

Is eLearning a viable option to face-to-face workshops for generating and sharing information within the New Zealand sheep and beef industry?

Margaret Brown¹ and Denise Bewsell²

1. AgResearch Ltd, Grasslands Research Centre, Tennent Drive, Private Bag 11008, Palmerston North 4442, N Zealand
2. AgResearch Ltd, Lincoln Research Centre, Private Bag 4749, Christchurch 8140, New Zealand
Email: margaret.brown@agresearch.co.nz

Abstract. Attendance at traditional face-to-face workshops for New Zealand sheep and beef farmers has been dropping steadily over the past few years. FeedSmart, an industry and government funded research program, was charged with identifying the most effective learning approaches to use to assist New Zealand farmers to feed plan more effectively. As a result of investigating the ways farmers preferred to learn, eLearning was identified as worthy of investigation. This paper reports on a small-scale, exploratory, action research study designed to determine the viability and effectiveness of generating and delivering information to farmers via a video-conferencing approach, supported by the use of other digital technologies such as video-cameras. Key learnings from this study are that: the farmers enjoyed and increased their knowledge using this approach; eLearning of this type has potential as a learning approach for farmers; and that eLearning as a learning approach for farmer education is worthy of further investigation.

Keywords: eLearning, adult learning, interactive, participatory, action research, video-conferencing.

Introduction

Adult learning literature supports the notion that adult learning should be approached in quite a different way to the approaches used in the teaching of children and young adults. Adult learning theory holds that adults will commit to learning when the goals and objectives are considered realistic and important to them. It also contends that for adult learning to be most effective, it should take place in small groups and include opportunities to discuss, reflect, share, give and receive feedback and be involved in 'hands-on' activities that relate to their real work (Bruner 1968, Knowles et al. 2005). Furthermore, Knowles (1984) argues that it should not be presumed that we, the people who design and deliver adult learning, know what it is that adult learners wish to learn and what form or style they wish that learning to take. To this end, Ota et al. (2006) and previously Rogers (1969) argue that successful adult learning commences with a comprehensive understanding of learner needs and assessment of readiness for the learning.

However, usually because of funding and time constraints, it has often proved difficult or impossible to successfully put all of these learning principles into practice in New Zealand farmer learning packages. As a consequence, a 'one size fits all' mentality has prevailed when designing learning packages and programmes for members of the New Zealand agricultural community.

Currently, New Zealand providers of farmer education are finding it increasingly difficult to attract farmers to learning events. According to farmers, this is primarily because of the present economic downturn and the need to cut back on costs considered optional. Anecdotal information from farmers shows that there is a plethora of learning events offered to farmers, but that few of these meet their needs. Farmers want to attend learning events which have direct application to their own needs, contexts and particular farming issues and to learn with and from other farmers.

The FeedSmart project offered the opportunity to co-develop with farmers, a learning package that was based on adult learning principles and which took into account farmers different levels of expertise, interest and farming contexts. One delivery approach that emerged, as a result of survey work into the forms of learning approaches for the FeedSmart content, was eLearning based on video-conferencing.

The purpose of the eLearning trial was three-fold. We wished to investigate the viability and feasibility of using eLearning as a learning approach for members of the agricultural community. We also wished to investigate whether it was possible to successfully translate an interactive, participatory, face-to-face workshop format into a distance format based on video-conferencing supported by other technologies. Thirdly, we wished to investigate the use of different technologies to support and enrich the video-conferencing learning sessions. It should be noted

that this study was only conceived of as a scoping, exploratory study to investigate whether carrying out a larger, more robust study was warranted.

Action research was chosen as the most appropriate method for this small-scale trial because action research allows individuals and/or groups to 'learn by doing' (Atweh et al. 1998). This research approach aligned well with the results of the earlier FeedSmart survey work which had identified farmers' desire to play a significant role in the development and implementation of the FeedSmart learning events.

Project background

FeedSmart is a development and extension project, funded by an industry body, Meat and Wool New Zealand (M&WNZ), and central government through the New Zealand Foundation for Research, Science and Technology (FRST). FeedSmart aims to improve how sheep and beef farmers assess, predict and plan their use of feed. This project grew out of the farmer identified need for assistance with feed planning so that they could better utilize the grass they grow. The project commenced with an identification and development phase which involved scientists and farmers working closely together to design, develop and trial a suite of computer software tools that would make pasture growth rate prediction, feed costing and feed flow planning more effective for farmers operating at differing levels of management intensity. Along with the computer software a comprehensive farmer manual was also developed in collaboration with farmers (M&WNZ 2007).

As a basis for the planning of the delivery of the FeedSmart programme, a context segmentation survey, involving some two hundred and eighty farmers, was carried out to ascertain farmers' current knowledge and feed planning practices. Market segmentation is a method for dividing a heterogeneous population into groups or segments that are homogenous (Dickson and Ginter 1987; Strong and Jacobson 2006). Different characteristics, such as geographical information or demographic information, can be used to segment a population (Haley 1968). We sought to understand the context or environment in which farmers make decisions about feed planning (Kaine and Lees 1994). The survey also covered farmers' preferred learning styles and delivery modes so that these could be taken into account when considering possible delivery modes for the programme. The results of the survey revealed that a learning package or packages that took account of the different levels of farmer experience, interests and priorities and farming locations was needed. These findings quite clearly showed that in this case, a 'one size fits all' delivery approach would neither equate with the farmer's identified needs, interests, farming contexts and issues or adult learning principles. Rather, the context segmentation findings showed that the best delivery approach would involve a number of different approaches from which farmers could choose the one or ones that best fitted their needs. To this end we developed four different workshop approaches which were offered to all New Zealand sheep and beef farmers. They were: i) workshops for people who are new to feed planning; ii) workshops for people who have feed planning experience and are interested in learning about the computer tools; iii) workshops for special interest groups such as women in farming and employees on large farms; and iv) workshops for rural professionals. All workshops were tailored to the level of the participants' experience, based on local context and issues and where possible were co-presented with 'credible' local farmers, a requirement identified by the farmers.

eLearning as a possible extension (technology transfer) delivery model

In the agricultural community, extension (technology transfer) is commonly understood to involve communication of information to help people form sound opinions and make good decisions (Black 2000). There are a number of extension delivery models which vary from linear 'top-down' transfer models through to participatory 'bottom-up' approaches. The FeedSmart programme takes a participatory 'bottom-up' approach to extension because the context survey work carried out at the beginning of the development of the FeedSmart programme showed that farmers wanted to take a role in designing learning events that involved hands-on tasks where they could learn from other farmers whilst supported by 'experts'. eLearning is a extension delivery approach which accommodates these learning preferences.

eLearning is a type of distance learning where the mode of instruction is through digital technologies via internet and computer technology (Garrison and Anderson 2003). Video-conferencing is one particular technology that fits this description. According to Garrison and Anderson (2003), eLearning should always be directed by well defined pedagogy which gives direction to the technology rather than the other way around. In this trial, the FeedSmart eLearning content was taken from the FeedSmart face-to-face workshop content which had

been developed on adult learning principles. This content was then adapted to the requirements of the chosen technologies, video-conferencing supported by digital photography and videos.

The main reason the farmers gave for being interested in some form of eLearning was that they said they did not like having to always travel to the larger centres for learning events as this took them off farm for most of the day. As they explained, time off farm had a real cost to them and in times of economic downturn, farmer education was one of the first things they cut out of their budgets.

However, these farmers also stated that they were not interested in distance learning that involved sole use of their home computers. Their reasons for this had to do primarily with their stated preference for learning in groups, as the preferred learning approach for them was very much a social, participatory one. What they said they would like, was for us to find some way of taking the interactive, participatory format of the FeedSmart face-to-face workshops and translating this into a distance delivery mode that was not based on use of the home computer but some other more interactive distance approach.

The farmers also indicated they had several other preferences. These being that:

- group numbers be small no more than twelve so that learning could be individualised and tailored to their needs
- travel to any event to be a maximum of thirty to forty minutes
- learning sessions to be no longer than one and a half hours
- learning sessions to be held on a day/s and at a time of day chosen by them
- programme content to be of direct interest and relevance to their farming situation, local context and their levels of expertise and experience.

Faced with this list of learning event preferences, video-conferencing supported by other technologies such as video-cameras and hands-on tasks and possibly some home-based computer work was identified as a possible means by which to deliver the small group, interactive, participatory style of distance learning that these farmers said they were prepared to trial.

New Zealand has a network of video-conferencing facilities set up in both urban and rural schools throughout the whole country. The New Zealand Ministry of Education partially funds the supply and installation of this technology into schools and they manage the school teaching programme that takes place via this system. To make the eLearning trial possible, we negotiated an agreement with the Ministry of Education to use their VirtualSchool Network video-conferencing facilities and to also receive support from their personnel with use of the technologies.

Furthermore, one of the authors, Margaret Brown, visited North Dakota State University to learn more about their farmer video-conferencing based extension delivery model which they have had in operation for nearly twenty years. North Dakota State University also offered their assistance, support and expertise to the FeedSmart trial. Finally, Dannevirke High School, in the central North Island, agreed to our using their video-conferencing facilities and their IT staff for the trial.

Purpose of the FeedSmart eLearning trial

As stated, the main purpose of the trial was to: investigate the viability and feasibility of using eLearning based on video-conferencing as a learning approach for members of the agricultural community. Along with this aim, we also wished to build IT capacity amongst our farmer group.

To our knowledge, this was the first trial of its type for New Zealand farmers and it was the first trial of its type for the FeedSmart course developers and presenters. Because of this new ground, and in line with the FeedSmart philosophy that farmers should be fully involved in the preparation, delivery and review of programme content and delivery, we decided, in this first instance, to carry out a small-scale action research trial to test the feasibility and effectiveness of this learning approach.

Method

Action research is described by Cohen and Manion (1989, p. 217) as 'a small-scale intervention in the functioning of the real work and a close examination of the effects of such intervention'. They go on to say that action research is usually collaborative, participatory and carried out by the people who are going to be directly affected by the results. According to Cohen and Manion, action research is a flexible and adaptable cycle of problem identification, identification of strategies to use to investigate or address the problem, trialling of the strategies, reflection and feedback, changing of actions and/or identification of another problem.

Action research was identified as the most appropriate approach to study the effectiveness of eLearning in one situation and to modify the approach, if necessary to ensure it was successful, because we wanted farmers, the end-users, to be directly involved in planning, carrying out and evaluating the progress and success of the trial. We also wanted the trial to be sufficiently flexible and unstructured to allow the farmers and presenter to explore the issues and challenges that came up with the use of the technology and presentation style as they occurred. Action research is very suitable for small scale, flexible investigation of issues which are pertinent to the group who are investigating it.

The group of eight sheep and beef farmers who volunteered to take part in the trial were interested in both learning about the FeedSmart feed planning content and also in trialling the video-conferencing and supporting technologies learning approach. These farmers also lived within a 30 to 40 minute drive of the local high school which had agreed to us using their video-conferencing facilities out of school hours.

To plan out the trial, a meeting was held with the group of farmers. At this meeting we established an understanding of each farmer's farm situation and management systems, local farming context and feed planning issues. We also identified specific feed planning subjects which these farmers particularly wanted to learn about. These included such topics as animal feed requirements and how to cope with drought situations. We also discussed the purpose of the trial, the action research approach and the farmers' personal aims and expectations. As we said this trial would reflect the farmers' identified needs wherever possible., We discussed their preferences for number of sessions, length of sessions, day of week, time of day, interval between the sessions, and technologies they might like to use. In addition to this preparation the scientist presenter received presenter training from Ministry of Education personnel.

The organisational plan agreed to, consisted of having three to four learning sessions of one and a half hours length, on Monday nights commencing at 7.00pm. It was also agreed that the sessions be at fortnightly intervals, but this was subsequently changed to meet farmer commitments.

The action research cycle involved an informal cycle of collective discussion and identification of feed planning content, setting of topics or issues to investigate, identification of issues around the use of technologies, the digitiser and video-cameras between sessions, identification of possible strategies to use to overcome these problems, trialling of strategies, feedback and evaluation of strategies and overall evaluation of the trial. Each session commenced with feedback on the previous session and concluded with feedback on the current session. The main data collection methods used were semi-structured discussions and survey. The trial commenced in March 2009 and concluded in May 2009.

It had been hoped that we might have been able to get the farmers to support their video-conferencing based learning sessions with the use of an internet-based course management system such as Moodle on their home computers, but they were not interested. Moodle would have allowed the farmers to converse (chat) with each other and the scientist presenter between sessions and it would have also allowed them to share documents, videos and photos. The farmers said they would prefer to use phone and email to do these things. Similarly, the scientist presenter found himself on such a steep learning curve with the new presenter style, that he too was not ready for this addition.

Trial findings and discussion

As this trial methodology was action research, which is characterised by on-going cycles of action, reflection and discussion, we have chosen to present the trial findings and discussion together in keeping with the integrated nature of the action research cycle. The findings and discussion are presented in six sections:

1. use of technologies and building community IT capability
2. farmer participation, enjoyment and learning
3. presenter challenges
4. translation of face-to-face format to distance format
5. value and feasibility of the video-conferencing based delivery approach
6. value and effectiveness of using action research methodology to investigate a small scale eLearning trial.

Use of technologies and building community IT capability

Video-conferencing The use of the video-conferencing system presented us with a number of challenges. Namely, problems with passwords, compatibility and connections between the Ministry of Education and AgResearch's video-conferencing systems and access to HELP facilities

outside of the Ministry of Education's work hours. These difficulties showed us that while we had hoped that it might be possible to build up farmer, and eventually farming community capacity, to use the video-conference equipment and support technologies like document cameras, it appears that at least for the first trials it is going to be necessary to have IT expertise on hand at each site to not only train the farmers in use of the equipment but to attend to such things as connection difficulties and sight and sound problems as they arise.

While this trial only involved the connection of one farmer group to the presenter at another site, the farmers said that it would be useful to connect with another group of sheep and beef farmers somewhere in the country who face similar feed planning issues. However, these farmers added that the ideal approach would be to have some sessions on their own and some sessions connected to another group to maximise their desire to be involved in learning events which are personalised as much as possible to each farmer's needs.

Supporting technologies During the VC sessions, use was made of the document camera to send images of pasture samples back to the scientist presenter which enabled him to analyse and discuss the samples directly with the farmers. The farmers reported that they particularly liked this task as they said 'It was nearly as good as being out in the paddock doing the exercise with Tom (the presenter)'. The farmers said they could see how a lot more use could be made of the document camera to emulate the kind of tasks that would normally be carried out in a face-to-face paddock exercise.

Apart from the use of the video-conferencing equipment, computer and the document camera at the school, the farmers used video cameras and digital cameras to take videos and photos of pasture measurement, quality and quantity in between the video-conference sessions. These videos and photos were brought to the video-conference sessions and streamed back to the scientist presenter for comment and discussion. The use of these technologies presented few challenges.

As stated above, we had hoped to incorporate the use of an internet-based course management system, such as Moodle into this trial, but neither the farmers nor the presenter wished to do this. The farmers said they would prefer to use email or phone rather than Moodle to communicate with other farmers or the presenter between sessions. The scientist presenter said he had enough new technologies to learn to use and that he would prefer to leave use of Moodle until a later trial.

The FeedSmart software All of the farmers used the FeedSmart computer software on their own home computers but for some this presented difficulties. In particular, some could not open one or other of the programmes and/ or their computers did not have the appropriate capability to run the software. This exercise showed us that the FeedSmart software needs further adjustments made to it to enable all farmers to run it on home computers of various sizes and capabilities.

Building community capacity As stated, one of the aims of the eLearning trial was to increase and build farmer IT capacity. In order to do this, we gave the farmers every opportunity to be involved in the use of the video-conferencing controls, the document camera and the sending of videos to the presenter site. This worked very well and the farmers reported that they liked taking 'control' of the technologies. Should these farmers be involved in another eLearning exercise, they would be capable of both leading the technology use and up skilling other farmers in its use. However, as stated above, it would appear necessary to engage the services of an IT person at each site while video-conferencing is a new experience and until community capability has been built to a level where the farmer groups have the skills to operate the technology on their own. Given that VC equipment is expensive, it may be that schools will insist that their IT staff be present with farmer groups.

Farmer participation, enjoyment and learning

Farmer participation and enjoyment The farmers entered the project with a high level of excitement and interest in both the FeedSmart content and the use of the technologies. This high level of interest could be attributable to the fact that these farmers were the first to be involved in a trial of this nature. This excitement and interest translated into a sustained high level of participation and interaction over the length of the trial. The farmers reported that this level of participation and interest was created and sustained through primarily the small size of the group (8) which enabled them to contribute, ask the questions they wanted answers for and set the direction of the sessions to cover the topics they each wanted to know more about. The farmers also reported that having the course content tailored to their own needs, expertise, context and issues greatly enhanced the learning level and enjoyment in the course. While the main purpose of the research was to trial the use of the technology and the feasibility of this

learning approach, the farmers were asked, in the closing survey, whether they had changed any of their practices as a result of being involved in the trial. All of the farmers reported that they had changed their feed planning practice in some either small or significant way/s as a result of being involved in the trial.

These findings would indicate that the small size of the group (8) met the learning and participation needs of this group of farmers. However, the size of group will be dependent on the size of each school's video-conferencing room. The notion of connecting via video-conference to another farmer group for some sessions could provide opportunity for enriched discussion and shared group activities.

Farmer learning On the matter of the learning level of this trial, the farmers reported that they had learnt as much 'if not more' from the small group, interactive video-conference sessions and 'homework' tasks as opposed to large group, face-to-face workshops. They stated that the shorter, repeated sessions had allowed them to reflect more on their learning, to try suggested actions (e.g. use of sward sticks to measure pasture length) and then to come back and discuss and share their findings and/or queries which the usual one-off workshop does not allow. They also said that their learning was enhanced by being able to have a say in the direction and content of each session so that their individual goals and expectations were met. As one farmer commented 'It's been really good, we have learnt stuff that applies right to my situation'.

It would appear from this small-scale trial that video-conferencing based learning is potentially as effective in terms of learning gained, as face-to-face learning programmes. These farmers said that this small group, collaborative approach allowed them to gain more information which was pertinent to their own farming situations than is usually possible through a larger group event. Thus, the time spent off farm was of high value and possible to justify.

According to the trial farmers, having access to an 'expert' was an important aspect of this trial. The farmers said they particularly enjoyed the interaction with the presenter, even though he felt at times that he was not engaging particularly well with them. Conversely, the farmers reported no feelings of distance or lack of connectivity, rather as one farmer commented "This is as good as having Tom (the presenter) here in the room with us'. Another farmer said 'In some ways this is better than having Tom here because we get him to ourselves...get to ask him exactly what we want to know'.

The farmers reported that the homework tasks, like the pasture measurement and analysis exercises with the video cameras in between the video-conferencing sessions, kept up and added to the interest of the programme without being onerous. All of the farmers reported that they would like to be part of another eLearning course of this nature so that they could try other new IT technologies.

This small scale trial showed that these farmers were willing to use some digital technologies to support and enhance the video-conferencing. It also showed that the use of these technologies enabled the course to incorporate valuable and effective, adult learning principle based, 'hands-on' practical learning tasks into an eLearning programme.

Presenter challenges

On-going evaluation of the presenter's use of the equipment, and his style and ability to interact and engage with the farmer group was carried out by both the farmer group and the presenter himself. While the FeedSmart scientist presenter was a very experienced and highly regarded presenter of face-to-face workshops, including a large number of the FeedSmart face-to-face workshops, he experienced a number of challenges with this new style of delivery. In particular, he felt that as he could not read the body language of his 'class', he was not able to engage and interact with them fully. As noted above, the farmers did not feel this way about the way he interacted with them. The presenter also felt hampered by not being able to move around as much as he would in a face-to-face workshop. These challenges highlighted the point, that eLearning via video-conferencing requires a different presenter approach which is based on more frequent direct questioning and individual and group tasks than is necessary in a face-to-face environment to maintain interest and engagement. It appears that presenter talking needs to be interspersed with frequent group questioning, responses and interactions approximately every five to ten minutes to maintain full audience engagement throughout a one and a half hour session.

The trial also showed that to enable the presenter to move freely from the computer, to digital camera, to whiteboard or Smartboard, it is preferable to have a technician present who can train the VC camera on the presenter and so free them up to move unhindered and more naturally between the pieces of equipment.

This trial also illustrated the importance of presenter training even if the presenters are already very experienced face-to-face presenters. While the FeedSmart presenter received this training from the Ministry of Education, AgResearch is looking to train more video-conference presenters who in turn will be able to build industry personnel capacity if eLearning based on video-conferencing becomes a widely used learning approach for the agricultural community.

Translation of face-to-face FeedSmart workshop format into a distance format

This trial showed that it is possible to successfully translate the content of a face-to-face, interactive, hands-on workshop into an eLearning format. The programme content that presented the most challenges was translation of the hands-on paddock exercises into a format that fitted into the distance mode. As stated above, this was done by giving the farmers homework tasks to carry out between sessions. The use of video cameras and digital cameras to video parts of these tasks which were then shared with the rest of the group and the presenter was seen by the farmers as a very valuable way to incorporate the hands-on practical tasks into the programme. The farmers also reported that the use of the document camera to share and analyse pasture samples with the presenter had been 'as good as' doing the exercise out in the paddock.

On reflection, the FeedSmart programme, with its necessity for hands-on paddock exercises, was a very challenging programme for our first foray into eLearning. However, we managed to successfully incorporate and translate the paddock exercises into homework tasks which the farmers were willing to carry out. This showed us that, with some inventive thinking on the part of both the programme designers and the farmers, it is possible to meet the adult learning principle of including some hands-on practical tasks in all adult learning programmes.

Value and feasibility of the video-conferencing based extension delivery approach

The results of the formative and summative evaluation of the trial showed that all members of this group of farmers found the trial interesting and of high value as it had increased their knowledge of feed planning and in particular, provided them with answers to their own feed planning issues. As one farmer said 'I have learnt more about feed planning from this than any of the other things I have been to'. Another farmer commented 'The best part has been getting Tom to answer my questions about my place...not just general stuff, my place'.

Despite the challenges the presenter experienced, he also said he could see value in the video-conference based delivery approach. He did however make the point that it is important to train other presenters in this style of delivery if we wish to grow this form of technology transfer as it is not easy to move straight from being a face-to-face workshop presenter to presenting via video-conferencing.

Overall, the developers', farmers' and the scientist presenter's evaluative comments showed that this particular eLearning approach to extension: 1) had met the developers' requirements to provide content and activities based on sound adult learning principles; 2) had been directed by pedagogy rather than the technology (Garrison and Anderson 2003); and 3) had met these farmers' identified learning preferences for 'bottom-up' extension in which they played an active role in the development and delivery of the materials.

The farmer and presenter evaluative comment on this small-scale trial also generally supported the notion that video-conferencing as an extension delivery approach holds value and potential and is worthy of further investigation.

With regards to the feasibility of this delivery approach from a commercial point of view, we need to investigate the full cost of this approach to both the farmer and the service provider. We would also need to look at on-going access to the Ministry of Education's video-conferencing facilities and the schools that own these and the on-going cost of this service. While this approach is going to be feasible for farmers who live within thirty to forty minutes of schools with video-conferencing equipment, it is not going to reach farmers who live in more remote areas. However, it is possible in the future that with better internet connections, webcams and technologies like SKYPE, it might be feasible to translate the video-conferencing sessions into interconnected SKYPE sessions for the remote farmers.

Value and effectiveness of using action research methodology to investigate a small scale eLearning approach for farmers

The majority of these farmers were hardly aware that they were involved in action research as the action research cycle of identifying issues, setting and carrying out actions, reflecting and evaluating actions, giving and receiving feedback and posing new actions closely emulates the

decision making and action implementation that most of these farmers use to solve their business problems intuitively with family, colleagues and friends. Therefore, the choice of action research was fitting in this small scale trial as it did not require the participants to acquire any new research skills. Action research also proved to be effective because it allowed us to successfully investigate and formulate a response to the research question 'Is eLearning a viable option to face-to-face workshops for generating and sharing information within the New Zealand sheep and beef industry?'

Conclusion

This small scale exploratory study was valuable because it added to the very limited New Zealand based information available on the use of eLearning as an extension approach for the agricultural community. In particular, for the farmer participant and from our position as designers and deliverers of the total FeedSmart learning package, this trial was both successful and valuable as it identified several important learnings about combining adult learning principles into eLearning programmes. Firstly it showed that it is possible to deliver an eLearning programme which truly reflects the adult learning principles of participatory, interactive, small group learning based on goals and expectations that are both important to and set by the learners.

It also demonstrated that eLearning based on video-conferencing supported by other technologies, can successfully deliver a learning programme that caters directly for farmer learning style preferences.

A third conclusion from this trial is that it is possible to successfully translate the hands-on content of face-to-face workshops into distance formats using such technologies as document cameras, video cameras and digital cameras. We also see potential to enrich future eLearning learning programmes with the use of other technologies such as Smartboards and computer based course management systems to handle course information and facilitate participant interaction between sessions. However, we caution that the use of these technologies might not be appropriate for all members of the agricultural community. Anecdotal evidence suggests that women farmers might be more receptive, than many male farmers, to the use of home computer tools for group interaction and information management between video-conference eLearning sessions. We base this contention on the observation that many male farmers rely on their partners to use or help them use the computer for farm business. We plan to test this observation in a future trial.

It is our intention to build onto the findings of this trial in three ways. Firstly, by repeating the style and format of this first trial with another group of farmers in order to overcome some of the technical difficulties we experienced with the VC connections and quality. We also have funding to carry out a further trial which will involve connecting two groups of sheep and beef farmers with the presenter to facilitate three way sharing and generation of new information. Our third trial is planned to involve joining two or three groups of women farmers together with one or two presenters. We hope this trial might present the opportunity to experiment with further digital technologies and possibly an internet based course management system.

Throughout these three trials we intend to continue to look for additional ways to enhance and build community IT capacity within the groups we work with. It is our aim to leave each group with a set of skills that will allow them to engage in not only future eLearning opportunities to build up their farming knowledge, but hopefully will add to the set of skills they use in other aspects of their lives and businesses.

Most importantly, this eLearning trial enabled us to answer the opening research question 'Is eLearning a viable option to face-to-face workshops for generating and sharing information within the New Zealand sheep and beef industry?' Our response is yes, it appears that eLearning, based on video-conferencing, is indeed a viable option to face-to-face workshops for generating and information sharing both within the New Zealand sheep and beef sector, but also within the wider New Zealand agricultural community.

Three key learnings from this study are that: farmers readily took to and enjoyed the elearning approach; video-conferencing supported by the use of other digital technologies provided a feasible and effective eLearning approach to extension; and that there is merit in investigating further the feasibility and effectiveness of eLearning as an extension approach for members of not only the sheep and beef farming community but also members of the greater agricultural community.

Acknowledgements

We wish to thank all of the farmers, school staff members and members of the New Zealand Ministry of Education and colleagues at the North Dakota State University who participated in this work and gave so freely and enthusiastically of their time and expertise. It was a very interesting and valuable learning experience for all involved.

Reference list

- Atweh B, Kemmis S and Weeks P 1998, *Action research in practice – Partnerships for social justice in education*, Routledge, London.
- Black 2000, 'Extension theory and practice: a review', *Australian Journal of Experimental Agriculture*, 40: 493-502.
- Bruner JS 1968, *Towards a theory of instruction*, Norton, New York.
- Cohen L and Manion L 1989, *Research methods in education*, Routledge, Bristol.
- Dickson PR and Ginter JL 1987, 'Market segmentation, product differentiation, and marketing strategy', *Journal of Marketing*, 51(2):1-10.
- Garrison R and Anderson T 2003, *Elearning in the 21st century*, RoutledgeFalmer, London.
- Haley RI 1968 'Benefit segmentation: A decision-oriented research tool', *Journal of Marketing*, 32(3): 30-35.
- Kaine G and Lees J 1994, *Patterns in Innovation*, The Rural Development Centre, UNE, Armidale, Australia.
- Knowles MS 1984, *Andragogy in action: Applying modern principles of adult learning*, San Jossey Bass, San Francisco.
- Knowles M, Horton EF, and Swanson RA 2005, *The adult learner – the definitive classic in adult education and human resource development*, 5th edn, Gulf Professional Publishing, New York.
- Meat and Wool New Zealand 2007, *FeedSmart – Feed sheep and cattle smarter*, workshop manual.
- Ota C, DiCarlo CF, Burts D C, Laird R and Gioe C 2006, ' Training and the Needs of Adult Learners', *Journal of Extension* [on-line], 44(6) Article: 6TOT5. Available at: <http://www.joe.org/joe/2006december/tt5.shtml>, accessed 15/11/2008.
- Rogers CR, 1969, *Freedom to learn; a view of what education might become*, CE Merrill Publishing Company, Columbus, Ohio.