the progression of students to the next year** or to the successful completion of their studies (cf. NTU 09/D). Therefore they took the alert data, automatically generated by the Dashboard system, of academic year 2017-2018 and associated those with the non-progression data. This statistical analysis showed that using a single alert period for all students was not appropriate. Of the 1 361 students who generated an alert after 14 days, 583 (43%) would have progressed to the next year or completed their studies: 22 % were first-year students, 64% final-year students. If final year students were three times more likely to progress after generating an alert than first years, the alert was at risk of appearing meaningless. After the 2017-2018 data analysis and a thorough consideration of the advantages and disadvantages, NTU decided to shorten the alert period for first-year students from the summer of 2019 onwards (8149 students in total). Testing was done with 7 days and 10 days. For third-year students (559 students in total, generating 1582 alerts), NTU extended the alert period to 21 days. In these tests, NTU took the existing 14-day period as a benchmark. Unfortunately, this year's results could not be considered representative due to the impact of the Covid-19 epidemic. The study will therefore be repeated, using new data, as soon as the situation normalises. For now, this intervention can be primarily seen as an interesting case study of a change management process, outlining the decisions taken to bring about a change in practice. It is important therefore to reiterate that some of the changes were made based on an analysis of risk and others were made taking into consideration both the practical application of the resource and, to some extent, how appropriate students and staff would view the decisions made.

To measure the effectiveness AHS and NTU both conducted statistical analyses. For the additional thematic analysis, NTU used Nvivo to interpret the data. The details of the studies are discussed extensively in the individual reports. AHS combined their studies in one O9-report (cf. AHS 09). For NTU the report 'Mode of communication' (cf. NTU 09/C) and 'Reducing the alert period' (cf. NTU 09/D) can be consulted.

3.2 Summarized results

3.2.1 Reaching out to students at risk

- Learning analytic systems, such as the NTU Student Dashboard, are designed to provide actionable intelligence to the user, be it students themselves, their personal tutors or other university staff. Alerts, automatically generated by the system, are one way to **generate actionable intelligence**; although these alerts need to be based on data sources that are proven to demonstrate the relationship between algorithm and the intended end result. Data sources need to be reviewed periodically as do the algorithms that analyse them. [cf. NTU 09/D]

- There is a strong correlation between automatic alerts, generated by the NTU Student Dashboard, and non-progression. Therefore, the alerts must be taken seriously and acted upon. [cf. NTU 09/D]
- **Absence** at intermediate test moments negatively influences a student's chances of progression. In the English for Business courses (AHS) the scores declined with on average 1,75 points per missed integration class. This not only shows the importance of intermediate tests that prepare students for the examination, but also that it is relevant that students become aware of that importance. [cf. AHS 09]
- Communicating with students about their study behaviour and potential threats, and thus **actively reaching out** to them, is valued. The English for Business intervention of AHS shows that students appreciate the communication: students very often indicated that they feel motivated by the approach, regardless of how the communication was designed. However, extensive feedback on the student's status is preferred, as demonstrated by the FIT intervention. According to the Student Transition Survey and this year's interviews, the NTU-students feel the same. In 2017, 97% of the students already indicated that NTU should contact them if it felt that it could improve their chances of progression and 74% of students said they would find receiving an alert if their engagement is low for two consecutive weeks valuable or very valuable. In the 2019 survey 88% the students told that they would be happy to be contacted by their tutor and 71% of the students would also be pleased to receive an alert directly from the Student Dashboard. In this year's interviews, the students indicated they experienced the alerts as a 'helpful nudge', an indication that the university 'cares', that staff members 'keep an eye out for them', and they are wanting to give them a friendly reminder to take action ('take in on board and move on'). [cf. AHS 09, NTU 09/B]
- Automatic alerts, generated by Dashboard systems, need to be **efficient**. On the one hand, tutors and staff members need to have sufficient alerts with which to act. On the other hand, they need to avoid being swamped with messages, ultimately risking missing those at most risk of early departure. Furthermore, the institution need to **effectively resource the actions** associated with the alerts and give staff members time to interpret the alerts, communicate with students and intervene in an appropriate way. [cf. NTU 09/D]
- **Transparency** is important. Students need to know that certain data are being used and that their institution can act upon this information where appropriate. [NTU 09/B]
- The needs of students regarding communication might **vary** according to the type of student or the programme to which they belong. It is therefore important staff members keep the students' background and their personal experiences with them in mind when talking to them about their behaviour and its possible consequences. [cf. AHS 09]
- It is of great importance that staff members are **trained**, not only to learn them how to work with data, how to interpret these correctly and how to supplement these with personal experiences, but also how to subsequently deal with the information on students who are at risk. Staff members need to know how they can communicate with them, what help they can refer certain students to and how they can deal with specific problems students already report. Staff members must be made aware of anxiety or mental health difficulties and how there may affect student's (re-)engagement. [NTU 09/B]

3.2.2 Medium of communication

- When students were asked in the NTU's Student Transition Survey 2019 how they would like to be contacted if a Dashboard alert was generated for them, students were most likely to say they would like to be contacted by **email** to their institution's email address (83%). The recent

interviews with NTU-students confirms this. AHS students perceive the communication by email as an added value compared to communicating through their administrative platform, the student tracking system (SVS), as the FIT results showed. According to the OLO students the communication is more clear, more transparent and more structured. Furthermore, the FIT test is generally valued higher by the students who received an email. They indicate that they have a better understanding of their strengths and weaknesses and also know how to deal with them. [cf. AHS 09, NTU 09/B]

- However, there is some evidence to suggest that receiving a **letter** is more likely to result in a subsequent face-to-face meeting between the student and a staff member of the institution, and that students that receive a letter are less likely to be in the lowest engaged student group, as NTU showed. [cf. NTU 09/C]
- Furthermore being contacted by **telephone** is perceived as 'more personal', 'more quick', 'harder to ignore' and 'more effective' (f.e. easier to signpost students to further support or to have a real conversation) by most NTU-students who were being interviewed. [cf. NTU 09/B]
- **Other media** should thus not be permanently excluded. Based on their interviews, NTU recommends institutions to consider different communication types for different stages of contact where escalation is needed, for example an initial alert, then an email, then a letter. [cf. NTU 09/B]
- The initial alert can thereby be included on **other platforms** of the university, such as the university app or the learning analytics system – such as the NTU Student Dashboard – itself. [cf. NTU 09/B]
- It is important though to keep in mind that having subsequent **contact with a staff member** of the institution appears a key factor, rather than the type of contact, in raising student engagement. Students identified with low engagement should therefore be encouraged to have contact with a member of the institution. [cf. NTU 09/B, NTU 09/C]
- This is an area worthy of **further exploration** on a larger scale, considering any other impact on the student as well as exploring the effectiveness of other types of communication. [cf. NTU 09/C]

3.2.3 Content of communication

- Emails that are sufficiently **personalized** work best, i.e. emails in which the student is addressed by name, the reason for the communication is well stated and the student gets an interpretation of his or her personal situation. Students of the AHS course English for Business who were in the individual condition, felt addressed more personally, which makes sense. They were also more willing to change their behaviour and (continue to) participate in the integration classes. [cf. AHS 09]
- Finding **the right tone** is important. NTU students not only want to feel informed when they receive the email, but also supported, stimulated and cared for. To achieve this, the tone cannot be too formal. [cf. NTU 09/B]
- It helps to make the communication as **complete** as possible and show students something can be done about their situation. However, this does not mean that the email should contain every detail about the **aids and tools**. They do not always arouse more interest or need, nor do they encourage students to take more action, as the AHS surveys show. However, further research is needed to reveal more about why certain details are missing their effect and which can or cannot be included in communication with students. [cf. AHS 09]

- If **support services** are mentioned, it would be a good idea to include the mental health services of the institution and a photograph of all people involved, according to the interviewed NTU students. [cf. NTU 09/B]
- **Positive communication** can also be included, using data or personal experiences of tutors or other staff members. [cf. NTU 09/B]
- It needs to be considered how to communicate to students with **the data** showing they are at risk. For example, a reference to the data as an argument to illustrate the effectiveness of presence during classes – in this case English for Business integration classes (AHS) – on study success in a personal email seems to scare students. In a group email this is not the case. Students in the group condition with learning analytics feel more motivated. Students are not singled out nor confronted too directly. Furthermore, in the group condition students feel more positive and activated due to the communications. Perhaps this approach triggers a healthy dose of peer pressure. Yet, in this context the preference still goes out to an individual email without learning analytics. Compared to the group condition, students feel more energy, less pressure and less concern. In addition, they showed up more during the integration classes. [cf. AHS 09]
- When informing students that they will be contacted about their engagement in induction the institution must keep in mind to mention that a tool like the Student Dashboard is **an indicator of engagement**, in order to manage expectations about its accuracy. [cf. NTU 09/B]

3.2.4 Timeframe of communication

- **It is a challenge to balance the accuracy of automatic alerts, such as those generated by the NTU Dashboard system, with efficiency or actionability.** An alert generated too early for example is likely to generate many false positives, take up excessive staff time and ultimately undermine confidence in the accuracy of the alert. An alert generated too late is much less useful because it would be unlikely that an intervention can be initiated at the very end of the academic year, or once the student is too far behind. [cf. NTU 09/D]
- Using **the same 14 days-alert period** for students of all years is problematic, given the disparities between the progression rate for different year group. First-year students are clearly in need of a shorter period: 78% of first-year students who generated a 14-day alert did not complete the first year. Final-year students, on the contrary, were three times more likely to progress after generating an alert. For second-year students the 14-days period was felt to be an appropriate time measure. [cf. NTU 09/D]
- Whilst mathematically a 21-day alert provides a better fit for final-year students, it is deemed **ethically inappropriate to leave students for three weeks** – that is 1/3 of a normal teaching term – before generating an alert. The gap between alert and potential intervention is considered too long, as students who have disengaged from study after this amount of time are more difficult to reach, support in changing their behaviour, or for them to catch up academically. [cf. NTU 09/D]
- In addition, half of the students interviewed indicated that they would prefer the **alert period to be shortened** rather than extended. It is important to take these opinions into account and share them when communicating about why and how alerts are generated. (NTU No engagement). [cf. NTU 09/B]
- Algorithms reflect the **prejudices and beliefs** of their programmers. Therefore, it is important for assumptions to be challenged and publicly discussed. Ultimately, one of the decisions about the alert period was a judgement about how the time span would be perceived, not the best mathematical fit. [cf. NTU 09/D]

4. Objective 3 – Intervention

When students have responded to the communication and contact an academic advisor, an intervention can take place. In most cases, the intervention is a conversation in which the student gains insight into the factors that endanger his or her study success, is referred to the most appropriate guidance services or is provided with concrete tools to improve the situation. The approach and content of this type of conversation is not fixed. It depends on the institution and its policy, but also on the approach of the different departments and the background or working method of the specific advisors. In addition, during the conversation, each of these actors experiences different successes and different challenges. Mapping these methods and experiences out one by one can provide an immediate and accurate picture of the interventions, as NTU did this academic year (NTU 09/E). It enables us to exchange insights, take an example of good practices, optimize the general intervention process and ultimately guide the student even better.

4.1. Methodology

4.1.1 Intervening with students at risk

In **NTU** the conversations with the students are conducted by a personal tutor. In this case, 'personal tutor' is a generic term, the role can be filled by a personal tutor, but also by a year tutor or – on small courses – a course leader. In the majority of cases, a tutor is a member of academic teaching staff, although in some disciplines, students may have a designated academic tutor – also called a mentor – that has not also got a teaching role within the school. The NTU policy is predominantly academic in nature, however there is some expectation of pastoral support. Once the tutor is notified that the student may be at risk of failure or withdrawal, he or she can decide to schedule a personal support session, meet the student in group or set up a proactive intervention.

4.1.2 Research data & analysis

In order to fully understand the practice of supporting students identified as at risk, reviewing the existing policy and reflect on challenges and successes of the interventions, NTU consulted a number of personal tutors. The institution focused on their strategy and approach, on how they perceive the process from a personal and professional point of view, and on what could be changed or improved in order to help facilitate better student support. The study took two terms (September-December and January-April) and involved 22 personal tutors. Consulting them was done in three ways: through focus group meetings, through diaries they were asked to keep, and through personal interviews.

Prior to the start of the reflective diary period (term one and term two), a **focus group meeting** was held to gain insight into how participants view their current supportive practice and allowing them to feed into the design and delivery of the reflective diaries themselves. Although there were key talking points, the meeting was more informal, and the structure of the conversation was loose. Each focus group meeting lasted approximately half an hour and was recorded. Some participants who were unable to join due to a lack of time or availability were interviewed individually; however the objectives remained the same.

The **diaries** were modelled on the Gibbs Reflective Cycle (Gibbs, 1988) and could be filled in online, using the Online Surveys platform. By keeping a diary, tutors were not only constantly encouraged to reflect on their own practices; information could also be generated sufficiently frequently. In the first semester the participants were asked to keep the diary on a fortnightly basis, reflecting on the previous two weeks of their personal tutoring experience. In the second semester this changed to a weekly basis, reflecting on that past week.

The platform presented the participants with some open questions that had been prepared in collaboration with them during the first focus group meeting. First of all, they were asked to describe the interventions they had carried out in detail – both the facts and their (emotional) reaction to those facts – and to formulate their plan of action. Secondly, they were requested to evaluate themselves: What did they do well? What went less well? And what did they learn/conclude from these situations? Thirdly, they were asked what information, data or staff cooperation could have helped them with their interventions and why. In the first semester NTU additionally recorded a closed, quantitative question. The aim of this question was to examine how much time personal tutors spend conducting various types of supportive activities – from using data to identify students, to responding to alerts, and several methods of ‘supporting students’. The participants were able to select multiple answers. However, because the question was interpreted differently by the participants and therefore did not lead to accurate results, it was deleted in the second semester.

Subsequently, a short **reflective interview** was conducted mid-term with each participant. These were informal phonecalls and acted as a ‘check in’ for staff. The interviews were not recorded, and were used simply to ensure that the process was running smoothly.

At the end of the first and second term the participating tutors were asked to attend a **new focus group meeting**. These meetings gave the participants the opportunity to not only reflect on their experience, but to offer their views and advice on improving the process of completing a reflective diary itself. Further, the focus groups helped to understand certain issues and approaches even better. The focus groups were initially face-to-face meetings with other participants and the NTU researcher. After the Covid-19-measures, the meetings continued online, using Microsoft Teams. The interviews were conducted by telephone. Again, key talking points were used, however the conversation remained informal and the structure somewhat loose.

The diaries were **analysed** by the OfLA researchers, with themes collated and discussed during the subsequent end of term focus group meetings and the interviews. In the first semester, 7 tutors participated in the survey and a total of 26 diaries (69 pages) were submitted. In the second semester 15 tutors participated and submitted 77 diaries (139 pages). The regularity of recording feedback and the completeness varied between staff, with some participants recording less frequently than others. The details of the study are discussed extensively in the individual reports: ‘Staff reflective diaries’.

4.2. Summarized results

- The complex nature of the personal tutoring role can lead staff members and students considering a personal tutor to have **multiple roles**, for example academic tutor vs. pastoral tutor, coach vs. problem solver or intellectual/challenging supporter vs. emotional/nurturing supporter (Bell 1996, Clutterbuck 2014). Clearly establishing these roles, for instance in the university personal tutoring policy, at the earliest opportunity is felt to be crucial.
- In order to establish a coaching or mentoring role, staff shared several techniques in **building rapport** (Clutterbuck 2005), which ranged from role modelling to sharing some personal experiences, thoughts and feelings. With some staff interpreting this fundamental stage of the tutoring process so differently, it could be argued that further consideration is needed on how staff can and should effectively build rapport and develop effective relationships with students.
- In building a relationship with the students, staff were often vulnerable to the **negative emotional effects** of supporting students with a problem. Staff not only empathised with their students, but felt this burden themselves, and suggestions were made to help support the staff

with the emotional weight. Establishing a network, forum or a debrief session for staff to be able to discuss issues raised during personal tutoring or to 'wind down' after a difficult conversation may be helpful.

- Personal tutors discussed their own skills and training throughout the process and gave examples of how this impacted their own approach to support. They find it for instance hard to identify the problem of the student, deal with complex personal issues (such as mental health problems), understand the severity of the issues, and subsequently provide the correct advice. Again, suggestions were made as to what could be considered '**essential training**', with a particular consideration for the types of issues they face in their role. Personal tutors were primarily thinking of the 'Mental Health First Aid' (MHFA) training; a programme that NTU already offers to some select staff but which is thought to be useful for all personal tutors.
- It is understood that there is an overwhelming need for '**front-line**' staff to be able to guide the student with a pastoral issue, when often the student themselves are not clear as to the nature of their own issue or when it should be raised
- Personal tutors consistently felt that **completing the reflective diaries** was positive for them. This was in part due to them having the space and time to consider their actions, but more importantly to process their experience on an emotional level.
- In supporting students, participants not only relied on their own skills and training, but often were required to **signpost the student to other services**. This in itself creates its own challenges, and recommendations were made in order to streamline this process and where further investment may be needed. First of all, they want to have full knowledge of the available services of the institution, both internally and externally. Secondly, they need help in diagnosing the problem. A tool, such as a 'flowchart of concern' – already created by a staff member – can be very useful in this respect, it details the type of issues raised, and subsequently points to the most appropriate support service that may be able to help address the problem. Thirdly, the personal tutors advocate to invest more in the various support services to reduce waiting times.
- Finally, participants throughout the study described the **administrative burden** associated with supporting students. A key factor in successful interventions is not only the actions taken during a meeting, but a good level of organisation in order to hold an intervention in a suitable quiet **space dedicated to student support**, and **follow-up** with the student.

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