

## **An open-source early warning system and workshop for students at risk of failing**

**David Hope, Pamela Docherty, Toby Bailey, Susan M Rhind, Margaret J Cullen, Avril Dewar and Helen Cameron**

### **Key Points**

- Established an early warning system (called TRANSIT) that can successfully identify students “at-risk” of failure within eight weeks of starting university
- Trialled the system over three contexts (medicine, maths, veterinary sciences)
- Organised a workshop to support at-risk students in 2014-15 and 2015-16
- Revised training material to focus on near-peer teaching and metacognitive skills
- Disseminated the tool and associated knowledge in a variety of venues including academic conferences, a University of Edinburgh Enhancement Themes case study and a GMC case study
- Used the work as a basis for applying to two additional grants to expand the project
- Created a systematic review summarising the evidence on early interventions
- Established a set of guidelines to be followed after project end

### **Project overview**

This project aimed to identify and better support at-risk students before they failed summative assessment. All objectives were met. In this summary we describe TRANSIT, our systematic review and workshop, dissemination and further work.

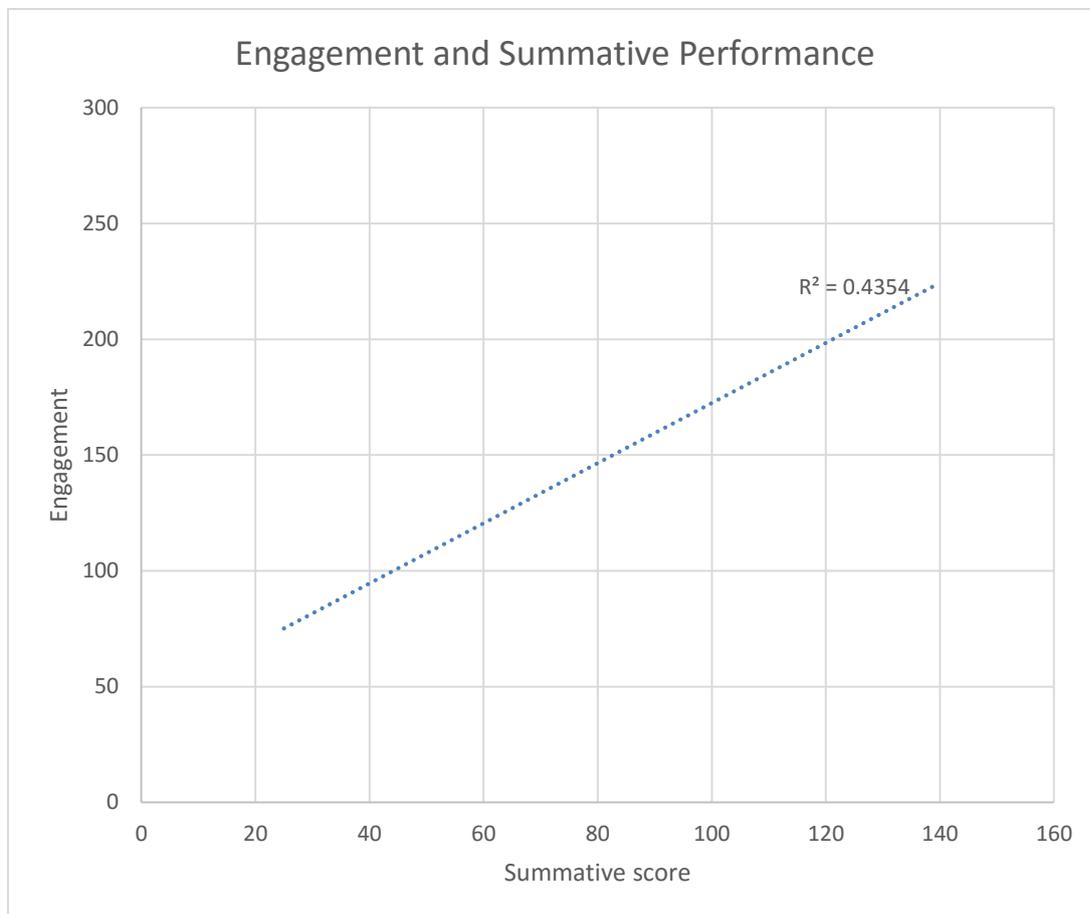
### **TRANSIT**

TRANSIT is a custom-built script designed to run using *R*, an open-source tool for statistics and data analysis (<https://cran.r-project.org/>).

In the initial phase, partners undertook data collection to identify variables useful in identifying early performance risk. The candidate list has been informed by the systematic review and our work in the project over two years, where we evaluated a large range of past and present variables. See the accompanying guidance notes “Data collection – identifying predictors,” document for more information.

Once complete, the partner structured the data in spreadsheet format and sent the data to the project lead who ran the script. This identified any major problems with the data and estimated an “engagement score” for each student. Typical components included attendance at tutorials, completion of administrative tasks, performance on formative assessment and meeting with Personal Tutors (PTs). The engagement score can be used to rank students from least to most at-risk.

The tool has been trialled in medicine and veterinary sciences twice, and maths once. It has proven extremely effective at identifying those most at risk. For example, figure 1 shows the results for year 1 medical students. The engagement score (calculated out of 300) correlates very highly with the summative score on their first set of exams (measured out of 160).



**Figure 1. Correlation between engagement and summative score**

Most of those who were identified as being very at-risk subsequently scored poorly on summative assessment. The model is effective at identifying students who go on to fail or receive borderline pass marks.

We are currently using the results and our experiences with the model to revise the script for ease-of-use. We hope that on completion it will be sufficiently straightforward that a novice can use it with only written guidance.

### **Systematic Review and Workshop**

The systematic review evaluated over 1,500 journal articles examining how to best organise early interventions to support students in difficulty. Sixty six articles met the inclusion criteria. We are currently preparing the manuscript for publication but summarise the findings here.

Using established quality metrics as a benchmark, the overall standard of evidence was poor. Less than half of studies had well-performed analyses and around a third made conclusions that did not follow logically from the results. The effect sizes were typically small, and there was strong evidence of publication bias.

Much of the literature targeted demographic groups considered to be at-risk (social, cultural, or ethnic), students who were considered academically at-risk or those who had failed or were under probation. Success was usually measured by attrition rates, academic performance and ability to apply critical thinking/metacognitive skills after the intervention. Interventions were academic, pastoral, or metacognitive in nature.

The systematic review suggested the success of early interventions was typically exaggerated. However there was some evidence that boosting metacognitive skills – that is, developing student approaches to thinking and learning, or teaching them to evaluate the effectiveness of learning strategies – was useful. Other evidence strongly supported the role of peer teaching.

Our initial workshop was offered to twenty students each in the school of maths, medicine and veterinary sciences (2014-5). Using a staff-developed programme we recruited students near the end of their studies to act as teachers for the first year students and provide a two-hour workshop on metacognitive skills, goal-setting and preparing for assessment.

Our revised workshop (fully informed by the systematic review findings and the first workshop) ran for medicine and veterinary sciences the following year (2015-16). In the revised form, significantly more emphasis was placed on providing the peer tutors with more guidance on best practice and supporting them to create the programme, which allowed it to be adapted to the needs of students.

Importantly, the 2015-16 workshops were run without funds from the PTAS grant. This aspect of the project is now sustainable and we intend to repeat it in future years with interested partners.

Surveys and interviews after the event indicated students and near-peer tutors enjoyed the workshop and felt it changed their approaches to learning. However, attendance was, as anticipated, relatively weak (averaging around 50%). Invitees tended to perform significantly worse on their next summative assessment than the class average. While those who attended outperformed those who were invited but declined to attend, it is not possible to verify whether this was due to the intervention or reflected an underlying tendency to engage more among those students. We are planning significant revisions again for next year in order to try to improve uptake and better support the at-risk students. This is, as expected, a significant challenge that will likely require many revisions before achieving significant success.

For more information about the training material, see the attached document “Workshop training and event outline 2015.”

## **Dissemination and Further Work**

The work has been extensively disseminated internally and externally. Internally, we have presented our findings at the university “Gearing Up” 2016 conference (see attached “Gearing Up slides”) where we advertised the project to other departments. We have also produced a case study for the Enhancement Theme team (see attached “Transit Case Study”) which is now hosted on their website. In addition to this we have been in regular contact between the three partner schools to share best practice.

Externally, we are producing a case study for the GMC on how we are promoting early interventions. We have presented two posters at an international conference on TRANSIT (see attached “AMEE Poster EWS Workshop 2015,” and “Hope 2015 open source early warning tool”). We are currently writing the work up for publication, along with the systematic review.

As a result of our early PTAS-funded work we were able to successfully apply for two additional grants. The first was funded by HEA Scotland (“Faltering at transitions: defining optimal support”) and allowed us to conduct an additional set of interviews with staff and students to highlight common problems when transitioning to university and incorporate these into our training material and feed into our general support strategies. This allowed us to recruit an undergraduate student to collaborate on the project and help revise our training materials. The second was funded by the Enhancement Theme (Student Transitions) at the University of Edinburgh (“Transitions to university – helping students help each other”) and was focused on developing a poster and set of flyers containing helpful messages to support new students using data from the PTAS and HEA grants. This is likely to be published (pending approval from the transitions team) in August 2016.

Besides the funded work we intend to continue developing TRANSIT and the associated workshop. A significant amount of work remains to be done in order to support at-risk students as they transition to university. We are particularly keen to encourage peer support at university and promote near-peer teaching so that when later-year students provide support to new students they are relatively experienced at doing so.

We intend in the meantime to write the results of the project up and seek publication.

## **Outcomes summary**

- The funds provided by PTAS allowed us to establish a large, cross-university scheme to support transitioning students
- TRANSIT and the workshop are now established and can be developed on an on-going basis with no further funds
- The systematic review suggests that early interventions are less likely to succeed than previously thought, but that a focus on metacognitive and near-peer support may be helping
- Two case studies, two conference posters, one conference presentation and two additional grants have been developed from this work

- There is significant interest in this topic in the university and we intend to continue sharing our work with other schools and the wider academic community
- We hope that the dissemination of our work (especially the publication of the systematic review) will help develop the field of early interventions

### Staff Development

We would highlight the following points in particular:

- Even as experts, staff cannot always clearly identify the support at-risk students need and so the input of later-year students may prove critical but further iterative work on this is required
- Projects involving multiple schools can be beneficial due to broader expertise and novel approaches to problems
- It can take multiple cycles before such projects reach maturity, so long-term planning is especially advantageous to avoid “one-off” pilot studies

### Output

| Title  | Detail  | Date             |
|--|---|------------------|
| A free, open-source early warning tool for students at risk of failing assessment.         | Conference poster presented at AMEE, Glasgow.   | September 2015.  |
| An “early-intervention” metacognitive skills workshop for academically “at-risk” students. | Conference poster presented at AMEE, Glasgow.   | September, 2015. |
| Building supportive communities by promoting student-led transition teams.                 | Conference presentation at the University of Edinburgh “Gearing Up” conference. The lead author was our student team member, Chiara Ventre. | March 2016.      |
| Building supportive communities.   | A case study provided to the Enhancement Themes team.   | February 2016.   |
| An early-warning tool for students at risk of failing assessment.                          | A case study provided to the GMC.   | Ongoing.         |
| Training Materials   | We are collating all training materials into a single manual for dissemination.   | Ongoing.         |

We are currently writing up three papers for publication based on the two poster presentations and the systematic review.