Practice and Evidence of Scholarship of Teaching and Learning in Higher Education
Vol. 1, No. 1, April 2006, pp. 37-59

The Supervision of Undergraduate Research Students: Expectations of Student and Supervisor

Susan Jamieson, PhD*
Division of Cancer Sciences & Molecular Pathology
University of Glasgow
susan.jamieson@clinmed.gla.ac.uk
Tel: 0141-330-4018

Craig Gray, PhD
University of Glasgow

Abstract

There exists a considerable literature on the supervision of postgraduate research students and on problems arising from conflict in the student/supervisor relationship, but relatively little is known about the supervision of undergraduate research students. This study aimed to survey student and supervisor expectations of undergraduate research supervision and to determine the degree of mismatch between these, if any.

The quantitative aspect of the study used a modification of Student Perceptions Of Research Supervision (SPORS), a research tool developed by the University of Western Australia, to survey a group of undergraduate medical students undertaking an intercalated science degree, and their supervisors. A focus group of students who participated in the survey subsequently provided insight into their expectations prior to and during the undergraduate research project; also, some reflection on the value of SPORS and on mediated discussion of disparity in student/supervisor expectations.

The modified SPORS tool (GM-SPORS) identified aspects of supervision accorded high and low priority by students and data from the focus group was consistent with this. GM-SPORS showed that, collectively, expectations of students and supervisors were fairly well-matched. This tool was also able to identify potentially mismatched student/supervisor

*Corresponding author

ISSN 1750-8428 (online) www.pestlhe.org.uk

pairs, in which conflict might arise. Nevertheless, most student respondents would not have wished to discuss their expectations with their supervisors: focus group participants suggested this might be due to, e.g., fear or discomfort. Nonetheless, GM-SPORS may have value if used at the outset of the research project, when it could provide a mechanism for airing student and supervisor expectations.

Keywords: undergraduate research supervision, intercalated, project, survey, SPORS

Context

As a research project supervisor for undergraduate medical students on an intercalated BSc course, one of the authors (SJ) became aware, personally and anecdotally, of problems that sometimes arose between undergraduate research students (URS) and their supervisors, regarding the role and responsibilities of the supervisor. From a search of the literature it was apparent this topic merited further exploration.

Introduction

The research project is considered a valuable component of scientific learning because it teaches empirical investigation, practical skills and concept formation (Northedge, 1997, p175). The successful outcome of the research project may be at least partly dependent on the nature of the supervision (Blaxter, Hughes & Tight, 1996, pp42-3).

Postgraduate Research Supervision

There exists a considerable literature on the supervision of postgraduate research students (PRS) and, in particular, on problems arising from student/supervisor conflict. Such conflict may arise due to differences in student and supervisor expectations (Blaxter, Hughes and Tight., 1996, p44); or due to differences in their academic styles, or ethical or moral values (Dawson, 1996). The cognitive style of the supervisor may have a bearing on quality of supervision, as perceived by students (Armstrong, 2004). There may be issues related to

gender (Heinrich, 1995); or to 'role power' (the supervisor as an authority figure/expert) and 'personal power' (individual assertiveness, personality) (Benesch, 1999).

Different supervisory models exist, possibly reflecting underlying beliefs about learning and about the relationship between student and supervisor (reviewed in Wisker, 2005, pp25-29). Anderson (1988) defined four supervisory styles: direct active (initiating, criticising, telling, directing); indirect active (canvassing opinions and suggestions, asking for explanations or justifications of students' statements); indirect passive (listening, waiting for students to think things through for themselves/solve their own problems); and passive (having no input, being unresponsive to students' input). Of these, Gurr (2001) suggests 'indirect active' and 'indirect passive' are appropriate to the supervision of PRS. Different students may prefer and respond better to different supervisory styles. Students may also require different supervisory styles from an individual supervisor as they progress through their postgraduate research project.

Armstrong & Shanker observed (1983, p177) that "little is known about the supervision of undergraduate research students". Yet it is important to address this issue, since for many students the undergraduate research project is their first opportunity to experience (semi-) independent research and an important opportunity to acquire the skills of which Northedge (1997, p177) speaks. Just as the PRS/supervisor relationship is considered critical for achievement of the goals of postgraduate study (Stykes & Radloff, 2001), so might we expect the URS/supervisor relationship to be essential to the successful outcome of the undergraduate research project.

Undergraduate Research Supervision

Are URS expectations similar to those of PRS? Are there likely to be issues peculiar to the URS/supervisor relationship? For example, one might envisage that the problem of role power could be exacerbated by the relative immaturity of URS, as opposed to PRS. On the other hand, URS will not have had their expectations shaped by experiences with a previous research supervisor. With regard to supervision style, supervisors of URS might feel the need to adopt a more directive role (i.e. 'direct active'), and this may or may not sit well with students.

Among those few studies directed at supervision of URS, Stefani, Tariq, Heylings & Butcher (1997) analysed the student's and supervisor's preconceptions on the nature of the research *project*; whilst Acker & Hammick (1998) focused on gender issues.

Of particular interest with regard to potential sources of URS/supervisor conflict would be the expectations brought to the project both by URS *and* their supervisors, especially in regard to supervisory style. Armstrong & Shanker (1983, p.182) investigated expectations from the *student's* standpoint but recognised that "to obtain a deeper understanding [of URS supervision] … it would be necessary to survey staff opinion as well." This was one aim of the quantitative aspect of the study described herein, which sought to survey URS and supervisor expectations and to investigate the extent of mismatch in these. Subsequently, a focus group of students who had completed the questionnaire provided qualitative information about student expectations, with regard to undergraduate research supervision. They also reflected on the value of a tool to measure student and supervisor expectations, and of mediated discussion of disparity in these.

Aims of study

Specifically, from analysing parallel questionnaires distributed to a group of URS and their supervisors, the quantitative aspect of this study aimed:

(a) to determine which aspects of research supervision were deemed by each group to be of greater or lesser priority;
(b) to examine the match between the collective expectations of students and the collective expectations of supervisors, to identify areas of supervision that could potentially lead to conflict; and
(c) to examine the responses of individual URS/supervisor pairs to see how closely their expectations matched.

Additionally, the qualitative aspect of the study aimed:

(d) to provide insight into student expectations of supervision at the outset of and during their undergraduate research project; and

(e) to elicit views on the value of the modified SPORS tool (see methodology) and of mediated discussion of disparity in URS/supervisor expectations

Design and Methodology

Samples

The student sample comprised 54 undergraduate medical students undertaking an intercalated B.Sc. (Med. Sci.) degree at the University of Glasgow; of these, three subsequently participated in a focus group. The supervisor sample comprised 49 University/NHS staff members. At the time this study was initiated, ethical approval was not required; access to students and staff was obtained via Course Coordinators.

Questionnaires

The quantitative research tool employed in this study was a modification of 'SPORS' (Student Perceptions Of Research Supervision). This tool was devised by members of the Evaluation of Teaching Unit at the University of Western Australia (UWA) and is described on that University's web-site (http://www.catl.uwa.edu.au/evaluation_of_teaching_unit/spors) and in a paper presented to an Australian National Conference on postgraduate education (Wijesundera, Hicks & Mann, 1996).

SPORS employs parallel questionnaires to ascertain the supervision style preferred by the student and the current style employed by their supervisor. Responses are measured using Likert-type rating scales; participants indicate the priority they attach to particular aspects of supervisory practice, using an ordinal scale of 5 for high priority through to 1 for low priority.

At UWA, the student and supervisor are invited to exchange questionnaires and discuss the relative ratings. Neither supervisor nor student is asked to rate or comment on the

other's *performance* – the purpose of SPORS is to allow students and supervisors to air their expectations; and to facilitate student/supervisor interaction without judgment or confrontation. Student/supervisor pairs have the option of inviting a third party to facilitate/mediate their discussion.

The Glasgow Modification of SPORS (GM-SPORS) closely followed the original questionnaires; any differences took account of the fact that student participants were URS and that their submitted work would not be a thesis, but a mock research paper.

Each student and supervisor received a copy of the appropriate GM-SPORS questionnaire: of necessity, student questionnaires were disseminated by their Course Coordinator at the end-of-year degree exam, and students were asked to complete the questionnaire in their own time; supervisors received their questionnaires by internal mail. To maximise the response rate, in each case an explanatory letter and self-addressed envelope were enclosed (Hoinville & Jowell, 1978, cited by Cohen, Manion and Morrison., 2000, p262). Participation was voluntary; the return of a completed questionnaire was taken to imply consent. Respondents had the option of providing their name; the enclosed letter explained that identification of respondents would facilitate exploration of the match between expectations of individual URS/supervisor pairs.

It was *not* part of the present study to have students and supervisors discuss relative ratings. Instead, to gauge the level of interest in such a discussion, participants were asked whether they *would have been* interested in doing this. They were also given the opportunity to make free-text comments.

Statistical analysis of quantitative data

Quantitative data was recorded and analysed using Minitab Statistical Software. Non-parametric statistical tests appropriate to ordinal data were employed (Jamieson, 2004; Pett, 1997, p27), viz. the Mann-Whitney U-test (Clegg, 1998, pp75-77; Pett, 1997, pp169-180) and the Sign Test (Clegg, 1998, pp71-75; Pett, 1997, pp105-112).

Focus group

To further explore student expectations of undergraduate research supervision, the sample student group was emailed to invite those who had responded to the questionnaire to attend a focus group. Three students participated in the focus group, which was conducted some 20 months after the quantitative aspect of the study, due in part to the timing of questionnaire distribution (at the end of an academic session), and subsequent difficulties in recruiting focus group participants.

An experienced educational researcher not known to the students led the focus group. The authors prepared a list of questions to be used as prompts. Initial questions were designed to put the students at ease and to get them to recall the time before and during their undergraduate research project. The proceedings (~90 minutes) were recorded with the consent of all participants, and subsequently transcribed.

Analytical coding of the text was performed essentially according to Richards (2005, pp90, 94-5); the text was read several times to get a 'flavour' of the entire discussion, then scanned line-by-line to identify data to be included in categories that were created and modified as coding proceeded. Categories were generated that related to various aspects of the research project, e.g., positive aspects, negative aspects, process, rewards; and some of these were broken down into subcategories, e.g., positive aspects included emotions, skills, attributes, achievement. Categories specifically related to the research question (expectations of undergraduate research supervision) and to the utility of SPORS/mediated discussion included: independence, choosing a supervisor, availability of supervisor, potential attributes of supervisor, priorities given to aspects of undergraduate research supervision, value of guidelines on undergraduate research supervision, acknowledging supervisor's perspective, value of SPORS for student, value of SPORS for supervisor, and dealing with URS/supervisor conflict.

Results & Discussion

Response rate for questionnaires

Thirty-six student responses were obtained (67%), whilst the response rate for supervisors was 39 from a sample of 49 (80%). This easily surpassed the 50% response rate deemed acceptable by Cohen, Manion and Morrison. (2000, p262).

Priorities given by students to various aspects of supervision

Table 1 lists the median ratings collectively accorded to specific aspects of undergraduate research supervision by the students and also by their supervisors. Of 33 items (aspects of supervision) scored, students collectively rated 22 to be of relatively-high priority (median of 4) and 5 to be of high priority (median of 5). Of the remainder, 4 aspects were rated of average priority (median of 3), with only 2 of relatively-low priority (median of 2). Those items deemed least important by the students as a whole were that the supervisor keep records of meetings/advice given; and that the supervisor provide help with issues relating to the student's personal life, employment, or technical training outwith the specific requirements of the research project. High priority was accorded to the supervisor being well-informed about the course and the research project; being available and easy to approach about any problem; being interested in the project; providing comment on the student's work during the writing-up stage; and ensuring that the project was of appropriate size and degree of difficulty.

Table 1 Median ratings for priority accorded to specific aspects of supervision

Item	The priority the respondent would place on a Research Supervisor:	Student Median	S'visors' Median
1.	Being well informed about the different aspects of the course/research project	5	4
2.	Helping the student with topic selection.	4	3
3.	Relaying to student the extent of support available (resources and expertise).	4	4
4.	Informing the student of their expectations in regard to performance and progress.	4	4
5.	Monitoring and providing feedback about the student's performance.	4	5
6.	Treating all students equitably/ fairly in terms of the supervisor's time and effort.	4	5
7.	Giving the student new ideas for alternative research directions.	4	4
8.	Helping the student to identify important goals.	4	4
9.	Providing a lot of detailed supervision (quantity).	3	3
10.	Providing pointed/ pertinent supervision.	4	4
11.	Maintaining close regular contact/ meetings on a pre-arranged schedule.	4	4
12.	Keeping records of all meetings with the student and indicating action taken or advice given.	2	2
13.	Requiring written work on a pre-arranged schedule so progress can be assessed in good time.	4	4
14.	Being available and easy to approach about any problem.	5	5
15.	Giving the student strong encouragement in her or his research.	4	5
16.	Answering the student's specific questions.	4	5
17.	Having general expertise in supervising research.	4	4
18.	Being an expert in the area of research supervised.	4	4
19.	Sharing their knowledge with the student.	4	4
20.	Supporting the student on technical issues and problems.	4	4
21.	Being interested in the student's research project.	5	5
22.	Listening to and respecting the student's existing knowledge and skills.	4	4
23.	Introducing the student to scholarly networks (departmental seminars, other researchers).	4	3

24.	Assisting the student to consult other people for expertise.	4	4
25.	Encouraging the student to explore issues for herself/ himself.	4	5
26.	Making available regular discussion groups combining the supervisor's students and other students.	3	2.5
27.	Encouraging the student to become interested in areas outside her/ his research topic.	3	3
28.	Suggesting ways that the student could make the most effective use of time.	3	3
29.	Giving the student support and guidance in preparation of his or her Research Paper, Portfolio, etc.	4	4
30.	Commenting on the content and drafts of his or her written work.	5	5
31.	Helping the student to develop academic writing skills.	4	4
32.	Helping student on extra-research issues such as personal life, employment and technical training.	2	3
33.	Ensuring that the student has a project of appropriate size & degree of difficulty.	5	4

Since the URS collectively rated many of the items in GM-SPORS as being of high- or relatively-high priority, the implication is these aspects of supervision resonated with them; i.e., expectations of URS may not be so different from those of PRS, for whom SPORS was designed. Nevertheless, when asked for their reaction, focus group participants felt the collective student priorities reflected the timing of the study: "It's really apparent we did this when we were being examined". In their view, this accounted for the high priority accorded to items related to writing up and equity of task (commenting on the content and drafts of the student's written work; ensuring the student has a project of an appropriate size and degree of difficulty).

Nonetheless, analysis of the focus group discussion supported the survey data to an extent, adding to its credibility. The focus group concurred with the high priority given to the supervisor being available and easy to approach; this was a recurring theme throughout the discussion. One participant was explicit in his expectation: "I thought I would see him on a regular, steady basis". One student was happy with regular, scheduled meetings, which not only ensured contact with her supervisor, but helped her set targets, giving her "a

weekly goal to work towards". But participants recognised it could be advantageous to have a supervisor present for extended periods, someone who was "gonna [sic] be there to help you", someone able to give them "a bit more time". Students perceived that one particular supervisor's value lay partly in that "he's in the lab all the time" and a common perception was that scientists/clinical scientists may give their students more time than clinicians.

The focus group agreed it was "important" and "encouraging" to know the supervisor was interested in the project. Participants commented about variation in the size and scale of projects, saying some were "enormous", whereas "other people seemed to [get] quite small, neat easy things", but they did not seem to feel that determination of project size/difficulty was specifically or solely the remit of the supervisor.

Interestingly, with regard to the low priority accorded by the surveyed students to supervisors keeping records of meetings, one focus group participant explicitly saw that as *her* responsibility and "kept [her] own records in [her] diary of…things…discussed".

Priorities given by supervisors to various aspects of supervision

Supervisors collectively rated 17 of 33 aspects of supervision to be of relatively-high priority (median of 4) in terms of their current supervisory practice (Table 1). Eight items were accorded high priority (median of 5); 6 average priority (median of 3) and 2 relatively-low priority (median of 2 or 2.5). Supervisors did not regard the keeping of records/advice given to be particularly important; and collectively attached relatively low priority to the provision of discussion groups. Supervisors mirrored the views of their students in collectively attaching high priority to being available and easy to approach with any problem; being interested in the project; and providing comment on the student's work during the writing-up stage. Other items accorded high priority by supervisors were: monitoring of the student's performance and provision of feedback; giving each student a fair share of the supervisor's time and effort; providing encouragement; answering the student's specific questions; and encouraging the student to explore issues for himself/herself.

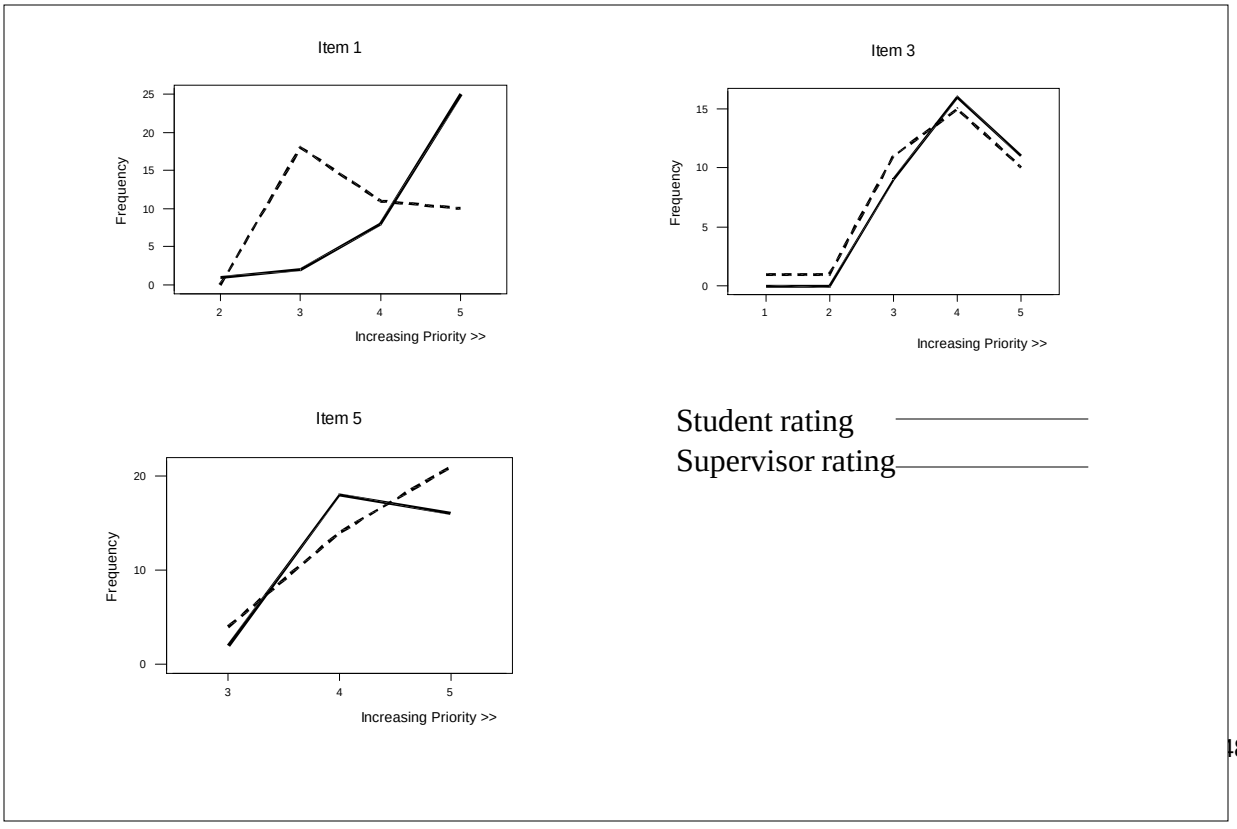
Match between collective student opinion and collective supervisor opinion

Table 1 indicates that whilst there was not absolute agreement on those aspects of supervision collectively deemed by students to be of high priority, and those collectively accorded high priority by supervisors, the disparity in median scores was never >1 for these, or indeed any, items.

To explore this further, for each item, the frequency of different possible responses was calculated for students and for supervisors. Selected paired frequency polygons of URS/supervisor responses are shown in Figure 1.

For some items, the pattern of response (i.e. shape of paired polygons) for students and supervisors is very closely-matched (e.g., Item 3). Other paired polygons are less closely-matched (Item 5), but suggest that there is still broad agreement between students and supervisors. A few paired polygons (e.g. Item 1) indicate that for these items there may be a subtle difference in the priority accorded them *within* the student and supervisor samples, not easily apparent from simply comparing the median responses for each sample.

Figure 1 Selected paired frequency polygons of responses to specific items by students and by supervisors



Application of the Mann-Whitney U-test to the relative priorities accorded to each item revealed a statistically-significant difference ($P \leq 0.05$) between the collective supervisor and collective student opinion with respect to items 1, 2, 12, 15 and 23 (Table 2).

Table 2 Statistically-different responses between student and supervisor samples

Item		Level of significance
1.	Being well informed about the different aspects of the course/Research project	$P \leq 0.0001$
2.	Helping the student with topic selection.	$P \leq 0.025$
12.	Keeping records of all meetings with the student and indicating action taken or advice given.	$P \leq 0.05$
15.	Giving the student strong encouragement in her or his research.	$P \leq 0.025$
23.	Introducing the student to scholarly networks (departmental seminars, other researchers).	$P \leq 0.025$

These disparate opinions were not obvious from simple comparison of the median ratings given by each group. This was especially true in the case of item 12 (keeping records of meetings and of action taken/advice given), since both groups gave this a median score of 2 (relatively-low priority). However, a closer look reveals that 18/35 (51%) of students responding to this item rated it as being of low or relatively-low priority (score of 1 or 2). However, as many as 30/39 (77%) of supervisors deemed this item to be of low or relatively-low priority. Thus, whilst each group collectively regarded item 12 as one of the least important aspects of supervision, there *was* a significant difference in the *proportion* of each sample that accorded this item low priority, revealed using the Mann-Whitney U-test.

Degree of match in expectations of individual URS/supervisor pairs

The above data show the considerable extent of agreement between students as a whole and supervisors as a whole. However, they also reveal that apparent concordance in the priority attached by each group to an aspect of supervision can mask variation in the range of individual responses *within* each group. Potentially, the general agreement between the two groups could mask a mismatch between individual student/supervisor pairs.

To investigate this, responses given by an individual student were compared with those given by his/her supervisor, using the Sign Test, which measures whether there is a significant difference in their ratings *across all items*.

There were 30 student/supervisor pairs amongst the respondents. At the 95% limit of confidence, there was a statistically-significant difference in response across all items between 9 (30%) student/supervisor pairs (Table 3). Five of these (17% of total) showed a highly significant difference in response ($P \leq 0.01$). For each of these 5 student/supervisor pairs, differences of 2 or more were found in the rating they gave each of several SPORS items. For example, with Pair A11/B12, the student accorded item 12 (supervisor keeping records of meetings) low priority (score of 1) whilst the supervisor accorded this relatively-high priority (score of 4); for Pair A23/B23, whilst the student accorded high priority (score of 5) to item 7 (supervisor giving student new ideas for alternative research directions), his/her supervisor thought this was of relatively-low priority (score of 2).

Table 3 Significant differences in responses from individual student/supervisor pairs (Sign Test, two-tailed)

Student	Supervisor	S	N	Level of significance
A1 *	B1	9	23	NS
A1 *	B2	9	20	NS
A3	B4	9	22	NS
A4	B5	8	23	NS
A8	B9	7	18	NS
A11	B12	1	23	$P \leq 0.001$
A12	B13	6	17	NS
A17	B17	4	19	$P \leq 0.05$
A18	B18	6	21	NS
A19	B19	2	13	$P \leq 0.05$
A23	B23	2	25	$P \leq 0.001$
A24	B24 ♦	11	22	NS
A26	B27	8	25	NS
A28	B28	5	21	$P \leq 0.05$

Key:

S ~ smaller of the number of positive or the number of negative differences between paired data

N ~ number of informative pairs of data (i.e. number of SPORS items where the student's and supervisor's ratings differ)

* ~ students with two supervisors

♦ ~ supervisors of two students

NS ~ student and supervisor responses not significantly different

A29	B24 ♦	5	22	$P \leq 0.05$
A30	B29	11	24	NS
A31	B30	5	15	NS
A34 *	B32	9	29	NS
A34 *	B33	10	27	NS
A35	B34	9	18	NS
A36	B35	1	19	$P \leq 0.001$
A37	B31	6	28	$P \leq 0.01$
A39	B37 ♦	3	14	NS
A40	B37 ♦	4	25	$P \leq 0.001$
A41	B38	4	15	NS
A45	B42	10	22	NS
A48	B45 ♦	7	20	NS
A49	B46	7	23	NS
A51	B45 ♦	6	17	NS
A52	B48	7	22	NS

For these 5 potentially mismatched URS/supervisor pairs, Table 4 lists the SPORS items over which they most differed. There was no single item common to all, but items 20 (supporting the student on technical issues and problems) and 22 (listening to and respecting the student's existing knowledge and skills) were differentially rated by 3 of these 5 pairs.

Table 4 'Mismatched' pairs: SPORS items where the difference between the student rating and the supervisor rating was 2, or more

Pair	Items for which their respective ratings differed by 2, or more
A11/B12	7,12,13,15,17,18,20,21,30 (n=9)
A23/B23	2,3,5,7,8,11,16,22,23,25,32 (n=11)
A36/B35	1,9,12,13,26,32 (n=6)
A37/B31	8,9,10, 20,22,24,26,27,28 (n=9)
A40/B37	5,6,10,11,16,20,22,24,27,29 (n=10)

Joint supervision/multiple students

Students A1 and A34 received joint supervision. For each student, his/her pattern of response was not significantly different to that of either supervisor (Table 3).

Three supervisors were each responsible for supervising two different students. Supervisor B45 was paired with students A48 and A51; in neither case was there a significant difference of response. Supervisor B24 was paired with students A24 and A29. There was no significant difference in response between A24/B24; but there *was* a statistically-significant difference ($P \leq 0.05$) in the response of this supervisor compared with his/her other student (A29: Table 3). Supervisor B37 was paired with students A39 and A40. Again, there was a statistically-significant difference ($P \leq 0.001$) between the response of this supervisor and one of his/her students (A40). The fact that B24 and B37 each showed a mismatch with only one of their two students supports the notion that some URS/supervisor pairings are likely to be more harmonious than others.

Differences in supervisor style

A closer look at individual supervisor responses does confirm that differences in style exist between supervisors in this study. For example, whilst the median rating accorded by supervisors (and students) to item 9 (providing lots of detailed supervision) was 3 (average priority), 3 supervisors rated this item as being of low priority (score of 1); but 1 supervisor (B26) accorded this item high priority (score of 5). This individual may adopt a more ‘direct active’ supervisory style. Unfortunately, since the student supervised by B26 did not return the GM-SPORS questionnaire, it is impossible to say anything further about URS/supervisor compatibility in this pairing.

In any case, it may not be safe to make assumptions about a supervisor’s style solely from his/her responses to the GM-SPORS questionnaire. For example, supervisor B48 gave item 20 (supporting the student on technical issues and problems) a rating of 1 (low priority). This may indicate a supervisor with a very ‘hands-off’ approach, possibly moving towards the ‘indirect passive/passive’ end of the spectrum. However, his/her student (A52)

was jointly supervised, although the second supervisor did not participate in the study. Possibly this second supervisor provided any technical support that was required. Alternatively, student A52 may have been particularly able and not much in need of technical support. Supervisor B48 may have recognised this and modified his/her supervisory style accordingly. In any case, student A52 evidently received supervision to his/her satisfaction, as indicated in the following text response:

> "I have had two superb supervisors … after reading some of the comments which sound like an 'ideal' supervisor, I realised how many of these criteria were fulfilled by my supervisors".

Perceived value of discussing mismatch in URS/supervisor expectations

Students and supervisors were asked whether they would have been interested in discussing their relative ratings of GM-SPORS items (aspects of supervision). Of the 34 students who answered this question, 21 (62%) said "No". One focus group participant suggested a negative response from her may have reflected the fact that she "was quite happy". However, other possible reasons for not wanting to discuss relative GM-SPORS ratings with a supervisor were identified: being "scared of him"; or that it would be "very difficult to go and meet somebody in that situation…very, very awkward".

In fact, focus group participants questioned whether it was realistic to expect a perfect match in expectations. They seemed to feel supervisors' expectations should hold sway since URS were "inexperienced" and "still learning". They also implied it might be naïve to expect supervisors to modify their views: in particular, with regard to "hospital consultants….what they say goes". As for dealing with URS/supervisor conflict, focus group participants felt: "you just work through it like …any other relationship"; common sense is how not to inflame the situation"; and "that's part of the learning experience …resolving the problems …how you work …with other people". These students suggested that a more valuable resource could be former URS who had successfully completed their projects: they could provide a mentoring function, for anything from choosing a supervisor, to simply providing moral support during the difficult spells.

Reflections & Conclusions

Limitations of the study

One potential limitation of this study is the use of a tool (GM-SPORS) that is itself a modification of one for which limited validation has been carried out, and which is primarily used by a single institution (UWA). However, the differences between GM-SPORS and the original tool are minimal, relating to the fact that GM-SPORS is intended for use with URS and that the output of their research is a mock research paper, rather than a thesis. Wijesundera, Hicks and Mann. (1996) presented their development of SPORS at a National Conference on Quality in Postgraduate Research, Australia. Their conference paper describes how items in SPORS were chosen to represent "key practices reported in the literature", giving the tool content validity (Cohen, Manion and Morrison, 2000, p131). SPORS was piloted with 88 student/supervisor pairs at UWA in 1995, across a wide range of academic departments, and is still in use today. Although the high ratings given to many of the items in GM-SPORS implied these resonated with URS, and there was concordance between surveyed students and the focus group with regard to some highest-priority aspects of research supervision, if GM-SPORS were to be employed in further studies, it would be appropriate to address its validity more thoroughly.

The gap between conduct of the quantitative and qualitative aspects of this study was considerable. As aforesaid, this was partly due to the administration of questionnaires at the end of one academic session; and subsequent difficulties in recruiting students to participate in the focus group. Nevertheless, aspects of supervision accorded high priority by students in the survey also featured prominently in the focus group discussion, perhaps indicating that participants truly were recalling their experiences as URS, and not just benefiting from hindsight.

Another limitation was the small size of the focus group and whether these students were representative of intercalated URS. The focus group in fact identified two main types of URS: those who simply wanted to "tick the box" or prolong their period as a student; versus those who were genuinely interested in and excited by their research project. The focus group gave rich information about various aspects of the research project that were not strictly

relevant to the research question and have not been reported here, but there is clearly value in conducting further qualitative research to explore the experience of (intercalated) URS.

A novel aspect of this study was the exploration of supervisor expectations with regard to undergraduate research supervision, as advocated by Armstrong & Shanker (1983). However, no qualitative aspect was undertaken with the supervisor sample and this is an area for future research.

Timing of GM-SPORS

The present study took place at the end of the academic year, when this particular cohort of URS had not only completed their research projects, but had been assessed on these. The thinking behind this was that students might be more frank at this point. Although it had been emphasised they were *not* being asked to rate their supervisor's performance, it was always possible that some students would be concerned about 'comeback' had questionnaires been distributed earlier. However, a disadvantage with retrospective analysis of URS/supervisor compatibility is, of course, that it's too late to do anything about it (at least from that student's point of view).

A major difference between PRS and URS is the duration of their research project. For URS, there are often just 10 or 15 weeks given over to the project, and even then the student may have lectures or other teaching interspersed with lab days. Distribution of GM-SPORS questionnaires half-way through this period could allow time for an adaptation in supervisory style, if deemed necessary.

Another, better option might be for students and their supervisors to use GM-SPORS at the outset of the research project, or possibly even at an induction day for their particular course. Since participants would not know each other at this point, their responses could not be taken personally. Such an approach would allow student and supervisor expectations to be aired 'up-front' and allow for negotiation of a supervisory approach to suit both parties. Some authors advocate drawing up 'learning contracts' (Wisker, 2005, pp51-53), or 'research contracts' (Blaxter, Hughes, Tight, 1996, pp125-127), and comparison of relative ratings for GM-SPORS could provide a basis for initiating discussion

about such contracts. However, as Blaxter, Hughes and Tight, (1996) acknowledge, contracts may be too rigid, and it seems better that a low-key approach be adopted, especially with URS.

Data from GM-SPORS surveys/focus groups could inform the production of course guidelines for URS and supervisors, although focus group participants in this study were sceptical about the extent to which staff might adhere to guidelines.

Using GM-SPORS and mediation to predict and address URS/supervisor conflict

Notwithstanding its limitations, discussed above, GM-SPORS could identify a mismatch in URS/supervisor expectations and could facilitate discussion between the parties involved.

Using the Sign Test, analysis of GM-SPORS data identified nine (30%) URS/ supervisor pairs with a statistically-significant difference ($P \leq 0.05$) in their expectations with regard to research supervision. Whether this was to the detriment of the student's experience or performance in the research project could not be determined, since students were not asked about their experience and the authors did not have access to students' grades for assessment related to the research project.

Perhaps the greatest concern should be reserved for those 5 (17%) URS/supervisor pairs with very significant differences ($P \leq 0.01$) in their responses to GM-SPORS. These pairs may have benefited from discussing their expectations of research supervision, such as occurs at UWA. However, it's unlikely this would be acceptable to URS, since of those students who answered a question about their willingness to participate in such a discussion, 62% (21/34) said "no". This may indicate a reluctance to be frank about their expectations – possibly because of the 'role power' issue (Benesch, 1999). Certainly, focus group participants suggested that fear or discomfort with the situation could preclude students from entering into such a discussion.

Students in the focus group thought URS should be able to raise issues and resolve difficulties with their supervisor, directly. They suggested that dealing with conflict in the

working environment was part of the learning experience. However, they recognised the potential value of support from individuals who have gone through a similar experience and suggested that former URS might provide a useful resource for students currently undertaking research projects.

Relationship between student approach to learning and expectations of undergraduate research supervision

Text comments from surveyed students and feedback from focus group participants indicated a strong sense of personal responsibility for the outcome of their research project, as well as for the good relationship with their supervisor. It's noteworthy that this group of URS would, prior to undertaking their intercalated science degree, have spent three years on a problem-based learning (PBL)-style medical course, where self-directed learning is emphasised (Ryan, 1997, pp132). Possibly, the expectations of such URS would differ from those of students who had experienced a more traditional, didactic course. Potentially, PBL-experienced URS may expect and/or prefer less directive supervisory styles. There is clearly scope for exploring the experiences of URS who have adopted different learning approaches prior to their research project. Additionally, there may be differences in the expectations of intercalating URS and those of non-intercalating URS.

Relevance and implications for practice

The primary author (SJ) no longer supervises intercalated students undertaking science-based projects, but this study has relevance for current and future supervisors of URS. It reveals that expectations of URS may not be so different from those of PRS; that URS and supervisor expectations may broadly match; but that individual URS/supervisor pairings may be more or less harmonious, which may reflect differences in supervisor style, whether or not the supervisor is lab-based, student motivation, etc.

Feedback from surveyed students and the focus group suggests that what URS most want from their supervisors is time and interest: supervisors should be fully prepared to offer both.

Supervisors should reflect on the various aspects of supervision itemised in GM-SPORS; the variability in response *within* student and supervisor samples surveyed; and the fact that as many as 30% of URS/supervisor pairs had significantly-different expectations of research supervision. Supervisors should consider which of their personal expectations are negotiable and be prepared to adapt to a specific student's needs.

Supervisors of URS need to make clear their expectations at the outset; to ascertain the student's expectations; and, if necessary, to agree a compromise. GM-SPORS may provide a mechanism for initiating such a discussion. Course Co-ordinators could facilitate use of the questionnaire by discussing GM-SPORS items at induction events; and providing students and supervisors with GM-SPORS questionnaires along with course information documents.

Acknowledgements

Thanks are due to Prof. Bob Matthew for his constructive advice; to Dr. Lillian Murray for facilitating distribution of questionnaires; and to Ms. Lucinda Dempsie for transcription of the focus group discussion.

Sadly, Dr. Craig Gray died before this study was complete; his inclusion as second author acknowledges his valuable contribution to the statistical analysis of the quantitative data, the conduct of the focus group, and to an early draft of the paper; and his role as mentor to SJ.

References

Acker, S. & Hammick, M. (1998). Undergraduate research supervision: A gender analysis. *Studies in Higher Education*, 23 (3), 335-347.

Anderson, J. (1988). *The supervisory process in speech language pathology and audiology.* Boston: College Hill Press and Little Brown.

Armstrong, M & Shanker, V. (1983). The supervision of undergraduate research: Student perceptions of the supervisor role. *Studies in Higher Education*, 8 (2), 177-183.

Armstrong, S.J. (2004) The impact of supervisors' cognitive styles on the quality of research supervision in management education. *British Journal of Educational Psychology.* 74, 599-616.

Benesch, S. (1999). Rights analysis: Studying power relations in an academic setting. *English for specific purposes.* 18 (4), 313-327.

Blaxter, L., Hughes, C. & Tight, M. (1996). *How to research.* Buckingham: Open University Press.

Clegg, F. (1998). *Simple statistics.* Cambridge: Cambridge University Press.

Cohen, L. Manion, L. & Morrison, K. (2000) *Research methods in education* London: Routledge (5th Ed.) Ch. 14, pp253-5.

Dawson, V. (1996). The [R]Evolution of my epistemology: my experience as a postgraduate research student. *Educational Action Research*, 4 (3), 363-374.

Gurr, G.M. (2001). Negotiating the 'rackety bridge' – a dynamic model for aligning supervisory style with research student development. *Higher Education Research & Development*, 20 (1), 81-92.

Heinrich, K.T. (1995). Doctoral advisement relationships between women (On friendship and betrayal). *Journal of Higher Education*, 66 (4), 447-469.

Jamieson, S. (2004) Likert scales: How to (ab)use them? *Medical Education* 38, 1217-1218.

Northedge, A. (1997). Different ways of studying. In Northedge, A., Thomas, J., Lane, A., & Peasgood, A. (Eds.), *The sciences good study guide* (pp155-180). Milton Keynes: Open University Press.

Pett, M.A. (1997) *Nonparametric statistics for health care research.* London: SAGE Publication.

Richards, L. (2005) *Handling qualitative data: A practical guide.* London: SAGE Publications.

Ryan, G (1997) Ensuring that students develop an adequate, and well-structured, knowledge base. In Boud, D. & Feletti, G. (Eds.) *The challenge of problem-based learning (*2nd ed., pp125-136). London: Kogan Page.

Stefani, L.A.J., Tariq, V-N., Heylings, D.J.A., & Butcher, A.C. (1997) A comparison of tutor and student conceptions of undergraduate research project work. *Assessment and Evaluation in Higher Education*, 22 (3), 271-288.

Styles, I. & Radloff, A. (2001) The synergistic thesis: Student and supervisor perspectives. *Journal of Further and Higher Education*, 21 (1), 97-106.

SPORS: http://www.catl.uwa.edu.au/evaluation_of_teaching_unit/spors [accessed 27 March '06]

Wijesundera, S., Hicks, O. & Mann, S. (1996). *Exploring postgraduatesupervision: student and supervisor perceptions***.** Paper presented at the National Conference on Quality in Postgraduate Research: Is it happening? - Adelaide, Australia.

Wisker, G. (2005) *The good supervisor: Supervising postgraduate and undergraduate research for doctoral theses and dissertations.* Hampshire, England: Palgrave MacMillan.