



## A DIGITAL TOOL FOR IMPROVING ENROLMENT AND COMPLETION RATE OF MASTERS' STUDIES

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### ABSTRACT

This paper presents a project, funded by Erasmus +, Strategic Partnership and conducted in by three European universities from; Sweden, Spain and the UK, in cooperation with a software company. The project aims to remediate the problem of masters' students who do not get their degree within the allocated time or even drop out from universities. The underlying cause is identified as students that have the formal prerequisites to register for a master's programme may still lack crucial previous knowledge and/or abilities to manage the studies.

The suggested solution was to develop learning resource modules for four different master's programmes in Europe and create a HTML5-platform to house them. The modules are intended to illustrate the different abilities and level of previous knowledge that applicants are supposed to bring into their studies by a suitable entry profile for the master's course identified by lecturers.

The access modules provides potential students with a self-assessment test divided in twelve parts. A visualization of the level of the twelve different skills or field of knowledge are then compared to the suitable entry profile for the master's course. Whenever weak spots in the prospective students' ability are identified, the students are presented with a series of learning interventions designed to remedy flaws in their ability.

The authors argue that the use of similar access modules could improve enrolment, completion rate, time-to-degree and retention in a wide range of educations.

**KEY WORDS:** Enrolment; e-learning; masters' education; higher education; educational technology;

### 1. INTRODUCTION

This paper is a amended and extended version of Preparing for Masters' Studies: A web based tool for self-assessment and knowledge gap mitigation Garrote et al, EDULEARN 18, Mallorca, Spain.

The idea behind this project was that potential students should have an opportunity to find out if their previous knowledge and skills are suited and/or sufficient for a particular study programme before they apply, but the self-assessment test was decoupled from the admission processes. In case they lack some desired ability, they should have an opportunity to mitigate knowledge gap before starting their courses.

Such a resource could help educational institutions recruiting the desired talent to programmes, but also help students that are struggling to hang in and complete their education by providing learning resources to mitigate gaps in their previous knowledge. The design of the access modules developed in this project can readily be used to develop similar modules for other levels of education (e.g. bachelor's programmes or vocational training).

### 2. BACKGROUND

In most countries tertiary education are organized in a similar way, students start with a few years of grad courses and then apply for the next level, i.e. masters' programme. The importance of education can be seen by the resources that are allocated to higher education by government. According to the World Bank Group



(WBG) there are around 200 million higher education students in the world in 2017, up from 89 million in 1998.

Because youth population continues to swell and graduation rates in secondary school have increased in recent years, especially in regions like South Asia, Sub-Saharan Africa and Latin America there is an intense demand for expanded access to tertiary education.

In Latin America and the Caribbean the number of students in higher education programs has nearly doubled in the past decade and a student with a higher education degree in the region will earn more than twice as much as a student with just a high school diploma (Worldbank.org, 2018).

### **Government expenditure per student in tertiary education, as % of GDP per capita**

The map below shows how Government expenditure per student, tertiary (% of GDP per capita) varies by country. The shade of the country corresponds to the magnitude of the indicator. The darker the shade, the higher the value.



Figur 1: <https://www.indexmundi.com>

Europe is unifying and standardizing the structure of their masters' level education through the Bologna initiatives with support of the European Union. The Bologna process for standardization of European higher education specified an undergraduate degree of at least three years called the "license" or bachelor's degree, followed by a two-year diploma called the master's degree, then a doctorate, meant to be obtained in three years. However, the process is not yet fully accomplished and the situation varies between countries within the European Union.

### **Educational attainment, at least Master's or equivalent, population 25+, total (%) (cumulative).**

The map below shows how tertiary educational attainment, at least master's or equivalent varies by country for the population over 25 years of age. The shade of the country shows how many % are studying or have completed a masters' or higher degree.



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Figur 2: <https://www.indexmundi.com>

When students apply to a master's degree programme, they must show that they have the necessary background, or prerequisites, to be successful in the programme. Most of the time, they must hold a bachelor's degree in the field in order to be admitted to a master's degree programme. Some graduate-level programmes don't require you to have a degree in a particular subject, while others require a degree in a related discipline. Some programmes will also require that you meet certain course prerequisites, for example certain healthcare programmes will require that you have a predetermined amount of clinical or laboratory experience.

When this project was initiated it was considered a problem that many students had the formal prerequisites to register for a master's programme, but still lacked skills or competences that are important to be successful in the master's courses. As a result, many students did not get their degree within the allocated time and several dropped out without a degree. Of all students that enter a master's programme in Europe about two thirds will get their degree (Eurostat, 2017; OECD, 2016, 2017; Xenos et al., 2002).

Before sending the application for funding of this project a little survey was conducted by sending an E-mail to 90 European and 10 Latin American universities, presenting the idea of the access modules and asking "Do you think that such a module is of interest and relevance to your Master's program?" The responses indicated that most universities experience similar problems with recruitment and retention of students.

### 3. THE PROJECT

The primary objective of this strategic partnership was to design an online platform to house free (on- and off-line) access modules to four master's programmes in Europe. The modules are intended to help universities attract suitable students and prepare them by evaluating and improving knowledge and skills that are pertinent in order to successfully study on the master's programme in question.

Information about the masters' programme, such as future employment options and recommended background and experience (even if it is not required in order to apply). An important aspect of a masters' programme is how well it meet with demands from industry and society. Employment rate and salaries of graduates are important both for students that are considering a career in a certain field and for government allocating resources to education (Barr, 2004; Sav, 2017).

Each access module provides potential students with a visualization of their existing skills and knowledge as compared to those identified by lecturers as necessary for study on the master's course. If there are any weak spots identified the student are presented with a series of learning interventions designed to develop the required abilities. Users are also presented with an option to enjoy all learning resources. The study material developed in this project had to be licensed as Open Educational Resources (OER) (Atkins et al., 2007; D'Antoni, 2008), i.e. free to redistribute and use for public education in accordance with the Paris Declaration (UNESCO, 2012).



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#### **4. THE PARTNERS AND THE PROGRAMMES**

There were four partners in the project; three universities; University of Borås (UB), University of the Highlands and Islands (UHI), University of Alcalá (UAH) and a soft-ware developer; Digital Connexions Ltd, (DC). UB is responsible for project coordination and for developing the subject-specific content for the access module for Textile Engineering. UHI worked with Digital Connexions on the development of the HTML5 System and is responsible for the subject-specific content of the access module for their Masters in Education and the module for Master in Leadership and Management.

University of Alcalá is responsible for evaluation of the project implementation and development of subject-specific content of the access module for the Masters in Telecommunication Engineering. At the same time, but not funded by this project, UAH has also developed a access module for a MSc in Aerospace and Defence Technologies.

The soft-ware company Digital Connexions Ltd is responsible for the development of the HTML5 System and development of the source code for the on-line diagnostic tool.

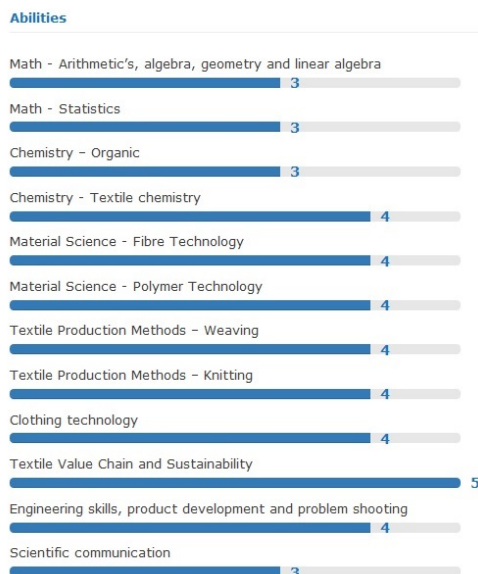
Instructional video on how to use the platform, as well as information about the project for students and teachers, was developed and published by UHI.

#### **5. THE DEVELOPMENT OF THE MODULE FOR MSC IN TEXTILE ENGINEERING**

The University of Borås (UB) was responsible for the access module for MSc in Textile Engineering. For the self-assessment feature teachers identified twelve different areas, based on their BSc learning outcomes and MSc admission criteria where new students should have particular qualification levels. For each area the users were supported by level guides to judge what level statement that best fit their current status. The module offered six predefined levels of increasing learning outcome fulfilment. After completing a learning interventions students can reassess their skills and knowledge.

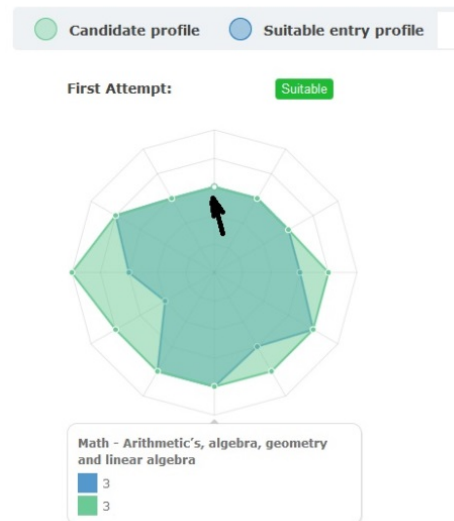
Each of the 12 areas or abilities listed below corresponds with a node in the diagram (fig.2) The darker area in the diagram in fig.3 (the “Suitable entry profile”) illustrate an estimation from teachers on the masters’ program of what it takes to successfully complete the studies.





Figur 3: A prospective student's assessment of his/her abilities

Module applied for: **MSc in Textile Engineering**



Figur 4: Diagram illustrating the comparison between assessment and the desirable entry profile

Before the module was made available online a survey was conducted to find out how students at the (two year) Master's Programme in textile engineering at UB responded to the idea. Present students in their 1st and 2nd year together with recently graduated students were invited to respond, out of 15 objects 11 or 74% replied. The results confirmed that many prospective students would appreciate a possibility to test their pre-knowledge and prepare for courses with self-studies. 55% of the respondents said they may had been more reluctant to apply for the programme if they had had gaps in their knowledge identified. So, while it may be necessary to create awareness among some potential applicants that are not suited for the programme, there is also a risk that suitable potential students are unnecessarily discouraged by the test.

## 6. DISCUSSION

For a university there are many ways to evaluate and improve their results, as measured by government and society. OECD's annual Education at a Glance (OECD, 2017) looks at who participates in education, how much money is spent on education in different countries and results. Results include indicators on the impact of education on earnings and on adults' chances of employment. Below are four statistical indicators of productivity; i.e. to what extent a university or a programme is successful at making their students get a degree. Enrolment; i.e. to recruit the most suited prospective students. Completion rate; make students successfully complete their studies with a degree. Time-to-degree; make students complete their studies within a specified time period. Retention; encourage the less successful students to re-enrol in a study programme and get a degree rather than drop out (Clark and Ma, 2005; Crosling et al., 2009). For educational institutions these indicators may be used to evaluate the work of adapting education to the demands from society and students. These four points are strongly connected, the first three reflect different results of students starting on programmes that they are not suitable for, or at least, are not prepared for. The fourth point is different. People representing government and industry tend to look at studies as an investment of time and resources that should increase future productivity and generate more tax income. Many academics would argue that enrolment in higher education may be beneficial for society and personal development even if it does not result in a grade or financial gains (Ferrante et al., 2017).

While we, the authors, adhere to the latter view, we find it of paramount importance that young people are guided to make informed choices about their future and that accurate information should be available to potential students before they apply for a programme. The access modules described in this paper can give prospective students much of the information needed to avoid the possible frustration and cost of a failed



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attempt to earn a degree, and provide suitable material for those who want to prepare for their selected programme.

The modules described above provide three things for the visitor; information about the programme, evaluation of their suitability and links to study material for those who want to remedy weak points in their knowledge, or further augment their abilities to come even better prepared for their studies. Today almost all universities have a webpage which is the natural starting point for potential students looking for information about academic programmes.

The AToM platform developed in this project is similar to many existing Learning Management Systems (LMS). The features that are required to utilize these modules (i.e. self-test(s), repository for multimedia and text, tools for communication and interaction) can be found in most LMS, similar modules could be developed and housed in a free-to-use LMS such as Moodle (moodle, 2018).

In countries with limited internet access free study material can be distributed on memory devices, i.e. USB-sticks. The modules described here are well adapted to be distributed off-line and it is also possible to store them together with an operational system on the memory device. To bring together study material and all the software needed to utilize it on a memory device have previously been proposed by the authors of this paper under the name Live USB Mediated Education (Garrote Jurado and Pettersson, 2011; Garrote Jurado et al., 2011).

Much study material that may be suitable for this purpose can be found as Open Educational Resources (OER) that is already available online (Atkins et al., 2007; D'Antoni, 2008). Even if it was not demanded by the funding agency it would be necessary to use free instructional material, text or video exclusively because it is impossible to prevent copying and redistribution of the material. In this case the funding agency requested that the study material developed in this project had to be licensed as OER, i.e. free to redistribute and use for public education in accordance with the Paris Declaration (UNESCO, 2012).

## **7. REFLECTIONS AND RECOMMENDATIONS**

To many people it would probably be more helpful with tests of previous knowledge and study aptitude than the self-assessment currently integrated in the modules.

We recommend all universities to market their programmes online, present general information about higher education and careers, provide potential students with the opportunity to evaluate their suitability for different programmes and offer some study materials or learning resources for those who want to remedy weak points in their knowledge or just want to prepare for studies.

Existing LMS provide all features that are required to utilize these, hence the platform developed in this project is not necessary for this to work.

In order to make higher education accessible to growing numbers of students, we strongly advocate a wider use and production of OER. This way computer-assisted education at low cost can be accessible world-wide, and in particular help developing countries to provide education as stated in article 26 of the Universal Declaration of Human Rights: "Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit" (Assembly, 1948; Atuahene, 2008).

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