Research Article

Factors affecting student choice of the undergraduate research project: staff and student perceptions

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Date received: 29/09/2004 Date accepted: 26/04/05

Abstract

As pressures on resources are growing and some question the value and types of final year research work for students in the biosciences and other disciplines, it is important to be well informed about student expectations of their project. In this case study within Biomolecular Sciences, questionnaires were used to compare staff and student perceptions about the factors influencing choice of research project by final year undergraduate students. As allocation method changed from choice of specific, predetermined title to negotiation within a wider subject area, any changes in influential factors were investigated. Students on 8 programmes, including joint Honours, were included in the surveys, and 84 responses were analysed, together with those of 20 academics. Results show that whilst staff are aware of most of the factors that influence students' choice of project, there are differences in some aspects - for example, those relating to the tutor's role and to the desire for challenging work. Whilst students were satisfied with both methods of project allocation, staff strongly preferred negotiation between staff and students to allocation by specific title. These findings may be useful to others currently reviewing their own practice with regard to project allocation and design.

Keywords: undergraduate research project; staff expectations; student expectations; choices

Introduction

Background

There have been several studies of the factors affecting choice of study programme (for example, Lightbody *et al*, 1997, Martin, 1996). However, despite the fact that students must make many academic choices within their study programmes, relatively little work seems to have been published concerning the factors that influence these choices. Most studies have considered motivation and/or learning styles which, whilst likely to be related to choices, are unlikely to be the only relevant factors. Choice is a complex area (James, 2002). Opinions about the influences and constraints on student choices appear to be based largely on anecdotal evidence. Good scholarship requires us to go beyond this and research our practice for ourselves (Andresen, 2000).

The final year undergraduate research project is a good starting point to investigate such factors. It is an essential component of many programmes in the Biosciences at UK universities, as indicated by benchmark statements in, for example, biosciences and biomedical science (QAA, 2002), and most academic institutions allow at least some choice in the research undertaken (Cowie, 2005). The mark awarded for the project is often considered to raise the student's overall assessment profile and there is some evidence to support this (Saunders and Harland, in preparation). There are a wide variety of styles of project, including laboratory/field-based, computer-based and survey-based, (LTSN Centre for Biosciences event report, 2003; Cowie, 2004, 2005; Hollingsworth *et al*, 2004) and some projects are carried out within places of student employment, rather than the educational institution. A variety of allocation methods is used, including ranked lists of project choices based on project titles provided by staff, staff/student consultation based on staff expertise/research activities ('shopping around'), prioritisation of a research area (theme-based) followed by subsequent negotiation of the project with appropriate staff, and student-generated proposals (Cowie, 2004). Each has potential strengths and weaknesses (Table 1).

Table 1 *Typical allocation processes for the research project*

Many of these points are developed further in Cowie 2004 and links from the LTSN Bioscience event report 2003 and LTSN Bioscience/Centre for Bioscience event reports 2004.

Process	Comments
• Ranked list of project choices based on project titles: ± description / abstract / key references ± identification of staff involved	• Popular projects oversubscribed • Student not actively involved in project design • Preference for certain staff may influence decision • Little flexibility, often locked into specific project
• Staff-student consultation based on staff expertise / research activities ('shopping around')	• Promotes active student participation in process • Student actively involved in project design / development • Projects adapted to suit student's background • Staff popularity may play a part • If allocation based on 'first come first served' basis, less motivated students get less choice / less popular projects
• Prioritisation of research area (theme-based), subsequent negotiation of project with appropriate staff	• Staff and student jointly involved in project design • Projects adapted to suit student's background / performance • Student chooses project area, not tutor • More flexibility to accommodate popular areas
• Student suggestions / proposals	• Promotes active student participation • Requires appreciation of feasibility of the work / what can be achieved • Facilities / resources may not be available

Projects are an opportunity for staff and students to develop more individual relationships, so staff might be expected to understand quite clearly what students are looking for when they are choosing their projects. Projects have clear academic objectives, both subject-specific and generic, and are frequently used to distinguish 'Honours' from 'non-Honours' students, with all of the implications that result. Projects are, however, resource intensive and therefore there is a particular interest at present to ensure they are used effectively (Wood, 2005).

The case study

In the School of Biomolecular Sciences at Liverpool John Moores University (LJMU) projects are a compulsory component of all Honours programmes. The majority are laboratory based. All provide opportunities for students to undertake independent and original research in a chosen specialist subject whilst developing a range of associated skills. Projects are conducted either within the institution, generally related to research activities of staff (internal projects) or outside, notably in an industrial or hospital setting (external projects).

The project module is yearlong and runs in parallel with the other modules taken by Honours students. All project tutors (supervisors) are members of academic staff and are generally assigned about 6 undergraduate project students per year. At the beginning of the module, tutors receive a copy of the staff handbook, which provides guidelines on the role of the project tutor. Responsibilities include providing help and guidance with the planning of the project and the experimental aspects, giving students encouragement throughout the module and developing their analytical, oral and writing skills. Furthermore, the project tutor is one of the assessors of the project. Tutors and students meet frequently, both in the laboratory and for discussion of progress. Where students execute the project outside the School they have both a project tutor from the School, with whom they have regular contact, and an external supervisor in the workplace, looking after the project on a day-to-day basis. The frequency of meetings and the relationship that develops between student and project tutor often results in the tutor additionally becoming a point of contact for pastoral and other issues.

In a number of UK universities, including LJMU, there has been a recent trend away from more traditional Bioscience programmes towards newer disciplines such as forensic science. The consequent requirement for projects in the newer subject areas, coupled with increasing student numbers and generally greater demands on staff time, has led to a re-appraisal of the process of project allocation within Biomolecular Sciences at LJMU. A major objective has been to employ a process that ensures equitable workload between project tutors, whilst matching projects to students' needs. In the mid-1990s a School-wide allocation process replaced a programme-based allocation process. This involved students ranking their choices from a list of specific project titles, with brief descriptions, provided by staff. In the academic year 2002-2003 the School changed to a new system, which assigned students to a preferred subject area followed by negotiation of a specific project with an appropriate tutor, in order to balance staff loading.

The research

A few studies have examined factors affecting the choice of science undergraduate research project. For example, Gabb (1981) found that applied science students looked for a sympathetic supervisor and a project with a definite endpoint. Ryder and Leach (1996), studying a range of science programmes, identified information about the project to be a key factor in helping students make a choice of project, particularly information about techniques to be used and the working environment. In the current study, the factors that guided student choice of projects before and after the change in allocation system were explored in order to optimise the learning experience for students undertaking projects and to avoid misunderstandings between project tutors and students. Points raised in previously published studies were included together with others that the authors felt likely to be important, and students were given a chance to comment. An action research approach was adopted, in order to integrate any appropriate changes, and to allow for continual reflection upon and refining of the process of project allocation and development.

The work had three aims, specifically:

- to compare the factors that influenced students' choice of project on the two allocation systems (choice of specific title and choice of subject area followed by negotiation) and determine whether different factors were relevant.
- to compare staff and student perceptions of students' decision-making regarding project choice.
- to investigate the expectations of both staff and students about the role of the project tutor.

As factors affecting *choice* of project were being investigated, the survey was not followed up to determine whether students' expectations were matched by experience. Whilst this issue is of interest, it was not pertinent to the current enquiry.

Methods

Although questionnaires generate only a superficial analysis of a subject, they are cost effective for the collection of initial data and provision of an overview of an area. In the context of this case study, where the authors as teaching staff (and additionally JH and VS as project tutors) may be seen to have a position of influence over students' marks, it was also important that data should be collected and analysed anonymously; a questionnaire could achieve this, whereas interviews could not. Therefore, a questionnaire was designed to investigate how and why students choose projects.

There were 4 categories of questions. Section A investigated factors affecting a student's choice of project, section B considered a student's experience of project work, section C questioned the role of the project tutor and section D allowed for other relevant comments. Sections A to C contained questions requiring a response on a Likert scale (ranging from 1-5) and in section D there was space for 'free response' comment. Minor adjustments were made

after a pilot, including the addition of a question about timing of the project, and three slightly different versions were designed for administration to three groups, reflecting the difference in allocation systems. Group 1 was final year students, nearing completion of their Honours projects in the 2001/02 academic year, who had chosen their projects from a list of specific titles and additional information supplied by staff. Group 2 was academic staff who had been project tutors in 2001/02. Group 3 was final year students, about to finish their Honours' projects in the 2002/03 academic year, who had selected a project subject area rather than a title, then been allocated to an appropriate member of staff and negotiated the particular project. Basic demographic data were also collected. Questions pertinent to the current study from all three versions of the questionnaire are given in Appendix A.

The questionnaires were distributed to students during timetabled classes in May 2002 for group 1 and May 2003 for group 3. Students on all of the undergraduate programmes in the School (Biochemistry, Biomedical Sciences, Biotechnology, Forensic Science, Microbiology, Molecular Biology, Nutrition and joint Honours programmes) were included. To ensure all students had the chance to complete a questionnaire even if they had missed the classes, copies were also available in project laboratories, the School Office and via the authors. Students were instructed to complete the questionnaires anonymously and return them to a 'posting box' provided in a quiet part of the department. Tutors were asked to encourage their students to complete the questionnaires. Staff questionnaires were sent in the internal post. Staff were asked to complete and return them, anonymously, to the member of the research team (SP) responsible for data analysis.
Qualitative data were collated as individual comments. Quantitative data were analysed using the Statistical Package for Social Sciences (SPSS). As the demographic data were distributed normally (data not shown), paired *t* tests were used for analysis of these aspects. Non-parametric tests are more appropriate for ordinal scales (Jamieson, 2004) and were used for analysis of the Likert rating scales – the Mann-Witney U test to compare means (equivalent to the *t* test for parametric data) and Spearman's correlation coefficient to determine associations between data items (equivalent to Pearson's correlation coefficient for parametric data). As with tests on parametric data, comparison of means gives the probability that two samples came from the same population; standard levels of significance were $p<0.05$ and $p<0.01$, while correlation values should fall within the range +1 to –1, with 0 representing no correlation. Details of the methods can be found in Bryman and Cramer (2001).

Results

1. Demographic data

For the 2001/02 cohort of students, 37 completed questionnaires were received from a total of 99 distributed, a response rate of 36%; the 2002/03 group of 121 students returned 47 questionnaires, which represented a 39% response. As the questionnaires were anonymous, beyond general exhortations to the class as a whole, it was not possible to follow up those who had not responded. *t* tests indicated that the demographic profiles of

each set of respondents were representative of their respective cohort and that the 2001/02 group was not different from the 2002/03 group (data not shown). Therefore, the data can be considered representative of the group as a whole, and where applicable the data collected from all the students have been combined to give a larger cohort for analysis.

Table 2 *Distribution of age, gender and level 2 marks among student respondents (data from both cohorts combined)*

Age group[1]	Male[2]	Average Mark[3]				Female	Average Mark				
		40-49%	50-59%	60-69%	70% or>		N/A[4]	40-49%	50-59%	60-69%	70% or >
23 or under[5]	16	7	9	0	0	41	3	4	20	10	4
24 or over	10	5	3	2	0	8	-	2	4	1	1
Total	26	12	12	2	0	49	3	6	24	11	5

[1] One student did not state their age; [2] five students did not state their gender; [3] three students did not state their average level 2 mark; [4] these students transferred directly to level 3 from an overseas institution; [5] students aged 23 or under at the time of the survey had entered as school leavers, students aged 24 and over were those who had had a break of some kind in their education. Although this grouping is somewhat arbitrary it enabled us to investigate whether continuity of education experience was having any effect on choices. The group of mature respondents was too small for further breakdown.

Table 2 shows the age, gender and average level 2 mark profiles for the students in the study. Information regarding the programmes of study, which respondents were following, is summarised in Table 2. Most students (64) had undertaken their projects within LJMU, while thirteen students did external projects and two students stated that they had worked both internally and externally (5 students did not answer the question).

Table 3 *Number of respondents by programme of study (data from both cohorts of students combined)*

Degree programme	Number of student respondents on programme	Number of staff respondents offering projects in programme[1]
Biomedical Sciences	41	7
Forensic and Biomolecular Sciences	23	7
Applied Microbiology	7	6
Applied Biochemistry	6	6
Nutrition	2	2
Biotechnology	2[2]	0
Microbiology & Biochemistry	1	3
Molecular Biology	1	1
Not stated	1	0

[1] most staff members offered projects in more than one degree programme
[2] presumably these students had tutors who did not complete the questionnaire

As most of the groups were too small for meaningful analysis, no attempt was made to look for programme related trends.

Twenty questionnaires were returned by staff, 67% of all staff supervising Honours projects. Table 3 shows the degree programmes for which staff participating in the study had offered undergraduate projects. 2 members of staff indicated that they had been overseeing undergraduate projects for less than 5 years, 4 had between 5 and 10 years' experience, while the majority of respondents (13) had been involved in project tutoring for more than 10 years (1 person did not answer the question).

2. Responses to individual items

The mean responses to those individual items common to all the questionnaires administered – i.e. those distributed to academic staff and to both groups of students - are shown in Figures 1 and 2 and Tables 4 and 5.

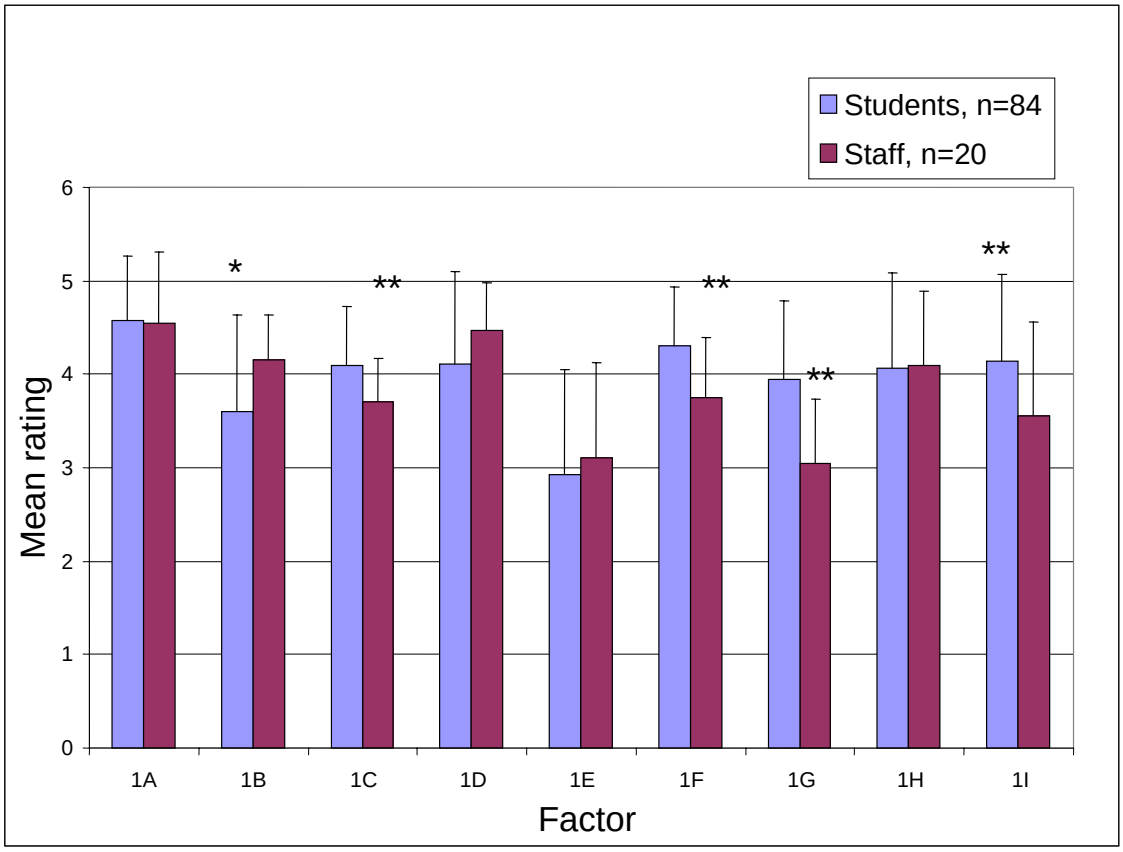

Figure 1 *Mean ratings of factors affecting students' choice of project. This figure shows the comparison of data obtained from staff responses and the combined data from students using both allocation systems. Bars represent 1SD. *p<0.05 **p<0.01*

Key to Factors: 1A=General interest in subject area; 1B=The possibility of working with a certain member of staff; 1C=The chance to use particular skills/techniques; 1D=The opportunity to do a laboratory-based project; 1E=The option of a non-laboratory project; 1F=The chance to extend knowledge in a familiar area; 1G=The opportunity to learn about an unfamiliar area/technique; 1H=The relevance to future career; 1L=Timing within academic year.

t test results indicate that there were no significant differences between the 2001/02 and 2002/03 student groups' responses to any of the items included in both questionnaires (data not shown). The responses show that students

and staff perceived 'general interest in the subject area', as the most important consideration in choosing a project (Figure 1). Students rated 'chance to use particular skills/techniques', 'chance to extend knowledge in familiar area', 'opportunity to learn new subject/technique' and 'timing in academic year' more important when choosing a project than the staff expected that they would, while staff considered that 'possibility of working with a certain member of staff' would be rated more highly by students than it was (Figure 1).

Table 4 *Comparison of percentage of students stating that they were looking for a challenging project with perception of this proportion among staff*

Group	Mean % of students looking for a 'challenging' project	Mean % of students looking for a 'straightforward' project
Students 2001/02	59%	41%
Students 2002/03	62%	32%[1]
Staff	16%	84%

[1] *2 students did not answer this question in 2002/03*

Table 4 is a comparison of the percentage of each student group stating that they were looking for a 'straightforward' as opposed to a 'challenging' project, with the staff members' perception of this ratio. It shows that while the majority of students in both cohorts reported that they were looking for a project that challenged them, overall, staff did not share this view (although the estimate among staff of the percentage of students looking for a challenging project ranged from 5% to 50%).

In the 2001/02 academic year, prior to the change in method for choosing projects, 20% of staff members felt that they would prefer titles for project allocation, while 65% indicated a preference for the use of subject areas and the remaining respondents did not have a strong opinion. Students in the 2001/02 cohort were not in favour of the idea of being asked to select projects by subject area and 76% felt that allocation of projects among their peers, using titles, had been fair. The majority of those in the 2002/03 group (78%) considered that the method of deciding projects by subject area had been conducted fairly for their group. There was no significant correlation between students' preference for method of project selection and the perceived fairness of the allocation process for their cohort.

Table 5 *Mean ratings for other aspects of project allocation*
(data from both cohorts of students combined; only items from question 4 which were addressed to all students and staff are included.)

	Students (n=84)	Staff (n=20)	
4A: student understands topic at the start of the project	3.67	2.60	P<0.001
4B: The possibility of external projects should be retained	4.02	4.50	P<0.001

Table 5 indicates that there was a significant discrepancy in the perceptions about students' understanding at the outset regarding what they were trying to achieve with their project. Over half of the staff (53%) felt that most students did not understand what they were trying to achieve from the beginning of their project, while most students (73%) indicated that they had understood the aim of their project from the outset. Staff also felt more strongly than students about the importance of retaining the opportunity for external projects. The number of students undertaking external projects was too small for separate analysis, but those who had undertaken such projects were generally in favour of retaining them.

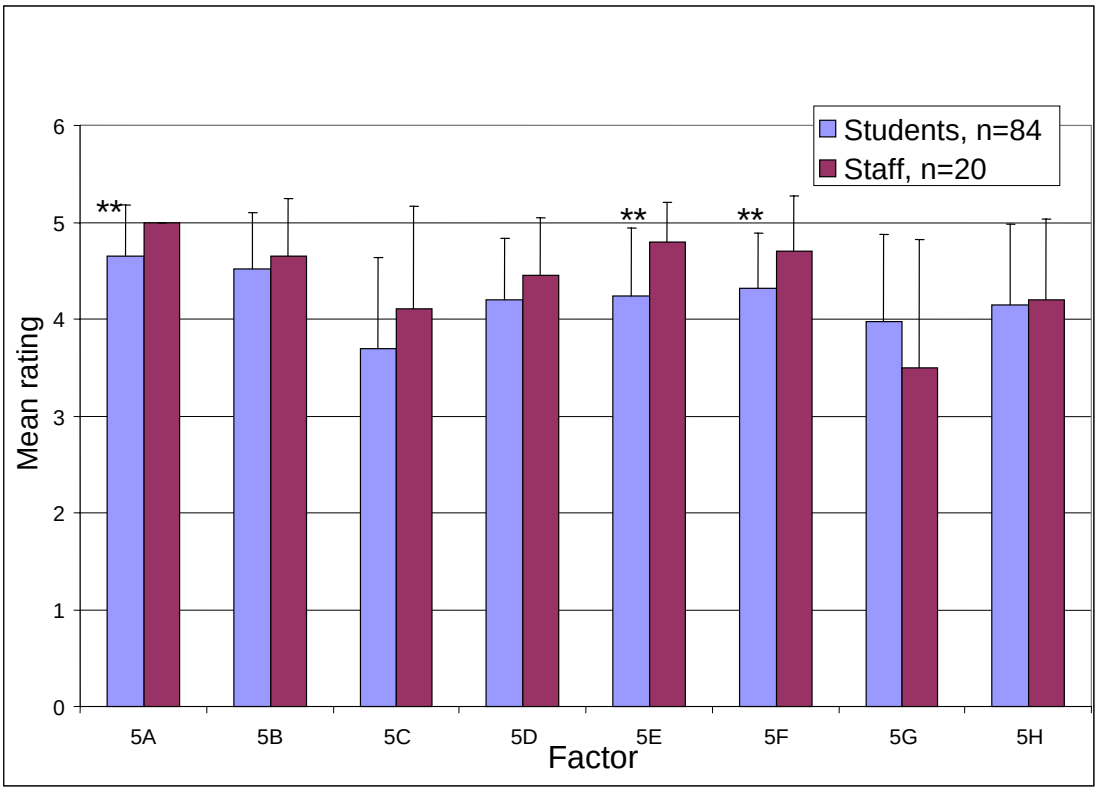

Figure 2 *Mean ratings of roles for project tutor. This figure shows the comparison of data obtained from staff responses and the combined data from students using both allocation systems. Bars represent 1SD. **p<0.01*

Key 5A=General direction and encouragement; 5B=Technical advice; 5C=Provide background information and reading materials; 5D= Provide scope for student input in project development; 5E=Help with interpretation of results; 5F= Guidance on writing up project; 5G= Act as personal /final year tutor; 5H= Provide reference for jobs in future

Regarding the possible roles of a project tutor (Figure 2), students and staff agreed that the tutor's most significant roles were 'to give general direction and encouragement throughout the project' and 'to give technical advice'. Staff also considered that 'helping with interpretation of the results' and 'giving guidance on writing up the project' significantly more important than students did.

3. Correlations

Significant correlations between factors possibly affecting students' project choices are given in Table 6.

Table 6 *Significant correlations between questionnaire items for all students, n=84. (Spearman's correlation coefficient 'r'; * p<0.05, **p<0.01)*
NB For clarity, columns 1H, 3 and 5H have been removed, as they contained no significant correlations.

	1A	1B	1C	1D	1E	1F	1G	1I	2	5A	5B	5C	5D	5E	5F	5G
1A.Interest in subject																
1B.Particular staff	0.287*															
1C.Skills/techniques																
1D.Lab-based project			0.393**													
1E.Non lab project		0.219*														
1F.Familiar area			0.298**	0.227*	0.265*											
1G.New subject/skills			0.305**			0.437**										
1H.Relevance to career			0.368**	0.218*		0.287**										
1I.Timing in year																
2.Challenging/easy				0.308**			0.257*									
3.Allocation fair						0.328**										
5A.General direction	0.234*															
5B.Technical advice	0.290**					0.309**		0.222*		0.430**						
5C.Background info										0.237*	0.268*					
5D.Student input						0.253*				0.269*	0.261*	0.402**				
5E.Interpretation results									0.240*	0.349**	0.442**	0.467**	0.274*			
5F.Help writing up									0.315**		0.246*	0.400**	0.306**	0.525**		
5G.Personal tutor										0.273*	0.297**	0.453**	0.277*	0.360**	0.379**	
5H.Referee in future				0.249*		0.226*				0.290**	0.224*	0.275*	0.264*		0.277*	0.405**

This shows that, for example, students who were looking for a chance to extend their knowledge in a familiar area (Factor 1F) were also likely to value the opportunity to learn unfamiliar skills or techniques (1G) (r=0.437, p<0.01) and to consider the relevance of the project to their proposed future career (1H) (r=0.287, p<0.01). There were significant relationships between students stating that they were looking for a challenging project (2) and the perception that project choice was affected by the chance to use particular skills and techniques (1C) (r=-0.308, p<0.01) and to learn about an unfamiliar subject or technique (1G) (r=0.257, p<0.05). [The negative correlation coefficients were obtained because on the questionnaire, the response indicating that one was looking for a 'challenging' project scored '1' while looking for a 'straightforward' project scored '2'.] Figure 2 also indicates that students felt that the possible roles of a project tutor were all important, and significant positive correlations were obtained between most factors (Table 6) indicating that they are inter-related.

Discussion

This study has shown that staff and students approach projects with broadly similar expectations. Both allocation methods (by title or by subject area) have satisfied the students who used them, although staff preferred allocation by

subject area for a variety of reasons. Allocation method did not influence choices and, as expected by staff, interest in the subject was the most important factor governing students' choice. However, there were some surprises relating to choice of a challenging project, and timing of the project was more important than staff had expected. Although students recognised all roles of a project tutor as important, they seemed to expect more autonomy in the practical work and analysis and more pastoral support than staff anticipated. Each of these findings is explored in more detail below.

Allocation method

When students allocated to their projects by titles were compared with those allocated via subject areas there were no significant differences and indeed no apparent trends for any common item. Both groups were satisfied with the allocation system that had been used for their cohort. Thus it was felt that the change in allocation procedure, which meant that students no longer chose a specific project title but had to negotiate with a tutor, involving more student input into initial project design, had not resulted in student dissatisfaction. A potential problem, that some staff may have lacked familiarity with some of the newer subject areas, had been dealt with through staff development activity and did not appear to be causing particular difficulties.

Staff were generally much more enthusiastic about allocation by subject area than by title. Open comments indicated that they were able to match students' interests, and to some extent abilities, more closely to the research projects they had available when they did not have to decide on the titles several months in advance of the module starting and before meeting the students.

As a result of feedback from the questionnaire for group 3 (students selecting by subject area), minor changes were made to the form on which students registered their choice of subject area for projects in 2003/4, allowing each student to indicate a topic of particular interest within the general category if appropriate (for example, immunology within the general category cell biology). Overall, the authors feel confident that the subject area allocation system is effective for ensuring students involvement in research of personal interest, while enabling staff workloads to be appropriately balanced. As there were no significant differences between students allocated to their projects by the two methods, it is concluded that allocation method alone is not a factor influencing their choice. There may, of course, be factors in other Schools/departments, such as number of staff and size of the student cohort, which could influence the choice of allocation method and this may have a bearing on the way students choose their projects. All allocation systems have strengths and potential weaknesses (see Table 1) and it is not suggested that using subject areas followed by negotiation of specific research areas will suit all departments. However, in a situation where staff are acting as project tutors to several students on a range of programmes it does seem to have several advantages over other methods.

Only a small number of students (13) had undertaken external projects and thus it was not possible to analyse their responses statistically as a separate group. However, within the general support for external projects, students and

staff who had been involved with work undertaken outside the School appeared to be more strongly in favour of their retention than those who had not. Such students may have recognised benefits in using equipment or techniques not available at the university, mixing with a different group of people, experiencing a 'working environment' of a different nature from the academic laboratory setting, and developing 'employability' skills. Some part-time students find that carrying out their project in their workplace reduces the total time to completion of a degree, as they need less 'release time' to attend University (Harland, unpublished). In addition to these advantages, external projects encourage the development and maintenance of links between the University and the community for the purposes of research, consultancy and other collaborations. These results accord well with those of Murdoch-Eaton and Jolly (2000), who found in an analysis of project work with medical students that external projects were rated highly by students who had undertaken them, and that concerns regarding the appropriateness of self-directed projects outside the mainstream of medical practice were unfounded. External projects, however, may not suit students who, for example, need considerable pastoral support, lack self-confidence and/or technical skills, are very inflexible in their time constraints, or just wish to remain within the University environment. Although the data have not yet been analysed in detail, there appears to be no advantage in terms of project marks for either 'internal' or 'external' projects, when like groups of students are compared (Harland and Saunders, unpublished). Assessment and feedback relating to undergraduate project work is currently an active area of research in many departments as well as that of the authors (see for example Tariq *et al*, 1998; Heylings and Tariq, 2001; Rowe and Mottram, 2003) and there is continuing interest in the process of learning within research projects (Finn and Crook, 2003; Ryder, 2004).

Factors affecting choice of project

In terms of choices, there was generally very close agreement between the factors that students rated as highly important and those that the staff expected to be influencing students. This is in line with work by Maunder and Harrop (2003), which demonstrated agreement between staff and student expectations of teaching in the context of lectures and seminars, and indicated that academic staff do generally know their student body quite well. However, there were some aspects where there were statistically significant differences. These results support findings in other areas, for example, Maclellan (2001) who demonstrated differences between staff and students in a department of education concerning their perceptions about assessment, and Dickie and Kato (1996), who found differences between staff and students' perceptions of learning tasks in physics. Stefani *et al* (1997) found several differences between staff and students in different aspects of project work in similar subject areas to those in the current case study.

Interest in the subject was the most important factor in choice, as has been demonstrated elsewhere in a variety of subjects (Henry, 1977; Dohn and Wagner, 1999). Although nearly all items were recognised to be important (rating >3.0) by both student groups and the staff (Figure 1), students rated 'the chance to use particular skills' (Figure 1, 1C), 'the chance to extend

knowledge in a familiar area' (Figure 1, 1F) and 'the opportunity to learn more about an unfamiliar area or technique' (Figure1, 1G) as significantly more important than staff anticipated that they would (p<0.01). This agrees with the observation that staff thought most students were looking for a project that was straightforward (84%, Table 4), while students indicated a greater interest in a challenging project than staff expected (59-62%, Table 4). The greatest discrepancy between staff and students was that about 60% of students were looking for a 'challenging project' while staff thought only 16% of students would do this (Table 4). This view may have been shaping the types and titles of projects that staff had been offering under the allocation-by-titles system. Students who considered that they were looking for a challenging project tended to perceive practising and extending their technical skills as an important part of the work (Table 6). The 'challenge' to students may thus be to perform laboratory activities with skill and competence, getting the 'right' answer rather than blaming 'operator error' as often happens when undergraduate practical classes 'do not work'. Students may also concentrate on the complexity of the techniques involved. On the other hand, staff may feel that since students have some practical experience to build upon and new test methods can be learned easily the 'challenge' does not reside in the techniques used. Understanding theoretical concepts and designing ways to investigate theories may seem more important and more 'challenging' than improving existing technical skills or learning new ones. Follow up work is being undertaken to investigate these issues. Meanwhile, negotiation around subject areas should enhance the design of projects that students find challenging. It is interesting to note that Ryder (2004) found that some project supervisors expected the project to achieve a wide range of learning outcomes. Furthermore, several of the students in his study had little understanding of the broader scientific background to their project at the start of the work.

The chance to work with a specific member of staff was also significantly less important (p<0.05) to students than staff predicted (Figure 1, 1B). For some time, titles had been provided anonymously at LJMU so as to reduce the influence of staff popularity upon choice. However, anonymity had only partly solved the problem of balancing staff loading. It is possible that staff research interests are clear in their teaching and thus students becoming interested in these subject areas picked out appropriate titles without formally knowing which member of staff was offering the project. The comments made by students about choosing subject areas have to some extent supported this view and the resultant amendment to the project choices form is facilitating matching the students to the various tutors offering projects in each subject area.

The lowest ranked item for both staff and students, with a score of about 3, indicating a generally neutral response, was the opportunity for a non-laboratory based project (Figure 1, 1E). This is a route currently taken by few students, and generally involves design of a survey, collection and analysis of data, to meet the same learning outcomes as students achieve with a laboratory-based project. Subject benchmarks, external examiners and professional bodies associated with the programmes in the School all favour

students undertaking laboratory work in their projects wherever possible. However, the specific interests of the student or unexpected problems in the laboratory occasionally require that an alternative be available. Moreover, non-laboratory-based projects are often offered as referral opportunities to students who failed a laboratory-based project at the first attempt. Some departments do offer alternatives to the traditional laboratory-based project (see for example, LTSN Bioscience/Centre for Biosciences event reports, 2004 and 2005). The neutral score for this item suggests that students and staff have no strong feelings about these projects and therefore the authors suggest their retention as fallback opportunities under difficult circumstances.

An unexpected result was the importance placed by students on the timing of the project. This item had only been included in the questionnaire after the pilot study, as students had indicated this was a factor they took into account when making their choices. In retrospect, it may have been useful to expand on this item to get more detailed analysis on the aspect of timing that was important. For example, when staff provided titles for projects, part of the information given was whether the project would run in semester 1, semester 2 or over the whole year (spanning the Christmas vacation). For students choosing their final year option modules and trying to achieve a balanced workload over the year this may have been an important factor to take into consideration. The only question on the timing of projects focussed on the influence of time within the academic year. In addition to trying to balance workload between semesters, the students may also have been concerned about the time in the week when the project would run. Many spend significant hours in paid employment and have to fit their academic studies around a fixed commitment to their employer. Likewise, those with childcare concerns can be restricted in the time they are available. Those who commute a significant distance may be reluctant to come into the University to spend a short time each day in the laboratory, preferring one or two long days to an hour or so here and there. Again, allocation through subject area and subsequent negotiation between the student and the allocated tutor should resolve this issue, and may enable a student to become involved in an area from which they could otherwise have felt excluded.

Role of the project tutor

Most of the questions relating to the expected role of the project tutor concerned the day-to-day execution of the project and production of the report (Figure 2). They reflected the views of the authors on the role of the project tutor when the research began. Students did not suggest any changes or additions to this section. However, the responses show that staff overestimated the importance that students place on each aspect of the role. For some of these – ‘giving general direction and advice’, ‘help with interpretation of results’, and ‘giving guidance on writing up’ – there was a significant difference ($p<0.01$) between the expectations of the students and the staff predictions of the importance of that characteristic (Figure 2). Staff perceive their role primarily as supporting development of the skills involved in research. Students, on the other hand, may view the project as a chance to test their own skills, and therefore wish to have more autonomy. However, correlations between the items suggest that students who rated any one of the

project tutor's roles highly were likely to feel that they were all important (Table 6). For example, 'giving general direction' (Table 6, 5A) showed a statistically significant correlation with 'giving technical advice' (Table 6, 5B, r=0.430, p<0.01), 'providing background information' (Table 6, 5C, r=0.237, p<0.05), 'allowing student input into project design' (Table 6, 5D, r=0.269, p<0.05), 'help with interpreting results' (Table 6, 5E, r=0.349, p<0.01), 'acting as a personal tutor' (Table 6, 5G, r=0.273, p<0.05), and 'acting as a future referee' (Table 6, 5H, r=0.290, p<0.01).

The one area where students rated the characteristic more highly than the staff expected was the role as both personal and final year tutor. In the context of this case study this represents a pastoral role, getting to know the personal circumstances of the student as she/he progresses through the final year of study, providing academic advice and sometimes careers guidance, and generally being a friend to the student. This may indicate that as the student is progressing through the programme the role of academic staff may be seen to develop from mainly scholastic towards personal support. It may also reflect a more general view that students value the personal relationships they develop with academic staff more than is realised. For example, a recent study showed that medical students valued facilitation skills more than content expertise in health tutors (Trevena, 2003).

Reflection and wider context

Elliott and Shin (2002) have shown that students' overall assessment of their satisfaction does not always agree with an objective analysis of individual components contributing to that satisfaction. From the results shown here, it seems that merely asking students if they had a satisfactory experience of project allocation, as can happen in some attempts to gain student feedback in a whole module or even a whole programme context, would lose a great deal of useful information. This piece of action research has resulted in several improvements to our project allocation process - for example, refining the choice of subject areas. Whereas previously there was an informal induction and planning process, the student must now submit a plan giving the aims and objectives of the proposed work and a timetable indicating milestones, for time management purposes. The plan is subject to formal approval before the student can start any practical work. This ensures that each student has developed a clear understanding of what he/she is trying to achieve before work commences and enables the tutor to keep a check on progress against a predetermined and agreed set of objectives. Plans enable students to manage their time effectively and account for any times of unavailability, for example half terms if they have school age children. The project module leader can also use them to assess project comparability in terms of workload and expectations. Another recent introduction has been the logging of meetings between tutor and student, to ensure there is a record of regular contact.

The first iteration of the student questionnaire enabled the authors to provide staff with information about the factors that had been important to students when they had chosen from a list of titles, in order to help guide the development of projects under the system of subject area allocation. Similarly,

knowledge about students' expectations of their project tutor has enabled staff to reflect on the ways they can best meet student needs within the project. The suggestion, based on data from the student questionnaire, that staff could be more 'hands off' in relation to data analysis and writing has met with mixed responses as the learning outcomes of the project module reflect training in data analysis and presentation and it is hard to balance the need for training with the request for more autonomy. Staff responses may be influenced here by a view, supported by comments from an external examiner, that training in writing is part of a tutor's role. Students would have been responding on the basis of their individual perceptions, while staff would have several years of collective experience behind their answers, so the two responses may not be entirely comparable.

This investigation is now being extended. The views of external tutors and part-time students, in particular, are being considered, to probe for any differences between these groups and the internal tutors and full-time student groups who formed the bulk of respondents in the survey reported here. It would also be of interest to determine whether mature students have a different perspective from students who have not had a break from education. Although the number of mature students in the current survey was too small for meaningful analysis, this group warrants further consideration as their views may be different from those of more traditional entrants (Hartley and Norton, 2002). Furthermore, in order to achieve a significant number of such students to analyse it may be necessary to pool data from several cohorts. It is also important to investigate whether the factors that this case study has shown to be important in Biomolecular Sciences are important for other disciplines. An investigation of related subject areas such as Pharmacy, Chemistry and Biology, is now underway in LJMU and this, together with an analysis of similar subject areas in other Universities, may enable separation of context specific from generic factors.

In this survey, the major difference found between student perceptions and staff expectations of student perceptions was whether students are looking for a straightforward or a challenging project. One possible reason for this might lie in what the different respondents mean by the terms 'challenging' and 'straightforward'. This was not investigated in the questionnaires and is currently subject to investigation by semi-structured interviews with a group of staff and students.

Conclusions

This case study has demonstrated that there is no significant difference in the factors affecting student project choices between allocation by project title and allocation by subject area followed by individual negotiation. It has highlighted the general similarity between staff predictions of and factors reported by students concerning their choice of project work, but allowed amendment of processes where appropriate and indicated areas for further investigation.

Acknowledgments

We are grateful for financial support from HEFCE funds to implement the University Learning and Teaching Strategy, and to the ILTHE for a Small

Grant awarded to JCH in 2002. We thank Mark Prosser for administrative support and John Bridson for help with production of some of the figures. We are grateful to all the staff and students who completed questionnaires, and to the reviewers and editorial board members from BEE-j who commented on the paper.

Early results and preliminary analyses of this work have been presented at the SRHE conference, Glasgow, December 2002, and the ILTHE Conference, Coventry, July 2003, as well as discussed at an LTSN Staff Development Event 'Making the most of final year projects', Cardiff, January 2004.

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