DISTINGUISHED EDUCATION EXCELLENCE AWARDS
Category: Professional Practice Innovation Award

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Section B: Case Study

Title: *Variable Rate Progression: Shaping your future at your chosen pace*

Summary: *Brief summary of what the case study covers*.
Variable Rate Progression is a generic model and suite of software tools used to underpin the design and delivery of a flexible degree. **VRP empowers students to become their own course designer, deriving personal pathways that embeds flexibility to enhance career prospects and balance needs of both home and work**. This personalisation is not available within traditional '*Years*' based course design. On a VRP degree, these personal pathways inherently exist and so do not have to be controlled or predefined by course teams.

VRP evolved during preparations for the 2017 revalidation of BSc Computing Systems; the largest undergraduate part-time course in the Faculty of Computing, Engineering and the Built Environment, comprising approximately 250 students. Approval for VRP was sought during this period and was endorsed by the Faculty, Academic Office and PVC Education, at Ulster University. Feedback from students and apprenticeship partner has been hugely encouraging, crediting the novelty and innovation of VRP. Software, developed to automate VRP, was shortlisted as a Finalist for 'Best Use of Educational Technology / ICT Initiative of the Year' at the Education Awards 2020.

Keywords: Curriculum design, Flexible learning, Variable Rate Progression

What was done:

Traditional course design provides one or more pathways through the modules of a degree, annually increasing the level of learning. Structures often remain fixed for the lifetime of the programme and while this approach aids management and delivery of a course, it limits flexibility. Students must follow the defined pathway(s) and where switching between pathways is possible, it is cumbersome to manage and too bespoke to automate.

The notion of **VRP is entirely novel as it introduces a model that simply has not existed before**; a degree that is neither full-time nor part-time. It enhances the student experience because it **empowers students to do something that traditional course design cannot** – tailor pathway(s) that meets their everchanging needs and preferences, permitting students to complete in a variable number of years.

VRP addresses priorities identified in *five&fifty. It* supports **educational attainment,** modernising the framework traditionally governing University study to provide flexible **access to higher education**, helping to spread the cost of learning and accommodating a range of student profiles. VRP also embodies Ulster's **commitment to the Athena Swan** Charter, tailoring rates of learning to meet needs of students who are parents, those with elderly caring responsibilities and spreading costs for those who cannot afford to study full-time.

Motivation and aims:

Computing Systems is a part-time course attracting a mix of regular students and apprentices, employed by local industry. Prior to 2018, it offered a traditional 5-year fixed pathway through constituent modules. Recognising the diverse demands of students that relate to progression rate, topical interests and evolving personal / professional circumstances, which threatened to impact negatively upon student engagement, progression and overall student satisfaction, the course team began investigating alternative approaches.

Student engagement has long been viewed from a curriculum perspective as an essential ingredient in promoting a positive student experience (HEA, 2014) and Universities proactively address factors relating to Academic/Institutional support and isolation to enhance this (Nygaard, *et al.,* 2013). However, work, family, personal and financial reasons, often regarded as external issues, play an important role. Beer & Lawson (2016) highlight the main factors cited for leaving a degree course, stating "…work and family are the biggest factors that contribute to the students' decisions to leave University".

Ten years ago, Kleinman (2009) supported the notion that "enhancing the utility of any curriculum has to be considered in relation to all those who interact with it". Nevertheless, research into programme delivery, employing more innovative, flexible structures to address student's work and life commitments is, as yet, much neglected in the literature, perhaps regarded as more of an operational paradigm which is less attractive to academic scrutiny.

Planning for the 2017 revalidation sought to offer students something new; a way to progress through the degree unhindered, at a personalised pace and pathway. This tailoring is now a unique strength of Computing Systems, offering ultimate flexibility and allowing students and apprentices to complete their degree in 3, 4, 5 or even 6 years. Figure 1 illustrates how VRP can support students to tailor personal pathways to accommodate careers and balance the demands of home life.

Figure 1: Use cases illustrating typical problems solved by the VRP model

Implementation:
Strategic Faculty funding supported a tender for software (see screenshots) comprising an intuitive course designer (VRP-Builder) and personalised pathway assistant for students (VRP-Assistant) – see Figure 2.

- **VRP-Builder** supports construction of 'VRP courses', infusing design characteristics informed by Computer Science that algorithmically enable the derivation of many course pathways. Modules with key dependencies are organised into formal data structures called 'stacks', while module coupling across stacks remain, at most, complementary. **Stacks becomes the primary building block for course design and progression control, superseding the traditional notion of years and stages.**

- **VRP-Assistant** serves to control enrolment of students as they annually (re)define their chosen pathway. Highly usable interfaces support students to select or defer modules and to plan and

experiment with the construction of different pathways. Thousands of potential pathways are realisable in the VRP model.

Figure 2: Screenshots showing the VRP-Building & VRP-Assistant

Successes and lessons learnt:

VRP has been operational on Computing Systems since 2018. Figure 3 present results from a 2019 survey involving 75 students and 5 sponsoring companies, highlighting the flexibility, value, influence and relevance associated with VRP.

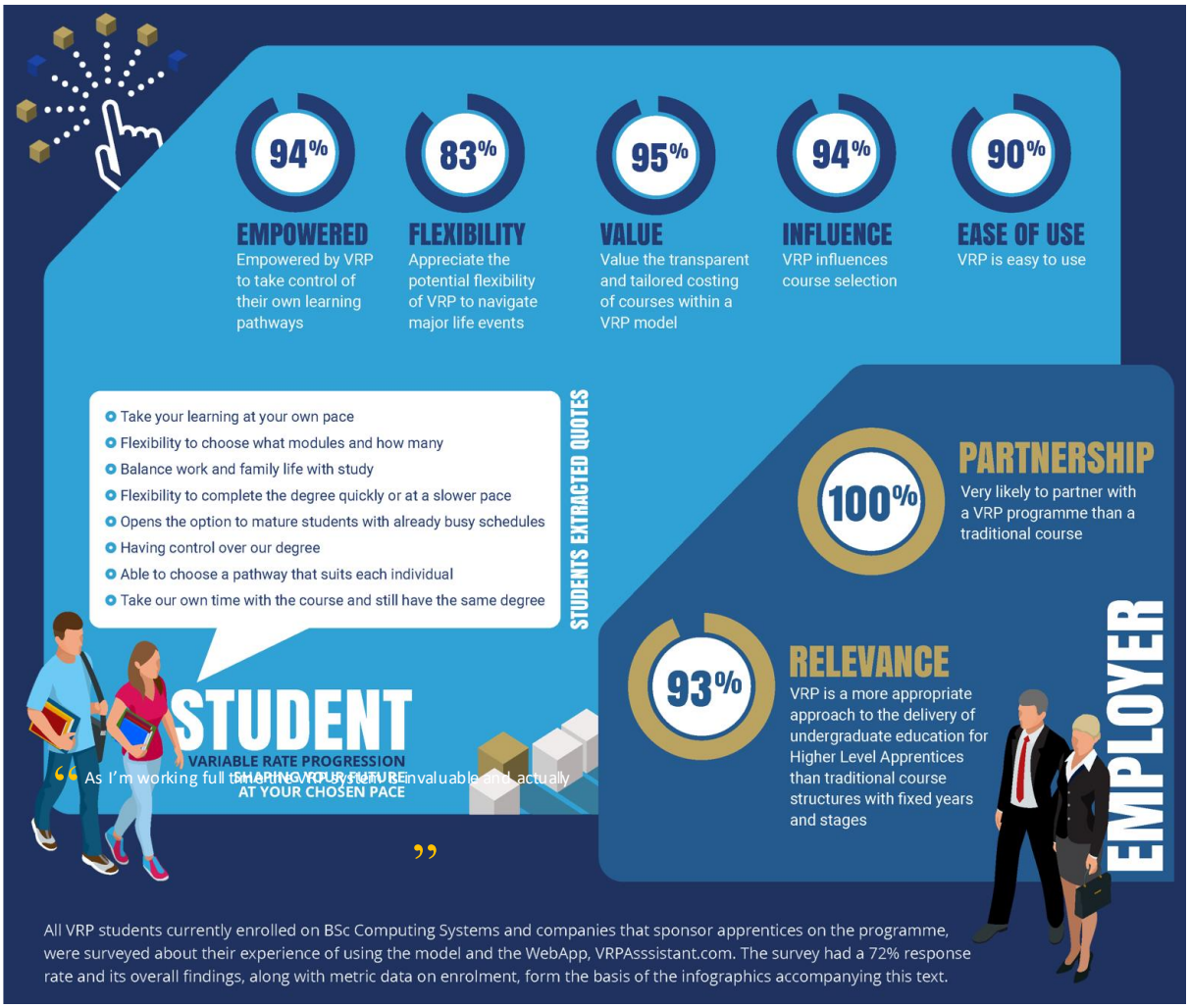
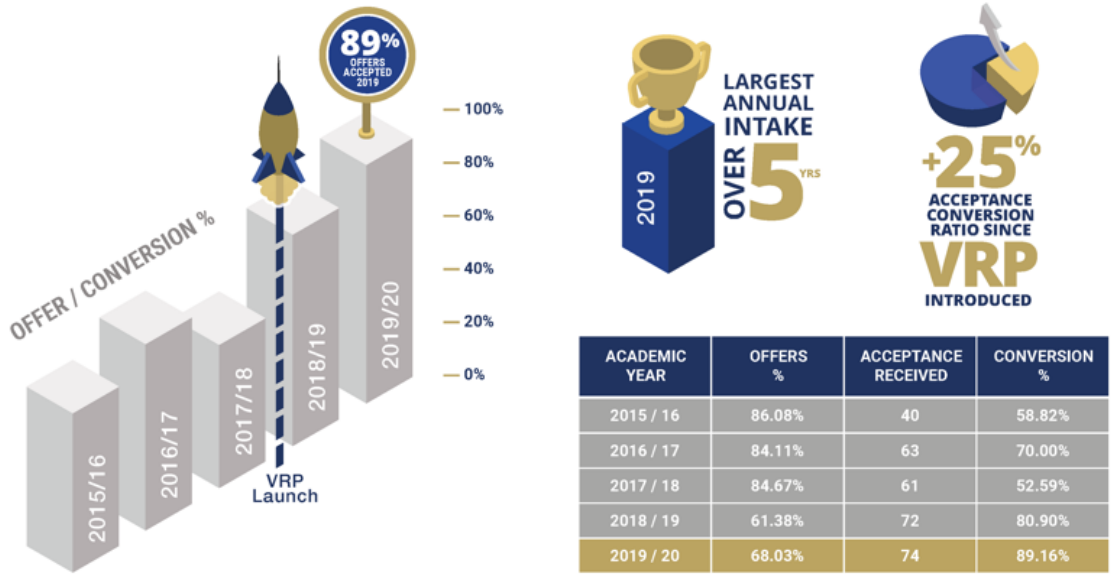


Figure 3: Survey result involving 75 Students and Apprenticeship Partners (Kainos, AllState, Deloitte, Etain, Nueda)

Furthermore, Figure 4 presents course application, admission and retention data highlighting VRP's positively impact upon growth of BSc Hons Computing Systems - 2019 saw the largest annual intake onto the programme with an increased acceptance conversion ratio of almost 90%.



ACADEMIC YEAR	OFFERS %	ACCEPTANCE RECEIVED	CONVERSION %
2015 / 16	86.08%	40	58.82%
2016 / 17	84.11%	63	70.00%
2017 / 18	84.67%	61	52.59%
2018 / 19	61.38%	72	80.90%
2019 / 20	68.03%	74	89.16%

Figure 4: BSc Hons Computing Systems 5-year intake profile, evidencing increases in offer / conversion ratios

Transferability:
VRP is a new product, generically applicable to almost any programme and is viewed as a unique model within higher education, invented and utilised at Ulster. VRP provides a flexible and feature rich framework for embedding VRP within any undergraduate degree.

VRP has received interest from the Ulster Business who are seeking approval from their professional accreditation body to underpin the redesign of BSc Hons Accounting with VRP. VRP was also presented to the Online Enrolment planning team at Ulster (Nov, 2019) who highlighted potential to explore adaptation of VRP software to support enriched annual (re)enrolment.

Further information:
Anyone interested to find out more about VRP should visit our website at www.vrpassistant.com

Course Teams interested in developing a VRP degree should contact Dr Mark Donnelly (mp.donnelly@ulster.ac.uk) or Dr Don McFall (d.mcfall@ulster.ac.uk).

Contributions:
VRP was developed by School of Computing staff at Ulster involving Dr Mark Donnelly, Dr Donald McFall, Professor Chris Nugent and Dr Joseph Rafferty. The VRP Software suite was contracted for development to Kyber Digital Ltd.

The team at Ulster created Variable Rate Progression (VRP) as a solution to the flexibility problem. It is the subject of a Creative Works disclosure and is recognised by the Academic Office at Ulster University. The team have evolved expertise in the operation of VRP that is not available anywhere else. The general area of expertise at Kyber was software development but the specific area of expertise utilised was process simulation, a requirement of model automation.

The duality of these skills, united and applied in the partnership, drove the overall solution to the problem, producing work products consisting of the VRP model and supporting software.