Building STEM Students’ Numeracy for   
Success in Higher Education

March 2015 to December 2015

Dr Elena Prieto-Rodriguez, The University of Newcastle

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Modifications: Changed to meet WCAG 2.0 accessibility requirements.   
Alternate text inserted for all images. Minor typographical errors corrected.

# Higher Education Participation and Partnerships Programme (HEPPP)

## 2014 National Priorities Pool FINAL REPORT

Building STEM Students’ Numeracy for Success in Higher Education

1 March 2015 to 31 December 2015

**Name of university** The University of Newcastle   
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In accordance with the Conditions of Grant, you must submit to the Department a **Final Report** (Clause 6.1 of Part A) and an **Acquittal Report** (clause 6.4 of Part A).

To meet this obligation, please submit:

* the completed **Final Report** template, in Word and PDF
* the completed and signed **Declaration** form, in PDF
* the completed **Acquittal Report** template, in Excel and PDF.

All documents must be submitted to [**equity@education.gov.au**](mailto:equity@education.gov.au) by **31 March 2016**.  
If you require additional guidance or clarification please contact [**equity@education.gov.au**](mailto:equity@education.gov.au).

\*Please send a copy of any correspondence regarding this project to:  
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# 1. PROJECT SUMMARY (Conditions of Grant, clause 2.2(a)-(e) of Part A)

## Objectives

The project objective is to create, evaluate and disseminate a set of research informed digital media resources to help STEM university students from low SES backgrounds succeed in mathematics.

The participants of this project included:

* 9 academics
* 1 project manager
* 2 postgraduate & 2 undergraduate Research Assistants
* 61 students participating in an informal evaluation
* 1 team of external consultants

Table 1: Project objectives

| **IDENTIFIED OBJECTIVE** | **EXTENT TO WHICH THE OBJECTIVE WAS MET** |
| --- | --- |
| Creation of a research informed sequence of 20 innovative videos designed to tackle specific areas of mathematical knowledge and skills and common misunderstandings | Completed |
| Unification of resources in a central interactive repository in App form | Completed as website to allow greater accessibility [www.mathstuneup.com.au](file:///C:\Users\eam609\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\Content.Outlook\D7F29X73\www.mathstuneup.com.au) |
| Division of videos into categories corresponding to mathematical strands required in engineering fields as well as ‘numeracy development’ and ‘thinking mathematically’ strands | Completed |
| Development of an App and Blackboard portal | Completed as website to allow greater accessibility |

## Project Activities, Milestones and Key Performance Indicators

Table 2: Project activities, milestones and KPIs

| **TIME FRAME** | **PLANNED ACTIVITIES AND MILESTONES** | **PROJECT ACTIVITIES AND MILESTONES COMPLETED** | **IDENTIFIED KEY PERFORMANCE INDICATORS** | **KEY PERFORMANCE INDICATORS OUTCOME** |
| --- | --- | --- | --- | --- |
|  | Concepts and storyboard | Completed | 1. Identification of content, skills and misconceptions both common and specific to STEM disciplines  2. Creation of 20 video concepts covering the most important items identified in 1.  3. Creation of storyboards for the 20 videos.  4. Project progress reports | Completed |
|  | App and Blackboard portal |  | 1. Production of 20 videos, App and Blackboard portal  2. Creation of marketing strategy  3. Implementation of marketing strategy  4. Project progress reports | Completed as website to allow greater accessibility |
|  | Final evaluation of the project and report |  | 1. Creation of evaluation strategy  2.Implementation of evaluation strategy  3. Final report  4. Project progress reports | Completion of evaluation strategy. Partial completion of the evaluation.  Unable to complete an evaluation as the outputs would not be utilised by students until 2016. The evaluation will be completed in 2016 by Elena Prieto and Peter Howley as part of an in-kind contribution. |

## Highlights and Issues

* Creation of research informed resources to support learning, mathematical knowledge, mathematical skills, capacity, retention and wellbeing of students from low SES backgrounds
* Division of digital resources into categories corresponding to mathematical strands required in engineering fields
* Division of digital resources into ‘numeracy development’ and ‘thinking mathematically’ strands
* Building the capacity of students from low SES backgrounds to meet their needs and the needs of their peers
* Dissemination and embedding and resources both within UoN and beyond the lead institution
  + A communication strategy has been developed and the key tools and methods will involve a combination of in-person, event-based, digital and traditional approaches such as; digital posts on the UoN website, Twitter and e-Newsletters; flyers and posters campus-wide; face-to-face sessions in tutorials, lectures and drop-in sessions; and media releases.
* Fostering interdisciplinary collaboration
* Creation of evaluation strategy
* Creation and implementation of marketing strategy
* Total outputs:
  + 20 innovative animations
  + 19 resource sheets and supporting interactive quiz modules
  + Online evaluation form
  + Evaluation strategy
  + Marketing report from school evaluation of prototypes
  + Poster
  + Postcards
  + Blackboard link to be used as a separate module for MATH 1110, MATH1120, EPMATH309, EPMATH125 (First Year Engineering and Maths students), PREP078, PREP093

*Did the project lead to implementable outcomes? What changes will result at your institution/nationally? How is research being translated into practice? Are there activities resulting from this project that will be continued?*

Digital resources will be used in first year lectures and embedded in Blackboard and social media sites. The audience within UoN will be approximately 5,000 first year students, and a similar project (HEPPP Swimming with Seahorses) has had >10,500 views on Blackboard, and >31,000 views on their YouTube channel.

The level of interdisciplinary collaboration achieved from the project is invaluable and will lead to strong research and teaching links beyond the project end. In particular there is strong interest within the project to further collaboration with Dr Graham Atherton for London Higher (UK) and Associate Prof Rosa Estela from Technical University of Barcelona (Spain) and the UoN in order to jointly develop student mathematical literacy resources beyond the funding of the project. The NSW DEC will be provided with information on the resources which can be distributed to schools throughout the State.

*Did you undertake an evaluation of your project?*

Yes X No

An informal evaluation took place with students (n=61) from 3 schools in the Hunter region. The data from the student focus groups was used to inform the innovation component of the STEM project.

An evaluation of extent of impact on teaching, learning, student success and retention would require an additional twelve months timeframe and funding. This part of the project would develop principles for engaging low SES and other non-traditional students to prevent attrition and academic failure, and support learning and create resilience.

*Please summarise the findings and attach your evaluation report*

A total of 61 students from Years 10 and 11 consented to take part in the online survey. The students from School One (n=15) and School Two (n=14) were from Year 11, completing the Year 12 block of work. Of the 32 other students who completed the survey, 21 students from School Three were Year 11, completing their Year 12 block of work, and 11 were from Year 10. The survey was developed in consultation with UoN academics and measures included usefulness of the video content, participant experiences with the website and effectiveness of the quiz modules. A copy of the survey is included in Appendix A. Overall, the results from the online survey indicate that 97% of respondents felt the videos would assist those having difficulty with the topic area. Survey respondents were also asked to indicate if they considered the layout of the website was user friendly. Results indicate that 97% of respondents agreed or strongly agreed with the statement.

I like that there are videos with each step, clearly explaining the method. I also like that there are practice questions available. (Female 08122015 11:29AM)

The video tutorials were really useful and did a good job of explaining the topics. The website itself was also rather easy to navigate and was quite user-friendly. The 'Other Links' tab was also really great in terms of providing extended resources. (Male 08122015 11:28AM)

The results demonstrated that participants were generally satisfied with the help and content provided and that they would find Maths Tune Up! a useful resource. These are indicators of a positive reaction to the project.

*Where applicable, indicate number of the following resulting from this project:*

| **Student contacts** | >5000 (2016) |
| --- | --- |
| **Journal (or other publication) submissions** | In progress (1) |
| **Conference Presentations** | 1 |
| **Websites developed** | 1 (Website address: www.mathstuneup.com.au) |
| **Educational or marketing campaigns** | 1 |
| **Community organisations engaged** | N/A |
| **Schools engaged** | 3 (students n=61) |
| **Parental/family contacts** | >5000 (2016) |

*Issues*

Evaluation was unable to be completed as the resources would not be available to first year students until 2016. An evaluation of extent of impact on teaching, learning, student success and retention would ideally require an additional twelve months timeframe and funding, however the evaluation will be completed in 2016 by Elena Prieto and Peter Howley as part of an in-kind contribution.

# 2. OTHER PROJECT MATERIAL (Conditions of Grant, clause 2.2 (b)-(e) of Part A)

Table 3: Additional materials produced over the course of the project

| **TYPE** | **AUTHOR** | **DATE OF PUBLICATION** | **PUBLICATION DETAILS** |
| --- | --- | --- | --- |
| Website |  |  | www.mathstuneup.com.au |
| Poster |  |  | Available as attachment |
| Postcards |  |  | Available as attachment |
| Resource sheets |  |  | www.mathstuneup.com.au |
| Quiz module |  |  | www.mathstuneup.com.au |
| Media release |  |  | Available as attachment |
| Evaluation strategy |  |  | Available as attachment |
| Online evaluation strategy |  |  | Available as attachment (hard copy) |

# 3. ACQUITTAL REPORT (Conditions of Grant, clause 6.4(e), clause 6.7-8 of Part A)

*Have you fully expended the Grant Funds provided under the Conditions of Grant?*

Yes No X­­­

Acqyuittal available as attachment. $440 is remaining in the cost collector as one research assistant didn’ claim all of their contract hours.

*\*IMPORTANT NOTICE - Unspent 2014 National Priorities Pool Grant Funds*

* *Grant recipients must fully expend these 2014 National Priorities Pool funds in the project period for which the grant is made and report on this expenditure to the Commonwealth, including the amount of any unspent funds.*
* *If a provider fails to spend the full amount granted it in respect of a year, the unspent funds may be recovered by the Commonwealth.*

# DECLARATION

I declare that:

* I am authorised by the university to sign this Declaration on its behalf, and
* to the best of my knowledge, the information that I have provided in the **Final Report** and **Acquittal Report** for the HEPPP 2014 National Priorities Pool project *Building STEM Students’ Numeracy for Success in Higher Education* is true, correct and accurate in all particulars.

I understand that:

* The provision of false or misleading information or the making of false or misleading statements to the Commonwealth is a serious offence under the *Criminal Code Act 1995 (Cth).*
* If any actual or potential conflict of interest arises, I must notify the Commonwealth immediately in writing of the facts giving rise to the actual or potential conflict of interest and to take such steps as the Commonwealth may require so as to resolve or otherwise deal with any conflict of interest that may arise.

**Title**  Professor  
**Name** Andrew Parfitt   
**Position** Deputy Vice-Chancellor (Academic)  
**Signature**