

InternetNZ Community Projects report

30 Jun 2016

Computer Science Field Guide and Unplugged website

*Tim Bell, Computer Science Education Research group,
Department of Computer Science and Software Engineering, University of Canterbury
tim.bell@canterbury.ac.nz*

The InternetNZ grant was given to "vastly improve the CS Field Guide (and include more emphasis on internet technologies), to make the Unplugged website more useful for educators (particularly tying it in better with new curricula), and to have a subsidised service available for Canterbury schools, where we work with the school to introduce these subjects into their mainstream programme."

The contract was signed off on 12 August 2015, and the project was to run to February 2016, but due to delays to the funding being activated, the project is only reaching completion now.

Overall the objectives of providing support for local schools to develop curriculum capability has been far exceeded, as interest in our program escalated quickly. The developments on the field guide have also exceeded our plans in some areas, although the videos planned are progressing slower than planned because of scheduling challenges and weather issues.

Supporting Canterbury teachers has gone beyond expectations; with this funding we have been able to deliver two separate two days of professional learning workshops, we have developed "Buzz Off" days for junior primary school students, based on the "Beebot" teaching tool, and these are now being requested by school clusters to be shared and run for their junior students. We have also developed "Kids to the power of Kids", an innovation where older students prepare to teach younger students, and share their knowledge in a conference day, where younger students sign up to their chosen workshop. During the conference day, their teachers will also be learning through Kids to the power of Kids. These initiatives are providing scalability and sustainability for the project.

The objectives and achievements are as follows:

Develop new introductory videos for CS Field Guide chapters	The videos have now been scripted and planned, and filming and editing is underway. There have been delays due to finding a time when the production company and the presenters are both available, and one scheduled filming has been postponed due to rain, but will be done as soon as possible.
investigate an improved format for delivering	The improved format for the Field Guide is

<p>the CS Field Guide.</p>	<p>now complete, and all existing material converted to the new format. It is now operating fully as an open source resource, and has already received useful contributions from individuals overseas.</p>
<p>Run PD for Christchurch computing teachers who are yet to engage with the new material, with a subsidised in-school PD service.</p>	<p>Tracy Henderson, Caitlin Duncan, Jack Morgan and James Atlas have been interacting with local schools to provide PD and planning support for Kaiapoi North, Ilam, Springston, Ladbrooks, St Margaret's College, Medbury School, Casebrook Intermediate, Mindplus (one day school), Yaldhurst School, Linwood College and providing support for an Ellesmere cluster initiative to complete a computational thinking day, which included PD for teachers from Clearview, Ellesmere College, Aidenfield Christian School, Halswell School, Lincoln Primary, and Templeton School. A Google Plus group has been established for teachers to communicate outside of formal PD contact, and in addition they fill out a form reflecting on each lesson they deliver based on the PD.</p> <p>This led to a two-day workshop in January attended by 30 in-service teachers, and a workshop on 4 July that has registrations from over 50 pre-service teachers.</p> <p>The follow-on effect of this PD includes:</p> <ul style="list-style-type: none"> ● The North Canterbury cluster looking to plan a Buzz off tournament and Kids to the power of Kids event. ● St Margarets and Ladbrooks School putting together a school wide implementation plan. ● The Bays cluster exploring running a Buzz off tournament and the Christchurch East cluster running a Kids to the power of Kids day with Chisnallwood Intermediate leading it.
<p>April to December 2015: develop a revised framework for Field Guide built-in interactives. The platform for the Field Guide to be updated to provide a better interface.</p>	<p>The new framework has been designed by Jack Morgan, Jordan Griffiths and Marcus Stenfert Kroese, based around Github and the Markdown language. The system is now fully deployed, and has been in use in</p>

	<p>schools since the start of 2016. Rewriting of a lot of the interactives has been done so they are more usable and easier to maintain as open source.</p>
<p>October 2015 to March 2016: develop new examples for chapters that have only one example,</p>	<p>Considerable new material has been added to the Data Representation, Programming Languages, Human Computer Interaction and Coding chapters, and new teacher guides have been added, with extensive material on public key encryption added to help students understand internet security, and new error control material to help them understand network reliability. A lot of work has been done on the Network Protocols chapter, although we hit some unexpected challenges with one of the simulations, and will have further work to do on internet protocol simulations.</p> <p>Another important improvement is that the field guide can now be saved as PDF, and printing (a popular feature, that was often requested by teachers) now works effectively. Teacher guides have been updated extensively and reformatted.</p>
<p>December 2015: run CS4HS event (PD event for all computing teachers), releasing the majority of the new material above.</p>	<p>The Computer Science for High Schools event provided PD for teachers; and co-incided with the initial publication of the new version of the Field Guide. The event had nearly 152 attendees, with 43 teachers attending for the first time, and 83 attending for a full 5 days. In the review survey 98.9% of the teachers said they would recommend the event to other colleagues.</p>
<p>Develop more videos and interactives, by hiring students over the summer, for release in the new school year.</p>	<p>A student worked on this over the summer, and helped us to refine the chapter on Network Protocols. Many new interactives have now been developed and released (some mentioned above). Three videos have been scripted, one has been shot, and the other two will be shot in the next few weeks (weather permitting).</p>

Spending against the budget is as follows:

<p>\$5K: develop better interactive material and examples in the CS Field Guide (one student during the year to develop a framework, and one working over the summer).</p>	<p>A \$1,000 scholarship was given to the student working on the framework, and \$4,000 as a summer scholarship for working on the Network Protocols chapter; the latter student also contributed to other interactives in the field guide.</p>
<p>\$8K: develop the CS Unplugged material to better support curricula by providing PD support for teachers, running trials in schools and writing it up</p>	<p>\$9750 (includes surplus from video): Approximately \$7,190 has been allocated for staff time to run PD for teachers and to prepare resources for teachers, \$760 used to purchase resources to support teachers to implement computer science in their classrooms, \$400 for catering at a training day, \$400 committed to incentives for teachers to give us feedback on the curriculum material as it is deployed, and \$1000 put towards costs for the CS4HS event. The following new resources are being trialled with the Google+ teachers.</p> <ul style="list-style-type: none"> ● A full set of sequential programming using classroom equipment that supports students to understand the first basics of programming. ● A set of lesson plans to create a fitness Unplugged app, which can be adapted for dance or drama. ● A set of lesson plans that supports year 8 extension mathematics on how to apply unplugged activities to Scratch projects. ● Daily challenges for students to complete within their learning programme after learning the basics of Unplugged.
<p>\$7K: about 4 of the remaining introductory videos for the CS Field Guide.</p>	<p>\$5,250 has been committed for 3 videos, with the remainder of the \$7,000 allocated being used for teacher support (as above), which has experienced a much greater demand and better outcomes than expected.</p>

We are grateful to InternetNZ for this funding, which has had far-reaching positive effects for computing education in Canterbury and beyond. InternetNZ is acknowledged in our events, and on each page of the CS Field Guide (<http://csfieldguide.org.nz/>).