

Evaluation of the current and future provision of undergraduate research projects in UK Schools of Pharmacy

DAVID MOTTRAM, JENNIE DAY, & PHIL ROWE

School of Pharmacy and Chemistry, Liverpool John Moores University, Byrom Street, Liverpool L3 3AF, UK

Abstract

Evidence suggests that there have been significant differences in the way that undergraduate research projects have been operated and assessed in UK Schools of Pharmacy (SoPs). The present study was designed to explore: current thinking within UK SoPs regarding the provision of undergraduate research project modules; whether undergraduate projects are meeting the educational requirements of all students and providing the appropriate knowledge and skills for the profession of pharmacy; the issues that impact on running undergraduate projects and whether they should still form an integral part of the MPharm curriculum. Views of project coordinators and other staff were sought by face-to-face and telephone interviews using a semi-structured interview guide. Interviews were tape recorded and transcripts analysed using constant comparison and thematic analysis. Considerable differences were found in the operation of projects and a number of constraints identified. However, there seemed to be general agreement that a research project should continue to be an integral part of the UK MPharm degree programme. Projects were not perceived as a means of generating publishable research.

Keywords: *Undergraduate, research projects, pharmacy, qualitative*

Introduction

The governing body for higher education in the UK, the Higher Education Funding Council (HEFC), determined that the final year of 4-year first-degree Masters courses should be taught at a Masters level (Credit and HE Qualifications, 2001). Therefore, curricular material in the fourth year should meet the following Level Descriptor: “Display mastery of a complex and specialised area of knowledge and skills, employing advanced skills to conduct research, or advanced technical or professional activity, accepting accountability for related decision making including the use of supervision”. With this emphasis on student self-directed study, research projects are normally a key element to the final year of study on UK MPharm Degree programmes.

The allocation to, and assessment of, final year projects on MPharm degree programmes poses a number of logistical and educational problems. In particular, in reflecting the broad spectrum of the

pharmacy curriculum, projects are undertaken in a wide range of disciplines. Research may be laboratory-based, computer-orientated or, increasingly, conducted in a practice setting, in line with other health-related academic disciplines (Murdoch-Eaton & Jolly, 2000; Thompson, McNeill, Sherwood, & Track, 2001). These different types of project require certain generic skills such as literature review, data generation and report writing. Other skills such as instrumental manipulation, software development and techniques in social sciences may be experienced only in particular types of project. Allocation of students to particular types of project is dependent upon staffing, resources and student preference. Assessment of projects must be equitable across disparate disciplines (Rowe & Mottram, 2003). It is also important to ensure that robust quality assurance mechanisms are in place to monitor the assessment procedures for undergraduate projects (Mottram & Rowe, 2005).

Correspondence: D. Mottram, School of Pharmacy and Chemistry, Liverpool John Moores University, Byrom Street, Liverpool L3 3AF, UK. Tel: 44 151 231 2071. Fax: 44 151 231 2170. E-mail: d.r.mottram@ljmu.ac.uk

There is evidence that final year MPharm projects in the UK are operated and assessed in very different ways between Schools of Pharmacy (SoPs) and that the credit rating for project modules varies widely (Sie, Bates, Aggarwal, & Borja-Lopetegi, 2003; Wilson, Jesson, Langley, Clarke, & Hatfield, 2005). The present study was undertaken to explore: Current thinking within UK SoPs regarding the provision of undergraduate research project modules; whether undergraduate projects are meeting the educational requirements of all students and providing the appropriate knowledge and skills for the profession of pharmacy; and, what issues impact on running undergraduate projects.

Methods

The study was designed to determine the views of the project coordinators and other members of staff involved in supervision of projects at UK SoPs. Fourteen of the sixteen established schools participated in the study along with two schools which were seeking full accreditation with the Royal Pharmaceutical Society of Great Britain at the time of the study.

An interview guide was used by the investigators to explore the experiences and views of interviewees. The guide comprised open questions designed to evaluate current thinking on the provision and value of research project modules on the following areas:

- a. Preparation of students prior to undertaking projects
- b. The importance of projects in the context of the whole curriculum
- c. The balance of subject areas for research and the modes and extent of supervision
- d. Whether projects were individual, group or a mixture
- e. Specific problems encountered, such as
 - i. Ethical approval for practice-based projects
 - ii. Resources
 - iii. Manpower

In addition, interviewees were asked their opinion on whether projects are still relevant to the modern MPharm curriculum and whether there are alternative approaches to meet the educational aims of project work. With respect to interviews conducted within schools still undertaking accreditation, a predictive approach to questioning was adopted, as they had not run undergraduate projects at the time of the interviews. In total, 12 interviews were conducted by face-to-face (F) interview at 7 schools, including 3 pre-1992 universities, 2 post-1992 and 2 schools undertaking full accreditation. A further 9 interviews were conducted by telephone (T). All interviews were tape recorded and transcribed. Transcripts were analysed using constant comparison and thematic analysis.

In addition, at the invitation of the RPSGB, a workshop on this subject was held at the Academic

Pharmacists Group Easter Conference in April, 2006. The participants at the workshop were invited to discuss and comment on some of the issues that were being addressed in the interviews. Issues arising from this workshop were incorporated into the results section.

Results

The analysis of transcripts was based on a number of headings that were used as a guideline to the interviewers. Under each heading, the themes that emerged are reported upon, with supporting quotes from the respective interviewees. Quotes are categorised as being F, T.

Benefits to students

Projects were primarily perceived as providing a stepping-stone towards research competence—not as producing trained researchers. Respondents identified a number of tangible benefits to students. These included training in research methodology, the opportunity to undertake independent work and to exercise independence in thought.

“... allows the student a much better opportunity to see modern research technology being used.” (4F)

“Moving them into a more free thinking mode, teaching them to think for themselves, to pursue an idea, use the correct methodologies, draw conclusions and discuss it in the scientific way.” (11F)

Projects were viewed by many as an opportunity to bring together skills from different parts of the course. Many respondents considered that skills derived from project work could not be obtained through other elements of the undergraduate programme.

“I don’t think they would be as capable of critically assessing experimental evidence and judging whether the conclusions that are being reached based on that evidence are valid or not.” (4F)

Although infrequently cited, the fact that students tend to get project marks that are higher than their average marks means that they can derive significant benefit towards their degree classification.

“Considering that we give half of the final year marks to the projects, obviously a lot of importance is attached to them within the degree as a whole.” (6F)

Benefits to the school

The majority of respondents perceived some benefits from supervising projects. One of the most frequently cited was that projects were seen as a means to get to know students better and as recruitment for PhD studentships.

“The student would, hopefully, be turned on by the prospect of research and the supervisor could assess potential for research in students.” (2F)

“It provides an opportunity to enthuse those few people doing a pharmacy degree that they might like to come into academic pharmacy.” (4F)

“The other advantage is to pick out potential researchers with us on the course.” (6F)

“If we’re going to look at what the department gets out of it, the obvious answer to that is potentially getting good quality PhD students out of it.” (10F)

“They could be the seed corn for potential PhD students.” (11F)

Some staff used undergraduate projects to pilot proposed larger studies. Practice-based projects, in particular, develop collaboration with external colleagues and enhance the reputation of the school.

“A good project can lead to opportunities for further research, can give research an opportunity to check things, develop compounds for future testing to help research and kind of give opportunities for publications, but it’s good projects. It’s probably two or three each year.” (7F)

“... it keeps us in touch with collaborators...” (2T)

Benefits to the profession

The perceived benefits to the profession were related to the acquisition of generic skills that would be applicable to pharmacists as members of a team of professional healthcare workers. Although research is not currently a major role for most practising pharmacists, there is a need to increase the inclination of future professionals to participate in research-related activities.

“Independent creative working. The idea that they actually make their own decisions I think is absolutely essential to produce good professionals.” (10F)

“The skills that students learn about analysing literature and reviewing literature I think are very important, not just for further research but also for their clinical practice in years to come.” (8F)

Weighting of the project on the MPharm course

Citations as to the number of credits allocated to undergraduate projects in the various schools varied from 20/120 to 60/120 of the year of study. Respondents provided contradictory views as to whether the weighting was appropriate in their own or other institutions.

“I do question whether it’s necessary to have such a huge part of the degree as the project.” (3T)

“I think it’s important that it has got a high weighting, because I think it is where they really are, you know they are not just regurgitating knowledge they’ve really got the opportunity to show that they have some understanding of this process”. (5T)

The weighting of final year marks towards degree classification also varied between schools. In general, anecdotal evidence suggests that students tend to obtain marks for projects higher than those achieved in other modules. The influence of the project upon degree classification depends on both the credit weighting of the module and the contribution of the final year mark to overall award mark. As both of these vary considerably, students in some schools had a significantly greater opportunity to obtain a higher class of degree.

“... generally I think we found the last year I don’t think anybody got a first, if they hadn’t got a first in the project. So they could have done very well across all of the modules, and if they’d had a bad experience in the project that can really penalise them”. (5T)

Were students well-enough prepared to undertake a project?

Research methods modules, where they operated, were variable in size and content. In some schools it was a brief introduction to research, in others it was a substantial stand-alone module. Research methods training was either generic or tailored to project type, where schools divided students into subject areas specific to their area of research.

Increasingly, schools are introducing research methods training earlier in the course. This is through “mini projects” or through student self-directed learning such as case-reviews or problem-based learning. However, where research methods were taught separately, it was considered that this should not be too early in the course or the information will have been forgotten by the time the actual projects begin.

“In the level three, we have an advanced group delivering drug discovery module, whereby the students work together in groups of about five or six, on what we call a ‘mini project’. Which takes place over the course of about five, three hour sessions and culminates in a poster conference.” (10F)

The provision of projects to meet demand

All schools provide projects in a wide range of research fields, including the pharmaceutical sciences, practice-based projects and those involving IT skills, including educational development. The proportion of projects within these fields varies widely. Some schools have up to 60% projects related to pharmacy practice, others fewer than 20%. The decision was largely based on the degree to which relationships have

been established with colleagues in the health service. Generally, there were few expressions of concern regarding obtaining sufficient projects to meet the current level of student numbers. However, in some schools the number of students needing projects was increasing, therefore, meeting students' expectations was becoming more difficult.

"So there's the problem of actually coping with numbers and also of course funding issues, because any wet lab with any specialist techniques, you know if you need consumables, they can be very very expensive and the funding is not there for it." (6T)

"It's very tight whether we are going to have enough supervisors... It requires a lot of twisting of arms and persuasion to get people to take on enough projects." (7F)

"Practice generally is very popular. I would say if I was able to allocate all the projects to those who wanted a practice, then I would say about maybe forty percent would go for practice projects. But obviously we haven't got enough staff. Another group that is very popular, pharmacology and cancer research." (9F)

"Because we don't have many more projects than students. It didn't used to be the case. We used to have about twenty percent excess, so there was some genuine basis for choice in our students." (6F)

The allocation of students to projects

The system for allocation varied between schools. However, most schools operated a two-phase system whereby students chose a research area then chose, or were allocated, to an individual project or supervisor.

"We have a fairly complicated two stage procedure whereby the students elect their preferred research area, so if it's pharmacology, drug delivery, clinical, etc. We then make the allocation based on the notional number that each area can take based on an equal number of projects per supervisor." (4F)

Some schools factored in students' second or third year marks into the allocation process where preference was given to either the most or (more rarely) the least highly achieving.

"... if we find we're over subscribed for a particular area, then we do the allocation based on the third year credit mark average of the student. So those students who have worked well and have higher credit mark averages are more likely to get their first choice." (4T)

"So I tend to start at the bottom and work out theirs first ... " (3T)

Many schools managed to get allocations completed by end of year prior to the project so that students had the opportunity to read around the subject area over

the summer break. Most respondents reported that a small number of students were disappointed with the outcome of the allocation system, however, they usually ended up with a positive experience.

"They've been allocated a project, maybe it's not what they wanted to do, but they've done the project and they've actually enjoyed it and it's worked out OK". (5F)

Many schools welcome students' own suggestions for projects.

"If students can think of a project which they themselves might want to do... they are encouraged to approach a member of staff who they think might want to supervise them. ... Some of them worked extremely well because the student buys into it." (2T)

The use of group projects within schools

Group projects are used in around one third of schools. Where group projects were used, it had generally been driven by increasing numbers of students to staff.

"We've considered all options. I think that there is still a very high level of idealism amongst the staff, although you feel educationally individual projects are much better." (10F)

"... they actually give a very structured training to people doing these group projects." (2F)

"Somebody thought that it was a way of doing quite a lot of undergraduate project supervision with limited numbers of staff" (2F)

The definition of a group project varied. This ranged from a series of independently performed projects in which all students investigated different aspects of the same problem to others where group members generated a common pool of data and then independently analysed the same data.

"colleagues ... have organised essentially a collaborative project between the three of them, so they have pooled four or five students to different elements of what is actually a whole, but each student does their own individual project. ... they are also partly judged on their ability to synthesise their contribution to the overall effort." (4F)

Potential problems with assessment and group dynamics were cited as reasons for not undertaking group projects in some schools.

"The disadvantage is with marking them fairly I guess. I mean knowing who did the work." (8F)

"What do you do with the group dynamics, how do you judge that. We use peer assessment a lot, and that largely works, but the fact still remains that even though students that mark down a colleague who's

really not contributing very much would actually much rather not have that colleague there in the first place.” (10F)

Supervision of project students

In most schools, all full-time staff are expected to supervise around 3–4 undergraduate project students. This increased to 5 or 6 in some schools, due to pressure of numbers. Some schools had a weighting system for supervision, based on whether staff were research active. Limits as to how many students can be supervised are, however, being reached.

“I wouldn’t want it to exceed the maximum say to maybe three at most per staff member, to supervise effectively along with their other teaching duties and so forth.” (12F).

“Those who are involved more in the research will have five projects; those staff who do less research will have two projects.” (9F).

“I think there is a limit to the number of projects that the individual academic can supervise, and I think that with increasing numbers of students coming through, that that has probably got more of an influence on projects than anything else to be perfectly truthful.” (3F)

Respondents stated that few staff expressed an unwillingness to undertake such supervision. However, it was felt that the effort put in to supervision was not always recognised.

“I think staff to some extent enjoy projects. They see that as one of the more acceptable faces of teaching.” (1F)

“My colleagues are actually extremely supportive of the project idea, so even people with quite busy research interests are prepared to put time and effort in”. (7T)

“I think it’s possible to just give staff more time to supervise, more time to feed back and more recognition of the work they put into them.” (7F)

Staff within some schools utilised postgraduate and postdoctoral researchers as supervisors but others saw problems in adopting this strategy.

“... staff actually have post-doctoral workers, for example running these, and the students slot in along with postgraduates, and so people don’t mind that” (2F)

“No, no, we wouldn’t use research students, they may give guidance and they may give advice, but they’re not used as supervisors, and neither are post-docs in the research lab.” (7F)

Where practice-based projects were operated, external supervision was not generally perceived as a problem since all schools operated a dual supervision system for such projects, involving local and university-based supervisors. However, some difficulties with practice-based supervision were reported.

“So they have local supervisors, but the supervisor in the school remains ultimately responsible. We have a special vetting procedure before we allow students to be located outside the school.” (4F)

“With the pharmacy practice there is potentially a problem there, because we don’t have enough input into the selection of supervisors.” (6F)

“Occasionally, the problems we get there are students saying they can’t contact their supervisor [in practice base], they do have to rely heavily on email”. (9T)

Other problems encountered around supervision included staff availability, staff accessibility, disagreements between staff and students and complaints from students about inequality in the amount of help given by supervisors.

Resources for running projects

Resource was not highlighted as being a problem in most schools. All schools operated a project funding allocation system based on a sum of money per student. In some schools the sum varied depending on the type of project that students undertook, with practice-based projects normally being perceived as being “cheaper” than laboratory-based projects and with pharmacology projects being perceived as the most costly.

“The clinical projects tend to be less expensive than the science based ones, although again some science based ones are relatively inexpensive. Others, particularly those involving animals are becoming almost too expensive to do, and this is a problem.” (4F)

Most schools had the flexibility to vire resources between students. Many schools relied on research funding to subsidise undergraduate projects.

“... there’s a bit of ability to vire money, so if you get 4 or 5 students and one doesn’t use all their allowance, you can use it for the others.” (8F)

“... in many respects the research is subsidising the projects, there’s no getting around that.” (10F)

The use of specialist laboratories and instruments had led to constraints where projects were being run at the same time as other modules. One strategy to overcome resource constraints involved dividing the cohort of students into two, with half the year undertaking projects in the first semester and the other half in the second. (2F).

“Time-wise we try to organise the project in such a way that there is not too much competition for instruments from undergraduates and from the project students.” (9F)

“Lab space is a bit of a premium, isn’t it? We just block book the lab out for project time, and we’ve managed to cope so far with that. The big problem with lab space is safety supervision.” (7F)

Timing and delivery of projects

Schools are subject to a European Union (EU) directive on project work in undergraduate pharmacy programmes (Council Directive 85/432/EEC). The EU directive does not stipulate that projects have to be in the final year of study. Most SoPs, however, run projects in the final year, on the basis that projects fit the requirements of M-Level study. Some schools have considered placing projects in the third year of study.

“The third year would seem an obvious place to do it, which is a similar position to where say science undergraduates on a three year BSc would do that, and as of course used to happen in BPharm . . . then the fourth year could be put more over to clinical pharmacy to pharmacy practice, to get them ready for their Pre Reg and generally a career as a Clinical Pharmacist.” (5F)

There was a wide spectrum of patterns of time allocation. It was observed that different subject areas required different time allocations and that timetables and laboratory availability placed restrictions on the time allocation of projects. Most respondents preferred long thin projects (1 or 2 days per week throughout final year) suggesting that this would be appropriate for pharmacy practice projects where the project involved patient recruitment or for microbiology projects where time was needed to grow microorganisms. However, some disciplines required a block of time, for example Pharmacology, where experiments may need to run back to back.

Research governance and ethics approval

Obtaining research governance and ethical approval for practice-based projects had affected the number and nature of projects in this area. In general, research governance was seen to be a significant impairment to practice-based projects although most schools had developed coping strategies. Many institutions had therefore opted for audit-type projects as a means of restricting the need for full ethics approval.

“So to an extent I think it is research governance that will have the biggest impact on the number of projects that we can offer.” (3F)

“It has caused us some problems in terms of the National Health Service research ethics and the

approval process. So we now advise our students not to do any project which may involve research ethics in the NHS.” (8F)

“I wouldn’t describe it as a problem, it’s a difficulty, and staff have had to work hard to make provision to meet the demands that have been placed upon us in terms of ethical approval and so forth. But the university has been working hard in conjunction with the local health board to devise ways in which these sort of things could be streamlined.” (4F).

Most schools that operated projects in the final year, were now attempting to complete research governance procedures for all their projects over the summer period, prior to the start of the final year. Some schools undertook research governance applications without student input but others used it as an educational tool.

“We’ve decided to make the ethical approval actually part of the learning experience for them.” (10F)

Assessment of undergraduate projects

In most schools, assessment for projects involved three components; the research proposal; the project performance/report and, a seminar/poster presentation. Generally, schools made use of marking schemes for projects and operated a system of blind double marking, with one of the markers being the main supervisor. Some schools give some or all of their students a short viva on the project. Increasingly, poster sessions were being used for presentation of project data. Some schools used generic, criteria-based marking schemes.

“Whatever area that they’re working in should have the same outputs, the same type of output.” (12F)

There was little evidence of robust quality assurance on assessment, particularly across projects within different fields of research. Many respondents reflected that they had not noticed any difference between subject areas but if they had they would have investigated it. One school reported that they carried out an analysis of variance between subject areas each year and there were no statistical differences (9T). However it was noted that as the numbers in each group were relatively small, differences between groups would be difficult to detect.

The role of External Examiners in the assessment process for projects was mentioned, rarely.

“...partly through discussions with external examiners who had a feeling that an awful lot of the fourth year was based on in-course assessment as opposed to one seeing a written exam and this was perhaps skewing the results” (4F)

Concerns were expressed at the Academic Pharmacy Group workshop, about the problem of assessment of such a large number of credits being

in the hand of one member of staff. The suggestion was made that project assessment could be on the basis of pass/fail to avoid excessive influence on student's final degree grade.

Publications arising from undergraduate project work

The number of publications arising from undergraduate project work was universally low. Most respondents cited about four or five abstracts per year, mainly presented at the British Pharmaceutical Conference (BPC) and occasionally at Health Services Research (HSR) or other conferences. Very few full papers resulted from undergraduate research projects. Generally, it was felt that projects did not significantly increase the school's output of publications and that those publications that did arise from projects were insufficiently robust for inclusion in research assessment exercises (RAE, 2007).

"I don't think you get much in terms of peer review publications. You might be lucky to get one or two that are of the standard that you might want to send to the BPC or something like that. I doubt if you'd get much more than that though." (11F)

"My own experience is that you can, with a good student and a good project, get a small publication. Although, that's not the driver, that's, you know, the educational benefits have to come first." (10F)

"Because undergraduate projects are by necessity small scale, they very rarely have a single significant output." (12F)

It was observed that academic staff need to remain conscious of the fact that projects should be used primarily to teach students how to do research and to publish not a means to achieve publications. Questions were raised at the Academic Pharmacy Group workshop as to whether data from undergraduate projects were fit for publication. If publication was a major motive, there would be tension between heavy supervision of students (where results would be more likely to be publishable) and lighter supervision where students may learn from their mistakes.

Overall, the production of publications was not perceived as a primary objective.

"I think you have to basically learn to accept that this is a teaching exercise, to teach the students how to do research. This is not a results producing exercise." (3F)

Discussion

Positive views and broad agreement

The principal external influence on the way that projects are run is laid down in the EU Directive (Council Directive 85/432/EEC). This has been ratified through the Royal Pharmaceutical Society

(RPSGB) regulations for the accreditation of UK pharmacy degree courses and accepted for subject benchmarking for pharmacy by the Quality Assurance Agency for Higher Education (2002). In practice the European Commission Directive is flexible in this respect and merely stipulates "Each student should carry out a personally directed research project covering about three to six months under the supervision of the academic staff and present a paper or dissertation on the project". The RPSGB elaborated on this directive but still allowed considerable flexibility, stating "The degree course includes a significant research project of three to six months duration, but not necessarily with all curriculum time during this period being devoted to this activity alone. The student must undertake the project alone or as his/her individual contribution to a team endeavour. The project must address a research question or problem, must involve a critique of research methodology employed, and must include an analysis of results generated directly by the student or indirectly by others as primary researchers." The degree of flexibility within the various directives has led to significant diversity in the delivery of projects by schools. This has previously been described as the biggest area of inconsistency in curriculum design between schools (Sie et al., 2003).

It was clear that there were a number of aspects of undergraduate project work where there was general agreement and consistency between respondents and schools. Projects provide a valuable component of education and training in which generic skills are re-enforced and unique skills, particularly associated with research methodology, are developed. This has benefit to the profession of pharmacy regardless of whether students are employed in a research-based environment. Projects were clearly seen by academic staff as an educational tool and not as a means of generating research publications.

Some interviewees questioned whether pharmacists who were unlikely to carry out research needed to carry out a research project, but most interviewees felt that increasing the weighting of the research project in the Masters' level of the course was a good thing as it increased the "science" element of the course. In general, academic staff considered project supervision to be one of the more rewarding modes of teaching and valued the opportunity to form closer relationships with students, in a climate where increasing numbers of undergraduate students within SoPs is having a detrimental effect on the personal learning experience for students (Taylor, Bates, & Harding, 2004).

Differences in implementation

Where differences were evident between the SoPs these related, principally, to the mode of operation of projects. There were a number of factors that

influenced the facilitation of undergraduate projects within UK SoPs. These can be broadly divided into external factors, determined by international and national organisations and policies, institutional factors determined by the organisation within which the schools operate and personal factors determined by the individuals responsible for facilitating projects. In most established universities the person facilitating projects had run them successfully for many years and appeared reluctant to alter a tried and tested formula. Innovative approaches were more frequently cited from the SoPs currently seeking accreditation.

(1) Mode of delivery

The majority of schools run projects in the fourth year, however, there is increasing debate about running projects in year three of the programme. The number of credits and/or hours within the curriculum devoted to projects varied significantly.

(2) Practice-based research

There is variability in the extent to which schools have developed links with external organisations, particularly with respect to practice-based projects. Some schools offer practice-based projects to more than half the students, whereas others offer very few or none at all. A particular constraining factor is the requirement to comply with the regulations of Ethics and Research Governance Committees (Jesson & Wilson, 2004). The impact of this is confounded by the inconsistencies experienced by students and supervisors in the application of the rules. Staff in most schools have come to accept the anomalies and to work within these constraints. However, ethics constraints have deterred or limited some schools from undertaking projects within practice.

Coping strategies have included a trend towards designing undergraduate projects that did not require full ethical approval such as audits or systematic reviews. Academic staff have also tended to utilise the experiences of their practice-based supervisor colleagues within the hospitals and Primary Care Trusts and rely on them to organise research governance or ethical approval. There is encouraging evidence that procedures for applying for research governance and ethical approval in the UK will improve (COREC, 2006).

(3) Integration of the project into the overall programme of study

University regulations impact on the structure of the course, in terms of modules and credits and on the methods and modes of assessment. This has led to marked variations between schools in terms of the timing of projects (year 3 or 4, semester or year long, part- or full-time blocks of study) and the credit weighting. The type of research conducted in schools demanded different work

patterns. For example, laboratory-based projects often require concentrated blocks of time, whereas practice-based projects lend themselves more to a longer–thinner period of data collection. Compromises often had to be reached in schools.

There is anecdotal evidence of a tendency for students to achieve a higher mark for their project work compared with other elements of the course. If there is a significant effect on students' outcomes, this could feed through to influence schools' positions in national academic "league tables".

(4) Student choice

All schools offered projects in a variety of research areas, the titles of which reflected the research interests of the staff. The extent of choice varied and, in the main, reflected the available expertise of staff and on occasion, their willingness to participate in project supervision.

There were differences in the number of students a full-time member of staff was expected to supervise. The average was 3 or 4 students but in some cases the number was significantly higher. Staff, at times, felt overstretched and undervalued for the time and effort that they put into supervision. Where projects were conducted in practice, schools normally used local, practice-based supervisors in addition to academic supervisors. Finding suitably experienced staff from the practice base was sometimes difficult and at one or two schools this restricted the availability of practice-based projects. There were clear indications that students often experienced problems with access to practice-based supervisors.

The use of group projects was very variable between schools. In some schools all students carried out projects within groups, in others all projects were individual whilst many schools were experimenting with the concept. Many advantages and disadvantages for group projects were expressed, often diametrically opposed. The definition of what constitutes a group project was also very variable, as was the approach to writing up reports that arose from a group project. The method by which project reports were individualised also appeared variable. Overall, there did not seem to be a consistent, compelling argument to suggest that the introduction of group projects was the panacea for accommodating increasing numbers of students nor for enhancing rates of publication arising from undergraduate projects.

(5) Resources

Resource issues were not extensively highlighted as a problem for running undergraduate projects. However, many financial restrictions within the schools were alluded to. All schools operated a per student allocation of funds, principally for consumables, although this figure varied considerably between schools. Funds from alternative sources,

such a research grants were sometimes used to supplement the school allocation. Practice-based projects normally required a smaller resource from the schools, this probably being offset by “hidden” resources from the practice base. Laboratory-based projects were generally more expensive, with pharmacology projects often highlighted as the most expensive. A significant constraint on the numbers of projects within certain research areas and on the timing of projects was experienced by most schools in terms of accessibility of laboratory space and equipment.

A balance between equality and diversity

Overall, interviewees were positive towards the concept of a research project as a major component of MPharm degree programmes. However, there were many aspects of the provision, delivery and assessment of projects where significant differences existed. Whilst diversity should be applauded, there should be a degree of consistency to ensure that all students completing a UK MPharm degree will have had an equivalent academic experience. Those responsible for the accreditation of pharmacy degree programmes may need to address this issue.

Limitations of the study

- The target group of respondents largely comprised the school facilitators for undergraduate projects. Opinions expressed were therefore derived from individuals who were probably committed to the concepts of undergraduate projects. Other members of staff within schools might have expressed somewhat differing opinions.
- The project was designed as a qualitative study. Respondents revealed certain quantitative factual information. Some of this has been reported upon in this paper. However, this information is by no means complete and comprehensive.

Acknowledgements

The authors acknowledge the funding for this project from RPSGB Pharmacy Practice Research Trust and Liverpool John Moores University. The authors thank

Professor Janet Krska for her initial input into the design of the project and we thank our Schools' of Pharmacy colleagues who contributed to the data collection for this project. The authors particularly thank Mrs Karen Stowell-Smith for her expert transcription of taped interviews.

References

- COREC (2006). Available at <http://www.corec.org.uk/Consultation/ImplementationPlanPressRelease.pdf> (Accessed September 2006).
- Council Directive 85/433/EEC. Available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31985L0433:EN:HTML> (Accessed September 2006).
- Credit and HE Qualifications (2001). Credit guidelines for HE qualifications in England, Wales and Northern Ireland. Prepared by CQFW, NICATS, NUCCAT & SEEC.
- Jesson, J., & Wilson, K. A. (2004). The new UK research governance: Its impact on pharmacy undergraduate research projects. *Pharmacy Education*, 4, 41–48.
- Mottram, D. R., & Rowe, P. H. (2005). A quality assurance procedure for pharmacy undergraduate project assessment. *Pharmacy Education*, 5, 251–254.
- Murdoch-Eaton, D., & Jolly, B. (2000). Undergraduate projects—do they have to be within the conventional medical environment? *Medical Education*, 34, 95–100.
- QAA (2002). Subject benchmark for pharmacy. Available at <http://www.qaa.ac.uk/academicinfrastructure/benchmark/masters/pharmacy.pdf> (Accessed September 2006).
- RPSGB accreditation of UK pharmacy degree courses. Available at <http://www.rpsgb.org/pdfs/eddegnewreq.pdf> (Accessed September 2006).
- RAE (2007). Research Assessment Exercise. Available at <http://www.hefce.ac.uk/researchassessment/> (accessed July 2007).
- Rowe, P. H., & Mottram, D. R. (2003). Evaluation of a generic assessment scheme for pharmacy undergraduate projects. *Pharmacy Education*, 3, 29–33.
- Sie, D., Bates, I., Aggarwal, R., & Borja-Lopetegi, A. (2003). An analysis of the new UK master of pharmacy degree programme: Rhetoric and reality. *Pharmacy Education*, 3, 169–175.
- Taylor, K. M. G., Bates, I. P., & Harding, G. (2004). The implications of increasing student numbers for pharmacy education. *Pharmacy Education*, 4, 33–39.
- Thompson, C. J., McNeill, J. A., Sherwood, G. D., & Track, P. L. (2001). Using collaborative research to facilitate student learning. *Western Journal of Nursing Research*, 23(5), 504–516.
- Wilson, K., Jesson, J., Langley, C., Clarke, L., & Hatfield, K. (2005). MPharm programmes: Where are we now? Report commissioned by the Pharmacy Practice Research Trust, September 2005. ISBN 0-9544961-9-1 Available at <http://www.rpsgb.org/pdfs/mpharmprogswawn.pdf>. (Accessed May 2007).