

## **Universidade Júnior, a project to motivate school pupils**

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**Resumo** — Este artigo apresenta uma experiência inovadora feita na Universidade do Porto para motivar alunos do ensino básico e secundário para o estudo das áreas académicas. Na maioria dos países desenvolvidos continua a haver condicionalismos económicos no acesso à educação superior. A massificação da educação superior não garantiu a equidade de acesso e, para além dos condicionalismos económicos, muitos factores sociais continuam a pesar nas escolhas dos jovens. Para muitos, a opção por uma educação universitária é ainda uma experiência em primeira geração e o desconhecimento da vida académica e das escolhas oferecidas é total. A escolha por áreas de ciência e tecnologia obriga a uma disciplina de trabalho desde idades baixas que nem sempre é apreciada. Em todo o mundo, as universidades têm experimentado estratégias para se darem a conhecer aos jovens do ensino básico e secundário com intenções de melhorar o recrutamento ou com objectivos mais altruístas de motivarem esses jovens para os valores académicos. A experiência aqui descrita não tem paralelo conhecido pela dimensão e pelo tempo e profundidade da experiência proporcionada aos jovens. Tem assim a intenção de demonstrar a exequibilidade do projecto e de fazer uma primeira avaliação preliminar do seu impacto.

A Universidade do Porto recebe cada ano cerca de 4.000 novos estudantes vindos do ensino secundário. No projecto aqui apresentado recebeu no mês de Julho um número superior de jovens para uma experiência de uma semana em tempo inteiro com acompanhamento personalizado e para uma actividade quase individual. Este objectivo exigiu a organização de actividades adaptadas às idades dos jovens, dos 11 aos 17 anos, e às diversas áreas científicas da universidade. Para além de três linhas de propostas para idades 11-12, 13-14 e 15-17, foram propostas actividades de alto nível em Física em Ciências da Vida e da Saúde e ainda escolas de línguas em espanhol, francês, inglês e alemão. Com a intenção de oferecer esta oportunidade de conhecer a vivência universitária a jovens de outros pontos do país, foi também organizado um regime residencial com acompanhamento profissional dos jovens desde o termo das actividades pelas 17h até às 9h do dia seguinte. O número de participantes em cada semana já se aproxima dos 1500 o que pode estar próximo da capacidade limite da universidade em espaços disponíveis (em período de exames dos próprios estudantes) e das cantinas para que as actividades normais da universidade não sejam afectadas.

Note-se que esta foi uma preocupação desde o primeiro momento para garantir a aceitação do projecto pela comunidade académica e a sua sustentabilidade futura.

A despesa principal do projecto é o pagamento aos monitores, um por cada grupo de 7 alunos participantes, e as refeições. Para cobrir estas despesas, definiu-se uma propina de participação, sendo as despesas adicionais de organização e de funcionamento suportadas pela universidade com o apoio de fundos governamentais específicos e dos municípios de origem.

Feita a divulgação nas escolas, a resposta dos jovens foi excelente logo no primeiro ano. Regista-se que a adesão de jovens de 16 e 17 anos é mais lenta por razões que podemos associar ao seu perfil psicológico de adolescente. A maioria dos municípios contactados ofereceu algum tipo de apoio que foi desde os transportes diários até ao pagamento da propina ou dos custos de alojamento. Os inquéritos de satisfação dos participantes e dos pais deram resultados muito positivos que também puderam ser apreciados pela repetição de inscrições que verificamos. É ainda cedo para analisar o impacto nas opções individuais de continuação de estudos mas alguns resultados preliminares sugerem que este efeito poderá ser muito notório.

**Abstract** — *Universidade Júnior* is a pioneering initiative launched by the University of Porto to receive school pupils for week long projects (Monday to Friday, from 9 to 5) in its laboratories. In the first edition, the number of pupils accepted was higher than the yearly intake of undergraduate students in the university and this number may grow in future. The impact on school children was enormous, right from its first edition, with high demand and very good evaluation from pupils and from their parents. The long term effects are yet to be measured but initial data suggests that its impact on career decisions may be very marked.

Each pupil is welcome in the university for a week-long project under the supervision of a junior tutor. Normally, two groups of seven pupils are formed, each group with his tutor under the coordination of one member of the academic staff. In this way the disturbance to the normal activities of teaching & learning and research are kept to a minimum and the acceptance of the project by the whole university community was very high. Specialized projects were set up for different age groups and special programs were designed for the very top pupils in high school.

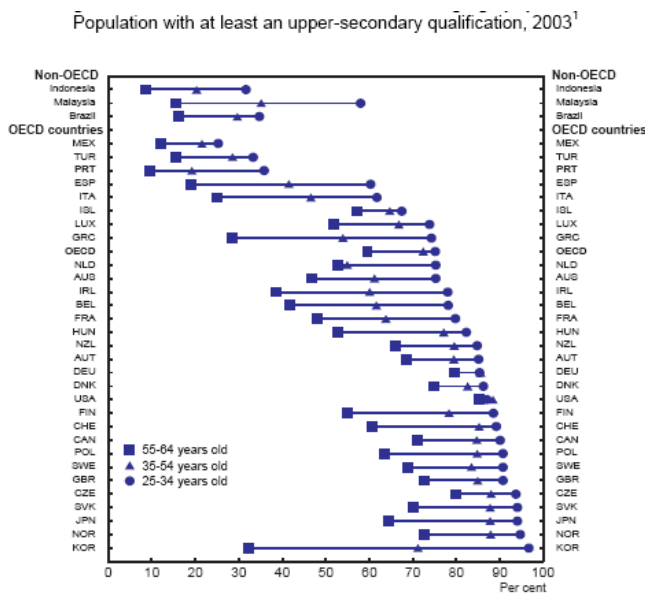
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*Index Terms — Motivating pupils, choosing science and engineering degrees.*

## WIDENING ACCESS

Increasing and widening access to higher education is a policy goal pursued in many parts of the world for a variety of reasons that go from economic and social development to social cohesion. European countries had a fast increase in participation after World War II, but feel now that they may be losing ground to other parts of the world. Indeed, data from OECD show how Korea could leap forward in a very short time span<sup>1</sup>, overtaking all other countries.

**Figure 1**  
Educational attainment of the working-age population



Portugal followed this trend with a time lag of some twenty years and faces still a problem in upper high school. In fact, many youngsters and their families do not appear to understand the rewards that staying in school may give them. This may appear very surprising as the penalty for dropping out is in fact very high, both in terms of unemployment and average income.

The situation is particularly difficult for boys so that different strategies are being pursued in many parts of the world to induce them to stay in school. The problem is complex and requires a multitude of strategies targeting different publics with different detailed goals.

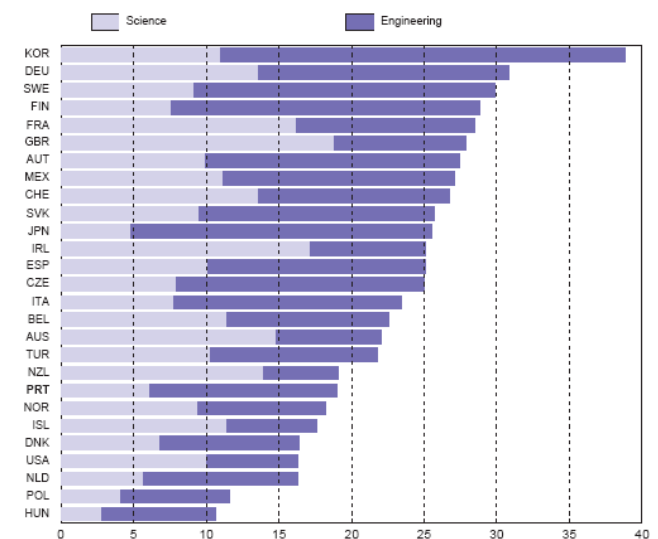
The massification of higher education does not guarantee automatically fair access to all social groups. Economic difficulties may still play a role and this appears to be the case in most countries where net participation is reaching 50%. But other social reasons may become dominant. For a

particular family, we are dealing with the first generation to reach the university gates and the lack of information about academic life and about the options offered is paramount. Many youngsters and their families just assume that university is not for them! It is this social group that may gain the most when an opportunity is created for some contact with the university life at an early age. But this is not easy as short one day visits do not open the necessary communication channels and the discourse of adults, academics or non academics, may be of little impact. Having contacts with other youngsters of a similar age is far more productive but this is just the interaction that is lacking in these target social groups.

## SCIENCE DEGREES

From the point of view of sustainable development, the apparent general trend away from science and technology areas is particularly worrying. The US is a net importer of graduates in these areas with almost 30% of the employed PhD holders in science and engineering being foreign born. Some European countries see a shortage of graduates coming soon and the distance to Korea graduation rate is enormous<sup>2</sup>.

**Figure 2**  
Science and engineering university degrees  
As a percentage of total new university degrees, 2003



In Portugal, as in other European countries, the demographic decline produced a reduction in the number of students seeking entrance to the university. Coupling this with the trend towards professional degrees, the areas of Science and Humanities find themselves in great difficulty to attract students or even to keep their numbers, a situation common to most of Europe.

## UNIVERSIDADE JÚNIOR

What should be done to keep the interest of youngsters for the school? This is a very complex question with many different lines of attack. It is not the aim of the present paper to do that but only to describe a single project designed and put into practice in the University of Porto in the last two years. The results are such that other universities may be wishing to replicate it. The description that follows aims at showing how it can be implemented and the results assessed. The University of Porto, with 22.000 undergraduate and 5.000 graduate students, is the largest Portuguese university. It represents less than 10% of the students but more than 20% of the Portuguese research publications. Most undergraduate students come from the nearby region but it is hoped that this influence may widen as the students may become choosier in the future. Within one hour drive, there are another four public institutions totalling more than 40 000 undergraduates. For many years, most departments had some initiatives bent towards school pupils, from open days to visits to the schools' events. The unique centralized initiative was an event where the education and research offer is shown to the town and region. It usually runs for three days attracting up to 12.000 visitors. A government program has been running for some time where school pupils are placed in academic research labs for anything from a few days to a few weeks mostly during the summer vacation and involving a few hundred pupils nationwide. All these very different activities are considered successful in bringing pupils in some contact with what the university has to offer. However, we felt that none had the duration that allowed an enduring effect or the dimension appropriate for an institution that takes some 4.000 new students each year. To that end, we decided to design a program<sup>3</sup> that should take in a few thousand pupils, allow them a wide choice within the university, with stays of a week full time, using the vacation time in schools and in the university.



**Figure 3.** The site of *Universidade Júnior* where all information is available and is the sole point of contact for pupils and university staff.



**Figure 4.** *Universidade Júnior*, Summer Experience, 11-12 year olds, a physics activity. Groups of not more than 7 pupils work with one mentor on rotating activities.

To welcome more than a thousand full time working pupils at any particular time, a strict organization<sup>4</sup> had to be set up as resources were frequently being tested to the limit, from canteen seats to laboratory space and we do not have in the university staff trained to deal with youngsters from 11 to 17 years of age.

Several programmes were organized to answer pupils' ages and expectations.

1. Summer experience for 11-12 years old;
2. Summer workshop for 13-14 years old;
3. Summer project for 15-17 years old;
4. School of languages for 11-17 years old;
5. Physics school for 17 years old;
6. Life & health sciences school for 17 years old.

All programmes are designed for a week, Monday to Friday, 9 am to 5 pm, but for the language school that runs for two weeks. The “experience” and “workshop” programmes are designed to cover several scientific areas in different buildings of the university so that the pupil can sample a wide variety of academic cultures. In the summer project, each pupil is given a personal project that he/she is expected to develop along the week. In all cases, the youngster will take home at the end of the week the outcome of his/her work.

## DIVERSIFIED ACTIVITIES

The activities are designed in a way that all pupils will be “doing things” while learning something and understanding the inner workings of a particular academic area. They are always organized in groups of up to 7 pupils under the supervision of a leader who is selected from graduate students or recent graduates. The Language school has a similar organization for Spanish, French, English and German. The learning is done by simulating immersion in the language while developing activities adapted to the group’s age under the leadership of a young graduate that is in most cases a native speaker of the language chosen.

The last two schools, in physics and in life & health sciences run for a week with a very selective group of not more than 50 pupils. As the number of places offered is very limited, they tend to be the very top from each secondary school.

Each student is given the opportunity to develop a personal project along a researcher, normally a PhD student in one of the university laboratories. Friday is conference day where the results are presented in the format of a scientific meeting.



**Figure 5. Universidade Júnior, Summer Project, 13-14 years, a biology activity. Each student executes a week-long project under the supervision.**



**Figure 6. Universidade Júnior, Summer Workshop, 13-14 year olds, taking the height of the sun. Each group visits four different scientific areas along the week.**

The aim of the whole project was to take in a wide range of pupils, with different ages but, more important, with different motivations for school work and varying ideas about future study and work. The range of activities on offer was such that all pupils could fit well into the university experience. The invitation to participate in the *Universidade Júnior* was sent to schools across the country and partnerships were established with many municipalities that volunteered to somehow help pupils from their region participate. This help ranged from substituting the pupil in paying the small participation fee to daily transportation to and from Porto. In general, municipalities up to one hour drive preferred to bring in pupils every day while others were lodged in Porto. This required a special programme to scout the youngsters in the evening and night. The number of participants from far away places is growing as the programme becomes known and the quality of the experience passes on.



**Figure 7. Universidade Júnior, visual arts activities. Each pupil is invited to very different areas of the university.**

## PRELIMINARY ASSESSMENT

*Universidade Júnior* was put on offer twice, in 2005 and in 2006. It is too early for a full assessment of all impacts but some conclusions can be drawn on the feasibility and impact upon the young pupils. The question of feasibility is important as the institution is taking responsibility for a few thousand minors, an experience foreign to its daily life. The collaboration and daily presence of the senior academic staff is crucial. We took the view that all proposals of activities should come from senior staff but the direct contact with pupils should be limited to young graduates and this strategy worked very well. The quality of the mentoring is likely to be improved when the age gap is smaller but the background support is always there to amend difficulties or correct deficiencies. The overall coordination is rather complex for such large numbers: At any particular time, there will be more than a thousand pupils and more than two hundred mentors with different activities, in different places in town and with some field trips as required by many disciplines. Putting together in the same programme activities ranging from poetry to engineering, from music to mathematics, from painting to biology, from languages to sports sciences, is not an easy task as the requirements, the expectations, the



**Figure 8. Universidade Júnior, sports activities. Seniors may concentrate on the topic of their choice but junior pupils try different activities.**

languages and the uses are very different and the coordinating staff has to have a deep understanding of all these widely different cultures. This was achieved with a very motivated, small and young set of people, most of them terminating their contracts as the last pupil was leaving town in the last Friday of July...

To evaluate this programme and compare it with alternative strategies being followed at national or institutional level, one has first to measure the contact time that has been as high as  $5.000 \text{ pupils} \times 5 \text{ days} \times 7 \text{ hr/day} = 175.000 \text{ hr}$ . This is to be compared with a typical Open Day event where we may get  $5 \text{ laboratories} \times 2.000 \text{ pupils} \times 3 \text{ hr} = 30.000 \text{ hr}$ . It is well known that short light contacts have a low efficiency as most pupils are not really interested as they feel that this is not really their area of interest. In *Universidade Júnior*, on the other hand, each people chooses an activity among a wide choice and then stays on the project until he get some take home result. It is too early to have a comprehensive assessment of the impact by analysing the career choices of the pupils and their success. However, some evidence exists that the enduring effect was already felt on year after its first implementation. Upon arrival, none of the 40 pupils in the 2005 Physics school declared his intention of doing Physics. Typically they would declare their goal of doing Medicine as many of our top pupils these days. One year later, 6 of them were applying to study Physics at the University of Porto.

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