THE EFFECTIVE USE OF DIGITAL VIDEO DISCS (DVDs) IN TRAINING PRE-SERVICE TEACHERS IN THE LEARNING AREA SOCIAL SCIENCES.

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1. Introduction

With the inception of the Government of National Unity in 1994, a new system of education was introduced in the Republic of South Africa (RSA). The most important change was the introduction of the Outcomes-Based Education (OBE) system in schools. It features an integrated approach to learning where flexibility exits between theory and practice as well as knowledge and skills as stated in the White Paper on Education and Training (SA, 1995:15). OBE further promotes the development of problem-solving skills and the establishment of a creative environment in which new technologies are used to acquire knowledge and to facilitate learning, thus making it more learner-centred as opposed to the teacher-centred approach of the education system before 1994 (SA, 1995:22,23 & Van Eeden, 1999:13).

According to Smerdon & Burkam (1999:2), the constructivist theory, that is one of the building blocks of OBE, allows learner-centred and learner-active teaching and learning to take place. Teachers are no longer the transmitters of knowledge, but facilitators of learning who guide learners to become more active in their own learning (Angelo, 1996:1). According to the White Paper on Education and Training (SA, 1995:15) the driving force behind the establishment of a new education policy was to ensure continuous learning as well as adaptation to and development of new knowledge, skills and technologies. OBE provides citizens with a strong foundation of general education that is aimed to overcome the challenges of the 21st century.

Before 1994 History and Geography were two separate subjects in the senior primary and junior secondary programmes. (Richter, 2005 & Transvaal Education Department, 1966:37). When the new curriculum for schools was drafted in August 1996 it introduced eight compulsory Learning Areas, one of which was Human and Social Sciences (HSS), as stated in the National Curriculum Statement – Parents' Guide (SA.DoE, 2004:2). HSS was a combination of History and Geography. The learning programme for HSS was part of the General Education and Training (GET) Band of the National Qualification Framework. At this stage the system of education in the RSA was in transition and the educational system was being phased out and replaced with a new education system, known as Curriculum 2005 (Van Eeden, 1999:13,103,106 & SA.DoE, 2002:2). In 2002 the Department of Education presented its streamlined and strengthened version of Curriculum 2005 namely the Revised National Curriculum Statement (RNCS) Grades R-9 (Schools) Policy for Social Sciences stating that History and Geography must be taught separately, but as linked disciplines known as the Learning Area Social Sciences (SA.DoE, 2002:4). The Learning Area Social Sciences (LASS) ensures that students have an understanding of the world they live in, the relationships between people, and between people and the environment over space and time as they are influenced by social, political, economic and environmental circumstances, as well as by people's values, attitudes and beliefs (SA. DoE, 2002:4). The LASS is part of the GET Band where it is a compulsory Learning Area within the Senior and Intermediate Phases, and its outcomes are covered within the Learning Programmes of the Foundation Phase (SA.DoE, 2002:3).

The new Curriculum also emphasises the integration of Information and Communication Technology (ICT) into education. Its aim is to integrate ICT within the curriculum to help learners to gather, synthesise and present information as well as provide learners with skills that are needed in the growing technology-based work place (Howie *et al.*, 2005:3). A mind shift must be made by schools in that they must realise that ICT must not be used to learn a specific skill, but it must rather be used as a "tool" to promote teaching and learning.

According to the Draft White Paper on e-Education (SA. DoE, 2003:1) South Africa is a developing country and the lack of developed infrastructure for ICT is widening the gap between South Africa and the developed world. This is evident in the USA where 72.7% of Americans currently use the Internet compared to only 6.4% of South Africans who have access to and use the Internet. South Africa is further faced with logistical problems regarding the provision of power supply, communication facilities and access to computers at schools level. The use of ICT requires electricity and telephone lines and due to the nature of our country it plays second fiddle to the need for basic amenities such as running water and sanitary facilities. In 2000 only 57.1% of schools had a power supply; less than 15% of schools in South Africa had access to computers for teaching and learning; and approximately 70% of the rural South African schools did not have access to computers (Howie *et al.*, 2005:

xviii,13,14). By 2003 only 26.5% of the schools in South Africa had computers showing that the rate at which learners are able to use computers for teaching and learning is very slow (SA. DoE, 2003:5). The reality of the situation is that learners will not have access to the Internet in the near future. Another hindrance in the slow integration of ICT into teaching and learning in South Africa is the slow rate at which teachers use and integrate ICT into their curriculums which is said to be slower than the rate with which hardware and connections are made at schools (Howie *et al*., 2005:9). This means that a human factor such as human fear of or lack of skills in ICT is responsible for the slow integration of ICT into teaching and learning. This shows that other forms of ICT must be used by teachers so that they are in step with modern technology and can use ICT as a resource and learning tool within the curriculum. Cheaper, more accessible and practical alternatives may include video-cassettes, video-recorders and televisions, but most importantly these alternatives have to ensure the effective use of ICT in teaching and learning within as many learning areas and disciplines as possible.

Another alternative worthwhile of investigation is the interactive Digital Video Disc (DVD). According to Fitzpatrick (2001:1) DVD-Video technology is the most successful video technology of any new format in the history of electronics. It is said to be a highly popular family technology as reflected in the American statistics showing a DVD-Video growth rate of 300% from 1999-2000 (Fitzpatrick, 2001:2). With the afore mentioned in mind, DVD technology can become a contemporary form of ICT used in the RSA. Twenty-first century advances in technology, like the use of DVD perhaps, may well lead to the steady use of ICT in teaching as an additional learning resource used in learning experiences like any other learning resources (White, 2001:148). In this century technology is thought to further offer benefits for students as it is also thought that ICT will revolutionise higher education due to it being regarded useful in improving learning outcomes and teaching quality, while having the potential to "extend access to education" by implementing learning designs that use a range of ICTs (Alexander, 1999:173). The ideal would be to use this technology with pre-service teacher students who could then implement it at schools.

A lack of training regarding the integration of ICT into different learning areas was identified in the SITES[1] Module 1 study from 1998-1999 when an evaluation of the status of ICT in schools in South Africa and abroad, was undertaken in relation to the instructional activities of teachers and/or students (Howie *et al.*, 2005:xviii). This finding, amongst others, brings to the fore the importance of incorporating ICT into the pre-service training of teachers that can be introduced into various disciplines at tertiary level, for example, within the disciplines of History and Geography.

The presentation of History and Geography within education is very complex. After two decades of observation at the University of Leicester in the United Kingdom it was shown that ICT - in this case computers and the Internet - have been used more progressively in Geography to support and reinforce learning and teaching (Castleford & Robinson, 1998:375). Within the discipline of History quite the opposite has been revealed. Many teachers abroad use technologically impressive ICT facilities to satisfy Department inspectors, even though computers, in their opinion, have not had the same effect and powerful impact on the History classroom like video recorders and televisions have had (Haydn, 2000:89,99). The latter may be attributed to the technological drive present in developed countries like the United Kingdom where the pressure on teachers to use computers in their teaching is so great that a "zero tolerance of non-ICT literate teachers" exists (Haydn, 2000:99). Technologies used in History classrooms are however, mostly first- and second-generation technologies such as combined audio-visual aids unlike the more sophisticated third-generation technologies used in Geography, especially when referring to the requirement of Geographical Information Systems (GIS) in the new curriculum (Howie, *et al*., 2005:7). The National Curriculum Statement Grades 10-12 (General) Geography (SA.DoE, 2004:13) requires the use of ICT to be used in the study of GIS and Geographical Positioning System (GPS) that ensures the attainment of Geographical numeric skills.

It is presently assumed that ICT has the potential to facilitate changes in education that will prepare students well for the Information Society. It is also believed that a shift from a 'traditional' teacher-dominant paradigm to a new paradigm where the emphasis is on active and interactive learners is well suited to the Information Society (Howie *et al*., 2005:xiv).

Teacher-training institutions in South Africa are faced with a challenge in the tertiary education sector of how to train pre-service teachers to teach Geography and History combined in the LASS. Teacher-training institutions in South Africa should offer comprehensive programmes of ICT in education and it is here that the Faculty of Education at the Potchefstroom Campus of the North-West University (NWU) has initiated a research project that uses the DVD and DVD player in the LASS to bridge the divide between the integration of ICT and to address the new challenge of helping students to take responsibility for their own learn. It aims to ensure effective learning using the DVD and incorporating the DVD into pedagogical practices in order to ensure optimum results.

Thus the aims of this research are to establish:

- the effective use of DVDs in the teaching and learning of the LASS; and
- which type of material must be included on a DVD that would best suit teaching and learning in the LASS.

2. THE USE OF ICT IN SOUTH AFRICA

The research project team at the Potchefstroom Campus of the NWU opted for an alternative medium within ICT namely the DVD, partly because it is already widely used overseas in America and there it is said to be the sphere to which future developments in ICT will be attached to (Fitzpatrick, 2001:4). The DVD was used in conjunction with a DVD player and was chosen as it is small, cheap, portable and works with a battery or electricity, in contrast with a passive personal computer. Other driving forces for the use of a DVD are listed below, as being advantageous over other ICTs, such as CD-ROMs and video cassettes, according to Crawford (1999:2) and Anon (2002:1):

- The DVD offers an unmatched storage capacity of 4.7 GB as it is seven times greater than the capacity of a CD. Unlike a CD, DVD's are two-sided and can carry twice as much data (as much as 9.4 GB).
- It is a more durable storage medium than video cassettes. No physical contact exists between the playing head and disc, and the data surface is protected by a chemically inactive plastic.
- DVD's offer a higher quality video playback than normal VHS videos.
- In South Africa the price of a portable DVD player, like the one used in this study, has dropped from R2 500 in 2004 to R1 650 in 2005. DVDs cost less than R5.
- DVDs have the ability to combine text, audio, photographs, animation and videos, and are playback only.
- DVDs are portable, have exceptional image quality and are flexible compared to traditional video tapes and CD-ROMs.

The latter helps motivate the decision taken at the Potchefstroom Campus of the NWU as to why the DVD and DVD player was chosen for the study, such as its excellent capacity for the storage of media. Another reason for its choice is that according to Anon (2002:1) the twenty-first century requires teaching strategies, such as DVD-based teaching that uses interactive media to motivate students, so as to keep up with a student's active life, stimulate their intellect and it is aimed to accomplish all this within "exemplary instructional design" that will, in South Africa's situation, address outcomes-based education. The challenge now faced is what type of media should be included on such a DVD that can be used to motivate students and ensure effective teaching and learning within the LASS. It requires a closer look at the use of ICT within Geography and History.

Within ICT, media technology proves useful in Geography because it is regarded as a highly visual subject, complimented with the use of multimedia (Peterson, 1994:27). This is supported by research showing that audio-visual resources can be used effectively to support

	Download video clips of current satellite imagery via the World Wide Web (WWW)
	Computer multimedia available as outline presentation packages via the WWW
	Animated diagrams and video clips that are regarded as excellent tools for teaching difficult concepts

teaching and learning in Geography because visual presentations and representation are integral parts of Geography education as seen in table 1 below (McKendrick and Bowden, 1999:9-11; Krygier, 1997:5 and Stanfield, 2002:1).

Table 1 Resources used in Geography

Geography

Resources typically used in teaching	Resources using specialised ICT
Recorded television programs	Videos of specific themes recorded on camcorders and edited onto videos
Slides	Imported digital images to computers and using computer overhead projector links
Chalkboards, overheads, videos, CD's	Recordings of sounds from nature
Atlases that integrate text, images, maps, diagrams, physical models and graphs	Power Point presentations

Table 1 clearly shows that the use of ICT in Geography is widely used, especially for its visual and audio potential. It is important to note that the resources using ICT like the video clips obtained from space and the computer multimedia available on the Internet are currently being used by the Pennsylvania State University in the United States of America to serve the educational goal of providing access to educational resources (Krygier, 1997:4). Geographers at United Kingdom Universities such as Leeds and Manchester, amongst others, believe 100% that the use of audio-visual sources for teaching and learning diversify teaching styles and 69% of them feel that its use meets student demand for audio-visual resource-based information, that includes ICT (McKendrick and Bowden, 1999:12).

The use of ICT can enhance History teaching and learning by making more historical information available for learners to access and it promotes "interactive" learning (Haydn, 2000:104). Haydn (2000:102) further reports that more and more evidence shows that learners enjoy using computers, that it improves their attitudes to school and that they feel that they "learn better" using ICT. In History teaching the sources listed below in table 2 are listed as excellent sources of media, but Hayden suggests that History teachers need to think about how ICT can make their job more effective when choosing their sources (Weiner, 1995:10 and Van Eeden, 1999:213-216 & 235-236; Haydn, 2000:106-109).

Table 2 Resources used in History

History

Resources typically used in teaching	Resources using specialised ICT
Video recorder and television	
Computers: data-handling programmes; historical games	
Word processors that edits, organises historical information and improves data manipulations and interpretations	
Primary source materials that are:	
• oral (interviews, memoirs, etc.); • written (maps, letters, poems, records, etc.); • archaeological (human remains, artefacts like paintings, tools, etc.); • visual and audiovisual (video's, photographs, films, CD's, monuments, ruins, etc.)	• Internet database
Secondary sources include:	
Historical films and historical fiction, text sources from a library, all used to help students make judgments.	
Documentary radio programmes and video documentaries	The Internet: historical web sites and electronic journals that provide multimedia texts
Newspapers and cartoons	CD-ROM software with graphics and large volumes of information

Table 2 shows that although the usual resources used in History teaching do not require the use of ICT, Internet historical websites and CD-ROMs are sources with a wealth of information that can successfully be used in History teaching. According to Deacon (1998:5-6), Universities in South Africa have a positive approach to technology, but the humanities tend to show an inequality of access and use of ICT among both students and staff. He further explains that the poor access and mixed attitude to the use of computers in the humanities has had both a cause and effect on the slow use of computer technology for teaching and learning in History teaching, as is evident in table 2.

It is thus clear that a slight disparity exists between the two disciplines' use of ICT as more advanced technology is used in Geography more regularly as compared to the use and integration of technology in History teaching and learning . Research in the USA and England has shown that learners in Social Sciences prefer ICT in teaching. A greater focus is, however, being placed on the integration of ICT in Social Sciences as learners prefer visual effects, moving pictures and other entertainment with educational content to learn from (Haydn, 2000:99; Deaney, *et al*., 2003:141 and Multenoff & Rodgers: 2003:1).

3. LEARNING METHODS

Learners need a more flexible approach to education as traditional methods of education will not enable them to meet the learning that is required of them such as gathering and synthesising information using ICT, needed for the growing technology-based work place. It is thus thought that a learner-centred approach to learning and teaching facilitated by a DVD can make a difference as the integration of ICT in the curriculum means that the DVD is to be used as a resource and learning tool (Howie *et al*., 2005:8,9). According to Golightly (2005:11) it is important that pre-service teachers are exposed to similar approaches of teaching and learning at tertiary level than what is expected of them as teachers within the school system. Within OBE education it is vital that pre-service teachers who are expected to teach in a social-constructivistic method are trained in that method or problems will be experienced. Thus, if pre-service teachers are to establish a personal understanding of a concept then they must assume the place of a learner and take part in the learning action. Research has shown how pre-service students who study in an active way are more inclined to plan lessons that are more active and learner-centred. It is thus thought that by using the DVD at tertiary level, pre-service teachers could mimic their experience and use the DVD technology as an alternative teaching tool.

The utilisation and integration of the DVD technology in the LASS's teaching may be used as a technology-based project that, together with the aid of multimedia sources, could ensure learner-centred teaching and learning. To establish how effectively ICT can be used in the LASS and which types of media are more effective in Geography and History teaching, one must keep in mind that people learn differently. Reay (1997:83) identifies four types of learner as identified by Peter Honey and Alan Mumford namely the activist, reflector, theorist and pragmatist. He states that each learner has certain wants and due to his/her needs a specific type of training is required. A summary of each is seen below:

- activist-wants variety, excitement, social activities and therefore the type of training required involves group-based activities, learning through execution and lively debates, etc.;
- reflector- wants a chance to reflect, analyse, deliberate, draw conclusions and thus the type of training required involves distance learning, audio and video resources etc.;
- theorist- wants models, complexity, rationality and thus the type of training required involves electronic inter-activity, models, simulators etc.;
- pragmatist- wants a chance to experiment with new ideas and techniques as well as practical applications and therefore the type of training required involves controlled experience and on-the-job training, etc.;

This study aims to satisfy the preferred learning style needs of learners by including a large variety of resources onto the DVD presentations, such as audio and visual resources, that will cater for the above needs of learners.

4. BACKGROUND TO THE RESEARCH METHOD

In this research project the focus falls on the integration of the DVD into South Africa's pre-service teacher education system so as to create a learning environment where the technology used is effective for teaching and learning and where pre-service teachers at tertiary level can utilise the DVD to help with teaching and learning. The research aims are to use one DVD to its potential in the LASS and to make it a medium that can promote learner-centred learning, aided by media sources beneficial to History and Geography.

Mayer & Moreno (2003:1) researched the best ways to use words and pictures to promote meaningful learning. They called it multimedia learning whereby one learns from words and pictures. The words may be presented as printed on-screen text or spoken in the narrative. The pictures can be illustrations, graphs, charts, photographs or maps that are still or they can be motion pictures such as animations, videos or interactive illustrations. These can all be used with great success within the LASS. Butler & Clouse (1994:1) state that although Social Sciences classes have been the last to recognise the potential of technology the use of technology within Social Sciences, is limited only to the imagination.

The DVD used by the student in the project contains on-screen text with spoken narration, as well as pictures are used throughout. The student is given an interactive study guide on

DVD, with instructions when to read from the study guide, reader or switch to the DVD on the portable DVD player. Research has shown that computer screens are not good for reading lengthy text (Haydn, 2000:102) and so reading text is kept to the minimum on the screen.

The project began in February 2005. It was to be undertaken using a compulsory module for all first year B.Ed students at the Potchefstroom Campus of the NWU. It is an eight credit module known as Learning Area Social Sciences (LASW 111). Students in the Intermediate and Senior Phases as well as the Senior and Further Education and Training programme register for this module. A total of approximately 350 students were divided into three equal groups (S1C, S1D & S1E). The first group received a portable DVD player with DVD and attended only scheduled contact sessions. The DVD contains the following media: an animation; verbal communication with on-screen text and photographs; graphs; on-screen explanations using flow charts and a timeline; maps; on-screen questions and answers; and an audio clip of a speech. The contact sessions were used to get the students to report back on tasks and group work as well as to reflect on the work. The learners used the DVD to prepare for the contact session in their own time and so it was aimed to promote learner-centred learning. The other two groups received full contact session lectures (2 periods per week for 10 weeks). The results of the DVD group were compared with the other two groups to establish any differences or similarities. Questionnaires were handed out to students before and after the start of the research study. The questionnaires were used to establish what are the attitudes and perceptions of the students were towards ICT, what their ICT skills were like and what their experiences during the research project were. This was done to try and establish the effective use of DVDs in the teaching and learning of the LASS.

5. RESULTS

Preliminary results, from a questionnaire completed by the students, are shown in table 3 and table 4 below. Although a continuum of seven was used in the questionnaire, the data has been grouped into three. Groups 1-3 are not in agreement, 4 is undecided and groups 5-7 are in agreement.

Table 3. Attitudes and perceptions toward the use of a DVD in teaching and learning, expressed as a percentage (%)

	1-3	4	5-7
	Disagree	Undecided	Agree
1. DVD explanations helped to explain the work	38	22	40
2. DVD is a solution for future teaching and learning	46	17	37
3. Prefer the DVD to formal lectures	51.9	15.6	32.4
4. DVD helped to study better	48.1	11.7	40.2
5. DVD gives freedom to be taught and learn at leisure	39	19.5	41.5
6. DVD requires self-discipline and time management	6.4	13.3	80.3

With regard to the attitudes and perceptions by students toward the use of a DVD in teaching and learning table 3 shows that 40% of the students felt that the DVD explanations helped them whereas 22% were undecided. 46% felt that the DVD is a not a solution for teaching and learning in the future, but 17% were undecided. 48.1% felt that the DVD did not help them to study better, while 11.7% were undecided. 41.5% felt that the DVD gives them freedom to be taught and learn at their leisure. An overwhelming amount of 80.3% of the students were in agreement that the DVD requires self-discipline and time management.

Table 4. Media on DVD preferred by students to help them understand the work better, expressed as a percentage (%)

	1-3	4	5-7
	Least helpful	Undecided	Most helpful
Animation	39.2	22.8	38
Timeline	41.3	26.2	32.5
Visual material (E.g. maps, photos)	18.8	21.2	60

Audio media	30.4	24	45.6
Only text on screen	63.8	18.8	17.4
Only verbal communication	40.9	26.8	32.3
Verbal communication with pictures and text	22.5	21.1	56.3
Verbal communication presented in a discussion rather than in a formal style	26.7	26.8	46.5

With regard to the media used on the DVD that was regarded as being helpful by students in their understanding of the work, table 4 shows that an almost balanced response was given as to the helpfulness of the animation with 22.8% undecided. 60% felt that the visual material were helpful. 56.3% were in agreement that verbal communication together with pictures and text was helpful.

A promising outcome so far is that many students found that the media used on the DVD, specifically the visual materials like maps and photo's as well as informal verbal communication together with pictures and text were helpful to them. Further investigation must also be undertaken into which media is preferred by students and whether it can be used to present History and Geography effectively.

6. CONCLUSION

Although the results are from the early stages of the study, initial feedback from students shows that students have not yet made a paradigm shift from teacher-centred to learner-centred teaching and learning with the use of ICT. There is a positive spin-off in that the students have realised that with the use of the DVD and learner-centred teaching and learning they have the freedom to learn at their own leisure. They have also realised that using the DVD requires self-discipline and good time management. Further investigation is needed as to why they have not made the shift to ICT, for example, establishing if the outcome was due to this being the only compulsory module taking part in the project and thus not the norm.

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(Footnotes)

[1] The Second Information Technology in Education Study (SITES) is an international comparative study managed under the care of the International Association for the Evaluation of Educational Achievement (IEA).