

Some Experiences in Blended Learning for Agriculture and Natural Resources Management

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ABSTRACT

It is often said that e-learning for agriculture and natural resources management has its limitations since many of the topics need to be taught and learned in a practical and contextualized way. Several Centres of the Consultative Group for International Agricultural Research (CGIAR) are presently exploring approaches to address the increasing demand for learning in agriculture and natural resources management through e-learning. One of them, the World Agroforestry Centre implemented two blended learning events which demonstrated that it is possible to address the issues of contextualisation and practical work by combining online learning with shorter face-to-face problem-solving activities. This paper discusses some lessons learned and offers a number of recommendations for blended learning approaches that can be used in training for agriculture and natural resources management.

INTRODUCTION

Agriculture, vitally important for most developing countries, must change to meet today's needs of sustainable food production while at the same time raising the living standards of rural poor and avoiding environmental degradation. International agricultural research has yielded numerous interventions that can contribute to this but their successful adoption and adaptation requires staff of agricultural research, education and development institutions to be fully aware of these through in-service training.

Advances in information and communications technology (ICT) and knowledge management (KM) have changed the way people learn and e-learning is increasingly recognized as a viable and learner-friendly approach that can complement, or even replace, more traditional training and education approaches. Agriculture however is a very practical subject and not all of it can be generalized at a global level since local context will largely determine success or failure of agricultural and natural resources management innovation. The management of plant genetic resources for example involves practices that are almost impossible to teach in an online environment and transmission of knowledge is often better achieved through peer-to-peer learning (Baena et al. 2007). Likewise, many agricultural practices need to be adapted to local biophysical and socioeconomic conditions if they are to be successfully adopted by those they intend to serve. Blended learning, combining an online, more general learning experience with more practical face-to-face problem solving activities, has the potential to include more learners while dealing with the issues of practicality and contextualisation.

BLENDED LEARNING: WHAT'S IN THE MIX?

The concept of blended learning

Blended learning has been defined in a variety of ways, but in general, it is the combination of multiple approaches to learning, combining several different delivery methods, such as collaboration software, web-based courses or computer communication practices and traditional face-to-face instructions (Mortera-Gutierrez 2005).

According to Driscoll (2002), blended learning refers to four different concepts:

1. To combine or mix modes of web-based technology to accomplish an educational goal
2. To combine various pedagogical approaches to produce an optimal learning outcome with or without instructional technology
3. To combine any form of instructional technology with face-to-face instructor-led training
4. To mix or combine instructional technology with actual job tasks in order to create a harmonious effect of learning and working.

Blended learning most commonly refers to the third concept – a combination of virtual components and formats with traditional face-to-face learning, which is how it is interpreted in the context of this paper.

Some advantages of blended learning

Blended learning can provide pedagogical benefits over more traditional training and education approaches. Lectures are not very effective for learners in terms of long-term retention and use (Salmon 2004). Learners need to discover the material in a novel and interactive way that takes individual learning needs and interests into account, so that skills may transfer into real-world settings (Derntl & Motschnig-Pitrik 2004). Blended learning approaches can increase the level of active learning, peer-to-peer learning and learner-centered strategies (Graham 2006). This may be particularly useful in the field of agriculture and natural resources management, where problem-solving, collaboration and team effort are often essential.

Another advantage of blended learning is the opportunity to establish a sense of community amongst learners (Garrison & Kanuka 2004) and for learners to develop connections with course facilitators and subject matter specialists. This allows learners to network with people sharing similar interests and experiences and also to have access to additional resources which goes beyond the lifespan of the course itself. Janssens-Bevernage & Stern (2006) have highlighted the motivational power of a face-to-face meeting of learners who have worked together online for an extended period of time.

In blended learning, learners experience new methods and ways of learning while still being exposed to the familiar ones of learning face-to-face. When there is no face-to-face component, learners may report some degree of isolation, and unless facilitators make the programme really interactive, learners may also report a disconnect with their classmates or the facilitators (Dickey 2004; Ibrahim, Rwegasira & Taher 2007). The outcome may be lower retention rates, lack of accountability, and drop-out. Newer web technologies have helped to address the concern of isolation and alienation in distance learning. Interactive tools such as video-conferencing, chat, wikis and blogs are now often common features of distance learning courses (Dickey 2004; Howell, Williams & Lindsay 2003). However, as Hunt (2005) noted, in countries where there is poor bandwidth or poor access to technology using these may not be feasible. As such, including a face-to-face component can be important to build an active learning community.

Blended learning often also has some positive side-effects. For students who are used only to face-to-face instruction, a blended learning approach provides room for the development of autonomy, self-efficacy, and individual organizational skills since certain parts of the course programme are self-regulated.

Some constraints to blended learning

Subject matter specialists may not always have the skills necessary to effectively teach or facilitate in blended learning environments. Quite often, more time is needed to develop an appropriate curriculum, activities and supporting learning resources for both the online and face-to-face parts. Online facilitation aimed at maintaining a consistent flow of learning can be time-consuming and challenging (Mathur & Oliver 2007).

Blended learning can reduce the time needed for the face-to-face part and thus positively impact on the cost of a learning event. However, there can also be additional costs that need to be taken into account and thus a detailed cost/benefit analysis is needed. For example, learners in developing countries may incur expenses in terms of hard and software, communication and internet access (Mathur & Oliver 2007). The cost of additional staff time needed for administration and facilitation must also be taken into account.

Blended learning for practical subjects

Tucker (2005) observed that blended learning will continue to dominate the e-learning landscape because it allows organizations to take advantage of the personal nature of the classroom as well as the advantages of using the as web cited above. This argument is especially valid for practical subjects such as agriculture and natural resources management since there will always be a need for learners to practice what they learn online in a real world setting.

According to Andreatos (2007), information and knowledge gathered in virtual communities concerning practical subjects, is superior to that available through traditional, even academic, sources such as books, in terms of practicality and in-depth and up-to-date coverage. The fact that people learn at their own pace and in their own context will encourage them to address their individual practical learning needs through facilitated discussion with others and the use of resources and background materials available online.

BLENDED LEARNING FOR AGRICULTURAL RESEARCH AND DEVELOPMENT

The World Agroforestry Centre has been offering face-to-face learning events on several subjects addressing global audiences for many decades. The demand however continues to increase and therefore the Centre has been exploring the use of e-learning as a way to meet this. Initial e-learning research focused on the development of learning object metadata (LOM) and repositories (LOR) and on learning management systems (LMS) (Zschocke and Beniest 2007). In 2007, the Centre implemented two pilot blended learning events: "Research Methods – Thinking Scientifically" and "Contextualising Teaching and Learning in Schools Using Natural Resources: the case of school tree nurseries". Their monitoring and evaluation have allowed the Centre to document these experiences, identify lessons learned and suggest ways for further improvement as described in the following paragraphs.

Access

The digital divide remains a major constraint for the widespread use of e-learning in developing countries, but as internet connections get better and reach farther and wider, web-based learning will become accessible to a broader range of learners. Our experience indicates that learners, eager to learn, will usually find ways to access online courses (Beniest et al. 2008). Most learners accessed their course at least once a day and spent more than 1 hour per day online. They also found the time needed to navigate between parts of the courses and to download or upload materials acceptable.

Familiarisation and introductions

Prior to implementing a new online part of a course, it is important to run a short introduction on the learning management system and its use, supported by a written manual sent to the learners beforehand, since most participants can be expected to be new to this technology. Such introductory part proved to be very useful for the participants, facilitators and resource persons since it allowed them to get to know each other online and share information about themselves and some resources. As a result, much time can be gained during the initial stages of the subject matter course itself since participants are already familiar with each other as well as with the tools and activities of the learning management system.

Facilitation

Learners were assisted online by facilitators and subject matter specialists. The task of the facilitator is to make sure that learners remain actively engaged throughout the course and receive individual assistance as and when needed. They must constantly monitor the participants and the learning event and intervene if they feel that learning is not taking place. This can be a time-consuming activity (instructional design, providing resources, assignments and other activities, monitoring discussions, helping learners through online messages, e-mail, telephone) but is rewarded by a high retention rate of learners. Only two out of 38 participants and three out of 30 participants eventually dropped out for valid reasons during the 'research methods' and 'contextualisation' courses respectively. Evaluation showed that participants appreciated intensive facilitation.

Subject matter specialists assist when more technical problems arise that facilitators cannot deal with. Online facilitation is increasingly a specialist field and it is rare that subject matter specialists have the knowledge, skills and attitudes needed for this since in our case their primary responsibility is to conduct high quality research. Subject matter specialists in the courses indicated that the online learning allowed them to better get to know the learners and understand their problems, as well as better focus their interventions for face-to-face learning (Beniest et al. 2008).

Learners, facilitators and subject matter specialists all indicated that they seriously underestimated the time needed to complete a blended learning event. This is especially the case for the first time development of such an event but it can be expected that subsequent courses on the same subject will be less demanding in staff time after the initial investment needed for curriculum and activities development and the production of supporting learning resources and references has been made.

Learning Management System (LMS) and activities

The World Agroforestry Centre has adopted Moodle as the learning management system for the online part of its blended courses. It is found to be simple, flexible and easy to access for people with moderate to good ICT knowledge. Moodle also encourages collaborative learning as learners communicate and interact with each other through a variety of activities and means, including forums, chat and e-mail.

Among the learning activities available under Moodle, forum discussions were found to be one of the most important ones. Figure 1 illustrates this for the 'contextualisation' course as ranked by the learners. Forums were used by facilitators to provide guidance and instructions and by learners to ask and respond to questions, as well as to discuss the learning resources and references. Asynchronous communication in the forums worked very well, since all postings were available throughout, regardless of time zones. A limitation is that feedback may be delayed for hours or even days, while responses to questions in a conventional classroom setting are mostly instantaneous. Challenges still exist in conducting live chats, videoconferences or other real time synchronous learning activities because of time differences between countries and access limitations.

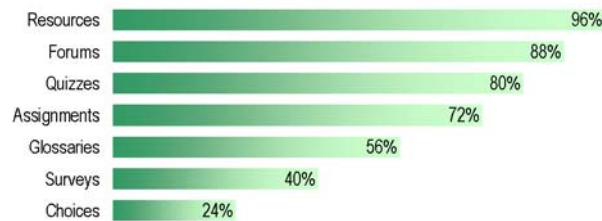


Figure 1: Favourite activities in the learning management system

Monitoring and evaluation

For the 'contextualisation' course, we used the Constructivist Online Learning Environment Survey (COLLES) instrument (Taylor & Maor, 2000) to generate profiles of learners' perceptions of the extent to which the virtual classroom environment is fostering learning. COLLES comprises of 24 statements grouped into six scales, each of which addresses a key question about the quality of the online learning environment. As can be noted from the COLLES results in Figure 2, this course scored extremely well on facilitator support, relevance, interpretation / making sense, and reflective thinking, while there is still room for improvement in the areas of interactivity and peer support. We found COLLES to be a useful tool to determine learners' satisfaction, monitor interactivity and evaluate learning.

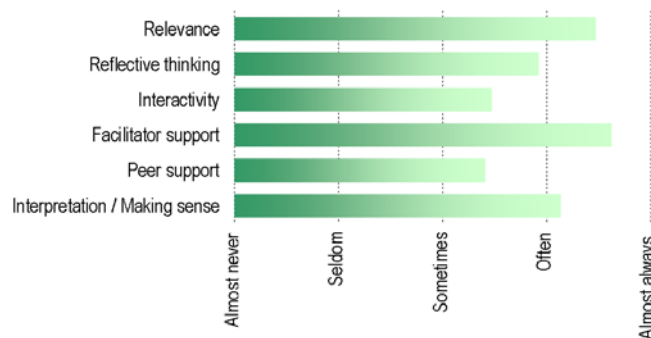


Figure 2: COLLES: Summary of results

DISCUSSION AND RECOMMENDATIONS

International agricultural organizations may find e-learning a practical and efficient way to enhance capacity strengthening for development and to reach larger and more remote audiences. Several CGIAR Centres are now exploring and researching opportunities such as knowledge banks, online courses, e-learning in support of university education, blended learning and others. The issues of practical work and contextualisation can be addressed in two possible ways:

- Offer blended learning events that deal with theory online and follow this up with shorter problem solving and practical group sessions using a face-to-face approach as used for our courses; or
- Organize follow-up through arrangements involving partners who can deal with local context and practical work for individual learners who participated in a more general and theoretical online course.

Whatever the approach taken, a significant portion of time for course design should be spent on assessing learner needs and special challenges that learners may face in a blended learning environment. Developing a comprehensive plan on instructional strategy to meet the needs of

learners can be a strong determinant of the success of online programmes in a global context (Ally 2004). Learners' technological resources such as online course accessibility need to be considered (Larsson et al. 2005). Similarly, it is critical to evaluate and assess the needs of the resource persons participating in the blended learning programme. Providing professional development for resource persons to improve their skills and knowledge regarding online pedagogy can help ensure the success of blended learning courses. Blended learning is a good way to initiate an organization into e-learning. The move from traditional classrooms to e-learning can be made in small steps making change easier to accept. Blended learning environments enable resource persons and instructional designers to develop the skills needed for e-learning in small increments: they can move small sections of a traditional face-to-face course online as they develop the needed e-learning skills.

Given all the possible formats of blended learning, it is difficult to identify specific best practices in introducing blended learning. But here are some powerful starting points which international agricultural organizations can use, based on literature (Driscoll 2002; Rossett, Douglis & Frazee 2003) and experiences, in order to gradually introduce blended learning:

1. Put an assessment online
One of the easiest places to start is to move a multiple-choice test or assessment online. This allows training departments to automate scoring and makes it easier to track and report scores.
2. Maximize e-mail and messaging, communities of practice
E-mail distribution lists and threaded discussions can be used before, during, and after training courses. The World Agroforestry Centre has been creating discussion spaces in DGroups for several courses where participants expressed a need to continue communicating and exchanging information and opinions with each other. Members share literature, experiences and opportunities for training and funding, post updates on the implementation of their personal action plans, and ask for advice.
3. Make reference materials and learning resources available online
Links to reference materials can be provided to learners to use before, during or after the training course. The links enable learners to explore topics in greater depth and stay up-to-date.
4. Move components of a traditional face-to-face course online
Instructional designers can review a training course programme, chunk it into modules, and determine the best medium to deliver those modules to the learner. Learning resources which are already available in repositories (e.g. Cereal Knowledge Bank, CGIAR Online Learning Resources) can be made accessible within a blended learning environment. Learners may have to complete modules online before being allowed for the face-to-face parts of the course, ensuring learners show up prepared. Online sessions can also be organized after a face-to-face course as a way to extend the classroom experience. In agricultural education and training, this can help learners with problems they encountered in the field when applying the knowledge and skills gained.
5. Bridge local and global agricultural knowledge systems
International agricultural research institutes can deliver the latest information from their global research by e-learning. After completing the global part by e-learning, learners can then meet face-to-face at different regional or national centres of expertise for more practical and locally relevant sessions. The local experience can eventually feed back into the global e-learning course.
6. Check assumptions, have a monitoring and evaluation plan

Tailoring the learning environment to the learners' specific context is a key element of learning design. End-users can be involved in a participatory approach to course design and monitoring and evaluation.

SOME FUTURE DIRECTIONS

Changes in the mix

Practitioners in agriculture and natural resource management can be connected to global, regional and local experts in blended learning environments by combining real-time, group learning and knowledge sharing (e.g. videoconferencing and local facilitation) with self-paced exploration and learning (e.g. computers and the Internet). The actual design of blended learning in agriculture and natural resource management can take many forms, depending on the course objectives and the audience it is targeted toward.

Emerging technologies and better internet connections will bring more opportunities for the use of multimedia, scenario learning, simulations and mobile learning in e-learning courses, which will allow further integration and demonstration of more practical applications into e-learning. The World Agroforestry Centre for example has been experimenting with the use of short video clips to explain practical field applications during a course on vegetative tree propagation.

Toward individualization of learning experiences

One drawback of face-to-face learning environments is that course activities generally are one-size-fits-all. It is difficult for a trainer to individualize classroom activities so that the unique needs of all learners are addressed. More and more learners require flexibility in programme structure to accommodate their expertise levels, schedules and learning styles. Individualization of course activities can be achieved using online delivery by providing learners with choices for learning activities that they can complete at their own pace (Dennis et al. 2006). A good example of this approach is IMARK, a partnership-based e-learning initiative spearheaded by FAO to train individuals and support institutions and networks worldwide in the effective management of agricultural information. Learners with various levels of experience, or having specific needs, can create tailored courses by designing their own personal learning path, often making learning more relevant to the situation of the learner and saving significant study time. To build the personal learning path, users are asked to respond to a series of "yes" or "no" queries that are formulated to assess their level of understanding. Upon completion, users are presented with a tailored list of lessons that will support their understanding of the subject matter. More than 50% of learners make use of the personal learning path feature to create their own customised course (Fratini 2006).

CONCLUSION

E-learning in support of agricultural and natural resources management capacity building and strengthening is no longer a question on whether it is feasible or not but rather on how best to go about it now that the technology is available and access to it increasingly possible, also in developing countries. We believe that blended learning offers more opportunities over purely online learning since it allows to address the issues of contextualisation and practical work which are very important for subjects such as agriculture and natural resources management.

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