Transforming teacher education: professionalism for a changing world

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Abstract

This article provides an introduction to a reform in undergraduate teacher education at Moray House School of Education, University of Edinburgh. The reformed courses are based on principles of Problem-Based Learning (PBL) and other student-centred methods, and involve a restructuring of teaching and learning, and new forms of assessment. The article draws on an early stage of evaluation, based on student comments and a sample of final assessments, in order to compare the reformed course with its predecessor.

Transforming teacher education: professionalism for a changing world

The BEd programmes in Edinburgh combine specific courses for distinct professional groups (primary, physical education, technical education, community education) and a generic educational studies core. Partly for reasons of economy, this pattern was adopted in 1999 in a form which involved a lengthy series of mass lectures and a number of 'workshops'. Without denigrating the quality of many of the lectures, student evaluations suggested that some went over students' heads, and that many students felt they were disconnected from their practical experiences and aspirations. Workshops tended to be discrete and highly scripted activities, and sometimes expected too little of students. In the search for a solution, a visit was paid to the University of Maastricht, Netherlands, to investigate Problem-Based Learning as practised in the Philosophy Faculty and other courses. This was felt to offer a more challenging and engaging approach and one which was potentially more connected to the professional aspirations and practical experiences of future teachers. We were also conscious of the need for a mode of teacher education which would promote a questioning and reflective attitude, and a professional ability to respond to a rapidly changing world. Perhaps we were fortunate in that teacher education in Scotland is less tightly regulated and prescriptive, with a greater emphasis on the 'reflective practitioner' (Wrigley, 2006).

The concept of Problem-Based Learning has a substantial history. It was first introduced in some North American universities for medical students (McMaster, Harvard, and others). It has spread both to Medicine in some British universities (Liverpool and Glasgow, for example) and in Europe to a range of other disciplines. Its particular origins, however, do affect matters such as course organisation. Although medical studies nowadays tend to make stronger connections than previously between health and social conditions, they nonetheless require considerable rigour in terms of the knowledge to be covered, and PBL courses have tended to see the initial 'problem' in terms of a specific micro-phenomenon in need of diagnosis. In adapting PBL to teacher education, some of us had reservations about this, and felt the need for a broader sweep. Whereas a key step in the Maastricht approach requires students to read a short text (usually a description or narrative of 20-30 words) and

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work out what is *the* problem, we felt that many educational situations were problematic in a more holistic and plural sense, and were often not susceptible to a straightforward 'diagnosis and prescription' methodology. In terms of timescale, medical students might typically spend two or three days working on one problem, including researching the medical science needed to find an answer; we preferred to work on a broader situation or issue, for around six days spread over three weeks, and sometimes much longer. (Other examples of longer activities can be found in Bolzan and Heycox, 1999)

Theories and methods

Barrows, the original pioneer of PBL in medicine, presents the following key principles:

- students acquire knowledge for themselves;
- they take responsibility for their own learning;
- they develop skills in problem-solving (Barrows, 1984).

Thus, PBL is not only a means of acquiring knowledge but also builds capacity as a learning professional. This is particularly important for professional educational in a time of rapid social and technological change (Engel, 1997:17-18). PBL's approach to knowledge and learning is essentially constructivist (See Ryan, 1999). Whilst respecting the need for content as propositional knowledge, it emphasises an active seeking for knowledge in response to real or simulated problems. It encourages students to develop a personal and affective engagement with issues, and to connect back to their own experiences as learners, or in some cases as classroom assistants, and forward to the next placement. Eraut (1994) summarises this as a balance between propositional, process and personal learning.

On a subject-based conception, expertise tends to be seen in terms of content: to be an expert is to know a lot of content; it is to have 'covered' much in one's learning: typically, one has a great deal of propositional knowledge, 'knowing *that*… (such and such is the case)'… Especially in professional areas 'knowing *how*… (to do something)' is also important. An alternative understanding of expertise may be put this way. Expertise is an ability to make sound judgements as to what is problematic about a situation, to identify the most important problems, and to know how to go about solving or at least ameliorating them. It does not, therefore, deny the importance of 'content' – but it does deny that content is best acquired in the abstract, in vast quantities, and memorized in a purely positional form, to be brought out and 'applied' (much) later to problems. Problem-based learning requires a much greater integration of knowing that with knowing how. Nor does it, as does subject-based learning, prejudge what is relevant subject-matter; there is a sense (but this needs careful interpretation) in which problems select the subject matter needed to deal with them (Margetson, 1997: 38).

Problem-based learning has a strong practical dimension, but it is important to distinguish it from non-problematising modes of vocational training which tend to imitate but not critique practice. PBL fits well into the Scottish understanding of teacher professionalism, as in the various 'Standards', which connect action with knowledge, attitudes and values. Problem-based learning challenges the student, but is also extremely satisfying. Traditional learning places the learner in a position of impotence, facing the teacher who sits there with all the knowledge. There's a natural human drive to learn, which is connected to biological psychological and social survival. We need to understanding new situations in order to tackle them. This can lead to a willingness to listen to others and engage with them. PBL makes room for this natural drive to learn. It gives students the possibility to understand what they

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have to learn as meaningful, understandable and relevant. The concept of a student 'steering their own learning' connects with the question of lifelong learning, in an era of accelerating development of the body of knowledge. People are having to become more independent in their search for knowledge. We need to identify what is important to learn, know how to find information, and develop the capacity to work on information and evaluate our own learning (Hård af Segerstad et al., 1999: 14:16).

Methodologically, PBL is very close to Project Method, as derived from Dewey and Kirkpatrick, and as practised in many schools in northern Europe. It begins and ends in a plenary forum, and the filling to this sandwich consists of individual and small group enquiry. The initial plenary process has been formulated variously in different places (e.g. Barrows' model and the models used at Linkøping and Maastricht; Bjørke, 2000: 88-90), but is an extremely important process in which the tutor's guidance, support and intervention can be crucial. It is very important to develop an understanding of this process among tutors and students. The version we preferred at Edinburgh has the following stages:

- *Clarify the task*: sometimes called a 'task', a 'problem' or a 'starting point', this is the time to ensure that students understand the point of looking at it.
- *A 'swarm' of ideas*: this might involve brainstorming, and students should be deterred from entering into discussion – at this point, it's everything goes. The group secretary should jot down the ideas.
- *Systematise the field of the problem*: this stage involves relating some of the issues, seeing how things connect – the teacher's role might be to ensure that one person's view isn't taken up passively by the others, and that all understand.
- *Choose ways of formulating the problem*: there is a need here to feel sure that you haven't missed the point - also involves finding out how much some people already know.
- *Identify learning needs*: decide what you need to know, and how to go about it.
- *Acquire knowledge*: this may involve a range of resources, e.g. library, an expert, lectures, etc.
- *Work on and illuminate the issue*: the group gets together again to find ways of articulating their thoughts, on the basis of their new found knowledge – the teacher may need to probe, to ask 'what theories did you use?' or 'what new question has emerged?' or 'can you now solve the problem you started with?'

The first five stages are plenary, in an initial workshop of 20 students though breaking into groups for discussion. Stage 6 is a research stage in which students work in 'learning teams', often pursuing specific directions of enquiry of their choice. Stage 7, in which the workshop reconvenes, includes a presentation by each learning team. Tutors normally also meet each learning team at least once during Stage 6, at a set time or at the team's request. It should be noted that this is a more economical model, in terms of staff time, than in some Scandinavian universities where tutorial involvement with learning teams is more intensive. In such circumstances, tutors are able to pay much closer attention to group dynamics but students may also lose in terms of autonomy.

While respecting the relatively open-ended nature of the enquiry, the course team must make available a sufficient range of resources. These include some lectures, but whereas lectures were the spine of our unreformed courses, in our PBL-based courses they are offered as one resource among many. The reformed course uses half as many lectures as its predecessor, they are securely located within particular 'problem' units, and we are

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experimenting with more interactive approaches, including panel discussions and a roving microphone. One tutor recalls her students reacting with shock: 'That wasn't a proper lecture – it was more like the Gerry Springer show. They were arguing!' It struck us afterwards, when discussing these comments, that our students had probably never seen teachers publicly disagree. In addition to lectures, the range of resources at students' disposal includes:

- reading lists of books, journals and URLs;
- chapters available electronically;
- websites;
- video-recordings;
- visits;
- consultation of staff with particular expertise.

We have been able to develop one floor of our library building as a resource centre where it is legitimate for students to work together without a silence rule. Here, students have access to computers, printer and photocopier, offprints, video-recordings, and 'soft resources' for presentations (card, transparencies, markers etc.) as well as books and journals.

The nature of 'problems'

Typically, the classic PBL problem consists of a very brief account of a phenomenon, in which is hidden a key issue to diagnose. Our understanding of education and teacher professionalism led us to use much longer scenarios or narratives containing a complex of related issues and perspectives. We have also used other ways of initiating the learning process (please see Course Description below). This need for variety is acknowledged by Bjørke (2000: 66-73) who suggests:

- a photograph which is puzzling because essential information is missing (e.g. a young boy mixing cement – is he helping his dad, or is it child labour?);
- tasks which require some kind of fieldwork (e.g. What is an old people's day centre? How do they work? Who uses them?);
- a task requiring planning (e.g. Traffic accident: a car has come off the road, and you are the first to arrive. What will you do?);
- a prompt for role-play;
- and even a study task (e.g. reading these two articles and sum up the similarities and differences).

Indeed, the more open-ended approach we took in our course design in Edinburgh stretches the concept of Problem-Based Learning from its classic form. This might be interpreted as following its philosophy but not always its methodology, or our approach could be viewed as a hybrid of various related open architectures of learning, including Project Method and Learning Challenges (see the Critical Skills initiative). There is, however, a growing diversity of methods, as PBL spreads across institutions and disciplines (see, for example, Bolzan and Heycox, 1999; Maitland, 1999; Usher et al., 1999), with some danger of 'PBL' becoming a flag of convenience to legitimize all kinds of student-centred learning in professional education.

Course description

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Each year of the B.Ed programme is to some extent unique, because of different curriculum content and also the contingencies of when placements occur. The following is a summary of the second year programme, serving primary, PE and Design and Technology students.

Semester 1

- teaching and learning;
- curriculum and assessment;
- education and social justice.

Each of these last 3 weeks, begin and end with a workshop, and include about eight lectures.

Semester 2

- the learner study (during a five week placement);
- the Future Schools challenge (an extended unit, with a four-week taught period, and several weeks of guided independent study).

The learner study required students to focus close-up on two or three individuals, drawing on the three units of Semester 1. The future schools challenge also drew on these three aspects, but required the students to shift their lens 'upwards and outwards'. The issue for Unit 1 was chosen to connect with the professional direction of the various programmes. Primary students were about to embark on a nursery or early years placement; PE students are centrally concerned with play, albeit of a different kind; and learning through activity is a key question for Design and Technology students but for the others too. We therefore built the unit round a question: What do we mean 'learning through play' or 'learning through activity'? Subsidiary questions were suggested to guide the enquiry, such as the relationship between experience and explanation, and the teacher's role. The unit did not, however, begin with an abstract question from cold, but was preceded by a variety of activities in which learning did not depend on direct instruction from a teacher (e.g. games workshops, audio-visual language learning, a game of touch rugby, theatre workshops, visit to museums etc.) It concluded with group presentations combining theoretical explanations, an interpretation of some practical situations and illustrations of good teaching strategies. Unit 2, after following a problem-posing study guide to acquire key concepts, required students to design a cross-curricular study unit incorporating appropriate assessment. Students' assessment was based on the student's own selection from their responses to the study guide. Unit 3 began with scenarios in which teachers were acting according to a 'common sense' professionalism, but which was, in effect, discriminatory and damaging. After several weeks of study, the task was to present two alternative endings or sequels, using any media, and followed by a written explanation theorising the situation and the issues at stake. Students proved extremely imaginative in their choice of media and genres for the 'endings', such as role-playing a staff meeting, letters from parents, a 'dear diary', newspaper reports, and poetry. In order to overcome the danger of negative discourses stigmatising individual pupils in the learner study, students were introduced to the concept of 'medical model' and 'environmental model' before placement, and took part in a question and answer session with visiting headteachers at the end.

The future schools challenge, culminating the year's course, required students to think of changes occurring in the world: technological, social, cultural, political, environmental, health

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needs, etc. and also changing understandings of education (new pedagogies, curriculum and assessment reform, education for citizenship etc). We specifically asked students to consider three issues in their final 'designs' (group presentations) and the accompanying (individual) theoretical explanations:

- the learning challenge;
- the citizenship challenge;
- the equity challenge.

This task required each group of students to develop a vision for a school of the (not too distant) future which provided a creative response to the way the world is changing. Many students chose to present this in role, explaining its policies and practices as if to an audience of parents. It is these group presentations and the individual theoretical explanations which form the basis for analysis and comparison in the final section of this article. Readers will note, from these examples, a close connection between theory and professional practice, often requiring both an experiential or embodied level of presentation (description, narrative, photographs) and a more abstract theoretical one. This helped to develop a dynamic of critical reflection which neither of these modes could have led to alone. (See Bruner, 1968, on the importance of using the narrative mode of thought as well as the logico-scientific one in school education.) In addition, the range of skills involved in such enquiry and presentation directly builds professional capacity.

Evaluation framework

A stated aim of the Education 2 course is to link together cognitive, ethical, affective and practical learning. (Course Guide, p2). We have tried to reflect this breadth not only in our assessments of students, but in our course evaluation. We want to assess and evaluate qualities such as:

- sharpness of critical faculty;
- ability to engage with professional thinking;
- depth of informed personal reflection;
- personal commitment;
- ability to work as a team player;
- sense of agency about educational developments.

This collection is not easily measurable, and cannot be seen as discrete issues, but the following questions help us to start to evaluate the new course. *What was the impact of activity-based collaborative learning on student achievement? To what extent did the course influence deep thinking, critical thinking on practice/possible practice, sense of agency and personal commitment? To what extent were students engaging with research and literature?* Among a large quantity of data, these questions have proved useful in framing an initial evaluation using student surveys and comments, and a small sample of assessments. We have used them to classify the general written evaluations invited from students at the end of the first semester. They are also used to analyse and compare a small selection of written assignments, graded 'A' and 'C' from four students on the 2004 exam based Education 2 course with four similarly graded students from the 2005 Problem Based Learning (PBL) course.

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Evaluation: student surveys

At the end of the first semester, all students were asked to complete a simple questionnaire comparing their experience of the reformed Year 2 course with the unreformed Year 1 course in which they had previously participated. This was a crude evaluation method, but practical and proved overwhelmingly positive. The overwhelming majority of students saw the new course as an improvement, and hardly any thought it worse than its predecessor. The first question offered a seven-point scale (much better to much worse) in response to the question *In general, do you feel this course is an improvement on the forms of learning in Education 1?* 29% answered much better, 55% better, and 17% a little better. None felt it was the same or worse. 85% thought it had led them to think more about educational issues, 62% that they were reading more, 89% that it involved them in working with other students more, 81% that they had generally had good support from tutors including enough time. Students were overwhelmingly positive about the form of assessment tasks and their appropriateness to the theme, though the number expressing difficulties in unit 2 has led us to revise this, actually strengthening the collaborative problem-solving nature of the activity. (In the coming year, it will be based on a curriculum and assessment design task.) A more variable picture emerged in terms of lectures and their fit to the units, and access to resources, two issues which we are subsequently working on. In addition, on a random basis, some groups of students were asked to complete a supplementary sheet. Two workshops (nearly 40 students) were asked to complete an additional survey, simply ticking any of a list of statements with which they agreed. Students were overwhelmingly positive about the value of learning in teams, the relevance of issues and tasks including assessments, and the way the course had helped them think about their experience of schools, including placements. A different group of students (two workshops, with 37 responses) were invited to make anonymous open-ended comments about their course experiences. Their comments are summarised, with some examples, under the questions in the previous section.

> *What was the impact of activity-based collaborative learning on student achievement?*

A quarter of the students chose to highlight the benefits of co-operative learning. Firstly, being part of a team appeared to induce acceptable levels of moral pressure. Individuals felt compelled to honour their commitments to read, research and meet previously agreed deadlines. There were no complaints about this self-imposed peer monitoring. This positive experience of collaborative learning gets to the heart of this course. Comments like, 'The group made me work harder' and 'didn't want to let anyone down' point towards the benefits of self-imposed discipline. Interestingly there are no complaints about peers demanding too much effort or setting unrealistic deadlines, complaints not infrequently heard when tutors set demands and limits. This may be due to the innate reasonableness of student-student expectation or it might suggest that similar demands are a pill less easily swallowed when hierarchically imposed. Acquiescence to rules may come more easily when peer consensus emerges in a group rather than when leaders instruct. Whatever the reason, tutors also sensed that student-student planning and guidance resulted in mature, task-centred attitudes to the demands of the course. Secondly, discussion in the groups helped students clarify their own thinking: 'Being able to talk made me internalise my own learning and make sense of it', 'I always felt I had something to say.'

It seems that knowledge was both accessed and deepened as it passed between the group and the individual. Of course this internalization process could have taken place within the

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previous system where learning depended predominantly on listening to lectures and quiet individual study. However, students felt that collaborative learning had been a new positive route to learning and a fairly angst-free experience.

> *To what extent did the course influence deep thinking, critical thinking on practice/possible practice, sense of agency and personal commitment?*
>
> *To what extent were students engaging with research and literature?*

We get close to the matter when a student writes about course participation, 'You feel as if you are sowing something.' There is a poetical quality to this reflection. It hints at a belief in hidden potentials, perhaps in children, perhaps within the student. It talks less of acquiring raw knowledge and more of experiencing of something hope-filled and powerful. This is deep knowledge (Hall, 2004). We have a student's core beliefs being infiltrated and examined. Whilst not all students indicated this level of experience, a number did appear to be en route. The extent to which deep thinking about one's career is preceded by critical thinking/reading suggests grounds for optimism. The course appears to offer opportunities to engage critically with others' thinking. Students noted distinct advances in their critical awareness through discussion and reading. Some students went on to say that this affected their teaching practice: 'It encouraged me to think about issues in educational institutions and how effective the institutions are.'

Interestingly, it was with respect to these issues that unsolicited comparison was made with the previous year's exam-oriented course. After commenting on his/her deepening ability to read critically, one participant concluded that 'little opportunity was available for this last year.' It is of real interest that negative comments on the course seemed to be confined to day-to-day matters such as assignment wordage and timescales, accommodation and timetabling of lectures. It is of equal interest that there were no criticisms of pedagogical principles and practice of PBL. No one questioned the value of groupwork or presentations, workshop methodology or the need for personal research. Students moaned (rightly) about photocopiers but not the overall quality of the learning experience.

Evaluation on the basis of assessed work

In order to establish a degree of parity, and to make the task of documentary analysis manageable, a small sample from the final assessment of the PBL course (the Future School challenge: presentation and written justification) was matched against a similar sample from the final examination of the unreformed course. In each case, a random sample was selected of two 'A' graded and two 'C' graded students, with each of these four students belonging to different learning teams. (It is worth noting that, despite rigorous criteria, very few students were graded below 'C' in the new course.) This examination, in addition to some short answers, required an essay, with a choice of three titles, one of which was: 'Our education system is simply out of touch with today's young people and with the big issues for our world.' What challenges do schools face, and how should they adapt in order to provide a quality education for the 21st Century? This fortuitous alignment provided a valuable opportunity to compare two different modes of learning and assessment covering similar themes.

In the new course, after a short series of lectures, including various outside speakers, covering such topics as global citizenship, refugees, media education, new learning theories, Storyline, health and creativity, students worked in teams for parts of four weeks

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(simultaneously studying for exams in other courses) using their tutors as sounding boards and guides. They managed their own time and had freedom to decide who did what; what to read, based on thematic bibliographies; the media and content of their presentation; when and where to hold meetings. Each presentation lasted twenty minutes followed by 5-10 minutes of questions and discussion from peers and tutors. Students on the old course had attended lectures, participated in workshops and read recommended texts, and had an hour to write the exam essay.

What was the impact of activity-based collaborative learning on student achievement?

It is only possible to reflect on this indirectly on the basis of an assessed piece, whether an essay or, in the case of the new course, the powerpoint used in the presentation and the students' written justification. In neither case do we have direct access to the process of the students' learning and their interaction with others. The question is particularly difficult when assessment is through exams or essays, which conceal their own genesis, compared with assessment on the PBL course which is more intimately connected with the learning process. It is nevertheless worth seeking such indirect evidence as is available, and reflecting on the issue of professional agency. Agency and personal commitment interlock. Here we try to ascertain if our exam students differ from the PBL students in terms of their engagement with the practical demands and opportunities involved in being a teacher. Are overt enthusiasms detectable? Are more energies apparent in one group or other? Is innovation detectable? Is there any dominance of proactivity or passivity?

Looking at the sample of four exam scripts as a whole, there are clear indications of three predominant students' activities: personal effort, memorisation skills and writing skills. It is more difficult to discern levels of agency and commitment. In the case of one student who uses imperatives 17 times (see following section) 'schools must…teachers should' we may be observing intensive engagement with his/her chosen profession. Similarly the very commitment to writing well and gaining 'A' grades may suggest real interest in engaging intellectually and practically as a teacher. Certainly to suggest less than this would be unfair. The exam format allows some scope for the students to hone their ideas and present them succinctly and speedily. This is a key competence in exam-passing skills and requires a level of content knowledge. Furthermore, it may also be a good indication of levels of engagement. We can be more certain about the PBL students. They were not confined to memorisation and writing. Their presentations exude both enthusiasm and prolonged industry. Reference is made to a wide range of genres, both personal and official: poetry, national and international documents, journals and textbooks. Diaries evidence the convening of between four and eight group meetings. Thoughts were presented after weeks of peer conversations and arguments. Experts were consulted within and without the university. Quantitative research was carried out voluntarily. Video cameras were used to film newly scripted dramas. Posters were designed. Words were delivered through ICT and in written scripts. Topics covered architecture, ecology, inclusion, social justice – racism, poverty, curriculum development, health. And after all this students were asked to think as a group and answer unexpected questions from peers and tutors. The benefits of collaboration are evident: energy, exploration, deep thinking.

To what extent did the course influence deep thinking, critical thinking on practice/possible practice, sense of agency and personal commitment?

This question has major implications for the ways in which the courses impact on the professional self-concept of teaching students, and relates to their experience in schools.

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Did convictions about the nature and purpose of teaching alter or did they remain static? Were they able to question structures and practice in themselves and others, or were norms accepted without question? Did they see themselves as active participants in an evolving profession or simply there to do the job as defined by headteachers and local authorities?
There is little difference in the extent of critical thinking, as such, in both samples of 'A' graded students, who could all analyse and comment significantly on educational issues. For example, one exam candidate was able to critique the influence of industry, analyse the restrictions this placed on the school curriculum and offer realistic next steps. This was backed up by suitable referencing. Similarly PLB students showed good ability to zone in on discrete problems such as childhood obesity, studying the national statistics and government reports, analysing the local situation and finally put forward ideas for both individual and structural change. As such the calibre of critical thinking in both groups could be said to be consistent and high.

However, comparing 'C' graded students, exam candidates tended to description rather than analysis, reciting areas where change was necessary and conceiving future schools in terms of a list: learning and teaching, assessment, curriculum flexibility, relationship with parents etc. Volume was not complemented by weight. Rather than tease out cause and effect, and make pointers to ways forward, the reader was often left with a litany of moral imperatives, of 'musts' and 'shoulds' (17 in one script): 'Schools must be able to include young people in a way that does not force them to adapt', 'Schools must learn to embrace social justice', 'Future assessment must be guided by change and must reach a balance.' Comments were often generalised, sometimes vague and frequently self-evident. The use of the 'must' command appears to take the place of the considered analysis found in the 'A' grade students. It might also indicate a sense of impotence and frustration – a feeling that change is needed from anonymous powerful others, but teachers have little influence or responsibility for it. By contrast, 'C' graded PBL students' presentations, despite the students being modestly graded because of a variety of other criteria (sometimes in the written component), still managed to elicit from tutors such comments as 'very interesting thinking and proposals', 'innovative and wide ranging…comprehensive', 'coherent rationale.' These PBL presentations typically outlined a problem in education, then asked who was most affected and which factors were most influential, before presenting a list of ideas to rectify the problem. The process indicated a degree of analysis of the problem, but the presentation of the issue was sometimes formulaic:

- What is the problem? Answer: equity.
- Who is effected? Answer: students with disability, ethnic minorities, potential excludes.
- Next Steps? Answer: diverse curriculum, flexible curriculum, improved community relations.

This mode of explanation is partly a stylistic feature of using Powerpoint, but was also echoed by the student in his individual written commentary. Other inclusions were criticised by tutors not because they completely lacked critical thinking – indeed they were said to be 'innovative and wide ranging' - but because the analysis and the proposals for a Future School lacked 'coherence as a whole.' It appears that if students did not have a strong flair for critical thinking, then the exam format exposed this immediately without offering any clear opportunity to nurture it, whereas the PBL format allowed it to emerge and indeed facilitated consideration of good examples of practice, even if the students did not advance to the stage of a coherent argument, design and presentation.

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To what extent were students engaging with research and literature?

The exam essays of the 'A' graded students focussed attention on 'big name' thinkers (Vygotsky, Bruner, Rogers, Goleman in particular) as well as key policy documents (esp. National Priorities). The four exam essays mentioned a total of eight authors and three documents, but 75% of these belong to one student. By contrast, PBL presentations had more references and were more evenly spread between students (over 30 references in total).

In the sample of essays, one student definitely displayed an ability to write and reflect to a high level, but showed no signs of engaging with professional reading/research, perhaps because of writing under exam conditions. Mere volume of references is not, of course, an indicator of quality in their use, but it is noteworthy that the sample students on the new course, both 'A' and 'C' graded, showed greater consistency and quality of thinking and that this was matched by the evidence of their referencing. The PBL students appeared to link their thoughts more seamlessly with professional texts, which may bode well for their future academic literacy. Again, the fact that this accomplishment was achieved not by the dictates of tutors but through self-motivation also bodes well for the nurturance of future professional learning. They also used a broad variety of sources, including, in this small sample of four students, reference to educational initiatives in Australia and research from South Africa, OECD documents and Council of Europe statistics. The most pronounced difference between our two cohorts, however, is seen in terms of direct participation in small-scale research. Though not a course requirement in either course – it is not overtly suggested in this unit of the new course - the momentum in one PBL group led to a survey with over 100 responses from teachers and pupils. The results were incorporated in the final presentation. Another PBL group interviewed teachers and recorded interviews with local authority officials.

At this point it is worth reflecting on dialogue between tutors and students as an aspect of the process of engaging with research and thinking. Written responses by tutors to exam papers included very brief and general remarks such as 'a fairly good essay' and 'good work.' In contrast comments from PBL tutors were more detailed: 'You spoke with authority and knowledge', 'Enormous effort…truly original presentation', 'Fielded a variety of questions with reflective responses.' In terms of taking students on to another level it would seem that the quality of the PBL presentations drew out more considered responses from tutors. This type of dynamic in a dialogue between a student and tutor is more likely to lead to sustained academic interest in a topic, with a greater possibility of keeping books open after final exams or presentation.

Conclusion

Enthusiasm, commitment and agency were very much in evidence. The PBL course in its structure seemed to facilitate practical engagement with a great variety of educational issues. The focus is way beyond that of the exam-based system of memorisation and hard graft, both channelled through the discipline of solo effort. The PBL approach may sit uncomfortably within a regime of teacher 'training' which requires the detailed surveillance of multiple competences. We are fortunate in Scotland in being able to set alongside this a more open expectation for educating teachers as 'reflective practitioners' (Wrigley, 2006). Teacher education cannot simply be a matter of reproducing past methods; an apprenticeship mode, although an essential aspect, is not good enough. The teachers graduating today will be working until the middle of the Century, and need to be able to

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promote as well as adapt to change. The 'problem-based' approach will be constitutive towards their survival and success. The best foundation we can provide requires, alongside specific skills, a degree of creativity based on knowledge, empathy and values. We are also conscious of modelling approaches to learning which stand in contrast to transmission methods currently exemplified in whole-class literacy hours, for example. Our students have an experience of collaborative learning involving problematisation, research, design and the presentation of responses and solutions which hopefully they will transfer to their own classrooms, and to the development of the schools in which they work. This relates the question of agency in the process of study during the course with that of professional agency as teachers. The imaginative remit of designing a future school was facilitated by an interactive learning style, based on the habits acquired in the earlier parts of the reformed course. This final task, the Future Schools challenge, is founded on the premise of progressive change and professional agency. It seemed to tap into the desire of many of us, tutors and students alike, to make the world a better place. In the final presentation the students were able to say, in effect: we've read the literature, we've talked the talk, we've had a dream and now we present where we want to go. This course's engagement with the aspirations of individual students is centred around complex and serious educational issues.

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