

The “ME”-Learning Experience: PDA Technology and E-Learning in Ecotourism at the Tshwane University of Technology (TUT)

E P de Crom
decromep@tut.ac.za

Tshwane University of Technology
Department Nature Conservation
Private Bag X680
Pretoria
0001

A de Jager
dejagera@tut.ac.za

Tshwane University of Technology
Telematic Education
Private Bag X680
Pretoria
0001

Abstract Ecotourism means nature-based tourism with an educational, economical and spiritual dimension. Educated ecotourism practitioners have many advantages for the industry and to conservation. To provide well-trained practitioners, learners in Ecotourism at the Tshwane University of Technology receive extensive training in Biology. They undertake field trips into nature to become actively involved in the nature-based experiences to prepare for their careers. This article reports on the application of mobile devices (PDAs) during field trips as an alternative to conventional paper-based workbooks. Two groups of learners participated in this study. The objective was to determine how mobile devices could be used to enhance and support learners during field trips. Various information files were prepared prior to the

field trip by the lecturer and transferred to the PDAs. During field work learners took notes and became cognitively involved in activities provided on the PDA. Although there are some limitations, the results of this study indicate increased motivation and more outcome-based appropriate assessment opportunities when using PDAs. Learners benefit from the features and tools of the PDA. They also have the opportunity to reflect by integrating the electronic Learning Management System and mobile technologies to receive and submit assignments. Follow-up investigations will reveal more opportunities and the sustainability of using handheld devices during field trips.

Keywords: Mobile technologies, field work, educational, PDA, mobile learning.

Introduction and background

Mobile technology is the emerging technology and becomes a very powerful tool in combination with e-learning opportunities in teaching and learning. In this project mobile and e-learning technologies have been applied in Ecotourism to support and enhance the learning experiences of the lecturers and learners at Tshwane University of Technology.

Ecotourism

Before explaining the need for training in ecotourism, it is important to realise what is meant by “ecotourism”.

It is generally agreed that ecotourism is nature-based tourism. In their descriptions of ecotourism, writers generally refer to nature as the basis, but have placed different emphases on responsibility, local culture, sustainability, education, and local economic benefits. For example, the Ecotourism Society defines ecotourism as responsible travel to natural areas, which conserves the environment and improves the welfare of local people (ResourceAfrica, 2004). Although there are many definitions for ecotourism, all appear to have four elements in common:

- The natural environment
- Ecological and cultural sustainability
- Education and interpretation
- Economic benefits at the local level

It is nevertheless distressing to realise that no definition mentions the spiritual or even psychological benefits of ecotourism. De Crom (2005) proposed arguments that find it reasonable to claim that ecotourism originated from and exists due to the desire of individuals to reconnect to nature. They fulfil this desire by experiencing unspoilt natural environments both physically and spiritually. Therefore, a personal experience in nature is an essential element of any definition of ecotourism.

Ecotourism and education

In all countries of the world, both rich and poor, ecotourism has the potential to play an outstanding role in educating people about the importance of an environmental ethic. This ethic must include recognition of the complexity and sensitivity of nature and a rejection of the belief that we can understand nature scientifically and manipulate it with technology. Participation in sound ecotourism can contribute to the development of a deep environmental ethic among people who travel internationally to visit wildlife settings, especially those in developing countries. Minorities of rural people are educated to behave responsibly toward the natural environment. The least environmentally concerned are residents of rural areas living in close proximity to wildlife settings (Fredrickson, 2002). They are almost totally dependent on the local flora and fauna for their sustenance. For them, the land is not for leisure, but a means of livelihood and survival.

People visit natural environments to reconnect (De Crom, 2005). Education and interpretation are important elements of the ecotourism experience. It will not only enhance the reconnecting experience of the ecotourist, but should also help to ensure better management for conservation purposes and development objectives. If ecotourism seeks to promote responsible travel, then its foundation must be education.

Ecotourism learners at the Tshwane University of Technology undergo extensive training in Biology, a major subject in the Ecotourism Management degree. To answer the question of why ecotourism learners have to be trained in subjects such as Biology, the following arguments are applicable:

- Because ecotourism means nature-based tourism and therefore every aspect of ecotourism is in some way related to nature, it is essential for ecotourism practitioners to have a thorough knowledge of nature and the interactions taking place within nature.
- Ecotourists are often well informed about the area they intend visiting. They also want to learn more about the environments they visit and they want to understand their connections with nature (Black, 1999:1). Therefore, they need well-informed guides or interpreters to be able to achieve this.
- Ecotourists often mention untrained or poorly informed guides and interpreters as a main concern as they contribute to rather negative experiences in nature. Well-informed and knowledgeable guides will not only enhance the nature experience of the ecotourist, but should also help to ensure better management for conservation purposes and development objectives.

Therefore, advantages of well-informed, trained and educated ecotourism practitioners (the product of TUT's Ecotourism Management course), are summarised as follows:

- Environmental awareness, concern and commitment through an increased understanding and appreciation of the natural and cultural environment are created.

- Providing education as part of an ecotourism experience has the potential to make people aware of, and become actively involved with the natural environment, following their experience (De Crom, 2005).
- Education and interpretation have an essential function in the natural resource management of every park, recreation area and reserve, as it has the capacity to reduce inappropriate behaviour (Alcock, 1991; Beckmann, 1988; Hall & McArthur, 1996; Herbst, 1979). This does not only apply to the visitor, but essentially to the owner, manager and all other role-players involved in the park or reserve.
- Tour guides are one of the key front-line players in the tourism industry. Through their knowledge and interpretation they have the ability to transform the tourists' visit from a tour into an experience (Ap & Wong, 2001:551). Therefore, there is a need for trained guides and interpreters who can set examples by their behaviour and insights.
- Knowledgeable, trained managers, guides and other role-players have an understanding for nature. In addition they may also reduce the negative impacts of tourism on an area as a whole. In the process the environmental awareness of the local community is increased, the tourist is provided with environmental education and conservation principles, and finally employment to the local people is provided because they are the 'informed' people of the area.

Mobile Technologies

What is a mobile device?

The wireless transmission of data gives rise to many different devices, features and services between device-users. As a result, people attain different meanings to the word 'mobile'. Therefore, just as important as to understand 'ecotourism' it is important to realise the meaning of 'mobile device' as used in this study. However, the purpose of this study is not to conceptualise the construct but to report on the application of mobile/handheld devices in teaching and learning.

Clarke (2003) provides possible interpretations of the term 'mobile' which may be summarised in the sense in which it is used in this research, and possibly for educational purposes, as follows:

- devices that are easily and conveniently portable and can transmit data wirelessly
- devices that can be used in different locations and situations and at different times
- devices that can be in any location from which transmission to another device is possible
- devices that can move with a person (e.g. in vehicles, trains, aircraft, busses, etc.) and still be able to transmit data

This study focuses on the use of PDAs (Personal Digital Assistants) in conjunction with laptop computers.

Powerful new hardware and software, capable of supporting mobile computing, offer new options in education. The PDA, which was primarily used in this study, is a hand-held computer approximately one-eighth the size of a laptop. Some models receive user input from a scaled-down keyboard, while others rely on an electronic stylus and incorporate handwriting recognition. Some are equipped with a camera and most have sound facilities for recording and play-back.

The “E” in the ME-Learning experience

The Partners@Work 2004 programme, an initiative of the Telematic Education department of the Tshwane University of Technology, provided an opportunity for lecturers to develop online (electronic) learning material for learners. As a result of the abovementioned identified needs and requirements for well-trained ecotourism practitioners, it was decided to develop the first level of Biology for the course BTech: Ecotourism Management. Biology IA provides the necessary background to ecological principles and covers the invertebrates of the animal kingdom.

The main objective for the online development of Biology IA was to determine how technology can support and enhance the learning and teaching experience in ecotourism training.

The following traditionally encountered problems in Biology IA were addressed:

- Limited exposure of learners to real-life situations in Biology
- Unknown terminology such as scientific names of organisms
- Similar facts for different organisms and phenomena
- Learners who did not have Biology as a school subject
- Limited time in which to complete the required syllabus
- English as a second language for 95% of the learners and of the lecturer

Biology IA was developed on WebCT (Learning Management System) as a tool for learning and teaching in addition to the prescribed textbook and formal lecturing. No content was duplicated from the textbook to the electronic material. The purpose was to integrate different tools to enhance the teaching and learning process.

With the implementation of WebCT-based Biology IA in January 2005, the value of WebCT tools, e-testing, animations, graphics and interactive exercises was noticeable even after the first exposure of learners to WebCT. Learners were inspired and enthusiastic during lectures to gather information and participate in group discussions. They were eager to stay in the class after completion of the lecture to search for the required information, complete quizzes and review the

PowerPoint slides and interactive sites provided on WebCT. Pre- and post-knowledge tests, as well as mastery learning quizzes, encouraged the learners to prepare and revise the relevant sections of the syllabus.

During the implementation phase, a further need was identified for electronic aid in the teaching and learning process, namely the use of technology during compulsory field trips. Ecotourism learners need to attend these field trips for 5 to 12 days every semester in order to gain practical experience and apply the theory of the indoor class. Conditions in the field are often not suitable for note-taking or the use of books as they visit places such as caves, rocky shores, mountains and hiking routes where a certain amount of physical and mental activities and awareness is required. Learners often complain that they “missed what was said”. The use of mobile technology, which includes laptop computers and PDAs, was tested to address these problems.

The “M” in M-E-Learning in Ecotourism

As the use of PCs, Learning Management Systems such as WebCT, video-conferencing, multimedia and video-recording has reshaped the traditional classroom, both the learners and lecturers have become more comfortable with accessing and utilising electronic technologies. In addition to the mentioned technologies, textbooks, the library, and conventional lectures are still used as principal educational sources. Compulsory outdoor training excursions form part of the curriculum of many of the courses offered at TUT, e.g. Ecotourism Management. Learners need to participate and understand these hands-on aspects

in order to understand and apply the theoretical subject matter. Learners of any nature related course are usually attracted to the discipline because of the opportunities it offers to leave the lecture room to explore, experience and learn in the natural environment.

No technological replica can replace field learning. However, technology can be taken into the field to support and enhance the learning experience. This paper reports on a pilot study in which the synergy of technology and field studies of ecotourism learners is facilitated.

The application of PDAs in field learning was an exploratory study initiated by investigating the rationale for training excursions (field trips) as part of the curriculum for learners in the Department of Nature Conservation, with special reference to those in the Ecotourism Management course. During these field trips learners are transported to various destinations in South Africa. The objective is for the learner to get hands-on experience and learning opportunities “in the field”. The usual programme involves the following:

Prior to departure each learner receives a workbook (project book) with a list of questions and assignments to be completed during the field trip. This completed workbook should be submitted before the end of the last day of the trip. This implies that learners have to obtain information from textbooks, brochures and other resources and write this summarised information in the workbooks. They also need to do this while being transported to the destination, walking or listening to lecturers and guides in the field - a difficult and inconvenient way of taking

notes. Learners also have to carry textbooks, field guides, paper and stationary for note taking, a clipboard, binoculars, etc. with them while studying the outdoors. These and other external barriers inhibit the concentration, enjoyment and ultimately the learning experience of the learners. The quality of submitted work is, understandably, also not good and is subject to the conditions under which the learners have to complete the workbook. These workbooks are evaluated and a mark is allocated which contributes to the predicate (a semester mark allowing the student to write a final exam).

The research problem for this study is located in questions raised in terms of the experiences and learning that take place during these field trips, e.g. What do the learners do?, What do they learn?, How do they learn? and Are the conventional tests, projects or workbook sufficient to evaluate the learners?

Research Question

Based on the research problem and existing literature the following question was formulated: How can the use of mobile technology support and enhance field learning for ecotourism learners?

Sub-questions resulting from the research question are:

- How can specific field experiences be enhanced by the use of mobile technology?
- How does mobile technology motivate learners to improve learning?

- In which ways are cognitive and psychomotor skills of learners stimulated in this environment?
- In what ways will learners benefit from the tools available?
- What features should the mobile computing systems provide?
- How do learners at various levels of experience use the provided technology?
- Are traditional evaluation methods appropriate for mobile learning?

Research Methodology

Both qualitative and quantitative methods were used in this study. Qualitative measuring instruments include interviews, observations, video-recordings, photographs and open-ended questionnaires and surveys, while instruments for quantitative measuring involve questionnaires and tests.

The participants

Two groups of learners used PDAs during field trips in the first and second week of April 2005:

- The first group consisted of 40 first year Biology learners in Ecotourism Management. This group was comfortable with the use of technology as they have been using WebCT and online learning in Biology since the beginning of the academic year. These learners were subjected to a training session in the use of PDAs prior to the field trip. They had some time to practice using the stylus and keyboard, had to answer questions and take notes on the PDA and had to use

various programmes (MSWord, Excel, My Pictures) in creating sample documents. On the day of departure learners were supplied with PDAs. All the learners participated in using the PDA. No paper copies of documents were handed out to this group.

- The second group consisted of 32 second year Ecotourism Management learners. They had not formally used WebCT and none of their subjects had been fully developed for WebCT. They received no prior training in the use of PDAs and did not have the opportunity to practice with the PDAs prior to their field trip. They were supplied with PDAs on the day of departure on a voluntary basis. The conventional paper copy of the workbook was also handed out to this group. A brief training session of the basic functions and use of the PDA and the accompanying programmes was provided. These learners had the opportunity to “play” with and discover the PDA *en route* to the first destination. Although reluctant at first, all the learners volunteered for a PDA, with the exception of 3 individuals. All participants in this group had the option of working on the PDA, but in addition also had to complete the workbook for evaluation by a co-lecturer.

Information provided on the PDA

Prior to the field trip the following information was created on a laptop computer and transferred to each PDA:

- A route map
- Information on features, sites, destinations, workbook questions, etc.

- Illustrations and photographs of aspects to be covered during the excursion (Figure 1)
- Discussion questions
- Surveys
- The Workbook questions

In addition, the multimedia programme, Robert's Birds of Southern Africa, was provided for use on the PDA.

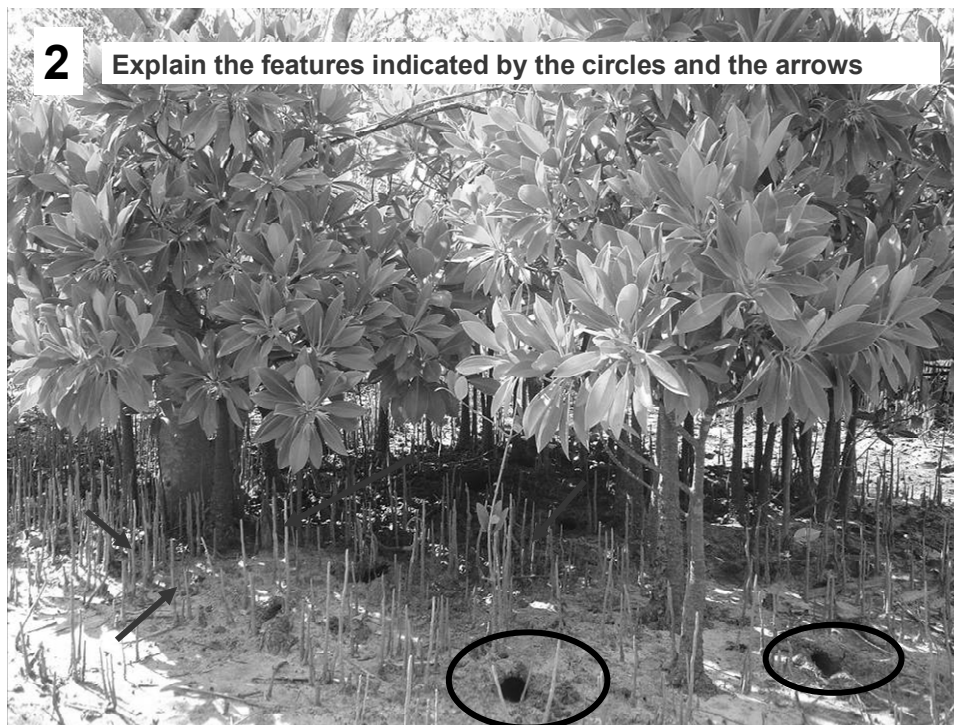


Figure 1: Example of a photograph of natural features on the PDA that learners had to interpret during a field trip.

Data Capturing

Learners used the PDAs in the following ways:

Pocket Word:

- Note-taking during lectures, discussions and informal conversations
- Reference for information finding
- Answering questions/evaluation
- Surveys

Pocket Excel:

- Data capturing during field observations
- Species lists

Multi-media:

- Bird identification and personal bird lists with Roberts Multimedia
- Games

PowerPoint Presentations:

- Graphics and text for information display

Learners also took photographs of interesting observations with their camera equipped cell phones or digital cameras during field work. These photographs were transferred to a laptop and viewed by the whole group as PowerPoint slide shows during discussion sessions. The photographs could also be transferred to all PDAs if required.

Some learners used both PDA and paper to take notes. Textbooks were always part of data collection.

Daily procedure

After a day's activities each learner's data was transferred from the PDA to a laptop via infrared. Each learner had a folder with his/her learner number with separate files for each day. This data transfer process was necessary to ensure that the data collected for each day by each learner was saved and the PDA could be recharged for the next day.

PDA and WebCT

Back on campus each learner's data was e-mailed to him/her in WebCT. The learners had the option to add information to the data collected during the field trip, to organise or to improve the overall presentation and to resubmit the completed assignment on WebCT in the assignment tool. Almost 40% learners used this opportunity and resubmitted the data in a PowerPoint slideshow format with additional data. The extra effort was credited. Examples of these presentations were presented to the class during a lecture. The impact of these efforts of fellow learners was extensive enough to encourage other learners to ask for permission to resubmit their improved field data as well. Permission was granted as this was regarded as an additional opportunity for the learners to learn according to outcomes-based education principles and to experience the new approach.

Submissions for evaluation

- Learners of the first year group who did all their note-taking, tasks and questions on the PDA did not have to submit any written material at the end of the field trip. Those who used both PDA and paper, submitted the written material in addition to that what they had done on the PDA.
- Learners of the second year group submitted the conventional workbook and the data they captured on the PDA.

Results and Discussion

Much has been written about the value of teaching and learning in natural and biological sciences in ways that are authentic and engaging to learners as they inquire and collaborate with others. According to Soloway (1996) today's learners are not mastering concepts or applying their classroom knowledge. He is of the opinion that a disconnection exists between what goes on in the lecture room and what goes on outside. Soloway (1996:270) proposes helping learners to make sense of their studies by providing tools that "can extend and amplify learners' cognitive processes". The implementation of mobile technology such as PDAs as done in this study, may be one of these tools implicated by Soloway.

In the first instance some valuable capabilities and features was identified to be available for educational purposes on the PDA. These include:

- Windows operating system which makes it compatible with other devices

- Internet
- Pocket Word
- Pocket Excel
- PDF Viewer
- Presentations (PowerPoint Viewer)
- Real-time player (Video recordings)
- Audio recordings and player
- Graphics display (if camera is available)
- Multimedia

The challenge was to explore these features of a PDA to enhance and support teaching and learning of learners on field trips.

Some limitations of the PDA experienced during the study include the following:

- Limited battery life: Although the battery lasted for at least a complete day's work in the field, it had to be charged every night to prevent data loss. The availability of separate SD cards on which data can be saved, will prevent this. (No separate SD cards were available during this study.)
- Stylus vs keyboard created some initial psychomotor difficulties: Some learners mentioned that they could not 'type' as fast as they need to with the stylus.
- Screen may be too small for reading, especially some PowerPoint slides with much detail.

- Limited memory on main device: Separate documents had to be created in cases of high volumes of data.

The interest and captivated attention of learners in both groups were clearly noticeable from the first exposure to the PDA. During previous field trips learners used to sleep, eat, have loud irrelevant conversations, etc. while being transported to the destinations. They always find it “impossible” to write and take notes while on the move in a bus or mini-bus. Therefore, much of what is being said by the lecturer is lost during these trips. Learners usually also tend to lose interest in the environment and quickly fall asleep in the bus.

This pilot study indicated that learners used the PDAs almost constantly on the way to the destinations. They took notes of what was said and interpreted by the lecturer, asked for statements to be repeated if they had missed something, used the existing information on the PDA to get answers to workbook or discussion questions and participated in meaningful discussions with each other on topics provided on the PDA. They concentrated on what was going on in the environment as illustrations and questions on the PDA drew the attention to noticeable features along the route.

When engaged in practical fieldwork, learners did not have to carry along all the textbooks, field guides, notepaper, clipboards, etc. Expensive books could be left at the camp. Everything needed was on the PDA. Attention was with what was going on around them and not with the heavy pack on their backs. Back at the camp textbooks, field guides and collected samples were used to add to or verify

information gathered throughout the day. Data was consolidated and compared and learners consulted each other for additional information or verification. Solomon (1991, in Rieger & Gay, 1997) suggests helping learners solve ambiguous and complex problems by giving access to data, and by offering opportunities “to collaborate, investigate and create”. Suggestions from these and other researchers (Brown et al., 1989; Newman et al., 1989; Resnick, 1987) are that biological science teaching should engage learners in real life problems and promote collaboration. During this study it was clear that learners collaborated in gathering more data on or by means of the PDA than paper-based, solving problems by comparing data and maintaining attention to various aspects of field learning by comparing information on the PDA with that found in nature (real life).

Educational researchers (Resnick, 1987; Soloway, 1996) argue that learners learn best when given the opportunity to learn skills and theories in the context in which they are used, then construct their interpretations of a subject and communicate those understandings to others. Mobile computer-mediated learning environments may support this process. This is of great significance in ecotourism training, as it is essential for learners to be able to find, organise, understand and interpret information, and communicate those understandings in an interesting and understandable manner to ecotourists or other role-players in the industry.

Mobile technology also supports “just-in-time” learning. This is an adoption by educators of a successful industry technique that involves delivery of parts and finished products at precisely the time in which they are needed (Schorr, 1995). Transferred to education, learners may receive context-related information or

complete a skill-building task, at the most appropriate teachable moment. In this study learners had the opportunity to consult applicable information when it was needed. For example, when walking in the bush and hearing the call of a bird, access to information to identify the bird by the sound it makes was immediately available. During these teachable moments (listening to the bird call in the natural environment), “just-in-time” learning is an essential part of the field experience of learners in biology. In few, if any, other circumstances can they learn and understand the interactions in nature at these specific times. The PDA is an excellent instrument in this learning environment.

While there is a wealth of literature describing technology’s potential for supporting education, little has been written from an education or communication perspective specifically about the value of mobile computing. Many projects concentrate on technical rather than learning concerns (Concord Consortium, 1997; Foster, 1995; Schnase et al., 1995).

The data gathered from this pilot study indicates a variety of possibilities in the use of mobile technology to support and enhance the field learning experience of the learner, as well as the teaching experience of the lecturer.

To answer the main research question, ‘How can the use of mobile technology enhance field learning for ecotourism learners?’, answers need to be found for the sub-questions:

1. How can specific field experiences be enhanced by the use of mobile technology?

- Information should be organised in ‘consumable’ quantities and time units ensuring that learners do not perceive an information overload on day one.
- Brief lecture notes or keywords should be available on the PDA during field work, ensuring that learners do not “miss out on what is said”.
- By using a PDA in field work, a calculator, dictionary, note-book, keyword reference and graphical representations are always available on one single hand-held unit and reference books need not to be carried along during all field projects.
- Sound and picture identification of a variety of natural features are available “just-in-time” in one unit.
- The PDA has the ability to store a significant amount of information.
- Stored information can be revised prior to submission for evaluation, adding to the field learning by doing additional research and organising information.
- Some PDAs and mobile phones are equipped with a digital camera which had been used to take photographs of features or sightings to be clarified, discussed or identified at a later stage.
- Reference material was always available (“just in time”).
- By synchronising PDAs and desktop systems, data was revisited, revised and improved where needed.

These aspects may contribute to the pedagogical experiences of the learner in the field and enhance the learning experience with technology at hand.

Apart from the abovementioned utilities, PDAs could be useful with enabling technology in aid of learners with disabilities such as those with an experiential backlog, or physical and cognitive disabilities. In addition to the functions listed above, specific uses that can aid those with disabilities include:

- As a dictation machine (on machines with sound facilities)
- As a text reader (on machines with sound facilities).

2. How does mobile technology motivate learners to improve learning?

Learning addresses the cognitive, affective and psychomotor skills of the learner. According to Malone & Lepper (1987) motivation, as an affective skill, is the central point of departure of all learning. Intrinsic motivation makes learning fun and results in a challenge, has a fantasy factor and leads to curiosity of the learner. This puts the learner in control of his or her own learning, creates satisfaction, improves the self-image and contributes to cognitive involvement. Some of the learners' experiences with reference to the motivational skills are summarised as follows:

Fun: "It was *fun* to work with these things", "It was more *fun* typing than writing", "I figured it would be *fun* and *interesting* to learn something new..."

Curiosity: "I was very *curious* about how the Roberts Birds program worked...", "I was *curious* to see if this method works better for me than pen and paper notes..."

Challenge: “...something new and *challenging* in life”

Interesting: “I was *interested* in improving my knowledge is a more modern and convenient way...”, “...increasing my *interest* and making me work more”

Satisfaction: “...technology is so advanced and things are now becoming so easy for us...”, “you can do a lot on a small computer in the palm of your hand”, “I enjoyed everything and I am willing to learn more”

Results from the open-ended questionnaires, interviews, video-recording and observations indicate that the majority of learners have a positive experience when using the PDA as a motivational factor. The learners accepted the challenge of the alternative technology and adapted to the new learning strategy. A follow-up field trip will indicate the sustainability of this experience.

3. In which ways are cognitive and psychomotor skills of learners stimulated in this environment?

Cognitive skills

Traditionally the learners received a workbook with questions that they had to complete and hand in on completion of the field trip. The opportunity for learners in this environment is to receive their tasks in an electronic format. They take notes and gather information and compile their own constructed knowledge. In the end this information is send to the learner via WebCT (LMS) in an electronic format with the opportunity to add and expand before submission. The learners get more

cognitively involved and have the opportunity to add photographs, additional information and even go beyond the usual and present their final assignments in PowerPoint.

Comments such as the following are evidence of learners' psychomotor experiences:

Psychomotor skills

- "It is so small one can use it like a computer"
- "I find it equally easy, it will take me a while to get used to the PDA but I am sure I'll get the hang of it pretty soon"
- "You can use the stylus on the screen like an ordinary pencil, much easier than typing"
- "I find using the keyboard much easier than the PDA. ...I first have to practice before I can type now..."
- "The keyboard is much faster than the pen"

4. In what ways will learners benefit from the tools available?

The PDA includes the use of the tools such as the Internet, Pocket Word, Pocket Excel, Clear View Presentation, Clear View PDF, My Pictures, Media Player, sound recordings and other available software such as multimedia or programme specific software. An important factor is the portability of the device. Guidelines in the application of these in teaching and learning in field trips were non-existing. This pilot study was conducted to determine how the tools of the PDA could be utilised.

The following application could be identified during this first introductory field trip.

Information display (MS Word, MS Excel, ClearView Presentation): Pocket Word, PowerPoint Presentations and My Pictures were used most often while Excel was used to a lesser extent for information display. Comments from learners include:

- “It makes it much easier to use in the bush, because one does not need to carry hundreds of books and paper along.”
- “You can move around with your information in your pocket”
- “The PDA can be used as a visual tool in the identification of all fauna and flora.
- “The learner can carry all the relevant identification literature in his/her pocket and the facilitator would be able to fast track through the part that would normally take the longest.”

Information gathering / Note-taking (Pocket Word and Pocket Excel): Students typed in short notes during outdoor lectures, guest lectures and informal discussions for use at a later, more convenient time. Students’ use of the device for this purpose was mentioned as follows:

- “I mainly used it out in the field to take notes”
- “...to enter new information that we learned during the excursion and to do a road strip count [game survey]”
- “To make notes when being lectured ...”
- “To make a tree list, species list, bird list ...”

Multimedia: The Roberts Birds¹ multimedia programme was emphasised in almost all the feedbacks as a huge advantage and assisting in (1) creating an interest in bird watching - a growing industry in ecotourism, and (2) identifying birds. The bird calls were highlighted as extremely helpful in identifying birds. Learners expressed the need for similar programmes, e.g. mammals, trees and wildlife features in general. The following excerpt from a student's feedback summarises a general feeling: "I used the PDA mostly to identify the birds, as I was lagging behind as far as birds are concerned. Now I can easily identify and know my birds".

Games: Learners played games mainly during quiet times or when travelling to and from a destination. Reasons given for their motivation to play games include "...to get used to the typing, etc."

Portability: The light-weight and easy-to-handle size of the PDA were regarded as positive features to replace books during walks and visits to 'remote' areas.

Comments from students in this regard include:

- "I like the fact that it is small and compact, no writing is involved ..."
- "It will help a lot especially in places where there are no computers at all!"

Although the lecturer, technologist and the learners were unaware of the full potential of the PDA, it quickly became clear that information display and information gathering (note-taking) as well as multi-media applications are some of the major advantages for teaching and learning. Learners even played games to improve cognitive and psychomotor skills.

¹ Roberts Birds Multimedia is available on SD Card

5. What features should the mobile computing systems provide?

Introducing an unknown technological device in teaching and learning is not always easy. From the experiences and comments the following could be included as essential software features for mobile computing systems: Windows Operating system, MS Word, MS Excel, Clear View Presentation, Clear View PDF and Pictures. Although it has not been tested during this particular field trip, a follow-up may include Internet connectivity, e-mail, Media Player and Sound recordings.

Comments from students on features that they found to be less positive include:

- Multi-tasking: “I don’t like the fact that you can’t close a window / return to the previous worksheet”
- Battery: “The fact that it switches off due to a low battery all your work will disappear”
- Fixed stylus or keyboard: “Typing is a hassle, it would be better with a small keyboard.”

However, if all the features are considered, the PDA is a valuable tool to use in teaching and learning and can replace expensive computer centres in the future.

6. How did learners at various levels of experience use the provided technology?

Both participant groups coped equally well with all the features of the PDA. Although the second group (with no prior training) appeared to be less comfortable with the device initially, they soon managed the stylus and produced the same results as group one. Some individuals in group two showed even higher cognitive skills with the PDA by creating interesting files on animal tracking and counts on own initiative.

The following comments, transferred from a survey on the PDAs, are representative of 95% of both learner groups:

- When we were given the PDAs on our 1st day, I was really sceptical and I thought... do we really need this in the bush? (After a while) it struck me that technology and wildlife could mix. I held it and it was “love at first handle”... This PDA... makes life easier. I enjoy the Roberts program most, it has so much to offer.
- I find the PDA extremely powerful and useful. When it comes to birding, it is in a class of its own. I use my bird book in conjunction with the PDA. The PDA will be extremely useful in helping to identify LBJ's, because one can listen to the calls.
- I think the PDA is a stunning idea, especially for us studying ecotourism. Now I'm able to take notes where I usually am not able to. The fact that you can load things like Roberts bird program, as well as all the other information one can load on is stunning! I don't need to carry 10 different books as well!

When asked whether the PDA caused learners to lose interest in the environment (a vital aspect for ecotourism learners), the answer was “No, the PDA was a tool and not the experience.”

7. Are traditional evaluation methods appropriate for mobile learning?

Evaluation methods need to be adapted as learners' approach to addressing problems, answering questions and debating issues online differs from the traditional pen-and-paper based methods. Answers tend to be more concise and to the point in comparison with the long irrelevant written answers. Instead of only evaluating the reading matter submitted by the learner at the end of the field trip, the day-to-day input and understanding can be monitored and addressed when problems arise. Most of the critical crossfield outcomes of outcomes based education are also incorporated in the use of mobile technology. Evaluation methods should be adapted to incorporate these outcomes, e.g. groupwork, collaboration, problem solving

Further research

All the abovementioned results should be followed up during the next field trip. Although most of the objectives of this research have been achieved in this pilot study, further research questions already originated, such as:

- What is the influence of mobile technology on the nature experience of people?
- How can mobile technology be applied in a career in ecotourism?

These and other possible questions will be investigated in a second field trip with the same groups within five months.

Conclusion

Mobile technology, in conjunction with other e-learning tools, can efficiently be used to enhance and support the field training of ecotourism guides, interpreters, managers and developers. By providing real-life problems and situations by means of mobile devices, training can be improved to ensure ecotourism role-players who can set examples by their own behaviour because they have the needed knowledge of nature.

Education and interpretation are important elements of the ecotourism experience. Using mobile technology in the teaching and learning process will not only enhance the reconnecting experience of the learner, but should also help to ensure better management for conservation purposes and development objectives due to exposure to real-life situations during field training.

The market is moving towards the convergence of enterprise applications and wireless devices that will open the doors to mobile learning. Cell phones, hand-held computers and PDAs now have the capabilities, connectivity and features to support learning activities. Technology enablement is critical for keeping workers engaged.

Mobile learning gives the front-line workforce - such as a retail sales associate,

soldier or cable repairman - the access to the critical information sources, learning materials and expertise to learn what they want, where they want, when they want.

The following concluding response typed on a PDA was received from a learner who sat quiet for almost half an hour, experiencing a sunset in the bushveld:

Its times like these that the beauty of a sunset leaves you with such amazement, it makes you forget to breathe... and truly leaves you breathless. One now realizes that there is so much more to life than that what humanity experience in general. No time will ever be wasted spent in nature. It opens up your mind and gives you a mental message, because it leaves you so relaxed... so connected...

References

ALCOCK, D. (1991) Education and extension: management's best strategy.

Australian Parks and Recreation, 27(1), 15-17.

AP, J. & WONG, K.K.F. (2001) Case study on tour guiding: professionalism, issues and problems. *Tourism Management*, 22(5), 551-563.

BECKMANN, E. 1988. Environmental interpretation for education and management in Australian national parks and other protected areas. PhD. thesis, University of New England, Armidale, NSW.

BLACK, R. 1999. Ecotourism and education. [Online], Available:
<http://lorenz.csu.edu.au/ecotour/rosy.html>

BRAGG, L. (1990) Ecotourism: a working definition. *Forum*, 2(2), July/August.

BROWN, J., COLLINS, A. & DUGUID, P. (1989) Situated Cognition and the Culture of Learning. *Educational Researcher*, 18(1), 32-42.

CLARKE, R. (2003) Wireless Transmission and Mobile Technologies. [Online], Available: <http://www.anu.edu.au/people/Roger.Clarke/EC/WMT.html>

CONCORD CONSORTIUM. (1997) Science Learning in Context. [Online], Available: <http://hub.concord.org/slic/>

DE CROM, E.P. (2005) A narrative interpretation of contemporary nature experiences in Southern African environments. PhD thesis, Northwest University, Vanderbijlpark.

FOSTER, C. (1995) PDAs and the Library without a Roof. *Journal of Computing in Higher Education*, 7(1), 85-93.

FREDRICKSON, L.M. (2002) Wilderness ecotourism and education as a means of promoting an international environmental ethic. Paper presented at the Seventh World Wilderness Congress, 2-8 November, Port Elizabeth, South Africa.

Unpublished.

HALL, C.M. & MCARTHUR, S. (1996) *Heritage management in Australia and New Zealand*. Melbourne: Oxford University Press.

HERBST, R.L. (1979) Introduction. *Trends*, 16(1), 2.

MALONE, T.W. & LEPPER, M.R. (1987) Making learning fun: A taxonomy of intrinsic motivations for learning. In R. E. Snow & M. J. Farr (Eds.). *Aptitude, learning and instruction*. Volume 3: Cognitive and affective process analysis. Hillsdale, NJ: Lawrence Erlbaum.

NEWMAN, D., GRIFFIN, P. & COLE, M. (1989) *The Construction Zone: Working for Cognitive Change in School*. Cambridge, England: Cambridge University Press.

RESNICK, L. (1987) Learning in school and out. *Educational Researcher*, 16(9), 13-20.

RESOURCEAFRICA. (2004) Ecotourism: fuelling development in southern Africa. Fact sheet no. 9.

RIEGER, R. & GAY, G. (1997) Using mobile computing to enhance field study. Interactive Media Group, Department of Communication, Cornell University.

SCHNASE, J., CUNNIUS, E. & DOWTON, S. (1995) The StudySpace Project: Collaborative Hypermedia in Nomadic Computing Environments. *Communications of the ACM*. 38(August), 72-73.

SCHORR, A. (1995) The Quick Response Center: An Interactive Business Learning Environment. *Interpersonal Computing and Technology*, 3(4), 57-65.

SOLOWAY, E. (1996) Technological support for teachers transitioning to project-based science practices. In T. Koschmann (Ed.), *CSCL: Theory and practice of an emerging paradigm*. New York: Lawrence Erlbaum Associates. pp. 269-307.

WILD NET AFRICA NEWS ARCHIVE. (2005) Ecotourism - the buzzword worth its weight in gold. [Online], Available:
http://wildnetafrika.co.za/bushcraft/dailynews/1998archive_2/archive_19980605_ecotourism.html