THE PLACE AND ROLE OF EM-LEARNING IN MULTI-MODE DELIVERY OF EDUCATOR TRAINING IN SOUTH AFRICA

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1   INTRODUCTION

In any country in the world, the business and responsibility of, as well as the challenge to the education fraternity are to provide quality education to all. Therefore, quality teaching and learning should be provided to assist all learners to acquire the required competencies (knowledge, skills and attitudes) at the highest possible level in order to fulfil their respective and diverse roles in life (Steyn, Steyn, De Waal and Wolhuter, 2002: 34). The point of departure should be to provide quality education in such a way that it is accessible and affordable to all. The quality of education is to a large extent determined by the quality of information transfer and the quality and quantity of support that the learners receive to master the outcomes of their studies. The developments in the field of Information and Communication Technology (ICT) provide a real opportunity to improve the quality of information transfer and teaching support that learners can obtain. However, the real challenge for education in the developing world, and even in the developed world, is the level of accessibility, affordability and complexities of ICT (Dreyer, 2005: 4). The result of the ability to provide assessable ICT in developing countries is the ever-increasing digital gap that deeply influences the quality of education of less affluent people and the difference in quality of education between developed and developing countries.

At the North-West University, Faculty of Education Sciences, the decision was made to provide enriched teaching and learning to a particular group of teachers via an off-campus blended teaching and learning strategy. Within the limitations of affordability and access, the decision was made to use the multi-mode teaching strategy (including some types of modern ICT) to support the students and to enhance the support that the learners obtain. The aim of this article is to report on the reasons, development and implementation of the project as well as initial results. Attention will be given to the nature and contents of the ADP-programme, the theoretical framework that was used to

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develop the strategy and the nature and content of the multi-mode teaching strategy that was employed.

The method of research that was used to develop the teaching and learning strategy particularly applicable to this programme was that of a process of iterative and systematic critical reasoning. Based on the critical reasoning, it was through an combined (and not necessarily initially decided upon) application of several (applicable) scientific methods and processes, such as observation, analysis and synthesis, induction and deduction that the strategy was developed (Stoker, 1961: 62-90; Mouton and Marais, 1989: 102; Mouton, 1996; 77-78; Harden and Thomas, 2005: 258; Bensley, 1998: 3; Ennis, 1987: 9).

2 THE AFRICAN DRIVE PROJECT (ADP) FOR ENRICHED TEACHER EDUCATION IN THE RURAL AREAS

The ADP is a joint venture between the Department of Education (North-West Province, South Africa), the North-West University (Faculty of Education Sciences, Potchefstroom, South Africa), eDegree (a private company assisting education institutions to provide e-learning programmes), GTZ (the German Technical Corporation), SAP (Software Applications and Products: a private company with the aim of developing e-learning via the Internet in South Africa) and Duxbury Appliances as main partners. These partners made a joint decision to test the feasibility of the application of e-learning for the in-service education of practising teachers in the North-West Province (ADP, 2004).

This programme was launched in order to address the following challenges in South African education and particularly the North-West Province, namely:

- the serious shortage of suitably qualified primary and secondary school educators;

- a major shortage of suitably qualified graduates to participate in the technology orientated local and global economy; and

- the realisation that special attention will need to be given to the compelling evidence that the country has a critical shortage of mathematics, science and language teachers and to the demands of the new information and communication technologies.

The focus of the ADP-programme is to:

- emphasise secondary (Gr. 10-12) educator development;

- develop innovative new learner-centred learning programmes and strategies;

- utilise appropriate information and communication technologies, to ensure:

- o   increased access,

- o   improved delivery, and

- o   effective management of teaching and learning;

- develop and evaluate appropriate models for the provision of Mathematics, Physical Science, Technology, Entrepreneurship, functional English and HIV/AIDS education and training to in-service educators in the North-West Province, South Africa and Africa by using:

  - o   a blended learning model for relevant learning,

  - o   an appropriate technology model for scalability, and

  - o   an attainable cost model for sustainability;

- facilitate the introduction of ICT into the delivery of learning at schools;

- facilitate the rollout of blended learning to educators and learners in the North-West Provinces, South Africa, SADC and Africa; and

- informs Government policies and strategies on educator development (provincially, nationally, SADC and in Africa).

The programme selected was the Advanced Certificate in Education (Natural Sciences and Mathematics). The modules of the programme may be summarised as follows:

YEAR 1			YEAR 2		
Code	**Module**	**Cr**	**Code**	**Module**	**Cr**
ORLK 511	Teaching and Learning A	8	ORLK 521	Teaching and Learning B	8
GSTK 511	Foundation studies in education and teaching	8			
RIDO 525	Computer principles in Education	8			
End July 2006			**End June 2007**		
Mathematics			**Science**		
NWSK 513	Mathematics for ACE IA	16	NCHK 511	Matter and stoichiometry for science education	16
NWSK 514	Mathematics for ACE IB	16	NFSK 511	Electricity for science education	16
End November 2006			**End June 2007**		

The major characteristic of the development of the course is the fact that e-teaching and learning plays a pivotal role in the delivery of the programme. Therefore, due to the fact that e-technology is not readily available in the rural areas, eight learning centres were developed, namely at Mafikeng (NWU), Mankwe, Taung, Kuruman, Rustenburg, Vaal Reefs, Bakwena and Baitsoki.

The overall control of the project is the responsibility of the ADP-Trust; the actual responsibility to deliver the programme is that of the Faculty of Education Sciences, supported by eDegree. The responsibility to develop the relevant technologies is that of SAP, and the North-West Department of Education is responsible for equipping the facilitation centres and identifying and supporting the relevant teachers, namely the students of the programme.

3   TEACHING AND LEARNING STRATEGY FOR THE ACE IN THE AFRICAN-DRIVE PROGRAMME

3.1   EDUCATION

Education refers to the planned activities of educators to assist learners to acquire/learn the relevant competencies (knowledge, skills and attitudes/values) in order to execute the learners' roles in life (Steyn, Steyn, De Waal and Wolhuter, 2002: 34).

Therefore, the focus of the programme is to provide the learners with sufficient learning opportunities to acquire the agreed-upon competencies. The learners must choose and use the relevant available support mechanisms in order to learn and acquire the competencies. The programme strives to assist and promote the development of self-directed, responsible learners. Therefore, the programme will not support a pursuit of qualifications or spoon feeding.

3.2   OUTCOMES-BASED EDUCATION

The teaching and learning strategy is informed by the principles of outcomes-based education. According to these principles, the teaching and learning activities as well as the content and assessment should be directed at the needs and requirements of the educators. The outcomes should directly relate to the competencies required by the practising teachers. Teaching and learning should also be informed by the constructivist approach according to which the context of learning is important, and teaching should be directed at assisting learners in developing the relevant concepts according to their own interests, aptitudes and abilities. The programme strives to support individualisation in teaching and learning (Ram, 1996: 89; Ertmer and Newby, 1996: 1-24).

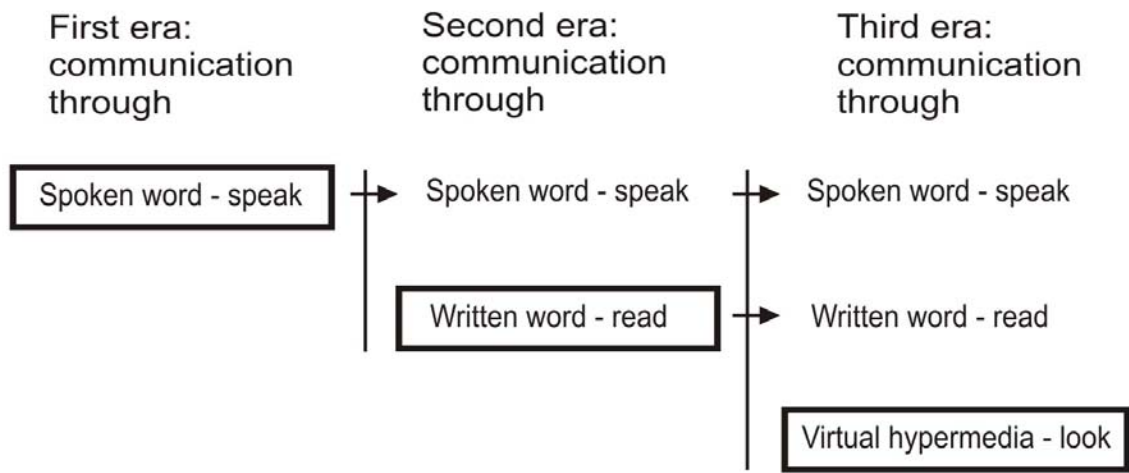## 3.3   EM-LEARNING (electronic-mobile learning)

3.3.1   Education and the provision of information

The place of e-learning should be understood within the context of the provision of information and contact (guidance/support) to students. Subsequently, the importance of the hypermedia image becomes evident.

It is also clear that dramatic developments have occurred in this field. 'Traditional text forms typically include a combination of two types of media: print and two-dimensional graphics. Electronic texts can integrate a range of symbols and multiple-media formats including icons, animated symbols, photographs, cartoons, advertisements, audio and video clips, virtual reality environments and new forms of information with non-traditional combinations of font size and colour' (Brunner and Tally, 1999).

The history of civilization and the relationship with developments in communication can be presented as follows:

Fig 1   History of civilization and communication (Rossouw, 2004)

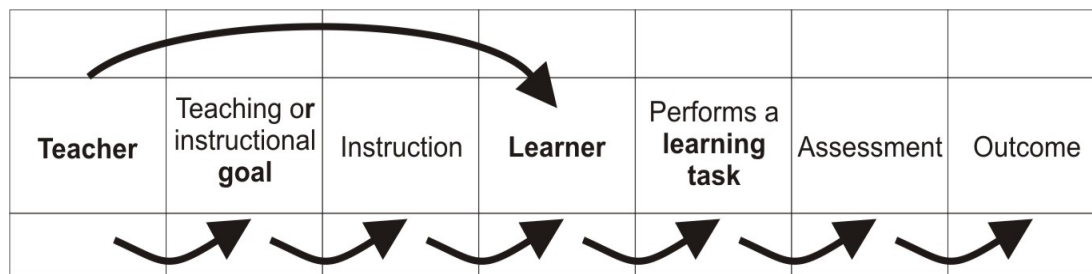| First era: communication through		Second era: communication through		Third era: communication through
Spoken word - speak	→	Spoken word - speak	→	Spoken word - speak
		Written word - read	→	Written word - read
				Virtual hypermedia - look

Communication is important in education. Therefore, the same periods may be distinguished in the history of education. However, hypermedia is not used in education. This aspect limits effective education and should be corrected as soon as possible.

3.3.2 Education/teaching and learning

❑ **The traditional teaching-learning situation**

In the traditional teaching-learning situation, teaching and learning occur linearly (see Figure 1).

Fig. 1 The traditional teaching-learning situation (Monteith and Dreyer, 2005)

Teacher	Teaching or instructional **goal**	Instruction	**Learner**	Performs a **learning task**	Assessment	Outcome

The teacher decides on a teaching or learning goal and, for example, instructs a class of learners to attain the **same** goal in the **same** way, using the **same** method(s) to attain the **same** outcomes. In this process, a task has to be completed, which is then assessed. **All** the **learners** have to complete the task in the **same** way, using the **same** methods to attain the **same** outcomes. Learners do not have much freedom in the choice of tasks, methods and the outcomes they would like to attain. Interaction is poor, and mainly one-to-one (one teacher, one learner, one source, one way, etc.)
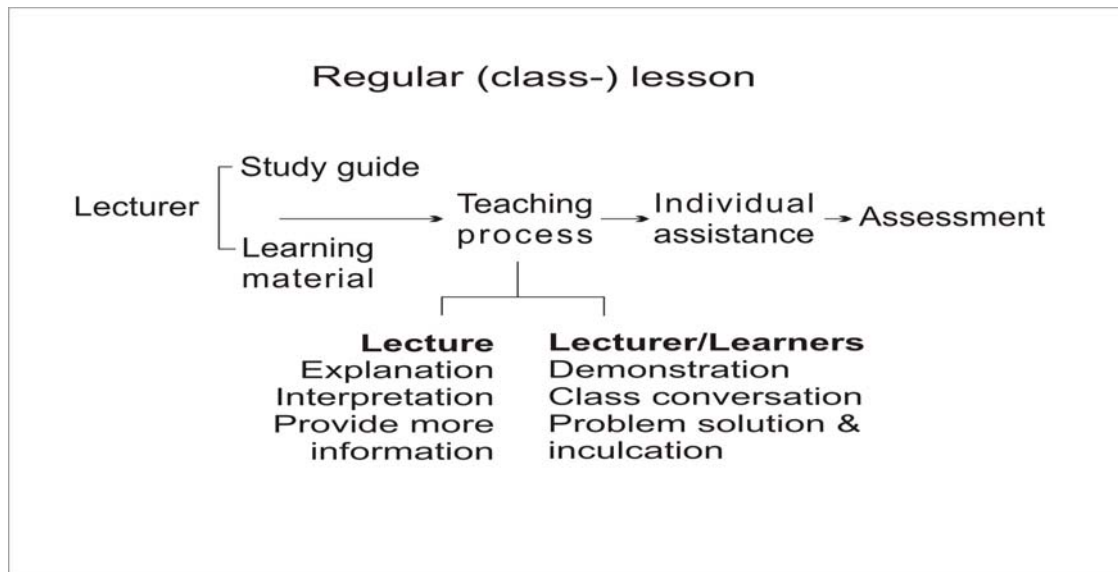
❑ **Teaching and learning in the 21st century**

Teaching and learning should take place within a learning community that functions non-linearly (see Figure 2 by Monteith and Dreyer, 2005). Structurally, the learning

community is an extension of the physical community outward to the electronic community. The extension, however, is not linear; rather, it is multidimensional and multilayered. The learning process in the community becomes like following a map, a kind of self-directed journey that the learner is embarking on with the help of a guide and (sometimes) a compass (Help-seeking/Assistance). Instead of exclusive teacher delivery, instruction is provided by a multitude of 'sources'. Assessment is assumed to be inherent in the performance of the learner in obtaining his/her goals. When designing learning experiences for students in the 21st century, three key elements should be emphasised: the content or resources learners interact with, the tasks or activities learners are required to perform, and the support mechanisms provided to assist learners to engage with the tasks and resources. Interaction is rich, multidimensional and non-linear (mutual between teacher, learner, groups, resources, by means of different vehicles, etc.) (Monteith and Dreyer, 2005.)

Learning community

Figure 2
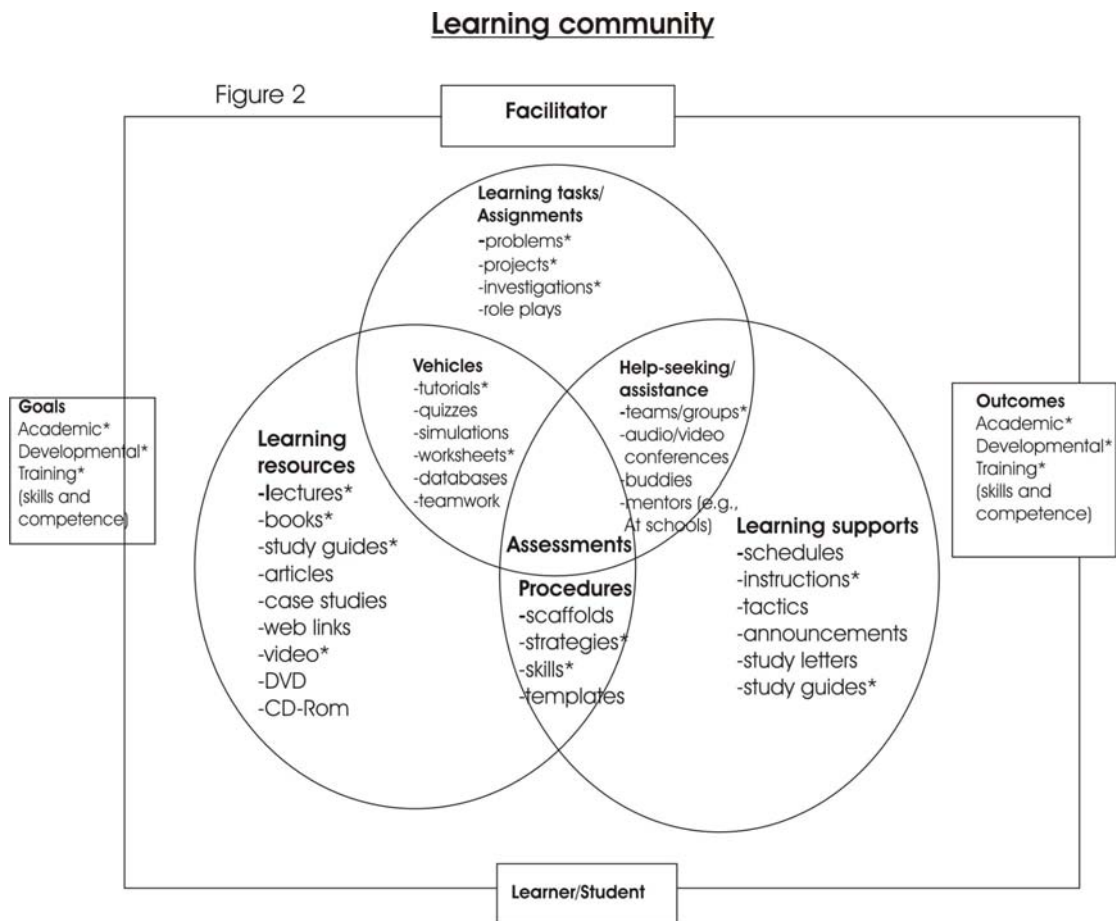
□ **Contact education**

In South Africa, 'pure' contact teaching is presently used as the benchmark against which the effectiveness of education is measured. Contact education can be illustrated as follows:

Regular (class-) lesson

Within the em-learning context, all typical aspects of traditional contact teaching can and should be provided, using different techniques/methods. In changing the support structure for teaching and learning in a developing country, it is important that the change which is effectuated is not too dramatic. Therefore, it is necessary to try and retain the familiar way of support for effective teaching and learning and gradually introduce the new types of em-teaching support.

In a developing country such as South Africa, em-learning should also be adapted according to the availability of electronic and other infrastructure.

4   BLENDED MODEL FOR TEACHING AND LEARNING

The blended model refers to a context within which different techniques/methods of teaching are provided, integrated in such a (logical) manner that it can be used by the individual learner according to the learner's specific situation and preferences. Blended teaching refers to the thoughtful integration of different teaching strategies, such as face-to-face teaching and the different online techniques, employing the strengths of each. Blended learning is about rethinking and reengineering the teaching and learning relationship (Garrison and Kanuka, 2004: 96; Osguthorpe and Graham, 2003: 227). The blended teaching and learning environment provides a number of advantages (Miller and Padgett, 1998; Dreyer, 2005):

- Students are able to access a variety of resources in a flexible manner.

- The blended teaching support ensures that the risks and benefits of synchronous and asynchronous support are spread and that support is always available.

- The format provides for flexibility concerning time and distance.

- The blended format takes students' familiarity with technology into consideration.

- The students are expected of to take more control over their studies.

5 TECHNIQUES/METHODS OF TEACHING TO BE USED IN THE ACE (OF THE ADP)

The challenge is to provide a blended model of teaching strategy to students living in the North-West Province, which is primarily a rural area, and to try and retain the principles of accessibility, affordability and enrichment. The primary challenge is to provide em-teaching and learning opportunities to students in rural areas. Based on the above-mentioned theoretical points of departure the multi-mode strategy of teaching was developed. The decision was taken to employ different techniques/methods of teaching as multi-mode strategy of teaching, ranging from the commonly used paper-based material and face-to-face support to electronic support on the web, in order to support the learners in achieving the required outcomes (Faculty of Education Sciences, 2006). By developing this particular strategy, the known type of support was retained, namely the paper-based material and the face-to-face meetings and the changes was not experienced as really big and frightening by the learners. The sms and DBD were employed because almost all learners are in possession of a cellphone and have direct access to a television and DVD-player. To introduce the internet support the eight learning centres were provided. The support techniques can be explained as follows:

- **Paper-based learning content**

Paper-based material includes the study guide, which serves as a roadmap that guides the study, as well as paper-based learning material that learners should employ to obtain the basic information required to reach the agreed-upon competencies. In a developing country, paper-based material ensures continuous accessibility of learning material because learners cannot primarily depend upon e-material, due to, for example, the problems regarding connectivity to the Internet.

- **DBD (digital book disk)**

The DBD can be described as the e-book in DVD-format, thus the paper-back format of the e-book. The DBD includes the integration of the written word, spoken word and hypermedia images. The DBD consists of the summary of the paper-based material as backbone and which is enriched with material from the videosphere, such as photos, animations, and teaching, as well as teaching videos. Each of the modules should have at least one accompanying DBD.

- **Contact sessions**

A limited number of contact sessions are provided to enable direct contact between the lecturer and student. The nature and content of these contact sessions should focus on the aspects of problem-solving and reinforcement of the level at which the learners should reach the agreed-upon competencies.

- **Cellular phone/sms contact**

The purpose of sms is to effectuate continuous contact with the students. The main aim of a sms should be to provide information, such as reminders and small pieces of guidance, regarding the particular module. At least one sms should be sent per week for each module.

- **E-mail**

E-mail is an additional method of personalised contact with the students. E-mails should be used to provide more extensive continuous information and guidance to the learners, and can be regarded as an extension of the sms. In addition, e-mail serves as a method for students to become accustomed to the use of electronic media. At least one e-mail should be sent to students per module every fortnight.

- **The web**

Web pages should be used to provide up-to-date (longer) information or learning material and bits of real (video) communications to students. Relevant information may be downloaded from the web and made available to students, or the students may find the information on the web themselves, e.g. an article in a daily paper. The (approximately) 5-minute lecturer videos should, for example, be used by the lecturer to provide up-to-date information, explain more fully by using present day situations or to provide information about particular problems in a particular assignment. The information and videos should be made available on the web at least every fortnight. At least one discussion forum should be provided per module per semester, and at least two (easy) assessment exercises per semester per module.

Results

The preliminary results of the implementation of the decided upon multi-mode teaching and learning strategy are very positive. The students fully benefited from the familiar paper-based and face-to-face support, appreciated the sms-support and gradually became accustomed to the use of the DBD, e-mail and web-support. One of the main stumbling blocks is the level at which Internet connectivity is achieved at the different centres. The students could not regularly connect to the Internet in order to access the new information and to submit their assignments, seeing that the Internet connections

were dysfunctional. Currently, an attempt is being made to provide the rural centres with wireless connectivity and, in this sense, to try and solve the connectivity problem.

6 SUMMARY

This article provided a report on the way in which the Faculty of Education Sciences endeavoured to enrich the quality of distance education by enhancing it through electronic-mobile support of practising teachers in their in-service and training programmes. By means of the partnership between the North-West University, the North-West Department of Education and the private sector, the nature of the programme was explained. The theory on which the electronic-mobile support of students was constructed was elucidated, and the constituents of the multi-mode strategy of supporting students were explained and preliminary results provided.

The final conclusion is that the strategy holds well for the enriched support of students in distance education, and shortcomings should be addressed in order to maximise the success of the multi-mode support of students.

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