**Business case for Probability | Tūponotanga - A Guide for Teaching Probability**

This business case was prepared by the Education Committee of the NZ Statistical Association and is subject to approval by the NZ Statistical Association Executive.

**Project purpose**

The purpose of this project is to support the teaching and learning of tūponotanga | probability in Aotearoa New Zealand schools. The project will develop a **digital teacher’s guide** (the guide), similar in purpose and structure to the Statistical Investigations | Te Tūhuratanga Tauanga book. The guide will align with the refreshed mathematics and statistics curriculum. The aim is to have initial chapters of the guide available by the end of 2024. *From 2025, schools must use the refreshed mathematics and statistics and English learning areas. The implementation deadline for the full curricula is 2027[[1]](#footnote-1).*

**Rationale for this teachers guide**

The refreshed mathematics and statistics curriculum and the NCEA change package offer a unique opportunity to reset, refocus and re-engage teachers with tūponotanga | probability. This project recognises the importance probability plays in everyday decisions and understanding of our changing world. Probability underpins daily decisions, in both our personal and professional lives. People, both as workers and citizens, increasingly need probability thinking skills to understand and make decisions about the world around them. Many societal issues involve uncertainty and risk.

Previously our focus has been on the statistical investigations and statistical literacy strands in the curriculum, which are considered world leading. We now need to work on or turn our attention to the probability strand to reflect the world we live in, research, and technological innovations to provide teachers with a 21st century approach to probability. There is an urgent need to update our approach to teaching probability.

We have not found existing books that meet the needs of Aotearoa New Zealand teachers. Our strong history of teaching statistics and probability from years 1 to 13, with contexts, applications, and technology, puts us ahead of writers elsewhere.

**Proposed content for the teacher’s guide**

The teacher’s guide will show tūponotanga | probability progressions from phase 1 through 5 (years 1-13 inclusive).

The teacher’s guide of 8-10 chapters will include:

* tūponotanga | probability pedagogical and subject content knowledge
* mātauranga Māori and te ao Māori perspectives on tūponotanga | probability, reflecting the bicultural foundation of Aotearoa New Zealand
* diverse cultural perspectives of tūponotanga | probability, including Pacific and other worldviews, and the history of tūponotanga | probability
* rich teaching and learning activities, including activities that embrace technology
* real world applications of tūponotanga | probability
* research-based rationales for the need to adopt a particular learning approach
* innovative solutions for progressions and activities for topics (e.g., risk) that are not currently part of school curricula but urgently need to be addressed.

**Format**

* A digital book (the guide) that is available for free download, with an option to purchase printed copies.
* This is a teachers’ resource, not a text book for students.

**Nice to have, but not included in the funding proposal**

* A flexible and expandable set of digital resources to support the guide.
* The guide is updateable to reflect growth and change in tūponotanga | probability.

**Project team**

* Steering group
* Project administration
* Project leader
* Editors
* Content writers
* Reviewers
* Publishers

**Funding support required**

We are seeking funding support from NZSA and NZAMT. Details below.

**NZSA**

Project leader $15,000

App development $10,000

Publishing $40,000\* See end of document for details on this

**Total $65,000**

**NZAMT**

Project administration $5,000

Chapter development $30,000 Cost of teacher release to contribute to the book

Teacher reviewers $2,000 Cost of printed copies of the book

**Total $37,000**

Editors, reviewers and academic content writers will not be paid. It is expected that this will come within their community service and/or academic outputs.

**Suggested timeline**

2023

|  |  |  |
| --- | --- | --- |
| Month | Funding | Project work |
| November | Contact funders |  |
| December | Confirm content, writing structure and template  Appoint steering group |

2024

|  |  |  |  |
| --- | --- | --- | --- |
| Month | Tranche 1  (3-4 chapters) | Tranche 2  (3 chapters) | Tranche 3  (2-3 chapters) |
| January | Approach content writers and finalise | Approach content writers and finalise | Approach content writers and finalise by end of February |
| February | Develop content | Develop content | Develop content |
|
| March |
| April |
| May | Peer review |
| June |
| July | Update content based on peer review |
| August | Review |
| September | Finalise content | Peer review |
| October | Design and final copy |
| November | Publish ready | Update content based on peer review |
| December | Launch Tranche 1 chapters at Stats Teachers Day (could be late November) | Review |

2025

|  |  |  |
| --- | --- | --- |
| Month | Tranche 2 | Tranche 3 |
| January | Finalise content | Peer review |
| February | Design and final copy |
| March | Publish ready | Update content based on peer review |
| April | Launch Tranche 2 chapters at HOD day | Review |
| May |  | Finalise content |
| June |  | Design and final copy |
| July |  | Publish ready  Launch Tranche 3 chapters and complete book at NZAMT conference |

**Risks**

|  |  |
| --- | --- |
| **Risk** | **Potential mitigation** |
| People no longer available due to unforeseen circumstances | Back up writers or teams of at least 3 |
| No funding secured by December 2023 | Try again in 2024, delay publishing date |
| Insufficient funding | Make a start with part of the project that fits with the funding available |

**Publishing deliverables:**

* Cover design (unlimited revisions)
* Branding (unlimited revisions, with book sample provided)
* Interior design and formatting, including formulae, clickable table of contents, cross-references, endnotes, and footnotes, as applicable
* Assuming no stock images need to be purchased
* Assuming no complex diagrams to be created from scratch
* Three rounds of revisions of completed interior design and formatting
* Cover provided as PDF and JPG
* Brand style guide provided as PDF (for any other marketing or future reference)
* Completed book provided as PDF

**International comments supporting the project**

We approached international members of the NZSA Education Committee and members of the International Association for Statistical Education (IASE) executive members to see how this fitted with their view on probability education around the world as well as New Zealand.

*Professor Rhys C Jones | Royal Statistical Society teaching section and Education Policy Advisory Group, and NZSA Education Committee member, United Kingdom*

I fully support this much needed resource, and think it is a great idea. The associated resources will help to make a big difference in the classrooms of Aotearoa, and I look forward to supporting this proposal further in the future.

*Associate Professor Ayse Bilgin | IASE immediate Past President, Macquarie University, Australia*

This is a great idea. It is great since it will include local context and Maori perspectives where possible for understanding and teaching probability. It would be great if one extra chapter is included on ethics, professional ethics (in statistics) and how ethical decisions are important for probability calculations. Since probability is not just mathematics and numbers but ethics is really important too.

I support your proposal. If you want me to be part of reviewers, evaluators, feedback providers for the produced materials, I would be happy to contribute to your proposal as a sounding board.

*Christine Franklin | American Statistical Association K-12 Ambassador, NZSA Education Committee member, United States*

I wholeheartedly support the writing of this probability book. I am grateful the Education Committee of NZSA is taking the initiative to develop resources to assist teachers in moving forward with teaching probability in a real-world context. This book will benefit not only students and teachers in New Zealand but students and teachers internationally.

Here in the United States, a leading document for recommendations of school level statistics and probability curriculum is the *Pre-K-12 Guidelines for Assessment and Instruction in Statistics Education (GAISE) II.* Although there are numerous resources being developed or available for the statistical investigations and statistical conceptual understanding outlined in *GAISE II*, there are limited resources available for teaching probability and what is available has limited connections to current directions for probability teaching and learning, in particular resources for teaching about risk.

Risk literacy is being recognized as an essential skill for both individuals and communities. For example, the Risk Know How project ([https://riskknowhow.org](https://riskknowhow.org/) ) and the risk framework developed for communities to use globally. See the article in *Significance Journal* (<https://rss.onlinelibrary.wiley.com/doi/abs/10.1111/1740-9713.01590> ) about the risk framework. As in the past, New Zealand is being visionary in establishing both statistics and probability learning outcomes for student success in the future and providing needed resources for teachers. I am happy to support this project in any way needed.

1. https://curriculumrefresh.education.govt.nz/ [↑](#footnote-ref-1)