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Technology Enhanced Learning for Remote Nurses in KwaZulu-Natal

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Abstract: The paper describes a project at the School of Nursing at the University of KwaZulu-Natal in Durban South Africa to increase access to university based education through the use of videoconference specialist education for nurses in rural areas of KwaZulu-Natal. *Objectives:* To evaluate the perceptions of lecturers and participants on the use of video-conferencing for nurse education. *Methodology*: Two surveys were conducted: a perceptions survey with lecturers of the School of Nursing and an initial and second survey with participants of a pilot advanced midwifery education programme conducted by video-conferencing. *Results:* Both participants and lecturers had very little prior experience of video-conferencing, but felt that it would increase access for rural nurses to high quality specialist education. Concerns were mainly about technical issues in running and conducting the sessions and the application of progressive education strategies using this technology *Conclusion:* Videoconferenced academic specialist nursing programs would provide technology enhanced learning for remote nurses in KwaZulu-Natal, but for optimal use, the presenters need to be trained in the use of VC.

Keywords: Videoconference, nurse education.

1.   Introduction

Africa has a health crisis with 24% of the health burden but only 3% of health workers [1]. This situation is compounded by more health workers being based in urban centres where teaching hospitals and high incomes are common [1]. In South Africa, the maldistribution of resources is similar. In our region, the province of KwaZulu-Natal (K-ZN), 54% of the population of 10.3 million people live in rural areas [2].

In rural areas, most local health service provision is at district hospitals and nurse led Primary Health Care (PHC) clinics. Nurse numbers are relatively low across the country, with 116.6 professional nurses per 100,000 population in 2008 [2].This is attributed to low remuneration and poor or deteriorating working conditions [3]. In 2008 there were 32,339 vacancies for professional nurses throughout all provinces in South Africa (40.3%) [4] and in a study in 2004, it was estimated that only 40% of PHC facilities in South Africa employ nurses trained specifically to work in PHC [5]. Currently, nurse training is provided at universities and colleges of nursing. Under the provisions of the Higher Education Act No. 101 of 1997, nursing education in South Africa qualifies as "higher education" giving it the same status as education in other professions [6].

Traditionally, professional post graduate specialist nurse training has been centralised in urban areas. People wishing to pursue a career in nursing would have to move to the urban areas in order to receive university based training or further specialisation. This centralised strategy is no longer appropriate for the province nor does it advance or support the

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decentralised ethos of the country's quality in health care policy or the rural health strategy. There is great need for provision of quality nurse training for nurses in the rural areas.

1.1   Increasing Retention of Nurses in Rural Areas Through – a Virtual School of Nursing

Part of the University of KwaZulu-Natal's School of Nursing's (SON) mission is to increase retention of nurses in rural areas. The SON has been active in decentralized education for rural nurses since 1999 using a system of part-time decentralized tutors and clinical facilitators to run short courses leading to registration with the SA Nursing Council, and also being credited towards a Bachelor level degree in Nursing. The SON aims to expand the decentralized programme, by using videoconferencing (VC) to deliver face to face education to nurses based in rural areas at their local hospitals, with a further aim of creating a sustainable "virtual" School of Nursing (SON).

1.2   Video-Conference in Nursing Education

The use of interactive VC as a teaching modality has been widely accepted for delivering medical education and continuing education programmes to health-care professionals. Videoconferencing is seen as a useful adjunct to traditional educational delivery modes, and provides quality education opportunities for participants in rural and remote areas who due to time, travel, and cost constraints would normally be unable to access these [7].

Distance teaching using satellite television broadcast with interactivity provided by telephone was used for several years in South Africa, in the late 1990s [8]. The use of videoconferenced teaching for nurses is not part of routine nurse education in South Africa and the SON has not previously provided nursing education using this modality. There is however ten years of experience of videoconferenced teaching at the Nelson R Mandela School of Medicine at the University of KwaZulu-Natal.

2.   Objectives

To plan for the commencement of VC teaching programmes by the SON, a situational analysis and an evaluation was conducted. The objectives of the evaluation were to:
1. Assess perceptions of lecturers in the SON of videoconference as a teaching modality
2. Assess the prior experience of the lecturers of using videoconferencing for teaching
3. Evaluate the implementation of a pilot VC education programme

3.   Methodology

To assess the level of experience and perceptions of the lecturers of the SON, a quantitative survey was conducted using a convenience sample of lecturers attending a staff meeting.

To evaluate the effectiveness of VC in a pilot teaching programme, quantitative evaluation questionnaires were administered to all the participants (n=57) in a decentralized, blended education programme for midwives in advanced midwifery in 2009. This programme was funded to improve access of rural women to Advanced Midwives (ADMs) at district level by increasing the number of ADMs in KZ-N. Programme targets were set on providing training for 120 -160 registered midwives in rural areas to become registered as ADMs over a period of 3 years. An initial evaluation in the first week of the programme and a midyear second evaluation were conducted.

The evaluations were conducted using routine audit tools in which the number of participants at each VC site for each session were recorded and a standardized VC Evaluation questionnaire which is routinely administered to all participants of VC courses. Initial evaluation questionnaires are only administered for new programmes.

The evaluation of videoconferenced courses is part of the standard evaluation by the Department of TeleHealth of all medical and other education courses offered at the Medical School by VC. These are process evaluations focusing on the implementation process and the participants' satisfaction with the technology against a set of evaluation criteria and indicators. The criteria were developed by the Department of TeleHealth based on a review of the literature which identified four core areas for VC evaluation: Access; Overall Satisfaction; Appropriateness, and Technical Issues [9-11]. The quantitative questionnaire focuses on the quality of the VC sessions and does not include evaluation of teaching content. Each criterion is measured using a number of questions which are rated using a 4 point Likert scale (Strongly Agree, Agree, Disagree, and Strongly Disagree). The questionnaire was developed by the authors based on the criteria (content validity). Face validity was established through the review of the questionnaire by a TeleHealth expert.

In the analysis of the questionnaires, the Likert scale was coded to a binary scale of Agree or Disagree. The proportions of participants agreeing and disagreeing were calculated for all variables and compared against an indicator of 75% agreement. Initial and second paired agreements were compared using McNemars Tests Exact Significance two-tailed ($p<0.05$) [12]. Only where differences between the agreements were significant ($p<0.05$) are the results of the tests reported.

4.   Technology Description

The ADM Teaching Programme via VC commenced in January 2009. ADM teaching sessions were broadcast from the Nelson R Mandela Medical School to four remote hospital sites. Broadcasting to the 5th site commenced in August 2009. Videoconferencing was ISDN based at 128 kbs^{-1}. The University site, with a multipoint control unit, acted as the hub. The University site provided coordination and technical support for the sessions.

5.   Results

5.1   Previous Experience and Training in VC

The SON has 26 permanent academic staff of which one staff member is currently involved in the pilot videoconferenced ADM programme. Sixteen of the 26 (62%) staff members completed the questionnaire in October 2009. Of the 16 staff member who completed questionnaires, 8 reported they had not used VC in the last academic year, and of these 6 had never used VC. Five staff had used it once, 2 reported having used VC more than once and one person did not answer the question. Nine people reported receiving some guidance in using VC, of whom only one reported having received training in VC. When asked whether staff should receive formal training, all 9 supported formal training in VC teaching.

5.1.1   Perceived Advantages and Disadvantages

Most of the staff (9) felt there were advantages using VC teaching. The main advantages reported were the ability to reach students in rural areas (7) and the cost savings that could be achieved by reducing travel for students. Other perceived advantages included improved access to specialist educators (4), clinical support (1) and the standardisation of the quality of education provided to students at all sites, including rural areas (1).

Perceived disadvantages related to concerns regarding possible technical problems and support of equipment and connection processes at remote sites (7). An additional concern (2) was whether some of the remote hospital based venues for VC were appropriate and big enough to accommodate the students. One staff member expressed concern regarding the suitability of VC for progressive, problem based and small group teaching methods commonly used in the SON.

5.1.2 Overall Satisfaction with Previous VC Experience.

Of the 16 staff members, only nine who have had previous exposure to VC completed the questions on training, satisfaction and suitability. All the staff were satisfied with their previous VC experience and agreed that they would recommend VC to a colleague, would attend future VC sessions and that VC would reduce travel for students .

5.1.3 Suitability as an Educational Tool

Overall more than half the staff members felt that VC was an appropriate educational tool, though some expressed concern about the ability of this modality to allow for appropriate interaction between participants (Table 1).

Table 1: Suitability as an Educational Tool

Criteria	Agreed	Disagreed
Presenter comfortable	8	1
Similar to Face to Face (F2F) teaching	7	2
Ability to allow for interaction	6	3
Suitability as an educational tool	5	4
Appropriateness as an educational tool	5	3

5.1.4 Technical Problems

Nearly all of the staff reported some experience of technical problems, including general technical problems of connection, picture, slides and audio quality (Table 2).

Table 2: Previous Experience of Possible Technical Problems with VC

Criteria	Agreed	Disagreed
The picture quality is good	8	1
The sound quality is good	6	2
PowerPoint image quality is good	5	4
Experienced no technical problems	2	6

5.2 Participant Satisfaction with VC ADM Programme

One videoconferenced ADM teaching session of 3 hours took place each week. In the first semester 47 nurses were registered to participate each week with all attendees apart from the lecturer at remote sites. In the second semester a fifth site was brought on line increasing the total number of participants to 57.

The participant questionnaire was administered at the start of the programme (n=43) and 6 months into the ADM programme in July/August 2009 (n=53) Thirty nine participants completed both questionnaires. Only the 39 participants who completed both sets of evaluations are included in this analysis. At the initial evaluation, only 4 (10.3%) participants rated themselves as familiar or very familiar with VC. By the second evaluation (which included participants from the last site that had joined the programme), 36 (92.3%) rated themselves as familiar or very familiar with VC.

5.2.1 Access (Reduction of Travel)

All the participants were from remote sites. An average return journey to and from Durban was calculated as 577.4 $\pm$ 292.9 km. The VC programme has resulted in a substantial reduction in travel costs for the participants and the presenters of the programme. Only a small number of participants reported that they would rather travel to Durban than attend VC (5 participants in the initial evaluation and 8 in the second evaluation).

5.2.2   *Overall Satisfaction with VC as a Teaching Method*

Participants reported overall satisfaction with the VC teaching programme at both evaluations with agreement levels above 75%. When asked whether they would attend VC again, all (39) participants in the initial evaluation and 35 (89.7%) participants in the second evaluation agreed. To the statement, "I would recommend VC to a colleague", 35 (89.7%) of the participants agreed in the initial evaluation and 33 (84.6%) in the second evaluation.

5.2.3   *Overall Appropriateness of VC as a Teaching Method*

Overall appropriateness of VC as a teaching mode was measured using the following criteria, the level of comfort of the presenters, the level of interaction with participants, the perception of the suitability of VC as an educational tool and the perception of VC as an appropriate tool for teach ADM. Participants agreed that the presenters appeared comfortable using VC for teaching with 32 (82.1%) participants agreeing in the initial evaluation, increasing to 34 (87.2%) in the second evaluation. In evaluating the perception that the level of interaction between participants is the same in VC as in Face to Face (F2F) teaching, agreement fell between the two evaluations, from 33(84.6%) to 29 (74.4%).

In comparing VC with F2F teaching, agreement that VC is as effective as F2F teaching dropped significantly from 35 (89.7%) to 27 (69.2%), (p=0.04) as did agreement that VC is a suitable education tool, falling from 38 (97.4%) to 31 (79.5%) (p=0.04). Agreement that VC is an appropriate tool to teach ADM fell from 33 (84.6%) to 29 (74.4%) (p=0.02)

Most of the overall agreements were high (mostly above 75%), with only three indicators falling slightly below 75%. Though all the agreements decreased from the pre- to the post evaluation, this may reflect adjustment to reality of receiving education via VC.

5.2.4   *Technical Issues*

For the ADM programme, as with any new programme, the fact that some hospitals were using the videoconference equipment for the first time, some technical problems were experienced. Significantly more participants in the second evaluation had experienced technical problems 27 (69.28%) than at the initial assessment 18 (46.2%, p=0.05).

Audio quality: Satisfaction with the audio quality of the presentation fell from 34 (87.1%) to 29 (74.4%) (p=0.005) while satisfaction with the audio quality of the participating sites fell slightly from 28 to 27 participants.

Picture quality: By the second evaluation, presenters and participants were seen clearly most of the time. In the initial evaluation, only 17 (43.6%) participants agreed that they could see the presenter clearly. This increased significantly to 30 (76.9%) participants in the second evaluation (p=0.01). A 5% increase in agreement on being able to see the other participants (from 25 to 27 participants) occurred from the initial to second evaluation.

A problem with quality of Powerpoint presentations emerged in the second evaluation. The number of participants agreeing on being able to see the slides clearly decreased from 34 (87.2%) at the initial evaluation to 25 (64.1%) at the second evaluation (p=0.006). This is not necessarily an issue of technology failure and is related failure to understand that slides used for videoconferencing should be prepared according to guidelines, as images lose quality when passing through videoconferencing system CODECS.

6.   Business Benefits

Technology has facilitated access to specialist education to nurses in rural and remote areas who are responsible for providing specialist care. The ADM VC programme will now aim to train at least 50 ADMs per year at a distance using this technology. This will go some way towards the target set by the Programme of providing training for 120 -160 registered midwives in rural areas to upgrade to ADMs over the next 3 years.

A second benefit is the level of satisfaction expressed by the participants in the ADM programme, with apart from technological problems, most of the criteria being rated 75% and above. The reduction in travel was substantial and most participants in the ADM programme expressed great appreciation for the opportunity to have access and support in specialist training for their field without the need to travel.

Lastly, the commencement of this VC programme provides the SON with a vehicle to meet their vision of increasing the retention of nurses in rural areas by providing opportunities for rural nurses to have access to university based programmes, such as specialist Masters Programmes. The use of the VC technology also ensures that the standard of nursing education is similar across all sites.

7. Conclusion

The first VC academic nursing qualification programme has been successfully offered to at total of 57 midwives in rural and remote areas. Based on the evaluations, further work is needed to expose more staff of the SON to VC teaching, to overcome their concerns regarding the suitability of VC teaching for problem based small group teaching

Some of the technical issues identified in the evaluations are not technical, but are issues relating to presenter experience in VC presentation and the suitability and quality of PowerPoint slide presentations used in VC teaching. Apart from connection problems, most of the problems reported were issues of participant user interaction with technology which can be addressed through training. It is planned to offer other distance programmes in nursing, including coursework masters programmes, by videoconferencing to further increase access to specialist training for nurses in rural and remote areas.

The recommendations from these two initial surveys are:

1. To provide formal training for all SON staff in the benefits of VC, the use of VC equipment, VC etiquette, use of PowerPoint presentations prepared for VC transmission

2. To reduce technical problems, integrate technical support staff from the SON with the Department of TeleHealth support staff to create a team of technical support staff to provide ensures the smooth running of the new VC nursing programmes.

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