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<b>Title</b>	Interactive CD ROM resources for nursing students. 'Developing a CD ROM tutorial' Brain injury and normal movement: an approach for nurses and carers
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<b>Publisher</b>	University of Salford
<b>Type</b>	Monograph
<b>USIR URL</b>	This version is available at: <a href="http://usir.salford.ac.uk/id/eprint/2074/">http://usir.salford.ac.uk/id/eprint/2074/</a>
<b>Published Date</b>	2001

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## **Interactive CD ROM resources for nursing students**

### **"Developing a CD ROM tutorial" Brain Injury and Normal Movement: an approach for nurses and carers**

**Helen Iggulden**  
**Lecturer in Nursing**

#### **Team Members**

Helen Iggulden, Lecturer in Nursing (Project Leader) Chris Tivey Camera and technical support, Jon Smith Graphic Designer, Dr. Krystyna Walton Consultant in Neurorehabilitation, Floyd Unit, Birch Hill Hospital, Colette Manning, Specialist Practitioner, Highbank Neurorehabilitation Centre, Bury, Steve Pym Physiotherapist, Highbank Neurorehabilitation Centre, Bury

#### **Abstract**

This project aimed to build on work the team has already completed in developing multimedia resources for Diploma in Nursing students. This work, funded by a previous TLQIS bid, resulted in two videos exploring the care of a person with a head injury from the acute phase through to rehabilitation. The work has been successfully disseminated nationally and internationally and has been followed up with the pilot use of Blackboard as an adjunct. The videos evaluated well with our own students and received positive feedback from independent reviews in the Nursing Times and the Nursing Standard. Evaluation from our own students has also indicated some key areas in which more in depth tutorials are needed. These include facilitating normal movement and preventing mobility problems. A search of both commercial and non-commercial products reveals that no such dedicated resources exist. In addition a National Service Framework for Long Term Conditions, including brain injury, is being developed for implementation in 2004. The scoping exercise has already indicated a need for staff development in the field of brain injury.

This project therefore aimed to respond to local student evaluations as well as nationally identified skill deficits by developing a tutorial on the topic of facilitating normal movement following acquired brain injury. This proposal therefore aimed to produce, evaluate and pilot a CD ROM tutorial taking into account the evidence base in the literature to inform such developments.

#### **Rationale**

1. The current trends in e learning and Higher Education.
2. Paucity of existing resources following Literature Search
3. Professional concerns following Select Committee reports to the House of Commons in March 2001 on the quality of provision for people with brain injury outside specialised units.
4. The level of support in the project work so far carried out from the university, school, as well as from clinicians, academic colleagues and students.
5. The developing National Service Framework for Long Term Conditions, due for implementation in 2004

#### **Background**

A database search into the nursing, medical, psychological and educational resources on the topic areas identified yielded very little. The search also identified problematic educational and design aspects of e-learning, debatable perceptual social and cultural issues in e-learning as well as difficulty in costing computer assisted learning activities. Nevertheless innovation needs to engage in some risk in order for progress to be made. The searched databases included CINHALL; a health related database, Psychlit a psychology database, Medline, a medical database and EDRS an educational database. The search indicated that there is inconclusive evidence of the educational advantages and disadvantages of computer mediated learning for students, (Kelly 1990, Beeson and Kring 1999 Neafsy 1998 Barnes 1998)) that visual and organisational design elements are very important in successful use of the medium (Wells 2000, Fels and Weiss 2000 Gittelman 1998) and that the attitude of students and teachers towards computers is also a important variable (Nass and Moon 2000,

Bornet 1999 Charleton and Birkett 1999 Spotts 1999). Doyen (1997) and Kelley (1990) also argue the case for further developments in order to evaluate CAL in nurse education

### **Aim**

To produce a CD ROM tutorial on Facilitating Normal Movement and positioning in the activities of living for Diploma in Nursing students, within 12 months, based on sound educational principles, taking into account as far as possible the current literature and research available on both the topic area and the educational mode.

### **Objectives:**

1. Establish a team made up of academic and clinical colleagues to develop the CD ROM , co-ordinated by the project leader
2. Agree tasks, time scales, and co-operative systems, level of technical support, and financial budgets and time issues, co-ordinated by the project leader.
3. Implement the agreed plans , with a system for monitoring progress
4. Evaluate the process of the project, including activity based costing
5. Evaluate the product of the project, with a view to transferring the products across to Academic Enterprise when the project ends.

### **Anticipated outcomes:**

1. An enhanced, flexible and available resource for diploma nursing students based on an area of concern in practice
2. Increased understanding of the role of educational technology and the issues arising
3. An improved patient care in non specialist areas
4. An enhanced profile of the university through dissemination

### **Objective 1**

Establish a team made up of academic and clinical colleagues to develop the CD-ROM, co-ordinated by the project leader.

The clinical members of the team participated by providing clinical knowledge, skills and advice through interviews with the project leader, by identifying suitable case studies, advising on patient consent to participate, providing still images, by providing short instructional video presentations, and by critical review of draft texts, images, graphics and animations to explain technical points.

The project leader drafted and edited design, structure, sequence and content, loaded text, still images and progress check questions into the software. The technician carried out video camera work and loaded movie files and animations and links.

### **Objective 2**

Agree tasks, time scales, and co-operative systems, level of technical support, and financial budgets and time issues, co-ordinated by the project leader.

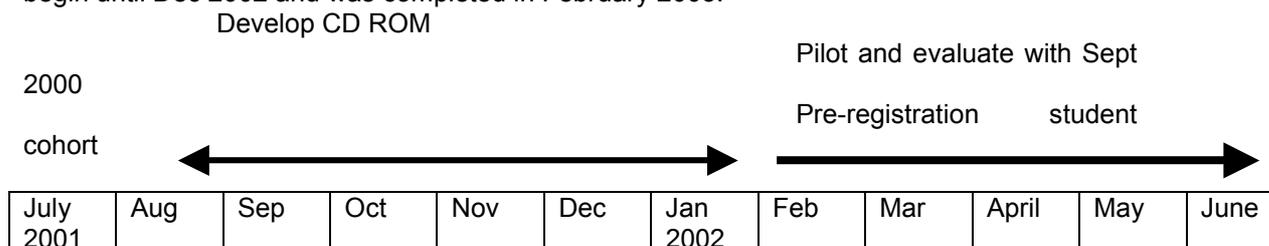
An additional element was introduced into this objective part way through the project. It became clear through evaluation and reviews of the previous video that a potential commercial market existed for the product. Academic Enterprise carried out a market analysis and produced a Business Plan which, in conjunction with an extra costing analysis, was presented to the Senior Management Committee in the School of Nursing. This resulted in an extra funding of £2650 being granted on the understanding that it would be repaid from sales once the product was marketed. This was a very beneficial development but delayed development a little because of meeting schedules.

The development process followed these key stages

- 1) Establish the team and agree key tasks specific to topic area, agreeing tutorial objective and learning outcomes, and where in the programme it would be appropriate.
- 2) Gather materials and content in a central location, including any handouts, slides, overheads, lecture notes, quizzes,
- 3) Identify where more material, or updated material is required, taking into account the diploma level and both visual and narrative material is used and either gather or develop.

- 4) Prepare the organisational structure of the tutorial and the deployment of materials, taking into account theoretical perspectives on Adult Learning, the growing body of evidence on the design and use of CD ROM in education and the need for feedback loops, as well as more general design issues on presentation and assessments.
- 5) Work with technician to integrate resources on CD-ROM
- 6) Pilot the CD-ROM with September 2000 intake students, who will have used the Rehabilitation video, produce earlier as part of their course
- 7) Use focus group interviews, pre and post test assessments and Likert rating scale to report on the educational, technical and usability factors and make recommendations for the future based on its strengths and weaknesses.

**Timescales:** The original estimate was as below. However piloting and evaluation did not begin until Dec 2002 and was completed in February 2003.



**Responsibility:**

Project Leader Overall project management, educational expertise

Technical Support Camera work, technical support

Clinical teams and academic colleagues: clinical content, expertise and advice, educational material.

Educational Development Unit: Support and Guidance

**Staff development requirements:** A resume of the Education Development Unit seminars attended is enclosed. The project leader continued to attend conferences, study days and search the literature on e-learning development, design and evaluation

**Piloting, monitoring and evaluation:** The CD ROM was piloted with a group of 120 Adult Branch Diploma in Nursing students at the beginning of their third year who had been using the rehabilitation video produced by the earlier project as part of a problem based learning trigger. Of these 84 students returned their pre and posttests and evaluation forms for analysis. They were given a paper based pre-test based on a brief scenario of a young who had sustained a brain injury following a road traffic accident. They were given the same test following completion of the CD ROM and were also given a Likert scale evaluation proforma, (see appendix) adapted from Boyce and Winne (2000) which explored student response on four variables Content, Interest Level, Design and Navigation. This proforma also invited open-ended comments on the strengths and weaknesses of the CD.

**Data analysis**

**Pre and post test**

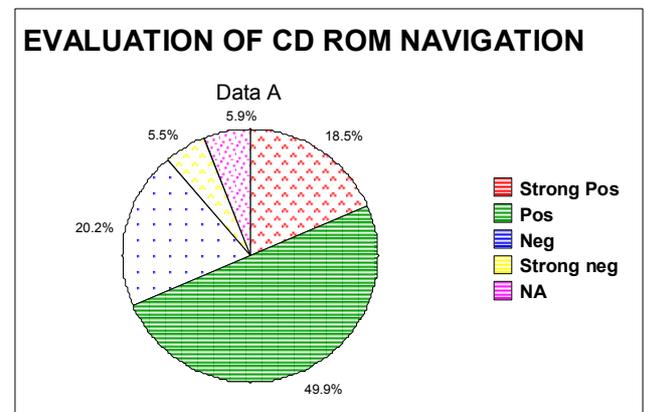
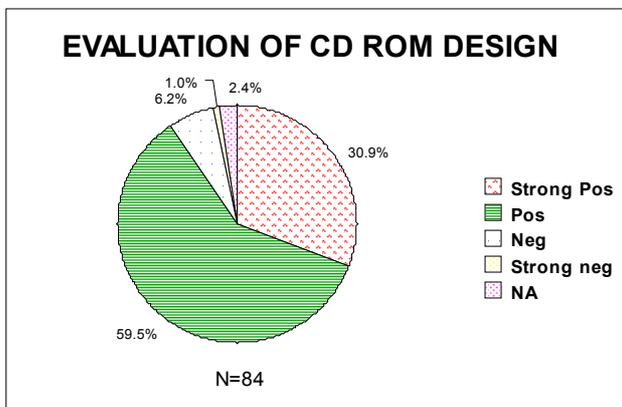
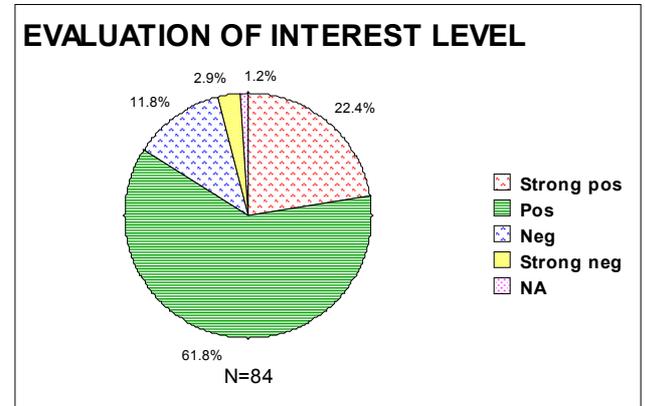
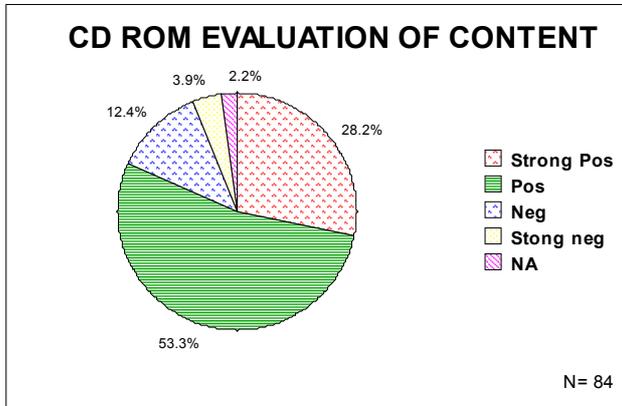
Of the 84 papers analysed with some it was possible to do a straightforward comparison between their own scores pre and posttest. With others this was not possible as the returned pre test papers did not match the number of returned post test papers. For this reason the pre and post test was analysed qualitatively, looking for the main differences in the knowledge base between the two. Grading criteria had not been assigned as the analysis sought to evaluate the change in the quality of their knowledge and understanding and a rigorous and valid scoring system for the answers given would have been time consuming to prepare.

**CD ROM Evaluation proforma**

The Likert scale responses to 84 evaluation proformas were analysed using descriptive statistics and graphical representation. The open-ended comments, which some students made in addition, were used to help interpret the results.

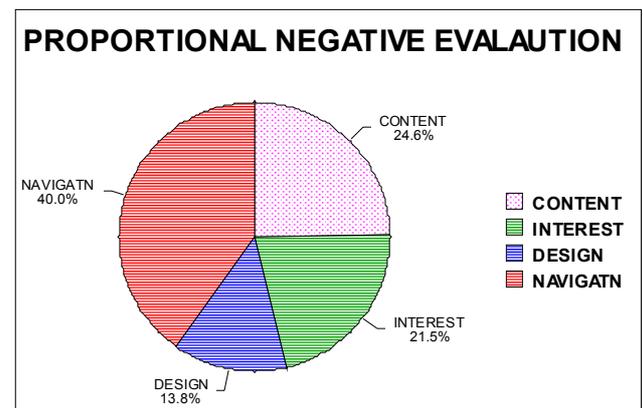
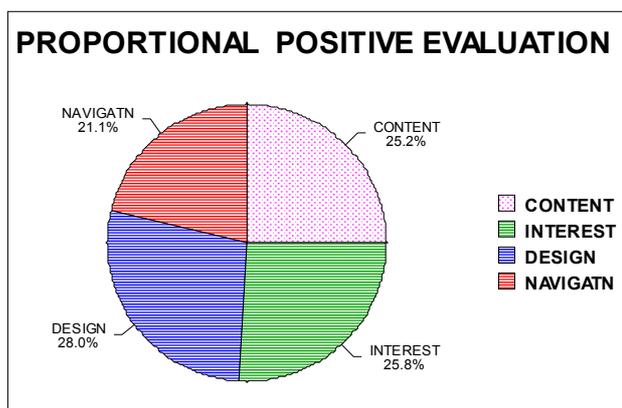
## Results

### Likert Scale Responses on Content, Interest Level, Design and Navigation



### Qualitative responses on Content, Interest Level, Design and Navigation

N = 84 in each chart



### Examples of positives

"Really different and interesting piece of coursework. Enjoyed doing and learning from it"

"Very good and useful CD"

"Very informative" Useful, interesting and concise information"

"Had a faulty CD so jumped around and missed bits, but I found the CD the very good when using the bits that worked"

" Content excellent"

" A terrific idea that needs some presentational tweaking"

"Could answer as many times as necessary until the correct answer reached."

"Overall bright and colourful, some interesting points raised"

### **Examples of negatives**

" There was no explanation of why an answer was wrong"

"Needs main page in order to navigate through sections"

"CD was damaged, unable to reach certain areas"

" Sometimes difficult to use controls"

"Slightly too long"

" Nothing mentioned on printing"

" No instructions"

### **Response to negative comments**

The students were given a draft version to evaluate and we knew the navigation and instructions for use were weak. The question slides in the programme do not allow for pop up feedback on question slides, although students liked the animations indicating correct and incorrect answers.

Their comments have been very useful and we need now to work on the following areas

1. Provide instruction on navigation and develop more navigation links to different parts of the programme
2. Provide overall picture of the whole programme with links on menu page.
3. Provide printable formats of the text sections with the CD
5. Use Perception to construct questions and answers with feedback and a facility to print and save test results.

### **Results of pre and post test.**

A qualitative analysis demonstrated an improved response on all questions.

#### **Pre- test summary:**

1. Most students knew that spasticity and contractures might develop. Some also connected this with pain. However the post test showed much greater appreciation of the effects of spasticity and contracture on other activities of daily living and an understanding of the term "windsweeping"

2. In relation to muscle tone many students seemed to guess with almost half guessing wrongly. The post test demonstrated a 100% correct response.

3. In the pre-test most students understood that brain injury interferes with motor pathways in some way. The post test demonstrated that students understood that the inhibitory influence of the upper motor neurone was lost.

4. The pre test showed a general understanding of the importance of change of position, but the post test demonstrated they had understood how to do this using a profiling bed and/ or a "T" roll.

5. No students understood the term "key points of control " pre test. The post test showed a huge improvement. They can use this concept in moving and handling many patients.

6. Although risk of falling was identified by most patients, the post test showed greater awareness of postural and in their answers used terminology introduced in the CD, such as neck and trunk flexion and lower limb extension

7. Again the post test showed greater awareness of postural as well as circulatory problems.

8. Very few students knew what the term "base of support" meant in the pre test, although some interesting guesses were made. The post test showed that most had understood that it is the area of the body in contact with the supporting surface.

9. 10, 11, 12 and 13 were all specifically related to terminology introduced in the CD, which is used to explain the components of normal movement. The post test improvement was dramatic as very few even hazard a guess in the pre-test.

14. Most students suggested some form of supportive chair, but the post test showed their understanding of the difference between "reclining" and "tilt-in-space" seating

The process of evaluating the application of the increased knowledge base in practice is still underway. However a few students have already returned the Likert Scale responses as to whether their practice has changed as a result of working through this section of the CD. Preliminary results from 7 students indicates that they remember concepts introduced in the CD, that they use this background knowledge in clinical reasoning, that they feel more confident in discussing care with other nurses, physiotherapists and occupational therapists and that where basic equipment such as "T rolls" profiling beds and tilt in space chairs are available they use them and understand the rationale but hat these are not always available.

**Staffing and cost:** The original costings were as follows

Release of project leader from normal duties @ £26.37 per hour, calculated at 1/2 day per week for 10 weeks = £1054 This time includes structuring, organising and entering CD ROM material before technical support, and working together with technician to finalise programme and burn CD

Cost of technician @ £40 per hour calculated at 5 days work of 7 hours on the CD. =£1400 His time will be used to upload and incorporate video clips into the Astound programme and finalise structure and add animations.

The above costings were based on the best estimate based on a one minute prototype CD ROM, bearing in mind that even activity based costing is at present a difficult and in itself time consuming activity not yet proven to be accurate.

When the decision was taken to extend the project and aim at a commercial market the following budget summary was presented to the Senior Management Committee for financial support from the School of Nursing

**Budget summary:**

**Income:**

TLQIS	£2750
Video Profit	£1000

**Total Income £3750**

**Expenditure (so far)**

Graphic designer 61 hours @£17.50	£1067
Technician 25 hours @£40	£1000 (estimate)
Video, CD ROM, poster presentations etc	£350
Software	£250

**Total Expenditure £2667**

**Remainder £1083**

### **Estimated future expenses**

<b>Graphic illustrator 20 hours @ £17.50</b>	<b>£350</b>	
<b>Technician 70 hours @ £40</b>		<b>£2800</b>
<b>Donation to contributors</b>		<b>£500</b>
	<b>Total</b>	<b>£3650</b>
<b>Projected shortfall as a result of using graphic Designer and aiming at commercial market</b>		<b>£2567</b>

In summary, the TLQIS money awarded has funded the development of the CD as in the original bid. The project has been evaluated as above and this part of the CD, with the amendments outline above can continue to be used with our students a part of their coursework. The additional funding from the school of nursing will be used to complete an extended version of the CD with a view to marketing it as outlined in the Business Plan prepared by Academic Enterprise.

### **Dissemination:**

#### **Conference Papers**

Iggulden H. (2002) Developing multimedia and e-learning for teaching and learning the care of people with brain injury Paper presented to The 2nd Scandinavian Congress of Neurological Nursing Reykavik, Iceland May 29- June 1

Iggulden H. and Walton K. (2002) Developing Multimedia Teaching Resources in Acquired Brain Injury Poster Presentation 13th European Congress of Physical and Rehabilitation Medicine, Brighton May 28 - May 31

#### **Forthcoming**

Iggulden H. (2003) Developing multimedia and e-learning for teaching and learning the care of people with brain injury Nurse Paper Presentation Education in Practice Conference University of Salford June 12

Iggulden H. (2003) Improving outcomes for people with brain injury through multimedia education of nurses and carers International Society of Technology Assessment in Health Care Poster Presentation June 22 - June 25 Canmore, Alberta, Canada

Iggulden H. (2003) Developing multimedia e-learning for teaching and learning the care of people with brain injury Round Table Presentation The Scholarship of Academic and Staff Development : Research, Evaluation and Changing Practice SEDA 9th-11th April 2003, University of Bristol

**Updating arrangements:** all the files used will be stored in a computer folder in a machine with a CD Writer, the software programme and the capability of capturing and editing video, scanning and editing images as well as text. This will ensure that files can be updated, imported to the CD-ROM folder and the CD re-burned with the updated files

### **Transferability, summary and concluding remarks**

The positive response from the students has been heartening and suggests a readiness in them to accept, use and benefit from the use of a CD ROM tutorial to entirely replace a lecture or taught session. Whilst it is an important pedagogical decision to make on the circumstances in which this would be appropriate, in nurse education there is the added advantage that such material can easily be made available on placement in the trusts. Also by using video clips to demonstrate certain points, illustrate abnormalities, and demonstrate suitable interventions the multimedia conveys the material in a realistic situation, which is

reinforced on the screen in written form verbally and visually so that students use several senses for processing the information

The work has been extremely time consuming, but as it has been very well supported by the school I have been given a workload weighting which takes into account my time and this has kept the costs lower.

We used some software called Astound, which is multimedia presentation package rather than "authorware" software. Whilst Astound has been adequate for the project, as we became more ambitious and the scope of the CD grew the software was found to be limited. The Graphic illustrator had prepared templates and illustrations using Flash and Illustrator and there were some problems with compatibility initially. Also from an education point of view I would have liked to use software that had a greater capacity for generating quizzes and questions with pop up feedback and a scoring facility.

The process has been very useful in generally re-visiting the teaching and learning process and particularly in how to structure teaching materials and anticipates learner needs. It has also involved a great deal of background reading in the whole field of computer assisted learning, educational philosophy and psychology as well as developing my own computer skills in using the multimedia package.

## **Appendix**

Evidence of staff development / networking activities in relation to Problem Based Learning resulting from the TLQIS Project

Angela Darvill & Moira McLoughlin – attended a one week Visitors workshop at McMasters University, Canada, 2000

Angela Darvill – completed MSc dissertation: Evaluating PBL in a cultural awareness module – Huddersfield University, 2001 (Paper submitted to Nurse Education in Practice, December 2001 for possible publication)

Moira McLoughlin – MSc dissertation (to be completed): Evaluation of PBL facilitator role- Huddersfield University

Christine Hogg & Moira McLoughlin – Presented a paper: Using PBL in Higher Education, UMIST, February 2001

Angela Darvill- presented a paper at Nurse Education Conference – collaborative event between University of Salford and University of Coventry-title: " Testing the water " – problem based learning in a nursing curriculum

Angela Darvill –paper: Problem Based learning –a review, published in Scholarship, School of Nursing Journal, and December 1999.

Angela Darvill- visit to University of Dundee, School of Nursing to observe the role of facilitator in action, 2000

Angela Darvill – Presented seminar: Experiences of undertaking PBL- School of Nursing, Post-graduate Seminars, 2000-2001

Angela Darvill & Moira McLoughlin –Expert witness –dissemination in using PBL in Higher Education, Faculty of Health and Social care, University of Salford. January 2001 (Education Development Unit)

Moira McLoughlin and Angela Darvill involved in University and School Key skills project work in relation to staff development and PBL

Moira McLoughlin, Christine Hogg & Angela Darvill –Invited to present a Core Paper at Nurse Education Tomorrow – Reflections on using Problem based learning to enhance cultural awareness -, International Conference, Durham University, September 2001 (to be published in January edition of Scholarship-School of Nursing Journal)

Moira McLoughlin and Angela Darvil – both members of the core curriculum development team for the new pre-registration Diploma in Nursing with advanced standing. (Involved in developing the PBL approach)

Christine Hogg, Moira Mcloughlin and Christine Hogg are all course –co-ordinators and PBL facilitators for the new pre-registration course.

Launched North West PBL Special Interest Group (SIG) – First meeting at the School of Nursing, 2001. Moira McLaughlin one of co-founders of the group and is now Editor of the SIG Newsletter (to be published on School Web-site – material is currently in the process of being developed)

Establishment of a School of Nursing PBL forum to share experiences, support and good practice of using PBL, December 2001.

The School of Nursing (represented by Moira McLoughlin and Angela Darvill) was invited to join a consortia of Universities in the North West to prepare a proposal for funds from the FDTL Phase 4 bids (HEFCE)- January 2002.

The School of Nursing took the decision to use a whole curriculum approach to Problem Based Learning in the pre –registration Diploma in Nursing with Advanced Standing. Maggi Savin-Baden , a consultant in PBL , was advisor to the curriculum team and ran workshops as part of a whole School development programme for PBL . Ongoing evaluations are demonstrating the value of PBL for a nursing curriculum , especially in relation to the small group approach to learning and the relationship between facilitators and students . There has been a marked reduction in attrition from the course as compared to other courses since the implementation of the new programme and PBL approach to learning .