

Connecting Excellence in Secondary and Higher Education

Lessons from Junior College Utrecht

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Introduction

Many talented secondary school students do not need to work hard at school and get bored in classroom as they understand subject matter quickly and need few explanations and little drill-and-practice (Betts, & Neihart, 1988). They have plenty time for going deeper into subject matter but are not challenged to do so. As a consequence, they are likely to develop bad study habits. So, when they enter higher education, they risk failing (Winstantley, 2007). Therefore, secondary education should challenge talented students and promote excellence. In upper secondary education, a thorough orientation towards higher education studies can provide plenty of opportunities for this. In science particularly, there is a need for challenging the most capable students (Taber, 2007).

JCU

Junior College Utrecht (JCU), a science education partnership between Utrecht University (UU) and 28 schools, founded in 2004, aims to be a working place for improving science education by teaching students as well by providing a teacher programme. Its main focus is promoting excellence in upper secondary science teaching and learning. JCU has adopted the view that, for this, the teacher is the main actor in the classroom. In his/her development, (s)he has to be supported by other stakeholders within the JCU context:

- Talented students and their parents
- Secondary schools principals
- Utrecht University (UU), in particular its Faculty of Science (FoS).
- National policy makers, in particular the National Platform Science and Technology (Dutch acronym PBT) which promotes science and technology as well as excellence in all levels of education.

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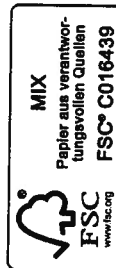
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JCU is presented here as exemplifying 'good practice'. *What are its success factors and challenges in connecting excellence in secondary and university education?* We describe developments in the student and teacher programmes in three main stages: 1.0 (2003–2008), 2.0 (2008–2011) and 3.0 (2011 onwards), related to developments in national policy and in university.

JCU 1.0 (2003–2008)

Since the late '90s, UU has been a leader in introducing honours (Wolfensberger, Van Eijl, & Pilot, 2004). In 2003, successful experience with honours and the need for more science students were reasons for suggesting the founding of JCU. This idea received support from the UU Executive Board. Network schools were consulted about participating in JCU. Principals were enthusiastic, but some teachers were reluctant in that they would miss having talented students in their lessons.

Figure 1 shows the design of the student programme, teaching the sciences to selected upper secondary students over two years for two days a week. In grade 11, the emphasis was on teaching the national science syllabuses at an accelerated pace, in grade 12 on enrichment topics orientated towards university studies.

JCU students' lessons	At JCU		At home schools		
When?	Monday	Tuesday	Wednesday	Thursday	Friday
Subjects	Biology	Physics			
	Chemistry	Mathematics			
	Enrichment topics				Non-science subjects
Taught by	Selected partner school teachers				Regular school teachers
	UU teachers/researchers				

JCU was housed in University College Utrecht-buildings and financed by UU and the partner schools. PBT allocated a starting grant. The JCU Board had representatives from UU and partner schools. JCU staff consisted of a director and a curriculum coordinator.

Developments in the Student Programme 1.0

In September 2004, the student programme started. In 2006, the maximum number of students was reached: 50 grade 11, 50 grade 12, from 26 schools. JCU teachers developed comprehensive curricula and taught the syllabi at an accelerated pace. The students enjoyed learning in a community of talented peers and in an academic environment. But they expressed a dislike for acceleration first, with enrichment following later: they wanted *enrichment now*. So, JCU asked UU teachers to develop and teach enrichment modules about developments in modern scientific research. In spite of promises, however, getting UU teacher time for JCU tasks was hard. Nevertheless, some UU teachers, although experiencing extra teaching load, accepted the challenge and, as they really enjoyed teaching the JCU students, they motivated their colleagues to join.

The first three months in JCU appeared to be crucial for students. During this period, they had to change their working habits and develop academic competencies. Some students (average 10%) did not succeed in this and left JCU.

Students were very happy with JCU. At the end of grade 12, all remaining students passed their examinations. However, the marks were lower than expected. Research (Van der Valk, Grunefeld, & Pilot, 2011) revealed an underlying problem: offering all JCU students the same curriculum in the same pace. In spite of selection, talents and abilities were diverse. JCU therefore faced the challenge of providing more opportunities for choice and student contribution (Van Tassel-Baska, 2002).

Developing the Teacher Programme 1.0

The teacher programme 1.0 had a slow start. Twice a year, partner school teachers were invited to come to JCU to become informed about the JCU curriculum and teaching. Teachers discovered that JCU gave students challenges they could not offer. Their initial resistance against JCU decreased. Some teachers were involved in developing enrichment modules. In 2007, the first annual JCU conference took place, aiming at involving partner schools in developing and testing JCU materials on a regular basis.

Developments in National Education Policy 1.0

In 2007, a new optional interdisciplinary subject, Nature, Life and Technology (NLT), was introduced in upper secondary education. This was guided by the NLT Steering Committee. Inspired by the JCU enrichment modules, it set aims such as orientation towards modern scientific research. JCU met the challenge of developing its modules for a full curriculum for NLT.

JCU 2.0 (2008–2011)

JCU accepted the challenge of transforming its set of enrichment modules into a NLT curriculum that could be an example for the emerging national NLT curriculum. For this, JCU developed a three-step implementation and dissemination model: (1) a module was developed, taught in the JCU student programme and evaluated. (2) the module was revised and tested in JCU partner schools, results and experiences being documented. (3) After a second revision, the module was disseminated nationwide. This model fitted in the certification procedure for NLT modules of the NLT Steering Committee.

Developments in the Student Programme 2.0

The introduction of NLT in the JCU curriculum resulted in a better balance, distributing enrichment between grades 11 and 12. It showed the variety of scientific topics that are investigated in Utrecht. JCU was successful in disseminating its NLT modules over the country. More UU science research groups wanted to develop NLT modules and contacted JCU for cooperation. In addition, parents brought JCU into contact with external institutions. Thus, for example, the module 'Heart and Veins' was developed for the Netherlands Heart Foundation.

The number of modules that became available made it possible to meet the differences of interest of JCU students. Students had to choose between two modules that were scheduled at the same time. Moreover, aiming at a more differentiated curriculum, JCU allotted time for differentiation assignments (JCU, 2011). JCU teachers developed assignments at different levels. It elaborated a pedagogy for differentiation, including presenting results to the class as a 'research community' and students giving feedback to each other.

As a result of the improved curriculum, the mean examination marks increased to the level that had been aimed for. The JCU testimonial that alumni

received also appeared to be valuable for getting into honours programmes and other special tracks in Dutch universities and abroad.

Developments in the Teacher Programme 2.0

The 2.0 teacher programme aimed at contributing to teachers' professional development by having them test NLT modules in their classes and reporting on experiences. In 'experimentation groups', partner school teachers discussed a module, prepared for teaching and reported on experiences. JCU gathered data to meet the *certification procedure* for NLT modules. Thus, by 2012, 14 JCU NLT modules had been awarded a certificate.

Moreover, partner school teachers tested the optional assignments developed by JCU. By doing so, they prepared for including differentiation in their classrooms.

The JCU Board felt that, for being a partner school, participation in the teacher programme was required. It had interviews with schools that did not participate sufficiently. As a result, some schools became more involved, whilst some others withdrew from the partnership. New partner schools were selected and the number increased to 29.

Through these developments, being a JCU partner made a real impact on schools. At the annual JCU conferences, schools exchanged experiences with JCU materials in their classes and with other relevant topics, such as emerging talent programmes. Thus, the partnership approach developed from being mainly top-down towards networking.

Developments in National and University Education Policy 2.0

By starting the Sirius project, the Ministry of Education promoted excellence in Dutch Higher Education. UU received a Sirius grant and started honours courses in all faculties. As JCU alumni were candidates for joining honours courses, the importance of JCU for the Faculty of Science increased. As JCU was on track, the UU Executive Board wanted to bring JCU under the wing of the FoS and to house it in a FoS building. FoS agreed and planned to evaluate JCU performances. The Evaluation Commission was very positive, in particular about the benefits of the JCU school network and its effect on school development. So, it advised FoS to continue JCU (Van Weert, 2010) which FoS did, in spite of severe spending cuts at that time.

The Ministry of Education started a new programme aiming at promoting excellence in secondary education. This was motivated by the Dutch PISA results, which showed that the low ranges performed well, but the more able students performed at a lower level than comparable countries. This presented JCU with a new challenge: how to involve more students.

JCU 3.0 (2011 onwards)

JCU stimulated its partner schools to join the national *Excellence* programme. Most of them did so and started experimental 'excellence' programmes in some classes. The JCU differentiation assignments worked well as exemplars of concrete student tasks. As a consequence, new views on promoting talent development arose in the schools. Promoting excellence is a primary task for schools which can be supported by JCU. As a consequence, at the present time (2013) big changes are taking place in the JCU student and teacher programmes.

Developments in the Student Programme 3.0

To support the emerging 'excellence' programmes in partner schools, JCU successfully organised two-day 'U-Talent' programmes for talented lower secondary students. 450 students participated in 2012, 600 in 2013. Through experience, partner schools saw that this group also needs – and enjoys – enrichment in lessons. U-Talent gave a new 'flow' to teachers and generated a need for differentiated lessons and for more places in the JCU grade 11/12 student programme. Thus, time was ripe for changing the JCU student programme into the *U-Talent Academy*. In it, teaching the science syllabuses to talented grade 11 and 12 students in a compacted and comprehensive way became part of the school programme. In the additional campus programme, selected students go to JCU for enrichment once a month. As the programme at JCU is shorter, the number of students could increase from 100 to more than 400 in 2016 without additional costs.

In the fall of 2012, the JCU Board communicated the U-Talent Academy proposal to partner school principals and science departments, expecting a sceptical reception. Surprisingly, the schools were enthusiastic. They felt challenged to develop their 'excellence' programmes this way and teachers were glad to get their talented students back in their classes. However, JCU teachers and students regretted the 'abolition' of the cherished JCU programme. Now,

in June 2013, 100 students from 23 schools have been selected and are eager to participate in the U-Talent Academy from September on. In 2014, four more schools will join. Then, the old student programme will stop and the number of Academy students will grow to 250.

Developments in the Teacher Programme 3.0

The aim of the JCU teacher programme has been changed towards preparing and supporting teachers in starting 'excellence' programmes in their schools and classes. For this, *teacher development teams* were created. 80 teachers participated, developing and discussing suitable teaching materials. Alongside this, a *principal development team* was started. 22 participants discussed how to organise excellence programmes in school and how to support teachers in realising the programme in their classes. Moreover, an intensive teacher professionalization course (a load of 180 hours of study) on 'promoting excellence in science classes' was developed and tested, with 25 participatory teachers.

In 2013, JCU prepared all school teams by giving a three-hour workshop on implementing U-Talent Academy.

Developments in National and University Policy 3.0

From 2012, the Ministry of Education gave all Dutch school additional funding for, among other things, promoting excellence in the schools. JCU partner schools use this for financing U-Talent student and teacher activities.

At Utrecht University, the Sirius project ended in December 2012. UU continues teaching honours programmes and plans to extend them to the first year of study. The FoS has decided that students entering with the *U-Talent Academy certificate* will be admitted to the Faculty's honours course. Through this, it can be seen that the U-Talent Academy leads to a clear benefit, thus motivating more students to participate.

JCU Success Factors and Challenges

JCU has been successful in its student and teacher programme by meeting needs and challenges from all its stakeholders. The main success factors have been:

- For students and parents:
 - carefully selecting students and involving them in a community
 - the JCU student programme connects secondary and university education
 - monitoring students' experiences and adapting the JCU curriculum accordingly
 - involving parents, e.g. by inviting them to student presentation meetings
- For teachers and school principals:
 - giving them opportunities for cooperation within and between schools and with the university
 - developing a teacher programme aiming at a progression towards school development
 - providing examples of challenging education and pedagogy way of concrete lesson materials
- For Utrecht University:
 - connecting with developments in honours education
 - meeting the needs of the Faculty of Science: more talented students; making UU research visible in secondary science lessons by way of NLT modules
- For national education policy:
 - connecting with new programmes and making them concrete for schools
 - providing new ideas and opportunities for policy development.

Now, the great challenge for the partners of the JCU partnership is to make U-Talent programmes in the lower grades and the U-Talent Academy a success. In particular, teachers have to be supported in their classes in order to meet the increasing differences between the students. Let 'excellence' in secondary and higher education not be a temporary hype, but a solid base for the continuation of these promising developments.

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Sirius: www.siriusprogramma.nl

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