
Student mental health risk monitoring: a Moodle analytics package

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Abstract

The emergence of early warning systems within schools and universities has focused primarily on identifying students in need of academic support to promote achievement and retention. However the same data, can be used to detect risks of mental health and to promote wellbeing.

We describe a Student Risk Monitor, a holistic early warning system with the aim of being generalizable across multiple courses and institutions. The software developed incorporates state of the art in academic analytics research to implement a set of rules that can be customized and combined to target a range of risk indicators, in addition to questionnaires for student self- reporting. The work also acknowledges the importance of instructor action by incorporating an in-built intervention function. Preliminary feedback from Australian primary and high school teachers has been mostly positive, with feedback indicating that the software is suited more for secondary and tertiary institutions and could be improved with student visualizations to promote self-regulation. Further evaluation of the software is required to assess its usefulness and usability.

Author Keywords

Mental health, positive computing, learning management system.

ACM Classification Keywords

H.5.2. User interfaces; J.3.c Medical information systems

1. Introduction

Academic early warning systems (EWSs) are tools increasingly used within learning management systems to assist instructors in identifying students who may be at academic risk, by analyzing data about their usage of the learning management system. The systems are based on research in the field of academic analytics, which aims to explore the relationship between learning management system variables and student learning and achievement. Research in this area is promising and suggests that forum use, course activity, assessment completion and grades can all be useful indicators of student participation and engagement as well as predictors of student achievement.

The broad aim of these systems is to improve student retention rates and/or achievement by alerting instructors of students who may be in need of support, so that early action can be taken. These systems have been successfully implemented in various universities throughout the world, and although the empirical data is lacking due to the newness of the field, two longitudinal studies have demonstrated significant effects on student retention and achievement [6].

However, despite their effectiveness, the systems could be potentially improved by also including input from the underlying cognitive appraisals and achievement goals

of students, which have been consistently shown to influence student's emotions, learning and achievement (e.g. [2, 6]). Research with both elementary and high school students has shown that interventions used to target appraisals and goals lead to substantial improvements in performance, motivation, and positive emotions. These interventions have also successfully been administered online [5], suggesting that incorporating them into early warning systems combined with self-reporting from students could lead to earlier intervention than current EWSs allow.

Additionally, the widespread application of the predictive models is limited, as patterns in learning management system use are often not generalizable across multiple courses. Learning management systems are designed to be content agnostic and dependent on how instructors integrate them into course specific activities. As such, relying less on prediction and more on incorporating individual sources of data that have proven to be useful indicators of student risk should allow early warning systems to be more widely applied.

The aim this work is threefold: firstly, to develop a holistic early warning system, Student Risk Monitor, based on a review of the current literature, combining student online learning management system usage with subjective data to provide a rounded view of student risk to instructors. Secondly, to incorporate an intervention functionality to promote action on behalf of the instructor in response to identified risks; and finally, to develop a piece of software that can be customized for use across multiple courses and institutions. This early warning system is implemented as a plug-in for the popular open source learning management system Moodle

Student	Procrastination	Perfectionism	Disengagement	Mindset
Manelle Phipps	●			●
Larni Kelleher	●		●	
Nicholas Tridgell	●		●	
Matthew Phillips	●		●	
Jenny Test			●	
Stephen Carydis			●	
John Test	●			

2. System Description

The Student Risk Monitor Module includes a series of Moodle blocks that can be added by instructors to the home page of any course they want to track. A single Moodle block produces two different interfaces for instructors and students. Figure 1 shows an instructor view. The key constructs of the application are rules, categories and interventions

Rules are the fundamental building blocks of the module, and are used to determine risk levels for each student. Rules can be either Moodle-based, using data obtained from the learning management system, or questionnaires, using subjective data obtained from the student. All rules have thresholds which specify the different levels of risk (which can be high, moderate, or low). Rules involve: 1) Online activity (days without logging in, total clicks in the course) 2) Achievement (overall grade, number of assessments failed) 3) Forum use (messages posted, messages read, compared to peers) 4) Interaction with assessments (deadlines missed, multiple submissions for one assessment, first view close to due date) and 5) Questionnaires to gauge student appraisals and achievement goals. Student academic goals and appraisals have been empirically shown to influence emotions and academic achievement, and as such functionality allowing teachers to obtain this information from students is highly valuable.

Categories are used to represent risks and contain one or more weighted rules, for combining risk factors that may be indicative of a higher level risk

Interventions describe responses *by the teacher to a student* who has been determined to be at-risk for any given category. Instructors can generate interventions to respond to certain risks and use templates or create new ones. Interventions can include: text, links to external sites, uploaded files. Appear as a web page that is linked by the student's block

3. USER FEEDBACK

Preliminary feedback from three teachers has been mostly positive. Two primary school, one high school were interviewed. Three different learning management systems used, and to varying degrees

Personal usefulness of the module was across the board, with one saying that they would use it in their teaching, one unsure, and one saying they would not use it However all three believe that **students would benefit from use of the software**. The most popular feature of the module is the use of **intervention templates**, with all three strongly agreeing that a) templates make the software easier to use, and b) that the feature is useful. One teacher suggested **giving feedback directly to students**, to allow self-regulation and reduce load on the teacher

Conclusions and Future work

Although most research in learning analytics and learning management systems has been focused on supporting learning academic skills proper, and detecting students at risk of not achieving the learning outcomes, an increasing number of HCI and learning technologies researchers believe that supporting mental health and wellbeing is just as important [4,7].

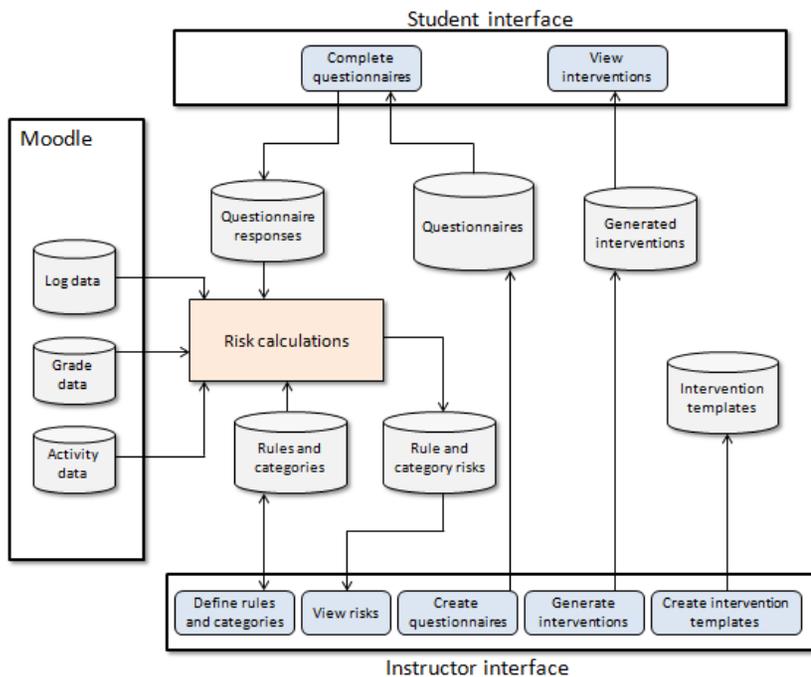
The prototype for the student risk monitor has been built and shown promise with a small group of target users (school teachers).

In the near future we hope to run a pilot in a classroom setting to examine how instructors use it and what effects it has, if any, on student's appraisals, goals and learning behaviors

We would like to funnel feedback directly to students, such as Purdue University's early warning system [1] which lets students know directly that they are at risk

It would also be useful to track students in the longer term with new data visualization to identify recurrent problems.

All this work requires constant collaboration with psychologists to develop default intervention templates



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