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Mathematical literacy of students in teaching mathematics in the first year of studies

Soňa Švecová¹, Iveta Kohanová² and Janka Drábeková³

1 Slovak University of Agriculture in Nitra, Faculty of Economics and Management, Nitra, Slovak Republic, svecovas@uniag.sk

2 Comenius University in Bratislava, Bratislava, Slovak Republic

3 Slovak University of Agriculture in Nitra, Nitra, Slovak Republic

The aim of the project outlined in this paper is to launch a new performance tracker of students' mathematical performance. Our project consists of two parts – data collection and analytical assessment – both of which will happen over three academic years. The data collection will result in a detailed database of students' math grades. This will provide us with a solid basis for understanding the overall performance of our students and any links between students' secondary education background and their university grades. More broadly, we aim to gain more insight into approaches to students' motivation, and, over time, we aspire to track the impact of any changes to lecturing materials or assessment framework on students' performance. As lecturers this will also add an indirect feedback loop for the quality of our teaching, for students from various types of schools. We aim to publish our findings by 2017.

Keywords: Student performance tracker, mathematical literacy, motivation.

INTRODUCTION

The aim of the project outlined in this paper is to launch a new performance tracker of students' mathematical performance. This database will serve as a platform for analysis and understanding of determinants of student performance, their motivation, and background and indirectly we can quantify the impact of changes of syllabus. Whilst the tracking of student performance is common in Slovak pedagogical universities, we are the first group to research and propose a performance measurement tool in a setting of an economics faculty. The project proposal is focused on university education. We aspire to factor the relevant information into our ongoing live project. Our project consists of two parts – data collection and

analytical assessment, both of which will happen over three academic years. The data collection will result in a detailed database of students' math grades. This will provide us with a solid basis for understanding the overall performance of our students and any links between students' secondary education background and their university grades. More broadly, we aim to gain more insight into approaches to students' motivation, and, over time, we aspire to track the impact of any changes to lecturing materials or assessment framework on students' performance. As lecturers this will also add an indirect feedback loop for the quality of our teaching.

RESEARCH PLAN

Our envisaged broader plan of action is the following: Our data collection begins in the current academic year of 2014/15, where we are able to track and store mid-term student scores, end of term exam grades as well as secondary education information. At the end of the current academic year, we will have sufficient data to draw simplified conclusions. We are particularly interested in the link between students' secondary school mathematics performance and their exam scores in our faculty. We are also keen on exploring the progression determinants of the students' first year mathematical performance: starting from mathematics admission test at our faculty, through any mid-terms test scores up to the final exam grade.

We have developed theoretical hypotheses about determinants of students' university performance using a variety of available literature sources.

Our statistical analysis of the collected data will provide a test for validity of these assumptions in the context of a Slovak university setting.

We also aspire to be able to draw broader practical conclusions about student motivation based on factors such as composition of tutor groups, student geographic background and the type of secondary school and the graduation score from mathematics. We would like to identify the motivation of students by short pre- and post- questionnaires or interview from a random sample of students. Research (Anderson, 2007; Rock, Gregg, Ellis, & Gable, 2008;) suggests that, if we would like to support differentiated classroom practices, we will have to continually assess, reflect and adjust content, process, and product to meet students' needs. On a more personal note, our own competence as lecturers can be greatly improved by having more data points and statistical evaluation at hand.

In the academic year 2015/16, we will use the same data collection and analytical approach and this time with a new set of first year undergraduates and the same process will be repeated in 2016/17 as well. Of note, the students at our faculty only have first year undergraduate mathematics; because after this first year of study they have only optional mathematics and statistics is provided by the department of statistics at our university. Hence our data set is different each academic year.

RESEARCH EXPECTED OUTPUTS

With a three-year data set, we will then be ready to draw more robust conclusions and identify the causality between mathematical performance and prior education background as well as the teaching framework at our faculty. We have to be very careful when working with data. For example, we need to be attentive to the complexities generated by the type of secondary school students come from. However, we would propose creative uses of pedagogical propositions that accommodate for differentiated learning. Tomlinson (1999) offers a caveat: "For all its promise . . . effective differentiation is complex to use and thus difficult to promote in schools. Moving toward differentiation is a long-term change process" (p. 6). It would be simpler and less invasive form of introduction of specialized mathematical seminars for students from various types of schools.

We aim to publish our findings by 2017, with a publication that highlights the determinants of the quality of education in our university.

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