

The effectiveness of Problem Based Learning 2: a randomised experiment in Continuing Nursing Education

'Problem Based Learning', a cluster of applied approaches to teaching, is in widespread use in professional education both in the UK and internationally. Its adoption is also being encouraged in other disciplines. The theoretical base for Problem Based Learning draws on a range of 'student centred' or 'constructivist' traditions. However, there are still many important questions about what forms of Problem Based Learning are best for particular students in different contexts.

This Research Briefing reports on a randomised experiment which was used to evaluate the impact of a part-time Problem Based Learning curriculum in a Continuing Nursing Education programme.

In the Continuing Nursing Education Programme of an English HE institution, on all the measures used, students in the Problem Based Learning curriculum reported lower levels of satisfaction than those experiencing a traditional curriculum. Their dropout rate was ten times greater than in the control curriculum.



Problem Based Learning can increase student dissatisfaction and drop-out. In the case studied, it did not appear to fit with the expectations and values about teaching and learning that prevail in professional and occupational cultures of nursing and the National Health Service. A Problem Based Learning Curriculum, of the sort studied here, seems insufficient to overcome these barriers or to change such cultures.

Problem Based Learning, in the form studied, did not appear to meet students' expectations about learning, teaching or their role as a student.



Further study in other settings is required to identify whether improved student outcomes can be produced with Problem Based Learning. The results found here may be specific to the type of Problem Based Learning offered or to its implementation.

The particular Problem Based Learning curriculum which was studied resulted in a reduced teaching workload.



A reduced teaching workload seems to favour Problem Based Learning, although the number of teacher hours per successful student is greater because of higher dropout rates.

The research

Background

Continuing professional education is regarded as an important contributor to professional development. In the UK the National Health Service alone spends more than £1 billion per year on it. However, the effectiveness of traditional continuing professional education approaches has been questioned. Problem Based Learning appears to offer a different approach to continuing professional education. It is an approach to teaching and learning that has been designed using theory and research evidence about the nature of learning and of professional expertise. It has been adopted in many disciplines and fields around the world and its use is advocated by a number of national and international agencies. The advocates of Problem Based Learning are many and they claim that its use leads to increases in student cognitive, metacognitive, interpersonal, communication, and self-directed learning skills as well as increased student satisfaction. However there appear to be a number of variants of Problem Based Learning on offer and it is often unclear what is being done in the name of Problem Based Learning. Many of the claims made for the achievements of Problem Based Learning appear to be based on anecdotal evidence or small scale evaluative studies of limited generalisability. There are also very few reports of the use of Problem Based Learning in continuing professional education.

Study research question

The research question was 'Does the use of a Problem Based Learning curriculum in a continuing nursing education programme result in higher levels of student attainment when compared to a 'traditional' curriculum?'

Methods

This study used a randomised experimental design to compare the learning outcomes of students who followed a 'traditional' curriculum with

CPE evaluation Category	PEPBL Evaluation framework	Measure
Programme design and implementation	Study contexts, participants, curriculum theory and practice	Tutor record of session content and activity Interaction analysis Non participant observation Tutor records of student attendance activity Interaction analysis Student study workload (self reported)
Learner participation		
Learner/teacher satisfaction	Learner/teacher satisfaction	Course Evaluation Questionnaire Observations Teachers Diaries Nominal Group technique Drop-out rates Exit Interviews Students Follow-up questionnaire
Learner Outcomes	Skills, personal and propositional knowledge	Follow-up questionnaire of students Follow-up questionnaire of students' managers
Application of learning after the programme	Approaches to learning	Assignments x 3 Approaches to Study Inventory (ASSIST) Self-Directed Learning Readiness Scale Group work video assessment

Table 1. Evaluation framework and summary of outcome measures and instrumentation

students who followed a Problem Based Learning curriculum in the same educational programme.

Sample

The educational programme was of a type in widespread use in continuing nursing education in England. The programme lasted one academic year and was undertaken on a part time basis. The study was undertaken in one English higher education institution and the data were collected on the programmes that ran in the academic years 2000-2001 and 2001-2002. Five 'teachers' volunteered to participate in the study. All teachers were qualified nurses and four had a teaching qualification and extensive teaching experience. Two teachers taught on the experimental (PBL) curriculum only and three on the control, Small Group Learning (SGL), curriculum only. The two teachers who facilitated the experimental Problem Based Learning groups claimed to have used Problem Based Learning previously and undertook various additional staff development activities to prepare for their role as facilitators.

The students were qualified nurses from five NHS hospitals who applied to take the programme during the study period. All applicants were interviewed, the

purpose of the research project explained and signed consent sought. Thirty five students were allocated to the experimental (PBL) curriculum of whom 20 subsequently completed. Thirty four students were allocated to the control (SGL) curriculum of whom 31 subsequently completed. The students had no previous experience of Problem Based Learning.

Data Collection and analysis

A project-specific framework for data collection was developed from existing frameworks (see table 1 above). Where possible, instruments with reported reliability and validity were used for data collection. New instruments were developed and piloted on non participating student samples for the follow-up survey. Data on the process of curriculum development, programme delivery, students and teacher response were collected using non-participant observation, teacher diaries, and researcher field notes. Qualitative data were analysed using the Framework method. Descriptive and Inferential Statistical analysis was carried out using SPSS. Standardised effect sizes (d) with 95% confidence intervals were calculated to estimate the difference between the mean scores in the experimental and control groups.

Key findings

Skills, Personal and Propositional knowledge

For both the individual assignments and overall, the effect sizes favoured the PBL curriculum. In a follow-up survey, line managers rated the former students' performance. Here the effect sizes favoured the traditional curriculum. In a follow-up questionnaire, students rated their performance in practice. Here students in the PBL curriculum rated their practice more highly than those in the control curriculum. Students in the experimental curriculum rated the impact of the programme on their practice lower than students in the control curriculum. The scores showed that a higher proportion of students in the PBL curriculum perceived that the programme had no impact on their practice.

The student follow-up questionnaire also showed that students in the PBL curriculum were less likely to have taken up a new hobby or interest, participated in formal learning, participated in practice development, or done any teaching.

Student Satisfaction

All of the indicators used suggest that students in the experimental (PBL) curriculum were less likely to be satisfied with their learning experience. Anxiety, frustration and anger soon replaced the initial enthusiasm of students exposed to the experimental (PBL) curriculum. It did not meet their expectations as professionals or learners. Relationships between the students and teachers in the Problem Based Learning groups were characterised by anger and conflict on the part of the students.

Teacher workload

Classroom teaching time averaged one hour per week less for the PBL curriculum, equivalent to a difference of nine working days over the length of the programme. But the number of hours of classroom teaching per student who completed the programme was 13 hours 50 minutes in the control curriculum and 15 hours 2 minutes for problem-based learning.

Major implications

This study reveals student dissatisfaction and a disjunction between expectations and practice in Problem Based Learning. This suggests that its theoretical basis needs further investigation. Within Problem Based Learning, it appears to be taken for granted that everyone shares the principles, aims and values that underpin the approach. There is a lack of recognition that pedagogy is a site for struggle between a number of competing discourses. Its focus on classroom practice distracts attention from issues in continuing professional

education such as the tension between employer driven demands and the 'personal growth' philosophy of Continuing Professional Education in higher education.

However, Problem Based Learning appears to be one of the most coherent pedagogical approaches on offer in higher education. It offers opportunities for both large scale rigorous evaluative studies and smaller in-depth qualitative studies to unpack the important components of the approach.

Domain	Components	Experimental (PBL) curriculum	Control (SGL) curriculum
Teaching and assessing content	Choice & organisation of the content	Student choice within the framework of programme aims & objectives	Teacher choice
	Assessment & feedback	Summative: Long assignments based on clinical practice for both	
		Scheduled formative peer feedback in each session	No feedback
	Teaching methods	Teacher facilitating group work	Mainly lecturing
Course design & organisation	3 modules		
	Three sequential full day introductory sessions thereafter 1 x half day session per week. 32 'sessions' in total	Between 25-30 full day sessions (planned) once or twice per week.	
Course contents	Workload / opportunities for practice	3 Hour Problem Based Learning session, rest of day for study	Full day in class
	Aims & Intended learning outcomes	Part time programme students all work full time. Majority had at least 50% of teaching days given as study leave	
	Guidance for Learning	Same for both programmes.	
Staff student relationships	Quality of relationships	Institutionally Same for both programmes. In Problem Based Learning programme improving learning ability centrally part of classroom activity	
Students and teacher cultures	Orientation beliefs and values. Abilities, skills and knowledge in learning Peer group morale, identities	Relationships largely confined to classroom with distinction between the teacher and the student maintained. Both students and to a lesser extent teachers oriented to a hierarchical teacher/student model. Relationships in control group remained positive throughout. In the Problem Based Learning group relationships between students and teachers became conflictual during progress of course	
		Students and to a lesser extent teachers implicitly adopt a teacher as expert student as novice orientation. Student's appeared to expect that they would be 'taught', which they appeared to regard as a passive information receiving activity. They did not appear to expect to have to actively learn themselves. Teachers in the Control (SGL) curriculum adopted this mode of practice. The experimental (PBL) curriculum constrained the extent to which teachers could adopt this mode of practice.	

Table 2. The Inner Teaching & Learning Environment and summary of the curricula

Further information

Further information about the project can be downloaded from the project website (address below).

A detailed summary of the two empirical studies can be downloaded from the ESRC Regard website (www.regard.ac.uk).

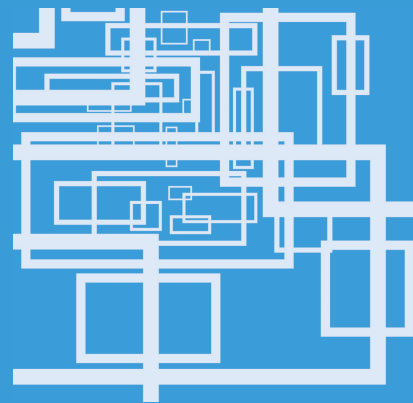
A full report of the Pilot Systematic Review and Meta-analysis was published by the Learning & Teaching Subject Network Centre for Medicine, Dentistry and Veterinary Medicine and can be downloaded from its website www.ltsn-01.ac.uk.

A full report on the evaluation of Problem Based Learning in Continuing Nursing Education is available from the project website.

The warrant

The study used a design and methods that have been empirically established as optimal for providing evidence about effectiveness, specifically the use of an experimental design with random allocation of participants. The study is based on a single programme of problem based education within an English Higher Education Institution. However, the study paid particular attention to maximising internal validity through, for example, achieving 100% response rates. A conceptual framework, drawn from the literature on educational evaluation and Problem Based Learning, was used to guide the selection of outcomes and instruments. Outcomes were measured using a variety of indicators to increase their reliability and validity, and data were collected using both quantitative and qualitative approaches. Where appropriate, expert's blind to the allocation status of the participants assessed outcomes independently. The study included extensive process evaluation. A conceptual framework of the learning environment in higher education guided analysis. Statistical analysis included sensitivity analysis of different types to increase reliability. A transparent process was used to guide the synthesis of the results into robust conclusions that were based on the data. The limitations of the study design and its conduct and their consequences have been reported and explored.

Teaching and Learning Research Programme



TLRP is the largest education research programme in the UK, and benefits from research teams and funding contributions from England, Northern Ireland, Scotland and Wales. Projects began in 2000 and will continue with dissemination and impact work extending through 2008/9.

Learning: TLRP's overarching aim is to improve outcomes for learners of all ages in teaching and learning contexts within the UK.

Outcomes: TLRP studies a broad range of learning outcomes. These include both the acquisition of skill, understanding, knowledge and qualifications and the development of attitudes, values and identities relevant to a learning society.

Lifecourse: TLRP supports research projects and related activities at many ages and stages in education, training and lifelong learning.

Enrichment: TLRP commits to user engagement at all stages of research. The Programme promotes research across disciplines, methodologies and sectors, and supports various forms of national and international co-operation and comparison.

Expertise: TLRP works to enhance capacity for all forms of research on teaching and learning, and for research-informed policy and practice.

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TLRP is managed by the Economic and Social Research Council research mission is to advance knowledge and to promote its use to enhance the quality of life, develop policy and practice and strengthen economic competitiveness. ESRC is guided by principles of quality, relevance and independence.

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