

# Te Whakatū Kōrero Working Papers

***Sustainability in Education:  
Is Distance Learning an Answer?***

— Josephine Bourke and Ormond Simpson

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# Sustainability in Education: Is Distance Learning an Answer?

## Introduction

The concept of sustainability is gaining acceptance in society and in business, but as this awareness has grown with available information, there are still some issues to address. One of these is gaining agreement on the effective responses to maintaining business today while also minimising the impact on the future (Bester, 2009). Providing ways of understanding the conceptual nature of sustainability may be where tertiary educational providers and researchers can make the greatest contribution to sustainability (Nicolaidis, 2006). This could come through embedding the concepts in educational programmes (Nicolaidis, 2006), undertaking research into the broad areas of sustainability, and contributing to wider adoption of sustainability within professional organisations (Stephens, Hernandez, Roman, Graham, & Scholz, 2008). While there has been some progress in the latter area, there appear to be delays in embedding sustainability into curricula. To assist progress, the first step is to gain acceptable definitions of what sustainability actually means for tertiary education and for educational providers.

There are a number of existing definitions of sustainability (Stephens, et al., 2008), many reflecting the United Nations report *Our Common Future* (World Commission on Environment and Development, 1987), which highlights the understanding of cross-generational fairness. The definition proposed by the Ministry for the Environment (New Zealand) is used in this report, as (despite some criticism as to its broadness) this definition reflects the concepts espoused by the United Nations:

... sustainability is about meeting the needs of today without adversely impacting on the needs of tomorrow. As a term it can be applied across a range of areas, such as the environment, society and the economy. (Ministry for the Environment, 2009)

The concepts of sustainability affect how education providers do business, and they are also influential in the design of curricula and how learning is delivered (Stephens, et al., 2008). If education providers wish to achieve an acceptable profile in the area of sustainability, they first need to address how they do business as an organisation (Baumgartner, 2009). Defining the organisation's

own position when it comes to sustainability is an important step to providing sustainable education. As part of this, the method of delivery needs to be considered (Roy, Potter, & Yarrow, 2007). This is particularly important with regard to distance learning (particularly e-learning), which appears to have sustainability implications that have not yet been fully explored (Roy, et al., 2007).

When looking at sustainability in education, there are several areas that need to be considered. The University of Plymouth in the United Kingdom refers to the main areas in sustainability education as being curriculum, campus, community and culture. They hold that without input from all four areas, sustainability in education is difficult to achieve. For this particular paper, the areas considered reflect and expand upon this approach. They are:

1. Curriculum choices, or what is taught. The curriculum is important to the organisation, as it forms the basis of the product and also indicates organisational direction. The various aspects of sustainability can affect what is taught in a number of ways.
2. Culture of the organisation, or how the organisation is structured to meet sustainability requirements. This also reflects wider cultural implications, as high-level requirements need to be backed up by resourcing to allow for full implementation.
3. Conveyance, or how the educational input is delivered to the student. Research into sustainable delivery often concentrates on distance learning, which is a particular focus of this paper too. Distance delivery has various guises, and there are a number of areas where the concept of sustainability is worth consideration.

Research on sustainability in education has been limited, often focusing on using the Internet as a tool for sustainable education, while omitting the need for social interaction and the difficulties with completions, which are common when distance learning is used. There are also implications for environmental sustainability and Internet use that are only now starting to be understood. This paper explores current research in the area of sustainable education and proposes several areas where there appears to be a need for further investigation.

# Curriculum choices

The literature on how curriculum decisions are made in tertiary educational institutions is not extensive, and what is available is largely based on empirical and anecdotal evidence. This evidence suggests that some organisations have expectations that their faculty will keep up to date with industry requirements (although there might not always be a formal process for ensuring this). There may also be requirements to consult externally, perhaps identifying stakeholder needs through discussions, with market research also included in this process if required. Some organisations also have academic research expectations that contribute to the curriculum requirements, but such research is often specific to those areas that interest academic staff members.

In practice, the regular curriculum decisions appear to be made in response to a number of factors, including:

- tradition
- market need
- a good idea
- industry organisation guidelines
- government imperative.

When it comes to tradition, institutions may opt for courses and programmes that have always been offered, or which reflect those commonly offered by other, similar organisations. For example, an Internet search for Bachelor of Business programmes in New Zealand alone indicates at least 10 providers of similarly named programmes, not including those with different naming structures (such as commerce). Core courses within the programmes appear to also reflect similar perceptions of traditional requirements. Anecdotal evidence suggests that some changes might slowly be taking place, although research in this area is limited.

Sometimes a proposal for curriculum changes will come from an idea that stems from research, or fills a perceived gap. Organisations might also respond to market need, but it can be difficult to confirm this need and provide timely educational opportunities to reflect the requirement. Education providers are not always able to respond to market need quickly, and the necessity could come and go while the organisation is still considering the situation. In addition, market need may not allow for the time lapse required by education

– if the need is current, then it is likely that graduates with the required skills should have begun their learning several years earlier. There is always difficulty providing curriculum that reflects the needs of the present, particularly as institutional processes often involve significant lead time for the development of new courses (Stone & Baldoni, 2006).

When looking at their curriculum, organisations need to consider the requirements of stakeholders and reporting entities. It can be helpful when there are guidelines from industry organisations, particularly professional groups that have specific requirements for qualifying for membership (for instance, a requirement to join the New Zealand Institute of Chartered Accountants or become a member of some other professional organisation). In such situations, tertiary education providers need to meet these requirements if they wish graduate accomplishments to gain recognition. Also, industry organisations usually give some notification or moderation to ensure that the institutions are providing appropriate learning opportunities. There is anecdotal evidence that (in New Zealand) some professional organisations are considering sustainability in their requirements, but the move towards this is slow, particularly when dealing with the processes of tertiary education providers in developing curricula. However, it is possible that tertiary education providers will need to take a lead in this area, rather than waiting for the professional institutions (Stephens, et al., 2008).

While understanding their conceptual role as educational institutions, and the needs of external stakeholders, it is also important for organisations to understand their government's reporting requirements. In New Zealand, government policy has a strong impact on education, where much of the funding for tertiary providers comes from government sources. The effect of government policy is particularly interesting when it comes to current information concerning sustainability as a curriculum issue. New Zealand government agencies have published three important documents that New Zealand education providers need to use as part of their sustainability development. These are:

- *See Change: Learning and Education for Sustainability*. This document, published in 2007, notes that tertiary education institutes need a core understanding of sustainability. It also looks at ways in which knowledge might impact upon different disciplines (Parliamentary Commissioner for the Environment, 2004; 2007).



- *Tertiary Education Strategy 2007–12*: This document provides guidance on sustainability to tertiary providers. It also suggests that organisations have a responsibility to promote the sustainable use of natural resources through teaching and learning, research, knowledge transfer and innovation (Office of the Ministry for Tertiary Education, 2007).
- *Evaluative Approach to Quality Assurance Policy Framework*: This document includes key evaluation questions concerning learners, teaching, matching learner and stakeholder needs, and expected outcomes. All of these requirements need to be supported by evidence of achievement (New Zealand Qualifications Authority, 2009).

These documents set the high-level, longer-term aims of government when it comes to tertiary education providers. The process of implementing these requirements is in its early stages at the moment, but there are already issues developing. The most important issue appears to relate to resourcing. In taking leadership roles as required in the *Tertiary Education Strategy 2007–12*, organisations need to have the resources to undertake research. There is also a requirement for organisations to have a core understanding of their sustainability issues, and to provide evidence that they are meeting expected outcomes – all of which will require both research and expertise within particular sustainability areas. Organisations are already experiencing difficulties with recruitment, and the increasing cross-functional requirement of sustainability increases implications for the professional development of teachers in various disciplines, which will impact on provision (Stone & Baldoni, 2006).

There is already evidence that any move towards offering sustainability courses, or embedding sustainability into programmes, is hampered by a lack of resourcing, support and perception of market need (Stone & Baldoni, 2006). But there is recognition that sustainability is also a question of culture and curriculum. For example, in the United Kingdom in 2005 the Higher Education Funding Council for England and Wales (HEFCE) asked universities to integrate sustainable development topics into their courses. However, apparently universities were resistant to what they saw as interference in curricula matters and it remains to be seen how effective this edict will be. It may be equally difficult to change the culture of universities. But there is recognition, at least in some quarters, of how important this will be. Dr Iain Patton of the Environmental Association of Universities and Colleges was recently quoted as saying:

If students leave with a degree but no grasp of the social and ethical environmental context in which they will have to live and work, have we not failed them? No matter how large a university carbon footprint is, it is nothing compared to the impact of

its graduates when they leave and enter homes and workplaces. If we miss this, we really do miss the big picture. When at university, we have the responsibility to ensure learners are exposed to knowledge and values which they can take on with them as informed, responsible citizens. Every aspect of our campuses, buildings, teaching and leadership must be oriented to achieve this. (Shepherd, 2009)

It may be that progress with sustainability in the tertiary education environment will be slow, and progress could be hampered without government funding or commitment from educational organisations.

# Culture of the organisation

Achieving commitment from tertiary educational organisations is a step that appears to be taking some time, yet without a change of organisational culture it seems that progress in educational sustainability will be hampered. Higher educational institutions may need to take a lead in defining and developing sustainability (Stephens, et al., 2008), yet despite the government imperative implicit in published documents, progress towards sustainable education in New Zealand appears to be slow.

New Zealand research indicates that when it comes to sustainability in education there are a number of issues that need to be addressed by educational institutions. The first is gaining an overall understanding of what sustainability means to an organisation (Parliamentary Commissioner for the Environment 2004; 2007). This understanding needs to reflect the organisation's business goals as well as its environmental aspirations. The limited research on sustainability in education in New Zealand indicates that the first step towards teaching in these areas is to address the sustainability of the educational provider itself. It is difficult to gain credibility in teaching sustainability if the organisation is not addressing its own contribution to sustainable education, particularly in an environment where corporate social and environmental responsibility is topical (Bester, 2009).

Business sustainability needs to be part of the organisation's core understanding of overall sustainability (Baumgartner, 2009), and in New Zealand it is also a government requirement (Parliamentary Commissioner for the Environment, 2007). Research indicates that the organisational structure is an important challenge to educational institutions wishing to promote sustainable education (Stephens, et al., 2008), and there appears to be a relationship between organisational commitment to sustainability and organisational culture (Baumgartner, 2009).

There are issues concerning organisational culture and structure that may prove challenging to educational providers. These include:

- Being a sustainable business. Current research indicates that organisations need to be careful about how they embrace environmental sustainability if it affects the profitability of the organisation (Soderbaum, 2009). Taking care of the more obvious areas of environmental awareness could be straightforward, but if there is likely to be any business impact there might be broader implications. One of the problems in this area is that there is a

broad understanding of sustainability generally, which may make things quite confusing (Soderbaum, 2009). For educational providers in New Zealand, consideration needs to be given to value and productivity, and also to the requirements of stakeholders (which may include government and students).

- The need to remember that when considering the organisational stakeholders educational providers may also need to take into account societal expectations. These could be emphasised through staff and student expectations of the organisation, and could put more individual responsibility on people to act in a sustainable manner (Natanasabapathy, 2007). If people act sustainably, then organisations might follow (Soderbaum, 2009).
- Curriculum issues, as many institutions try to provide courses and programmes that reflect external market demand. External registration organisations (such as accountants and engineers) have their own educational demands for qualification, with less concern about including sustainability as an extra specification. Cross-functional adoption of sustainability within programmes and courses could also be hampered by the considerable weight of processes that new courses and programmes must conquer.
- The requirement for appropriate research. Academic institutions may need to take leadership in research into sustainable education. However, as Soderbaum (2009) notes, there needs to be discernment in research to avoid politics or rhetoric gaining more importance than proper research.

Research indicates that it is difficult for proponents of sustainability to gain attention within New Zealand educational providers. It appears that most of the current provision has only occurred through the persistence of staff members. Without a supportive and flexible culture surrounding the introduction of sustainability into tertiary education, there are implementation difficulties. Research also indicates that the politics and ideology of sustainability need to be dealt with in the tertiary education environment, with sustainability research and delivery supported (Soderbaum, 2009). To quote Baumgartner (2009, p. 102), in the sustainability environment the 'low hanging fruits can be grabbed', but the issues concerning more difficult sustainability issues still remain unsolved. It might be that having a 'clean image' is more vital than being sustainable (Bester, 2009), and the method of delivery could be part of this image.

The effort to include sustainability in United Kingdom higher education has been focusing to a large extent on global warming and the consequent need to reduce carbon emissions. Earlier this year the University Secretary for the United Kingdom indicated in a letter to the HEFCE that the government wanted universities to reduce their carbon emissions by 80 per cent compared with 1990 levels by 2050, and by 26 per cent by 2024. This request was reinforced by a government statement that from 2011 a proportion of funding will be linked to how well individual institutions are reducing their emissions. In turn, the HEFCE and Universities UK (the vice-chancellors' group) have set up a 'Sustainability Taskforce', which has set equally high standards for carbon reduction. A fund of £30 million (NZ\$100 million) will be offered to universities between now and 2011 to develop emission-reducing projects.

It is interesting to note that much of the sustainability strategy for full-time universities in the United Kingdom rests on increasing the efficiency of their plant. For example, heating and lighting together account for around 70 per cent of universities' energy costs and therefore carbon output. There are examples of universities developing alternative innovative heating systems, such as biomass boilers at Bradford University and the University of East Anglia in Norwich (Bradford University), and electricity generation systems such as 'wave farms' at the universities of Plymouth and Exeter on the southwest coast of England (PRIMaRE, 2009).

Changes to the organisation's culture need to encompass more than just the easiest options, and need to be managed to include the development of an understanding of what sustainability means to educators. While some higher educational institutes are taking the lead in sustainability, there also needs to be more of a core understanding of how sustainability will affect teaching provision. As part of this development, some on-site universities are concentrating on improving their environmental impact. However, research is also moving to consider the value of the different types of provision while also considering sustainability.

# Conveyance or delivery

When it comes to delivering sustainability within tertiary education, it is important to consider the nature of the typical tertiary student. Students at this level are mostly adult learners with specific needs. An overview of relevant literature indicates a number of trends, including an understanding that helping adults to learn is different from teaching children (Knowles, 1970). Research indicates that problem-based or enquiry-based learning might provide a more appropriate fit for the adult learner (Carey & Whittaker, 2002; Milligan, 1999). For most adults, this will not be their first learning experience (Corder, 2008). Adult learners can be more self-directing, using their own experience in their approach to learning, and showing a readiness to learn (Forrest & Peterson, 2006; Rogers, 2007). However, this approach needs to be tempered by an understanding that learning support may have an influence on successful outcomes (Robson, Bailey, & Mendick, 2008).

As we move towards further consideration of sustainable education in this context, it is important to look at the sustainability of the method of delivery. Research indicates that benefits may be achieved through greater use of distance education, but there appear to be costs attached to this that are not always fully considered. Distance learning is commonly regarded as important to sustainable education, but there are issues with both the methods used and the results.

Research indicates that there are sustainability issues that need to be further understood, particularly as e-learning is not necessarily proven to be more environmentally sustainable than paper-based distance offerings (Roy, Potter, & Yarrow, 2003). While there seem to be opportunities for new technologies in distance learning, concerns remain (Rutland, 2007). Using mobile technologies for open and distance learning community development may be appropriate (Green, 2007), but thought must still be given to students as important stakeholders. Any approach to distance learning should include a focus on their needs, rather than the method of delivery favoured by the institution (Weaver & Peters, 2007).



Issues that must be considered in respect of sustainability in distance education include:

- There is a low level of understanding of the issues regarding completions for distance students. It is also difficult to come to terms with motivations for distance learning, and the effort required to promote successful student engagement (an important consideration for all aspects of sustainable education).
- There is a general lack of understanding of the resources required for sustainable education encompassing distance delivery.
- The focus of much of the current research is on e-learning, rather than other options for environmentally sustainable distance delivery.

Distance learning is recognised as often being a lonely pursuit, with research indicating that distance learners are often disadvantaged compared with on-site students (Ross, Siepen, & O'Connor, 2003). There is also evidence that the non-completion rate is higher for distance learners generally (Levy, 2007). The issue of higher levels of non-completion among distance students is a strong consideration for sustainable education. Distance education methods are being considered as an important part of the sustainability mix, with research considering the environmental impacts of various modes of educational delivery. While issues surrounding these factors remain, as the environmental impact might simply be moved from institution to student, there has been a major increase in use of the Internet as a delivery method. As this trend seems likely to continue, the rate of non-completion among distance students requires further research (Levy, 2007).

Of course, there could be a question whether completions are the only important result (Zepke, Leach, & Isaacs, 2008), with student expectations perhaps differing from those of their learning institutions. However, business sustainability measures include the use of completions as an important benchmark, and significant non-completion among students can also have a social impact. An apparent high failure rate among distance students is not a particularly strong recommendation for use of the mode of delivery itself. However, studies have indicated that completion rates are not only affected by the mode of delivery, but also by motivation to learn. Personal motivation can strongly affect outcomes, rather than simply the mode of delivery (Klein, Noe, & Wang, 2006). However, the individual nature of distance study might provide a stronger challenge to that motivation.

With the apparent increased risk of non-completion for distance learners (a risk for distance deliverers seeking business sustainability) (Levy, 2007), understanding the importance of motivation may be vital. For educational providers, completion rates are important for business sustainability. They are also important as a societal factor, with high non-completion rates perhaps contributing to significant educational failure. A better understanding of student needs in distance learning would be helpful, as would a greater understanding of the appropriate methods for successful distance delivery.

As researchers investigate distance learning issues it is becoming clearer that provision of distance education requires specialised knowledge, both of the nature of the provision and the media used. To begin with, assumptions are often made about the skill levels of students, but however their learning materials are provided students usually need guidance on how to study by distance (Poupa, 2001), perhaps including appropriately structured overviews (Dee-Lucas & Larkin, 1995). Designers of distance methodology need to be aware of this. They also need to be able to incorporate delivery improvements and student support to assist in completion (Levy, 2007). Research has recommended that distance learning be entertaining as well as relevant, and that engaging the student requires that methods use creative (and perhaps expensive) methodologies (Ross, et al., 2003). This advice is not always understood by providers, who appear to regard distance learning as a cheaper option rather than one that requires significant upfront expenditure and ongoing support for both teachers and students. Retaining students in distance education is a significant issue, and requiring the provision of relevant, exciting and interesting materials to help with retention is important. However, as the cost and complexity of provision increases, so too may issues of sustainable provision.

While some publicity concerning distance learning presupposes a decreased cost of provision, there remains a need to provide significant resources to support distance students. In addition to the increasing requirements for distance material to be entertaining and creative (indicating increased expenditure on development of the materials) (Ross, et al., 2003), distance students can require more support if they are to successfully complete their studies, again indicating expenditure that may not be acknowledged. Distance teachers cannot support a significant student volume if the individual interaction requirement is high, yet expectations appear to be that teachers can successfully manage virtually unlimited class numbers when using distance delivery.

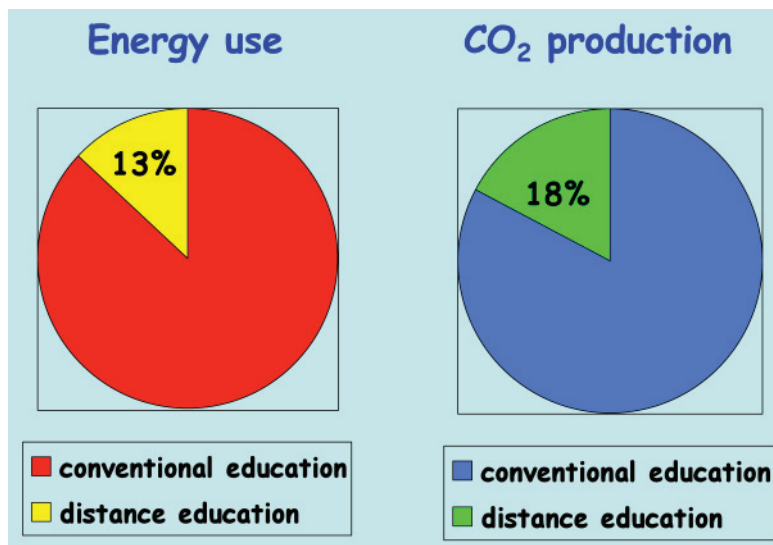


In terms of the delivery of environmentally sustainable education, current research into distance learning appears to be focusing on provision through electronic media, rather than on broader facilities. However, there are access issues with electronic methods, with many students still indicating difficulties with using the Internet for their studies (Poupa, 2001). Literature suggests that one of the disadvantages of studying by distance is missing out on the social interaction of class work and the intellectual stimulation provided by class discussions, and current attempts to replace the classroom environment with the Internet might be slow to gain acceptance. The provision of online chat tools and other online facilities does not currently appear to have a strong uptake among students, and could be difficult to manage with larger class groups (Ross, et al., 2003). In addition, many students are dealing with learning their coursework, plus learning strategies to manage online learning – an increased workload that might contribute to the high non-completion rate already associated with distance learning (Ross, et al., 2003).

There is also research stating that while it appears more economical to distribute documents through electronic forms than through print, there are indications that the cost of producing electronic information is often underestimated (Poupa, 2001). There is also the cost (both financial and environmental) of printing documents when learners are given electronic copies that they prefer to read in print. Evidence is beginning to emerge that students dislike extensive reading online, and while they manage smaller requirements to read online documents, any increase in this type of reading is not proving popular (Robertson, 2006). The cost could be transferred to learners who use their own printers, but the sustainability of many individual printers being used might not be accounted for. Some research supports the idea that learners will print material that interests them, or which they wish to follow up (Poupa, 2001).

If there is a greater failure rate for learners who adopt a distance learning mode, the social impact of failed educational opportunity should weigh against possible financial and environment benefits, and should be the subject of future research. While the future of open and distance learning might include more use of technology, there might be a return to paper for most distance learning should research into environmental sustainability identify this as a better option. As environmental concerns increase, it is likely that more people will find distance learning to be a more acceptable option. This could lead to increased issues in terms of completions and managing the expectations of stakeholders. We might also be dealing with more demanding students.

Herring and Roy (2002) suggested that in the particular case of the United Kingdom's Open University (OU) distance education was far more sustainable than conventional forms of higher education.



*Fig. 1 Sustainability*

Their initial analysis indicated that distance-taught courses involve 90 per cent less energy and CO<sub>2</sub> emissions than campus courses, although electronic delivery did not result in a reduction in energy or CO<sub>2</sub> emissions compared with print-based distance learning (Herring & Roy, 2002). However, their analysis failed to take into account the considerably higher levels of dropout from the OU and from distance learning generally.

Average dropout to graduation from conventional United Kingdom universities is around 20 per cent. Research is indicating that the delivery mode has an impact on completion (Frankola, 2009; Klein, et al., 2006), and dropout from the OU to graduation is now thought to be around 80 per cent based on the latest HEFCE figures. However, when measuring the energy use inherent in delivery modes, there appears to be no consideration given to the differences in completion and dropout rates. This lack of comparison in dropout rate has two effects:

1. If instead of comparing the energy per student studying, it is the energy per graduate produced by conventional and distance education that is compared, the energy advantage of the OU is raised to about 50 per cent that of conventional education, instead of Herring and Roy's 10 per cent estimate. This would seem to be a fairer way of comparing conventional and distance

education, as it compares outputs rather than inputs. The result shows much less of an advantage for distance education and may begin to fall within the inevitable errors involved in any such estimates.

2. Equally serious are the possible social effects of dropout mentioned previously. There is some evidence that dropping out of full-time higher education in the United Kingdom has long-term deleterious effects on the dropouts' physical and mental health. In particular, it increases their chances of experiencing depression, unemployment and general indebtedness (Bynner & Egerton, 2001). Depression is thought to be one of the most serious problems facing British society, with costs running into billions of pounds in treatment and social security costs, as well as loss of production. With nearly 50 per cent of the United Kingdom's 18 year-old age cohort entering higher education with a 20 per cent chance of dropping out, this means that around 10 per cent of the cohort may be experiencing the increased chances of depression and unemployment noted above.

There appears to have been very little research into the effects of dropping out of distance education. Since almost every distance education institution produces more dropouts than graduates – sometimes by a large ratio – this lack of interest in its main product is curious and a very clear gap in our understanding of the effects of distance education. We might hope that dropping out of distance education has less deleterious effects than dropping out of full-time education, but the fact that we do not appear to know for certain is alarming. Neither has any estimate ever been made of the effects on sustainability of dropout, but given the effects noted above it must be considerable. We need considerably more research into the effects of dropout from both conventional and full-time education on sustainability before we can safely conclude that distance education has real sustainability advantages.

# Future research possibilities

Educational sustainability presents quite a few research possibilities. For example, New Zealand government requirements refer to an organisation's core understanding of sustainability, and with the difficulties in defining the impact of sustainability there needs to be more research into what providing sustainable education actually means. Following on from that, thought also needs to be given to the requirement to identify sustainable use of natural resources through teaching, learning, research, knowledge transfer and innovation.

There are further research possibilities for environmental sustainability in terms of curricula. Once a definition of sustainability in education has been agreed organisationally, there needs to be discussion about the best place for sustainability in the portfolio. It may be that educational providers will decide to embed the concepts of sustainability into current courses or programmes, or they might provide new qualifications. Institutions could also consider taking leadership roles in sustainable education and education on sustainability. However, this would also require research in this area, and could mean significant resourcing requirements in addition to considerable possible gains. All would depend on the organisation's core understanding of sustainability and what it means for the education environment. It would also affect the sustainability of any organisation as a business, particularly where increased resources are needed.

Arising from this area is the sustainability of distance learning. Within this overall theme are a number of issues that could benefit from research. The first is the sustainability of distance learning overall. In today's environment, there appears to be a move towards distance learning as being more economical, but is the cost structure truly understood from a business sustainability point of view?

As a delivery method it would seem to have an advantage over on-campus learning from an environmental point of view, but the development of e-learning is also having an impact. Early research indicates that paper-based distance learning might be better for the environment than the e-learning equivalent, but this requires further research.

Current research has not highlighted the importance of completion rates for distance students. This occurs no matter what technology is used for delivery, and there are issues concerning motivation and engagement. Learning by distance is lonely, and many people do not complete their study. In fact, it is often difficult to reach 50 per cent retention in distance education programmes. Research in this area would be beneficial, particularly when referring to a New Zealand context.

# Conclusion

This paper looks at the current research into distance learning as a part of sustainable education. It appears that much research into distance education is assuming two things that need further investigation. The first is the assumption that distance learning will prove a better option for students, while ignoring evidence that suggests that distance learning completions are significantly lower than those in attendance-based tertiary institutions. This may be particularly true when the institutions are offering pre-degree programmes, but this has not yet been fully tested in research. How sustainable is a business that features significant dropout rates?

The second assumption is that e-learning will be more sustainable than paper-based equivalents, an idea that may not be supported by research. While online offerings can diminish the need for paper, the technology itself is not as sustainable, with hardware, software and energy requirements being substantial. Although it might seem heretical in today's e-environment, the return to paper-based learning could be more sustainable with current technology – concepts that need further testing in research.

Distance learning is likely to prove more sustainable – for the economy, the planet and society. However, the way it is provided needs to be examined in the light of both research and student need. The road towards sustainability in education is not likely to be short.

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