

Revitalising communities to sustain grassland research

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Abstract. Participation in science subjects at school and University has decreased in developed countries as the curriculum has broadened and the proportion of students staying on at school and entering university has increased. Global shortfalls in STEM graduates (Science, Technology, Engineering and Mathematics) mean an increase in salaries, which in turn are decreasing the likelihood of students staying on at University for postgraduate study. This is unfortunate given the increasing challenges in sustainable food production – grassland research needs great people enjoying great careers in order to contribute to global sustainability. This paper addresses the complex issues which have been the foundation for current generations, and considers what can be done to ensure that communities are revitalised to sustain grassland research.

Keywords: Schools, career opportunities, research.

Introduction

Sustaining grassland research is a grass roots problem – it starts in the home and in the schools. Every message that parents and teachers send, intentionally with words or unintentionally with body language, influences the direction of the young. When adults are happy in their chosen career, they encourage others, either intentionally or unintentionally, to follow their path. When they are dissatisfied, the reverse happens. The workplace has changed since baby boomers chose their careers, and frustrations in primary production, science and academia are rife. Add the explosion of school subjects, the plethora of potential careers and the very different upbringing of progeny that has occurred in the last couple of decades, and it isn't surprising that recruitment into grassland research is suffering – globally. The Australian Council of Deans of Agriculture has calculated that there are 6 jobs for every agricultural science graduate. New Zealand has had fewer than 100 graduates (of approximately 22,000) a year in agricultural science for the past decade. In the UK, agriculture science was in the top 5 for highly employable graduates last year, and biological science was 6th, indicating a shortage of recruits.

This paper considers the research on the younger generations, their career priorities, how and why they differ from previous generations, and how the grassland research community can adjust to ensure that the right messages are sent to schools and careers counsellors.

Generations

Generational theory (Howe and Strauss 1991) suggests that global occurrences such as wars or depressions (economic downturns) influence the development and hence behavior, attitudes and personalities of 'the generation'. Although their theory has been criticized as being too generalised and 'overly-deterministic' (e.g., Aanestad, 1993), it is a useful starting place for considering changes in the work place.

The Baby Boomers (Table 1), now aged approximately

49-68, are the progeny of those who grew up during the Second World War, and consequently have a strong work ethic and a focus on service. At school, rote learning for some areas of knowledge (times tables, Shakespearean speeches, periodic table, monarchs of England, for instance) was the norm and students were streamed, with drafting/encouragement into 'harder' subjects. University was for only a small proportion of school leavers (5-10%) and expectations were that a working career would involve loyalty and hence only two or three job changes. In the workplace, McCrindle Research (2008) has suggested that Baby Boomers want freedom of choice and expression; leadership must be informed by knowledge, information and logic.

Generation X members were born after the development of the contraceptive pill, between 1965 and 1979. As the product of 'choice' they were brought up as important members of the family. They want independence and flexibility in their employment and are influenced by perception rather than facts, don't value authority or experts, and want leadership from within the team (McCrindle 2008).

Generation Y will form over 40% of the workforce by 2020. Members of this group are skeptical of power, want to be their own boss and value freedom and lifestyle (McCrindle 2008). Y-generation people grew up through a period of very high employment; they also know that the Government or their parents will support them if they are not working – and even if they are. The Pew Research Center (Parker, 2012) reports that 19% of 18-34 year olds regularly receive financial assistance from parents.

Table 1. Generations (McCrindle 2006)

Generation	Alternative name	Approximate years
Builders		1946
Boomers		1946 - 1964
Generation X	Generation Me	1965 - 1979
Y generation	Millennials	1980 - 1994
Zappers	Homeland	1995 - 2009

Similarly, almost 22% of 25-34 year olds live with their parents. At the same age only 11% of Baby Boomers lived at home. This support enables members of the Y-generation to leave the workplace if they don't feel valued and happy. Although the job market is not as open as it was before the Global Financial Crisis, they still have options, including not working.

The Z-generation (z for zappers) shares the same significant factors in parenting and schooling which have influenced the attitudes of the Y-generation. Hence it is likely that the attitudes to 'power' and 'employment' will be similar, although their world view (and consequently their attitudes towards environmentalism and employment security) has been influenced by climate change and the Global Financial Crisis. This group regards security of employment rather more seriously than the Y-generation members.

The younger generations are a phenomenon sown and nurtured by the Baby Boomers. Employers of all generations are reaping the consequences of the upbringing and schooling we've given them, and the Zappers behind them. Enabling them to choose primary production and grassland science as a career will take effort, but the rewards will be in having a vibrant, motivated and productive workforce.

The STEM

Science, technology, engineering and mathematics (STEM) subjects have declined in popularity in formal education globally. This is despite the fact that STEM knowledge is vital in meeting the challenges in: (1) food and environment; (2) economic development (which is linked to tertiary education in science and technology (Wolff and Gittleman, 1993); and (3) the ability to create wealth from innovation (which is linked to scientists and engineers in the workforce (Porter and Stern, 2001)).

Analysis (Westgate 2007) has suggested that factors behind the decrease in STEM students include: (1) shortage of specialised STEM teachers; (2) poor image of science and scientists; (3) perception of science as a hard subject; and (4) lack of knowledge about STEM careers. All of these factors are true, but school children still take the sciences if they want to be doctors or veterinarians (Hipkins *et al.* 2006). The challenge, then, is to make STEM careers as attractive as the medical professions by showing students that the rewards are high. At present, however, a considerable portion of the value in science careers is intrinsic (discovery, responsibility and meaning) rather than extrinsic (money and kudos). Career decisions are made at school before many of the children have the maturity to understand the difference between intrinsic and extrinsic rewards. Well-meaning suggestions that options can be kept open by taking a spread of subjects from the traditional to the new actually limit future options.

These new subjects were part of reforms in the education system designed to enable every child to complete a qualification with a sense of achievement. Subject liberalisation was an attempt to make education more relevant for a greater proportion of the population, and choice increased. At the same time the need for a scientifically-literate society able to understand the benefits and risks of new developments was recognised and the

approach to teaching traditional subjects was changed. This meant a move away from a system where knowledge and abstract facts were considered to be important and exams were final, to a child-centred approach with greater emphasis on course-work, open-ended tasks, context dependent knowledge, analytical skills and verbal reasoning (Warrington and Younger 1999). The unintended consequence is that children have tended to opt for subjects which they perceive to be enjoyable and where acceptable achievement can be obtained for minimum effort. Coe *et al.* (2008) have shown that it is more difficult to obtain a high grade for subjects where memory and accuracy are required (physics, chemistry, biology, mathematics, French and German) than in what are termed the creative subjects (drama, design, photography, media studies).

Perhaps of even more concern, given the liberalisation of the curriculum, is the 'just follow your passion' advice. Research (Newport 2012) has shown that famous people (*e.g.*, Steve Jobs) who have given this advice publically actually didn't have passion until they'd worked at it for some time. At 15 years old it is unlikely that a lifetime's passion will be identified, and keeping a broad mix of subjects actually limits future options, whereas doing the hardest (Coe *et al.* 2008) subjects allows diversity later in life.

At school Y-generation students have been given leadership opportunities (over half of them now believe that they are leaders) and high grades (in the US, 43% of grades given are As (Rojstaczer and Healy 2010)). They have also been encouraged to evaluate and challenge other people's ideas and decisions. They are inclined to argue if they don't like what is being said or done, whether or not they have taken the time to inform their opinion (Sheahan 2005). This has resulted in an education system with more focus on 'teaching to the exam', mastery tests where students can have repeated attempts at 'passing', multi-choice and internal assessment – so that teachers can justify the assessment. In New Zealand research has shown that this style of education has suppressed motivation (Meyer *et al.* 2009). 'Helicopter parents' have been helping to ensure that the route is obstacle free; 'curling parents' have ensured a smooth passage.

Despite all the negative signals and research results, there are also reports that students are interested in science and do see it as having value for the future (National Education Monitoring Report 2007). The fact that they then don't study it at university is a global tragedy.

Recruiting more students into studying science and then into science careers will require overt signals into schools. Canada, Ireland and the USA have attempted to ensure a strong supply of STEM workers with preferential scholarships and investment in teaching. The United Kingdom education reforms (Stuart 2013) are aimed at ensuring a rebalancing of the economy with a focus on engineering and manufacturing, recognising that this requires higher standards in the STEM subjects (science, technology, engineering and mathematics) than are currently being achieved. Students at school need overt signals about the subjects that will be valued in careers. The UK is attempting to send them; other countries could follow suit.

The new workforce

Much of what has been written about the Y-generation reflects generalisations (and is focused on developed countries): there are people in the workforce younger than 35 who aren't typical of their generation (and many of the atypical ones are from rural backgrounds) – but the very fact that so much is being written about this new group does indicate a change.

The younger generations have seen the cost of materialism and consumerism on their parents (broken marriages and an epidemic of stress-related illnesses), and say that they are more interested in life than money. They are, however, the most materially endowed and entertained generation ever, and research by Robert Half International (2008 and 2012) shows (Table 2) that they put 'Salary' number one in the list of wants, followed by 'benefits'.

Research (Pryor *et al.* 2012) ongoing since 1966 by UCLA (American Freshman Survey) and 1975 by the University of Michigan (Monitoring the Future Study, involving school seniors) has shown that the proportion of students who for whom being wealthy was very important changed from 45% for Baby Boomers to 70% for Generation Z to 75% for Generation Y. In contrast, 'developing a meaningful philosophy of life' decreased from 73% for Baby Boomers to 33% for Generation X to 21% for Generation Y members (Twenge *et al.* 2012). Clearly the reasons for choosing a career are quite different for current generations than in the past.

In the workplace

Hudson research indicates that both Baby Boomers and Generation Y have a strong work ethic, but Sheahan (2005) points out that there is a 30 hour per week difference in what that work ethic means to them. This may be because the Y-generation members were forming their world view during the 90s when their parents were being urged to 'work smarter not harder'. The urging was supposed to stop Baby Boomers working even longer hours. Generation Y members, who, in Peter Sheahan's words, are manipulative, and will twist and distort information to get what they want, exploiting any loophole they can, work smarter so that they can go home early, having ticked all the boxes (or at least enough 'for a pass') on their job list.

Work life balance is a major consideration for Y-generation (Table 3), after money and benefits... the long hours for research that have been the norm and children have seen in their parents, coupled with uncertainty to do with project funding, are not what they want.

Table 2. Consideration before joining the workplace (Robert Half International 2008 and 2012)

Consideration	Score 2008 (out of 10)	Score 2012 (out of 10)
Salary	9.1	9.0
Benefits	8.9	8.9
Company stability	N/A	8.9
Career growth	8.7	8.6
Location	8.4	8.4
Leadership	8.0	8.0
Brand	7.6	7.8
In-house training	N/A	7.2
Job title	7.2	6.7

Table 3. Major differences in work attitude between traditional and new employees (McCrindle Research 2008)

Traditional Employers	New Employees
Work ethic – live to work	Work-life balance – work to live
Task focus	Team focus
Commitment	Enjoyment
Authority	Empowerment
Independence	Support
Structure	Flexibility
Tell them	Involve us
Conformity	Creativity
Tradition	Innovation
Regional	Global
Long careers	Many jobs
Learn then earn	Lifelong learning
Loyalty	Variety

Professional development, conferences and travel are key for the Y-generation and are easy to achieve in science. Likewise innovation and creativity (Table 3) – that is the foundation of science. Unfortunately 'career steps', also key at the beginning, and associated with increasing pay and responsibility are less clear to explain. Add salary and benefits as the initial attractant, and grassland science suffers in terms of delivery for those concentrating on external rewards.

Management and leadership

Sheahan (2005) identifies motivators for Generation Y employees as culture, team, management style, flexibility, conditions, and salary. The key is inclusion. McCrindle Research reported that 97% of the Generation Y members surveyed valued a leadership style that involved empowerment, consultation and partnership (and would leave if they did not get it). Similarly, Robert Half International (2008) puts working with good people at the top of the list, followed by work-life balance (Table 4).

Research by Massey University reported (Macky and Boxall 2007) that common features in top workplaces include excellence in leadership, focus on performance and results (including performance-based rewards, recognition systems and formal management structures), allowing employees to feel they are making a difference, and ensuring that they are acknowledged for their contribution.

From this it is clear that the key to staff retention is the employer...a keynote paper given by Martin Thorley (Merston Peters Ltd; a recruitment/Human resource management company) at the Oxford Farming Conference this year (Thorley 2013) suggested:

- Work on the quality of your management; become world class
- Be flexible on how you attract and reward people; show that you care
- Be prepared to invest in success through training and development

Thorley warned that there is a talent shortage that is getting worse, competition is getting stronger for good people, and that the best people are wanted by everybody – they have choices. He also warned that "Growing new people is a long term strategy".

In addition, Robert Half research suggests that in recruiting people, emphasise the competitive salary being

Table 4. Consideration in the workplace (Robert Half International 2008)

Requirement	Score (out of 10)
Working with good manager	8.74
Fun people	8.69
Work-life balance	8.63
Short commute	7.55
Green company	7.42
Nice office	7.14
Technology	6.89

offered, plus the benefits, stability of your operation, and its reputation. Support the employees' professional goals and create opportunities for training and career development. Do salary reviews regularly (perhaps more than annually) and award bonuses when you can.

All of these suggestions must be put in place in order for reputation of grassland science to improve.

The education summary

The younger generations have not been encouraged into grassland science because of the lack of overt rewards modelled by their parents – long hours and hard work are not what they want from a career. In addition, the effort required to achieve success in the sciences is greater than some rather more overtly fun subjects. As a consequence participation in the sciences in schools has decreased meaning that a smaller proportion has the foundation for studying grassland science at university. Even some of those with science at school make the decision to do a more liberal and less laboratory focused degree, because the high contact hours in science restricts their ability to work during semester.

After graduation from a bachelors degree, staying on for honours/masters and then Doctoral studies extends the time on no real income, when graduates from a three-year degree are in hot demand with a concomitant increase in salary. In New Zealand the average graduate salary is less than NZ\$40,000, but applied science graduates are being offered NZ\$48,000, plus SUV, computer and phone. Five years later and the applied science graduate could be completing a PhD with a post doctorate salary of NZ\$65,000, whereas the classmate who left to join the industry will be on a salary package approaching NZ\$100,000.

Overall, the opportunity cost of doing a science degree, and then putting in the postgraduate study that leads to a science career, is a huge barrier and loss of earning power that the young are now calculating. Government intervention to acknowledge the cost, plus a formal program of in-work supported PhDs on salary, is required to make a difference.

Once in the work force, all that has been written about the younger generations must be put in place to ensure that they are retained because they feel valued.

Conclusions

The younger generations are very much better than previous generations at getting what they want in the workplace, because they have the parental support to leave.

Employers must therefore ensure that they have the six dimensions of high-performance work systems: a fair

promotion process, few status differences, accurate performance appraisals, regular constructive feedback on performance, information sharing, inclusion in decision-making. Creating such a system has been reported (Macky and Boxall 2007) to lift job satisfaction, commitment, trust in leadership, and ultimately performance, for the business.

The key is to create communities which starts in kindergarten and works through the schools into universities, the workplace and back into society; when grassland science is seen to be valued, everybody will want to play a part in it. Leadership from Government is required, through the science and innovation portfolios, as well as the education ministries. Northern hemisphere countries are already exploring options. Australasia could be considered as having small science systems which can be nimble on their feet, plus a high degree of connectivity – but are in danger of losing the plot in political ramblings. Delays will mean that we lose more of our very few grassland people to other countries. All of have a part to play in getting the message out – grassland science has a huge amount to offer and the importance of the work has never been greater.

References

- Aanestad G (1993) The Bust Generation: A Cohort Analysis (Unpublished PhD thesis). University of Hawaii. <http://scholarspace.manoa.hawaii.edu/handle/10125/10141>.
- Coe R, Searle J, Barmby P, Jones K, Higgins (2008) Relative difficulty of examinations in different subjects. www.score-education.org/media/3194/relative_difficulty.pdf
- Hipkins R, Roberts J, Bolstad R, Ferral H (2006) Staying in science 2. Transitions to tertiary study from the perspectives of New Zealand year 13 science students. 92 p.
- Howe N, Strauss W (1991) Generations: The History of America's Future, 1584 to 2069. New York: William Morrow & Company. ISBN 978-0-688-11912-6.
- Macky K, Boxall P (2007) The relationship between 'high-performance work practices and employee attitudes: an investigation of the additive and interaction effects. *International Journal of Human Resources Management* **18**, 537-567.
- McCrindle Research (2006) New Generations at work: attracting, recruiting, retraining and training Generation Y. www.libraries.vic.gov.au/downloads/Public_Libraries_Unit/newm_generationsatwork.pdf.
- McCrindle Research (2008) Mind the gap. www.mccrindle.com.au.
- Meyer LH, McClure J, Weir KF, Walkey F, McKenzie L (2009) Motivation and achievement at secondary school. The relationship between NCEA design and student motivation and achievement: a three year follow-up summary report. www.educationcounts.govt.nz/data/assets/pdf_file/0011/4_9358/NCEA_Summary_Report_Final_150709.pdf.
- Newport C (2012) So good they can't ignore you: why skills trump passion in the quest for work you love. Business Plus, Hachette Book Group, New York.
- Parker K (2012) The Boomerang Generation. Pew Research Centre. www.pewsocialtrends.org/2012/03/15/the-boom-erang-generation.
- Porter M, Stern C (2001) National innovation capacity. pp. 102-115. In: Global Competitiveness Report 2001. World Economic Forum and Harvard Business School.
- Pryor JH, Eagan K, Blake LP, Hurtado S, Berdan J, Case MH (2012) The American Freshman: National Norms Fall 2012. www.heri.ucla.edu/monographs/TheAmerican_Freshman

- [2012.pdf](#)
- Rojstaczer S, Healy C (2010) Grading in American colleges and universities. www.gradeinflation.com/tc2010grading.pdf
- Robert Half International (2008) What millennial workers want: how to attract and retain Gen Y employees. www.rhi.com/geny
- Robert Half International (2012) Workplace Redefined. Shifting Generational Attitudes During Economic Change. www.roberthalf.com/workplacereDEFINED
- Sheahan P (2005) Generation Y: Thriving and Surviving with Generation Y at Work. Hardie Grant Books.
- Stuart G (Chair) (2013) From GCSEs to EBCs: the Government's proposals for reform. [www.parliament.uk/documents/commons-committees/Education/EIGHTH_REPORT-GCSEs to ECBs Reform-HC 808.pdf](http://www.parliament.uk/documents/commons-committees/Education/EIGHTH_REPORT-GCSEs_to_ECBs_Reform-HC_808.pdf)
- Thorley M (2013) Retaining you talent. www.ofc.org.uk/files/ofc/papers/martin-thorley.pdf
- Twenge JM, Freeman EC, Campbell WK (2012) Generational differences in young adults' life goals, concern for others and civic orientation, 1969-2009. *Journal of Personality and Social Psychology* **102**, 1045-1062.
- Warrington M, Younger M (1999) Perspectives on the gender gap in English secondary schools. *Research Papers in Education* **14**, 51-77.
- Westgate T (2007) Strategic science. Parliamentary Office of Science and Technology, Postnote 277, 4p. www.Parliament.uk/documents/post/postpn277.pdf
- Wolff E, Gittleman M (1993) The role of education in productivity convergence: does higher education matter? In 'Explaining Economic Growth'. (Eds A Szirmai, B van Ark, D Palt) (Amsterdam: North Holland).