

# **Pathways to tertiary education: Creating a framework for success in STEM for regional and remote low SES students.**

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## **Abstract**

*This project aims to increase participation in higher education by inspiring regional and remote students to study Science, Technology, Engineering and Maths (STEM) subjects in upper secondary school and university. The project will reinforce high academic expectations in regional and remote schools through new resources and activities that build academic attainment, confidence and motivation to continue studying STEM subjects. These activities will be supported by resources for teachers and parents, which will be able to be adopted nationally with minimal adaptation. Professional learning opportunities will also be offered to teachers.*

## **Introduction**

Young people will face greater challenges in finding future work as digital disruption transforms the global employment landscape. In the PricewaterhouseCoopers report *A smart move* (2015), it was predicted that 5.1 million Australian jobs were at high risk of being automated by technology in the next 20 years. The Foundation for Young Australians report *The New Work Order* (2015), predicts that whilst automation will radically affect 70% of current jobs, areas of growth will remain in professions that require problem solving, digital literacy, and numeracy skills. *The New Work Order* report estimated 75% of jobs in the fastest-growing industries will need skills in STEM. Both reports highlight the importance of STEM education in equipping young people for success in future employment.

Students from low socio-economic (SES) backgrounds in regional and remote areas of Western Australia face additional educational challenges when compared to their metropolitan peers. Challenges include limited access to tutoring and revision courses; reduced study options due to small class sizes; no access to subject specialists; and transient communities. There exists an urgent need to support the academic achievement and access to higher education of young people in regional and remote Australia. Increased support for STEM study is a critical strategy to ensure regional and remote students are equipped for future success.

The University of Western Australia (UWA), through Aspire UWA, received funding from the Commonwealth Government through the 2016 National Priorities Pool to develop resources and activities that inspire students in regional and remote areas of Western Australia to study STEM in upper secondary school and increase participation at university. As part of this Commonwealth Government supported project, entitled 'Creating a framework for success in Science, Technology, Engineering and Mathematics (STEM) for regional and remote low SES students', Aspire UWA will trial new practices that build

academic attainment, confidence and motivation to continue studying STEM subjects despite the additional challenges faced by regional students. Success in STEM subjects in upper secondary will support students to meet pre-requisite requirements; expand their pathways to higher education; position them for success; reduce the risk of them dropping out; and open up future careers.

### **Project overview: A framework for success in STEM**

This project will adopt the principle of incremental innovation to extend existing equity initiatives. Aspire UWA has well-established relationships with regional and remote schools in the Gascoyne, Kimberley, Mid West, Pilbara, and Peel regions of WA, and has effectively delivered equity outreach in Perth and regional WA for the past eight years. At present, Aspire UWA's core programs focus on holistically raising university aspirations in these schools. This new initiative will build on the current core programs with the development of a cohesive framework for STEM engagement. Aspire UWA will draw on expertise from UWA maths and science education academics, interested students and teachers and university student ambassadors.

The project objectives are to:

1. address the disadvantage and paucity of resources and support available to regional students to facilitate their aspiration towards and success in higher education study;
2. develop and implement a framework to build capacity in numeracy skills of Years 9 and 10 students that underpins STEM study in upper secondary schools, and maintains student engagement in STEM through to Years 11-12;
3. develop resources and activities with the potential to be disseminated widely for the benefit of students in other regional and remote areas of Australia; and
4. inform students of STEM careers and further study pathways and support they can access

An action research methodology will be used with consultation, feedback and refinement embedded throughout the project. Qualitative and quantitative data sourced from student and teacher surveys will be used to measure the success of the project and highlight areas which need improvement.

This project builds on the success of Aspire UWA's 2015 National Priorities Pool funded project which targeted numeracy skills of students in Year 7 and Year 8 in metropolitan Perth. The activities developed through the project were successfully delivered in schools, and refined through the project using similar methodology as outlined above. Key lessons from the previous project will inform the early development and direction of this project.

### **Creating a Framework for Engagement**

A regional and remote community's attitude towards education has a significant impact on the motivation of young people and thus is critical to the success of the project (Australian Clearinghouse for Youth Studies, 2015). Research also suggests that teaching staff and parents are key influencers who have the potential to positively influence participation in

higher education (Moore, Sanders & Higham, 2013). The proposed framework is a holistic, four-pronged strategy, engaging students, teachers, parents and current university student ambassadors, recognising the contributions that each of these groups make.

Year 9 and 10 students in regional and remote WA will be engaged through in-school workshops which build numeracy skills that support STEM study. The workshops will align with the Australian STEM curriculum and incorporate skills such as critical thinking and problem solving, which are essential to the successful study of STEM. The workshops will be built around authentic activities which illustrate the application of STEM in the real world, using a hands-on and interactive approach.

In addition to the focus on curriculum content and skills, explicit links will be drawn between studying STEM and future career options, allowing students to make informed decisions about their study choices. This mirrors the Chief Scientist's recommendation that career advice be offered to students, explaining the value of studying STEM and the associated career pathways (Office of the Chief Scientist, 2014). The importance of embedding a careers focus is a consistent theme within the literature surrounding widening participation in higher education (Moore et al., 2013). Year 11 regional and remote WA students will participate in a residential STEM camp in Perth that will highlight STEM research, link participants with inspiring role models and connect them with industry to highlight STEM careers. The benefits of literacy and numeracy skills are well researched with Shomos and Forbes (2014) finding that an increase in educational attainment from Year 11 to Year 12 resulted in a ten percent increase in wages. The project will also provide Year 12 regional and remote WA students with intensive subject-specific revision and exam preparation in STEM subjects through WACE revision sessions.

Teachers will be supported through the provision of an educator's resource pack, which will enable schools to run similar workshops, adapting content to fit their students' needs. The pack includes follow-on material to extend the learning beyond the school workshops.

Wilks and Wilson, (2012) examined the educational aspirations and barriers facing young people living in low SES regional and rural Australia. It was evident that students' ideas of their academic abilities and aspirations towards higher education were often influenced by family members. The study also found that parents were concerned about the accessibility to higher education institutions and courses, finances, and separation from community. A parents' resource pack will showcase future careers in STEM, and provide information on the benefits of tertiary education as well as providing information about the support available to university students from regional areas.

University student ambassadors from UWA play an important role in the Aspire program as representatives to partner schools. The project will provide training to build leadership and facilitation skills in ambassadors, who will assist in the delivery of workshops in regional and remote schools. Many of the student ambassadors are from regional WA; as such, they become inspiring role models to regional and remote secondary students.

## **Applicability to other universities**

The framework and associated resources will be designed, implemented and evaluated at secondary schools ranging from inner regional to very remote WA and disseminated nationally through equity networks and professional associations in mathematics. The numeracy workshops have clear links to content as specified in The Australian Curriculum, Assessment and Reporting Authority's (ACARA) Australian Curriculum, and therefore can be easily adapted to a range of classrooms and abilities. It is envisaged that whilst the project targets low SES students in regional and remote WA, the resources developed will have national application, with minimal adaptation.

## **Expected impact**

It is projected that the project will engage at least 500 Year 9 and 10 students in numeracy activities from 20 schools, and 200 Year 11 students in residential camps by the end of 2017. Whilst the project scope is one year, the activities and resources developed through the project will be incorporated into Aspire UWA's core program offerings, thus having ongoing impact. It is also anticipated that the resources could be used nationally.

Aspire UWA will continue to work with educators to help students grow their confidence and sustain their interest in STEM study. In addition to student engagement, Aspire UWA will work with teachers, providing unique professional learning opportunities and teacher resource packs that provide inspiration, skills and resources to continue to engage their students in STEM and make links to careers. Parents will also be engaged and parental resources provided.

Aspire UWA has a strong network of student ambassadors originally from partner schools in regional areas. Ambassadors, many of whom study STEM subjects, act as positive role models for the high school students, and collectively provide an additional support network for newly enrolled regional students at university. It is anticipated that the project will result in more students studying STEM subjects in upper secondary school and beyond that, increasing university applications of students from regional and remote areas.

## **Key questions that will be posed to encourage audience participation**

- How might these resources, which were designed to engage students in the North West of Western Australia, be adapted to be relevant in other contexts?
- How are other universities engaging students in STEM?
- How do other institutions engage, reward and recognise university student ambassadors to increase participation?
- How have other universities successfully engaged parents in regional and remote communities?
- How have other universities successfully engaged with teachers and educators?

## **References**

Australian Clearinghouse for Youth Studies. (2015). *Engaging young people in regional, rural and remote Australia: Prepared for the National Youth Affairs Research Scheme.*

- Retrieved from [https://docs.education.gov.au/system/files/doc/other/young\\_people\\_in\\_regional\\_rural\\_and\\_remote\\_australia.pdf](https://docs.education.gov.au/system/files/doc/other/young_people_in_regional_rural_and_remote_australia.pdf)
- Foundation for Young Australians. (2015). *The New Work Order: Ensuring young Australians have skills and experience for the jobs of the future, not the past*. Retrieved from <http://www.fya.org.au/wp-content/uploads/2015/08/fya-future-of-work-report-final-lr.pdf>
- Moore, J., Sanders, J., & Higham, L. (2013). *Literature review of research into widening participation to higher education: Report to HEFCE and OFFA by ARC Network*. Retrieved from <https://www.offa.org.uk/wp-content/uploads/2013/08/Literature-review-of-research-into-WP-to-HE.pdf>
- Office of the Chief Scientist. (2014). *Science, Technology, Engineering and Mathematics: Australia's Future*. Retrieved from [http://www.chiefscientist.gov.au/wp-content/uploads/STEM\\_AustraliasFuture\\_Sept2014\\_Web.pdf](http://www.chiefscientist.gov.au/wp-content/uploads/STEM_AustraliasFuture_Sept2014_Web.pdf)
- PricewaterhouseCoopers. (2015). *A smart move – future-proofing Australia's workforce by growing skills in science, technology, engineering and maths (STEM)*. Retrieved from <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>
- Shomos, A., & Forbes, M. (2014). *Literacy and Numeracy Skills and Labour Market Outcomes in Australia: Productivity Commission Staff Working Paper*. Retrieved from <http://www.pc.gov.au/research/supporting/literacy-numeracy-skills>
- Wilks, J., & Wilson, K. (2012). Going on to uni? Access and participation in university for students from backgrounds of disadvantage. *Journal of Higher Education Policy and Management*, 34(1), 79-90. <http://dx.doi.org/10.1080/1360080X.2012.642335>