Chris Wild and Maxine Pfannkuch

University of Auckland, New Zealand

(1) Barriers and threats

There has never been a bigger buzz about data, the power of data and the usefulness of people who can extract nuggets of insight from data than there is right now. Ironically, at this very time of explosive growth, the biggest long-term threat to statistics in secondary education is the erosion of its relevance due to narrow, historically-entrenched notions of what it can and should do. In the US, even the AP Statistics flagship has been leapfrogged in expansiveness of data vision by the newly-minted AP Computer Science Principles course.

The biggest barrier is the pitifully small market share statistics gets in the curriculums of almost all countries. It is not getting the exposure deserved by the benefits it can bring to society and the future lives of students. Historical market capture by others has crowded us out and possession, as they say, is nine tenths of the law. Other barriers are a lack of teachers who were educated in statistics at college and university and inadequate professional development to help them up-skill and modernise.

Then there are inertial, attitudinal barriers. With statistics education needing to expand its scope, we prioritise by considering what machines can do versus the thinking that is inherently human. Anything that is purely procedural can be taken over by computers: the subject needs to become much more conceptual with much more focus on bigger pictures. We have to wean ourselves off our heavy concentration on soon-forgotten procedural details.

Conceptual approaches also require that students write. Math teachers "didn't sign up" to teach how to write and mark "essays". Math teachers' and students' extreme discomfort with uncertainty and ambiguity is another barrier. This becomes insidious in the attitudes whereby "easy to teach" and "easy to assess" gets to trump "actually worth learning".

Then there is an attitude that teachers cannot teach things they did not themselves learn in college or university. Its corollary is, "teachers can't learn to teach new things". This is paralysing, and more so since most university study in statistics has not actually prepared people to teach modern data-driven, conceptual approaches to statistics. Also paralysing is the attitude that says we cannot start change until everything has been worked out and is in place. In some Arcadian Neverland this might be ideal but, in the real world, resources for development do not begin to flow and new textbooks do not start to get written until we are staring down the barrel at changes that will hit us "tomorrow".

All of these things can conspire to have us still teaching 1950s statistics in the 2050s, albeit to dramatically shrunken numbers as other disciplines expand to fill the data void and become the go-to disciplines for turning data into insight.

(2) opportunities

Data is currently seen as exciting and valuable, and the people who know how to gain value from it are highly sought after. There has never been a better time for getting attention and market share for teaching modern, accessible, data-centric statistics.

Statistics education has an opportunity to help students come to a much broader appreciation of what data is and what it can do for them and society. It has an opportunity to help students to make better sense of their world using data, to be not-easily-misled, and to prepare for a burgeoning job market. It has an opportunity to harness the power of visualization to greatly enhance the statistical understanding of a much wider spectrum of society. It has an opportunity to harness computational power to finesse away tedium, unnecessary difficulties and mindless procedural busywork so that we can concentrate on turning data into insights. Modern approaches to statistics give math teachers an opportunity to teach an area that is not only important but also palpably real and palpably relevant.

Our teachers are perceptive citizens of a fast-changing world where they expect rapid technological advance to continue to profoundly affect the way people work and live. They do want to prepare their students for this world. They do want to make a difference. And when given licence to break free of rigid historical shackles, many are incredibly creative and incredibly innovative in response to new challenges.

So let's trust in the capabilities of our teachers to learn new things, seize the opportunities and break down the barriers, casting them aside to advance into a brave new world. Long live the data revolution!