Key Statistical Skills (KSS) Surgeries to support a Widening Participation psychology student population

(Part of the Psychology students Maths Support Programme 08-09 funded by West London Lifelong Learning Network)

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Key Statistical Surgery (KSS) Background

A host of studies have indicated that significant barriers exist for minority ethnic and various other ‘non-traditional’ student groups in terms of a positive HE experience (e.g. Archer, Hutchings & Ross, 2003), progression through programs (e.g. Solomon & Woodfield, 2005) and even in terms of actual degree marks/ outcomes (e.g. Reay, Davies, David & Ball, 2001). The attainment gap between white and ethnic minority students at UK HE institutions has consistently been reported in research conducted over the last decade (e.g. Richardson, 2008). Stuart, Lido, Morgan & May (2009) and Stuart, Lido & Morgan (Under Review), highlight the importance of engagement and emotional belonging at University for ethnic minority and under-represented student groups, and reveal that non-traditional students reported less peer support, lower engagement and less uptake of tutor support.

Many social science students world-wide find the statistical content of a psychology course challenging (Gordon, 1995; 2002). This can be particularly challenging for non-traditional students (in terms of age, entry pathways, SES and ethnicity) – who face a number of barriers to the student experience (e.g. Bowl, 2001; Solomon & Woodfield, 2005). Wyche & Graves (1992), and Baranchick & Cherkas (2002), among others, highlight that key skills in maths can act as a barrier to learning for non-traditional and under-represented student groups in Higher Education (e.g. mature, minority ethnic, lower SES and female students) within the field of the social sciences. This may especially be the case for mature students, and students from non-traditional entry pathways, studying psychology at new universities (Gordon, 2002). Therefore, it is of key importance that we recognise students’ cultural and life experiences, and assess the extent to which this background might affect a student’s comfort levels, confidence and ability to engage with topics such as Statistics in the social sciences (Epps, 2005). In other words, we must examine issues of cultural capital and belonging at University (Bourdieu, 1979; Stuart et al, 2009) in order to better deliver teaching and produce effective learning strategies for a Widening Participation (WP) population of students within UK Higher Education (HE).

To this end, West London Lifelong Learning Network provided matched funding with Thames Valley University, in order to pilot and evaluate a series of Key Statistical Skills (KSS) ‘Surgeries’ to support WP psychology students. This report will summarise briefly the project background and details, the methodology (including participant and tutor demographics), and ultimately the results illustrating the significant and positive impact of the KSS project on a diverse, Widening Participation population studying statistics in Psychology (at both undergraduate and postgraduate levels). Suggestions will be proposed to further broaden our teaching skills and curriculum delivery, encouraging ‘deep’ or engaged approach (e.g. Biggs 1999 a & b), or as Marton and Booth (1997) term it, ‘active learning’ in a ‘non-hierarchical’ environment.
KSS Program Methodology

KSS Surgeries Overview:

The interventions mainly targeted first and second year students (Levels 4 and 5) and were scheduled to occur at key time points during the academic year; namely, more than 1 week in advance of their first quantitative lab reports, as well as 1-2 weeks in advance of their statistical exams. The Statistical Skills (KSS) Surgeries took place for three days, for each tutor, on three separate key time points in Term 1, and one time point in Term 2. The first KSS was in Week 6 of Term 1- one week before the first quantitative lab reports were due for the first years (as well as the certificate students), and then another set of KSS during the reading Week 7 for second years (as well as the graduate diploma students)- one week in advance of their lab report. The final Term 1 KSS Surgeries were held in Weeks 13 (overlapping to14) before the statistical exams took place in Week 15 (the same week for all students). In term 2 there were no quantitative lab reports, and therefore KSS surgeries were only held in Week 13 before the exam. The aim was to prevent students ‘falling through the cracks’ at these four key assessment time points in the degree progression, simply as a result of their maths skills, or lack of previous maths experience (as is the case for WP students from non-traditional pathways, such as mature and non-A-level students).

During the KSS session weeks, both experts were booked appointments via ‘timetabling sheets’ with 20 minutes per surgery session- students were however allowed to attend in groups and ‘pool’ their KSS surgery times (thus, avoiding the poor attendance often found with ‘drop-in’ sessions). These sheets were circulated in lectures and posted outside the KSS surgery lab, however students were also able to book via blackboard and e-mail. Students showing up without an appointment were not sent away, and instead helped on a ‘first come’ basis (in the absence of any pre-booked appointments). Any extra appointment spaces were made available to third year students, graduate certificate and MSc students, thus most slots were booked during these key semester times.

The KSS tutors:

The delivery of this program was at one of the UK’s strongest widening-participation Universities in a demographically diverse Psychology subject group. The KSS Surgeries were staffed by two external statistical experts in the field of psychology. A background in psychology and an intimate knowledge of the BPS’ core statistical requirements was considered essential. The external nature of the tutors was also intended to send the message that these ‘Surgeries’ were to be seen as a special opportunity to be taken advantage of (rather than simply extended office hours). Thus KSS tutors recruited were unknown to the students, and not considered ‘Staff’. They were also chosen for their user-
friendly, approachable styles- both were young (late 20s), and enthusiastic researchers currently employed elsewhere. Dr. Jessica Morgan, a recent PhD student from Sussex University who was acting as a research assistant on an ESRC funded project with Dr. Catherine Lido. In addition, Gabrielle Basquine, a former TVU first class graduate beginning her MSc Occupational Psychology at Brunel student (and employed by the council in accountancy). Gabrielle was a last minute replacement for Jose Manuel Roche- a PhD candidate who pulled out last minute due to conflicts with his viva preparation.

**KSS Student Participants:**

The students which voluntarily took part consisted of a diverse sample of n= 119 students (13% Male and largely 87% female, aged between 18 and 50). All were psychology students at Thames Valley University, however the sample consisted of the following academic years: n=46 1st years, n=50 second years, n=5 third years and n=15 postgraduate. These students were on the following courses: n=103 BSc, n=11 Graduate Diploma, n=3 certificates and n=2 MSc. Most of the students were full-time, with only 9 part-time. This distribution was as expected given that the program largely targeted 1st and 2nd year BSc students.

**Figure 1: Year of Study Pie Chart**
With regard to nationality and ethnicity, n=76 were native English speakers, and n=39 were not; also, n=62 classified themselves as white, n=27 as Black or Black British, n=10 as mixed race and n=9 as other (consisting of n=1 Asian, n=4 as Indian or British Indian and n=5 as Middle Eastern). This is slightly worrying as the majority attending are white students (and those whose first language is English), and given the Widening Participation demographic it would appear that certain ethnic minorities (such as Asian students) are under-represented in attending, however Black (African, Caribbean and Black British) students were well represented in attendance. This will be discussed in conclusions. The raw percentages are as follows:

**Figure 2: Ethnicity Pie Chart (Before Recoding)**

With regard to their previous maths experience, most of the sample (67.2%) had GCSE or CSE experience with maths; fewer (17.6%) had A-level or AS-Level (1.7%). These percentages appear in line with TVU’s WP demographic, demonstrating that relatively few (approximately 18%) have A-level maths, whilst the majority have GCSEs (although many of these had the older equivalent CSEs). Therefore, the KSS was successfully attended by students who do not come with previous Maths A-levels. The frequencies are as follows:
Table 1: Previous Maths Education (Raw Frequencies & Percentages)

<table>
<thead>
<tr>
<th>Previous Maths Education</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCSE/ CSE</td>
<td>80</td>
<td>67.2</td>
<td>71.4%</td>
<td>71.4</td>
</tr>
<tr>
<td>AS-Level</td>
<td>2</td>
<td>1.7</td>
<td>1.8%</td>
<td>73.2</td>
</tr>
<tr>
<td>A-level</td>
<td>21</td>
<td>17.6</td>
<td>18.8%</td>
<td>92.0</td>
</tr>
<tr>
<td>BSc</td>
<td>1</td>
<td>.8</td>
<td>.9%</td>
<td>92.9</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>6.7</td>
<td>7.1%</td>
<td>100.0</td>
</tr>
<tr>
<td>Valid Total</td>
<td>112</td>
<td>94.1</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>7</td>
<td>5.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: Previous Education as a Pie Chart
KSS Evaluation Measures:

Following delivery, we evaluated the KSS students’ demographics, reasons for attending, satisfaction, confidence improvement and their actual measurable learning outcomes (marks). Some space was given for students’ qualitative comments (See Appendix B for questionnaire). In a final phase, Research Methods tutors’ qualitative feedback was also gathered (See Appendix D for tutor prompts). The KSS surgery evaluation questionnaire was designed by the module leaders and based on Stuart et al.’s (2008) ESRC student experience and outcomes questionnaire, as well as Jan Burgin’s general evaluation form for teaching and learning skills at TVU.

Following their Surgery session, every student completed a questionnaire. This questionnaire contained detailed demographics such as course, year of study, mode of study, sex, first language spoken, ethnicity and age, as well as more study specific demographic factors such as the level at which they have previously studies maths, and what statistical problems they are currently struggling with. Students were also asked their main reason for attending the KSS surgery, the statistics they were most and least comfortable with. Most importantly the questionnaire assessed their academic and statistical confidence both pre and post their KSS surgery visit. Other questions directly evaluated KSS on a 10 point Likert scale, and assessed specifically the helpfulness and knowledge of the KSS tutor, the usefulness of the KSS session, the organisation (and advertising) for the program, and lastly whether they would recommend the KSS sessions to a friend. Overall marks of KSS attenders and non-attenders were obtained anonymously and confidentially from the module leaders upon completion of the courses. The data were entered into SPSS version 17 and the analyses are presented in the results below.

Qualitative evaluation was also included on the questionnaire, via a text box where students were asked to ‘Please state what you found most useful in today’s KSS Surgery’, as well as ‘What would you suggest might improve today’s KSS surgery’. The results were analysed thematically, using a bottom-up approach (Braun & Clarke, 2006), and are presented in the Qualitative results section below.

Qualitative data was also gathered from the research methods tutors (n=6 of those not involved in coordinating the project) via semi-structured interviews on e-mail. Their qualitative experience of course delivery was assessed (and contrasted with retrospective reports of their experience last year). This naturalistic data was analysed using Interpretive Phenomenological Analysis (Smith, Flowers & Larkin, 2009) in order to better capture the individual experience of each tutor, and the results are presented in the Qualitative results section below.
Other Procedural Details:

The Key Statistical Skills Surgeries were both advertised and booked via Research Methods lectures, online via Research Methods Blackboard modules, as well as ‘on paper’ outside the Surgery meeting room. The lecture advert and posters around the building read "Is your statistics module giving you the cold chills? Why not try our remedy & attend a... Key Statistical Skills Surgery with a postgraduate expert in Psychology? (See Appendix A for example poster). With regard to the email office hour, students were told repeatedly through the course, on Blackboard and on posters and also: “You may e-mail KSS tutors with a stats or assessment query & they will respond Weds. 1-2 pm (Weeks 4-15).” The e-mail was given in lectures, on Blackboard and in posters and students were told to send the e-mail entitled ‘KSS’. Once the first and second years had all had a chance to sign up, the extra slots were made available to Year 3 students, as well as those on the Research Foundations course for certificate students and even the MSc Health Psychology students, yielding a very diverse psychology student sample.

In addition to the KSS ‘Surgery’ times, the two expert tutors hosted a virtual office hour every week via e-mail and blackboard, and also attended liaison meetings with the Levels 4 and 5 Research Methods module leaders on a bi-monthly basis, and KSS E-mail Help was held on Weds.(1-2pm). Each tutor received approximately n= 50 emails through-out the academic year (including repeat queries and multiple responses to a single student).

As described above both were required to 'man' KSS surgery sessions- for 3 days each at 4 key time points across the year (in Weeks 6 & 7 in Nov. and again before exams in both terms). The days and dates within those weeks were chosen by the tutors and they were often in on separate days. Unfortunately, breaks were to be taken when no students had an appointment, as no set lunch break was able to be scheduled. The rooms were Psychology team laboratories, which has been booked out for this purpose, decorated with posters (see 'Stats Doctor is in!' Door Poster in Appendix D), table cloth, and had a selection of biscuits, snacks, teas and a large window to make them feel light and airy. There was a desk for the Stats tutor, with a computer that had SPSS, all key research methods documents and the internet, as well as 3 chairs for students and student groups. Waiting room chairs were set up in the hallway outside. A KSS evaluation box was decorated and set up to hold the questionnaires, and an anonymous folder was held both by the tutor, and outside the lab (for when students overlapped) to allow anonymous collection of the data.
Quantitative Results

We received a large number (n=119) of completed evaluation questionnaires, which were entered into SPSS version 17 for analysis.

Overall Evaluation

The average tutor rating was 9.10 on a scale from 1 to 10, with a narrow standard deviation of 1.21. This indicates that there was consensus that the tutors were ‘Incredibly Helpful’. With regard to the KSS session overall, it was rated as 9.12, with SD= 1.24. Again, this indicates that there was consensus that the program was ‘Incredibly Useful’ overall. With regard to the KSS session organisation, it was rated as 8.50, with SD= 1.66. This was above the mid-point of 5, however, it was the lowest in the satisfaction ratings. This would indicate that although it was well organised, it might bear closer examination in the qualitative feedback (for instance comments about wanting more time with tutors and over-running students).

Overall, the students would very highly recommend the KSS sessions to a friend, with a mean of 9.55 out of 10 and a narrow SD= 1.15. These items were internally reliable, yielding an alpha of .89, which means that we could merge them together to obtain an overall KSS satisfaction variable. Overall the program has been immensely successful this year- as can be seen in the computed overall mean satisfaction score of M= 9.10, (SD= 1.14).

Confidence Improvement

All questionnaires indicated pre to post improvement on confidence, only 3 of the 114 reported no improvement. There were no systematic differences and improvement ranged from an improvement of 1 scale point, to 5 students showing an 8-9 point improvement (on a 10-point scale). This pre to post improvement was from a pre-confidence rating of 4.05 (on a 10-point scale), to a post confidence of 7.54. This confidence change was very highly statistically significant; F(1, 113)= 361.25, p<.001.

Confidence Improvement Sex Differences

2-way mixed-model ANOVAs confirm that this confidence change is significant and consistent regardless of whether English was the students’ first language, however there appear to be a marginal interaction with regard to whether the student was male or female [F(1,100)= 4.32, p=.07]. T-tests for simple effects to decompose this interaction reveal that female students were significantly lower in confidence before the session (p=.02). Following the session, there are no longer any sex differences in confidence (p>.05), which means that the KSS surgery was particularly useful in raising women’s confidence levels to those of the

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male students. However the cell sizes are very unequal with the majority (87%) female students.

**Graph 1: Pre to Post Confidence Improvement by Sex**

Confidence Improvement for Male and Female Students

Confidence and Previous Maths Education

There was also no significant interaction with previous education/ maths experience (p>.05), and all groups showed significant positive confidence improvement (p<.001), however, it is worth noting that those with a BSc had shown the ‘shallowest’ increase whilst those who classified their previous experience as ‘other’ showed the ‘steepest’ improvement. This would indicate, as we would expect, that the program is most beneficial to those without a ‘traditional’ maths background (such as A-level, A-S level or— for the case of those not doing a Graduate Diploma – a BSc), and raises them to a post confidence level that is now higher than those with an A-S level. Those with a BSc perhaps show the least improvement, however they start out highest in confidence and therefore these students (the Graduate Diploma students) have a ceiling effect (i.e. less room for improvement). These patterns are illustrated in the figure below.
Graph 2: Pre to Post Confidence Improvement by Previous Education

Confidence and Year of Study

Also, with regard to year of study, it is worth noting that all years showed significant and positive improvement (p<.001), however, the first years showing the steepest increase in confidence, and were significantly higher in confidence change than graduate student (p<.05) and marginally more than second year students (p<.001)- as would be expected given the comment above that those already with a degree have less room for confidence improvement. Therefore the KSS is most beneficial for the first year undergraduate students.

Confidence and Ethnicity

Ethnicity was broadly self-defined as ‘whatever they perceived their ethnicity to be’. This was recoded in order to meet minimal cell requirements for ANOVA, thus yielding 4 broad categories (without regard to nationality). They were namely White, Black, Mixed-race and Asian/Other (which consisted of Indian, Asian and Middle Eastern). With regard to ethnicity, again the improvement is consistent and significant (p<.001) across all ethnic categories, thus there is no interaction of confidence improvement with ethnicity (p>.05).
There were no overall significant differences in confidence by ethnicity (p>.05; although Black students were lower, and Mixed race the highest, this was not statistically significant), nor were there differences in ethnicity when combining it with student age, meaning that the improvement occurred for all students, regardless of ethnicity. What may be of interest here is the ethnicity of those attending, and the fact that Asian students overall appear to be not attending when compared to Black and Mixed-race minority ethnic students.

**Graph 3: Pre to Post Confidence Improvement by Ethnicity**

**Confidence and Age**
There was no significant relationship between age and confidence improvement (r= -.08, p>.05), however the older students were significantly more positive about the KSS program overall (r=.21, p<.05). Regardless of age those who showed the largest confidence improvement reported the highest satisfaction (r=.44, p<.001).

However, the only significant two-way interaction in this study concerns age. There was a highly significant interaction between Student Age (Traditional vs. Mature) and Confidence improvement [F(1, 112)= 9.08, p<.01], whereby there is no confidence difference Pre the KSS (although Mature students are slightly lower), and following KSS Mature students are now more confident than traditional. Caution must be used in terms of interpreting these findings, as given government definitions of mature as being over 21, the sample is largely (n=94) Mature by definition. However, the pattern in the graph below remains of interest.

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Graph 4: Pre to Post Confidence Improvement by Age

Confidence Improvement for Mature & Traditional Students

Findings Regarding Student Outcomes (Marks)

At the end of the academic year, marks were gathered from the two major cohorts of students, namely attendees from the first and second year, undergraduate BSc Psychology Research methods courses. These were examined descriptively, and it was found that the marks of those attending were significantly negatively skewed (Skewness statistic= -.80, when accounting standard error, this rises to -3.08). This indicates that more attending students than would be expected achieved high marks. Anecdotally, this distribution shows more negative skew than the overall course distributions including the non-attenders. However, the marks of the attendees are unrelated to any confidence improvement, nor with any evaluation of the KSS program. Finally, a further statistical comparison of attendee to non-attendee marks, reveals no significant differences in a t-test (p>.05), which is no surprising given the lack of control, and number of confounding variables in this study.
The negative skew of attendees’ scores is of interest; it may be the case that those attending are receiving more support and therefore achieving higher marks, or alternatively it may be that the keener, more highly achieving students are more likely to attend. This could be assessed by running the program longitudinally. It is suggested that if this program runs again next year, progression of students’ marks can be stringently tested by examining the repeated measures improvement of attendees and non-attendees from year one to year 2 research methods.

**KSS Students’ Reason for Attending**

When students were asked the reason for attending the KSS sessions, their answers centred mainly around assessment help. As can be seen in the ranked table below, this was closely followed by, general help (which may concerns seeking emotional reinforcement and support from a tutor). However, the next few answers surround interpreting results (such as being able to interpret significance and write this up sensibly), being able to ender data into SPSS properly (including recoding, transforming and computing means), and finally (ranked 6th) being able to know exactly what each feature is on the SPSS output (and again being able to interpret significant findings here). Ranked 5th was exam preparation help (which is interesting as each course had a revision session). Finally only one student admitted to using KSS for ‘catch up’ (as it was stressed that these sessions were not to be used in place of attendance), and one for their dissertation (as few third years had access to the scheme).

**Table 2: Reason for Attending KSS (Raw Frequencies & Percentages)**

<table>
<thead>
<tr>
<th>Rank &amp; Help Topic</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment Help</td>
<td>45</td>
<td>37.8%</td>
<td>38.5%</td>
<td>38.6%</td>
</tr>
<tr>
<td>2. Generalised Help</td>
<td>35</td>
<td>29.4%</td>
<td>29.9%</td>
<td>68.4%</td>
</tr>
<tr>
<td>3. Results help</td>
<td>13</td>
<td>10.9%</td>
<td>11.1%</td>
<td>79.5%</td>
</tr>
<tr>
<td>4. SPSS data help</td>
<td>9</td>
<td>7.6%</td>
<td>7.7%</td>
<td>87.2%</td>
</tr>
<tr>
<td>5. Exam preparation</td>
<td>7</td>
<td>5.9%</td>
<td>6.0%</td>
<td>93.2%</td>
</tr>
<tr>
<td>6. SPSS output interpretation</td>
<td>6</td>
<td>5.0%</td>
<td>5.1%</td>
<td>98.3%</td>
</tr>
<tr>
<td>7. catch up help</td>
<td>1</td>
<td>.8%</td>
<td>.9%</td>
<td>99.1%</td>
</tr>
<tr>
<td>8. Dissertation help</td>
<td>1</td>
<td>.8%</td>
<td>.9%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Valid Total</td>
<td>117</td>
<td>98.3%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td>1.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>100.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Unfortunately, it was not possible to reliably assess what the students’ felt was their best and worst statistical skill, as each yielded over 50% missing data. This maybe as it appeared repetitive, or it may indicate some insecurity in naming statistics, however, when asked what their main statistical problem in the course overall was, there were only 25.5% missing answers. As can be seen in the table below, most answered that they had problems with SPSS interpretations, or everything to do with SPSS, whilst some indicated that had issues with ‘Everything’, ‘Statistics in general’ or ‘Nothing in particular’, however, some students did in fact show some self-reflexivity here. Six students indicated that their difficulty lie in deciding which test to use when (a commonly reported problem in the social sciences). The rest named specific statistics, which included (in this order): descriptive statistics (year 1 level), t-tests (year 1 level), ANOVA (year 2 level), Regression (year 2 level), Power (year 2 level), Levels of data (year 1, but a persistent problem throughout the course), Correlation (year 1 level), Chi-square (year 1 level), Degrees of Freedom (largely a year 2 issue), Concepts of Validity (all levels) and finally Post hoc tests (year 2 level).

Table 3: Main Statistical Problem in Research Methods (Raw Frequencies & Percentages)

<table>
<thead>
<tr>
<th>Rank &amp; Help Topic</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
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</thead>
<tbody>
<tr>
<td>1. SPSS output</td>
<td>14</td>
<td>11.8%</td>
<td>15.7%</td>
<td>15.7%</td>
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<td>interpretation</td>
<td></td>
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<td>2. Everything</td>
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<td>10.9%</td>
<td>14.6%</td>
<td>30.3%</td>
</tr>
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<td>3. SPSS in general</td>
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<td>4.2%</td>
<td>5.6%</td>
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<td>5.6%</td>
<td>73.0%</td>
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<tr>
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<td>86.5%</td>
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<td>3.4%</td>
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<td>1.7%</td>
<td>2.2%</td>
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KSS Surgeries for WLLLN 2009
Qualitative Results

KSS Students’ Qualitative Comments

A Thematic Analysis (Braun & Clark, 2006) was conducted regarding comments written in the ‘free response box’ of the evaluation questionnaire. This analytical approach was selected in order to summarise and succinctly present a bottom-up representation of what the students as a cohort expressed (rather than looking at individual experiences per se). The students’ qualitative comments surround the themes of: **Generalised help/ feedback (e.g. reports)**, **Gaining confidence**, **Feeling free/ uninhibited to ask questions** and **One on one personal attention/ support**. The KSS tutors were also highly evaluated and mentioned throughout (even personally by name) in many of the comments. Direct quotes concerning what they found the most useful in the KSS sessions are presented by theme.

**Generalised help/ feedback (mostly for reports)**
Mostly students indicated that they were attending for practical and moral support with regard to assessments. Generally speaking the main purpose of the sessions were seen as help on what goes in a lab report and where, however, once the students attended it would appeared they received much, much more.

Quotes included:
- Everything was useful, good tips on how to present data.
- Getting feedback on what I had done well to gain a confidence boost. Learning a few things to improve.
- The opportunity to ask specific questions regarding the FRM report.

But less frequently they reported that they attended as they didn’t understand specific statistics:
- Bringing greater clarity to the function and uses of the r and t-tests, and the purpose behind them.

**Gaining confidence**
The qualitative data did in fact triangulate the statistical findings that the KSS directly and immediately led to a ‘boost’ in the students’ confidence with regard to statistics and research methods in general.

Quotes included:
- Getting feedback on what I had done well to gain a confidence boost.
- I feel so much more confident after talking with the tutor about my assignment, she was really great.
Feeling free/ uninhibited to ask questions
Not only did the students appear to gain in confidence, they also appeared to be more empowered and better able to communicate their learning needs. This may be because the tutors were very approachable, and are also not employed in a hierarchical position.
Quotes included:
• That you can choose what is important to you and you direct the session.
• She was very knowledgeable and helpful, I felt at ease and comfortable to ask her questions.
• The opportunity to ask specific questions regarding the FRM report.

One on one personal attention/ support
Not surprisingly, the majority of attendees were mature female students (this directly reflects the demographic make-up of the TVU Psychology courses). It is well established (e.g. Solomon & Woodfield, 2005) that these students are often high achievers, but suffer with relatively low levels of confidence and high levels of anxiety. It would appear that the KSS was indeed helpful in providing personal and emotional support and guidance and made the students feel valued.
• Talking through my options and getting reassurance.
• Everything- One very helpful and interesting hour.

General KSS Tutor comments
Again, the above feelings of support may have been affected by the gender and open manner of the female KSS tutors.
• A very good teacher!
• I was impressed with the friendliness and professionality of the tutor.

Suggestions for improvements focussed almost solely on having longer time with tutors (slots were 15 min. but groups of students could ‘pool their time’) and also holding more sessions (not just before assessments and exams). No negative comments were made about the program or the tutors.

Research Methods Tutors Qualitative Comments

N=4 tutors took part in e-mail interviews (low number perhaps being affected by participation occurring during summer holidays). An Interpretive Phenomenological Analysis (IPA, Smith, Flowers & Larkin, 2009) was conducted regarding each of the four
tutors email interviews and revealed the following general pictures, in order to use a grounded approach that would give a subjective account of each tutor’s experiences. Please see Appendix C for full prompts and ethical instructions.

**Tutor A** was involved in teaching first year student courses Research Methods 1 and Research Methods 2. This tutor commented that they were aware of KSS and described it as “a student-centred support to our regular teaching, centred around the assignments the students faced and their needs in comprehending the content of the course. It was an adjunct to our teaching and not a substitute for it - and it really supported the students”. They felt that overall it was very successful; “It worked really, really well. The students were really really positive about it. I was actually considerably surprised about just how positive they were about it.” And with regard to affecting staff’s teaching this tutor commented “It was very beneficial. It took a lot of pressure off us inasmuch as the students could ask freely of the KSS tutors questions it would be hard to elicit out of them from us.” He seemed less sure about the effectiveness of the e-mail office hour and with regard to direct questioning about it’s effectiveness they stated “I believe so”. When reflecting on the change in their experience of research methods teaching from last year to this year, Tutor A stated “I’d say it was the single biggest and most positive change!”. Finally with regard to the future of KSS he stated “I would love to see this program run again next year. Perhaps even more sessions and perhaps even better publicised; though it worked very well anyway this year so a straightforward repetition wouldn’t be a bad thing.”

**Tutor B** was mainly involved in teaching the Research Foundation Course, but has in the past had involvement in year 1 Research Methods. This tutor was aware of KSS and felt that it was “A very good opportunity for students to be taught in a less threatening environment” and that it was ‘extremely helpful’ to her students. Tutor B also felt that it benefited her personally in that her “Students were more relaxed.” When reflecting on the change in their experience of research methods teaching from last year to this year, Tutor B stated “There was a change as KSS added the extra support and time students needed.” And for next year this tutor felt that nothing needed to be changed about the program, and that it should run as is next year.

**Tutor C** was only involved in teaching/supporting second year Further Research Methods (which also included Graduate Diploma students). She was aware of the program and knew that “Stats tutors came in to support students with their assignments a few weeks before hand.” When asked about the benefits of the program for students, she stated: “I can only speak for FRM. However we saw a better submission rate and students across the range of abilities scored more highly particularly it seemed in the first lab report.” This tutor did feel that the email office hour led to fewer students directly emailing her this year, and also felt
it benefited tutors “both in terms of our time management and that of the students.” When reflecting on the change in their experience of research methods teaching from last year to this year, Tutor C stated “I think the students had more confidence and were able to work more independently on their assignment and this showed in their results. I would put this down to the KSS as having taught on FRM for five years with varying cohorts of students in terms of ability/confidence levels I have never experienced such a smooth running semester particularly in terms of the lowered rate in student panic levels around hand in week.” As for next year, this tutor would very much like to see it run (‘Definitely’) and stated “the only thing I would change is that for certain weaker students an appointment is compulsory!”

Tutor D was involved in second year Further Research Methods only, he was aware of the program as the team discussed it and he felt it was well advertised. He stated that the program was “an opportunity for students experiencing difficulties with their research methods programme to receive one-to-one tuition to aid their learning.” With regard to its success he felt it was down to attendance and “Those students that utilised the KSS surgeries appeared to benefit significantly. Clarification of a topic that many students find difficult in such an environment can only enhance the learning experience.” With regard to its benefits to him personally; “the KSS program took a significant amount of pressure off tutors who would otherwise be swamped with regular queries- which are not always easy to deal with by email, such is the nature of the topic.” When reflecting on his experience teaching FRM last year to this year, he stated “The major change was the reduction in volume of queries received from students, and particularly around the submission of assignment one [quantitative lab report].” Tutor D was extremely positive about the program, had ‘little doubt’ that it benefited the students, would very much like to see it run next year and had no changes to suggest as he felt the program ran extremely well as it was.

Tutor E was only involved in teaching/ supporting research methods at all levels, including the Masters level courses Advanced Research Methods 1 and 2. Overall this tutor felt the KSS surgeries were extremely beneficial to the students; “They were extremely beneficial as it gave students someone to go and ask at a set time (which possibly helped them plan their time as well) any questions they may have or if they felt unable to ask their tutor. I know from teaching research methods in the past that sometimes students think their questions may be perceived as silly.” He felt it also benefited him personally in terms of teaching load as “students often call in outside of office hours, we were able to direct students to the KSS tutors to seek advice.” This tutor was probably the most positive about the e-mail office hour; “having the tutors available by email also helped ease the number of emails I received. Hopefully it was beneficial to the students too as they had a set time they could email the KSS tutors so could plan their work accordingly.” Tutor E was perhaps a bit more hesitant in terms of KSS affecting his overall teaching experience from last year, due to the
persistent problems of chronic ‘non-attenders’ not being aware of the program. He states “The actual teaching was probably marginally easier but we had a very small cohort of students that turned up infrequently and were probably unaware that the KSS sessions were running - these students would have probably benefited from the sessions. In terms of student queries, there was a noticeable decrease from the previous year so this was probably down to the KSS sessions.”

Finally, with regard to running it next year, this tutor was very positive, but (unlike the previous tutors) made some small suggestions for expansion, but likewise striving for equality in appointments; “Yes it would be excellent to have the program run again next year. I’m not sure it could be improved - maybe only by having more time slots available? Maybe some students booked more times than they needed or possibly saw it as an intensive one on one session to address all of their concerns in one go - that could be addressed. One other thing we could possibly do, is publicise it from the beginning of the year - maybe mention it every week and have some larger posters to advertise it.”

Tutor Summary

The emerging picture from the students’ comments appears to be overwhelming positive about the KSS surgeries, as they appear to noticeably increase students’ confidence, as well as anecdotally appearing to improve students’ marks, submission rates and the overall understanding of assessments. This has the ‘knock-on’ effect of decreasing research methods staff workloads, by decreasing the number of student queries, and general student assessment ‘hysteria’. The e-mail office hours perhaps had less obvious impact to some of the tutors; however, almost all of them noticed a decrease in e-mail queries from last year to this year.

All tutors state that they would love to see the program run again, and most would make no changes, however, one felt it could even be expanded. In sum, all tutors felt that a student-centred, user-friendly, statistics program, such as KSS, benefited the students as well as themselves personally. They felt it was an asset to the department. Finally, it should be mentioned that the TVU external examiners highlighted the KSS program as an area of excellence within the department.
Conclusions

Previous research has shown that student experience and even teaching preference varies for non-traditional and under-represented student groups. Stuart, Lido, Morgan & May (2009) and Stuart, Lido & Morgan (under review), highlight the importance of engagement and emotional belonging at University. Stuart’s research reveals an emerging pattern where non-traditional students, particularly in ‘old’ university contexts, appeared to be experiencing fewer opportunities for peer support and collaborative learning, often confounded by earlier educational experiences which prepared them for working alone rather than in groups. The present research aims to remedy issues of social capital and habitus (Bourdieu, 1979) for under-represented groups and seeks to make the statistical aspects of Psychology degrees more accessible for those who may come from a non-traditional entry pathway, have been out of education for a significant period of time, or for some other reason lack the confidence to succeed in this area. Quantitative and qualitative findings with both the students and the staff illustrate that the present Key Statistical Skills Surgeries have succeeded in fulfilling these aims. The students who have chosen to engage (largely mature, female, English speaking students of white and black ethnic backgrounds) have all significantly improved in their confidence and have overwhelmingly positively evaluated this program. However, there were also differences between demographic groups regarding this improvement, whereby females appear to have larger confidence gains than the male students (largely given that they came with lower levels of confidence), likewise mature students appear to have large confidence gains following the KSS. This latter finding is triangulated with qualitative research reporting increased feelings of social and emotional support. Finally, although the program is effective regardless of educational background and year of study, it would appear that the First Year Undergraduate Psychology students benefited the most in terms of confidence, and there are some marginal (though not significant) findings that those who have ‘other’ qualifications and ‘older’ qualifications (e.g. CSEs) are benefiting in steeper confidence increases than those with more traditional maths backgrounds (such as A-levels and BScs in Maths)- perhaps as the latter are higher in confidence to begin with and have ‘less room for improvement’.

Ultimately, the KSS Surgeries, email office hours and program as a whole engenders many best practice qualities from Race’s (2003) tools for encouraging the ‘Want to Learn’, namely; Inspiring, Enthusing, Praising success, Accepting, Coaxing, Listening well, Legitimising ‘not yet knowing’, Sharing what we learned from our own problems, and Generating students' ownership of their ideas. As statistics can often be intimidating and alienating for social science students, it is essential that programs like the KSS ensure that recent recommended HEA guidelines for teaching psychology research methods in an active and inclusive manner are met (e.g. Lewis et al, 2007; Marek, et al., 2004; Helman & Horwsill, 2002) are met to
facilitate students’ learning, and empower them with regard to their own statistical learning.

The introduction of the KSS surgeries is consistent with the call to diversify teaching methods – in order to meet diverse students needs – and is in line with Stuart et al.’s (2009) research program which strongly suggests that traditional lecture and seminar formats should not be prioritised across all university contexts; and that students’ engagement with statistical work, needs, in particular, careful attention and support to avoid attrition (particularly at early stages of Psychology degree programs). The program appears to be most necessary at the early stages of the degree program, for students’ without traditional entry qualifications/ maths background, and particularly to increase the confidence of mature and female students, and those who might lack initial confidence in this area. Taken together, these findings highlight the need for universities to listen to students’ learning preferences and to offer a wide range of teaching formats in statistics, including individual study skills provision and opportunities for more social, collaborative learning in a non-threatening and non-hierarchical context- aimed at SPSS skills as well as practical assessment support.

Dissemination

The research leaders have extensive experience in carrying out funded research (including inter-disciplinary and collaborative work with Universities, such as Sussex, Kingston and Bedfordshire). It is therefore anticipated that these significant and novel findings can be presented at current teaching and learning conferences, and will be submitted for consideration at the HEA Psychology Network Conference. Funds have been held back for this purpose. It is hoped that this report may be published online, and once accepted by WLLLN will be submitted to the HEA for possible inclusion in their online Teaching and Learning Library. This report has been circulated internally within the TVU Psychology department, and Learning Skills team in order to encourage further examples of best practice teaching and in an attempt to secure further funding internally to run the KSS surgeries next academic year. However, it would be nice to re-submit the program for further evaluation across various ‘types’ of Universities (perhaps at Russell-group and campus-based institutions) for comparison.
References


Is your statistics module giving you the cold chills?
Why not try our remedy & attend a...
Key Statistical Skills Surgery
With a postgraduate expert in Psychology?

WHERE? 3rd Floor Research Labs 309 b & c
WHEN? 9am to 5pm Mon-Fri of Week 6
        Plus Wed. of Week 7 (Reading Week)
WITH? Jess Morgan & Gaby Basquine
SIGN UP? Outside the Research Labs
         (or on sign-up sheet handed around in lectures)

ALSO: You may e-mail KSS tutors with a stats or assessment query & they will respond Weds. between 1-2 pm (Weeks 4-15). Please obtain the e-mail from your RM1, RM2 or FRM lecturer & send an e-mail entitled ‘KSS’.
Appendix B: Questionnaire

Key Statistical Skills Sessions in Psychology

Please take a moment to complete this questionnaire, as it will help us evaluate to what extent we are meeting your needs. Your responses are anonymous and confidential.

Student Number: ______________________________

This will not be traced back to you in anyway

Course: ______________________________ (e.g. BSc, Grad dip, MSc)

Year of Study: 1st 2nd 3rd Graduate Other: ________________

Circle one and fill in any blanks

Mode of study: Full-time ☐ Part-time ☐

Sex: Male ☐ Female ☐

1st Language: English ☐ Other ☐

How would you best describe your ethnicity: ______________________________

Age: ______

1) Have you done Maths before at: GCSE AS-Level A-Level Other: ______

(circle any that apply)

KSS Surgeries for WLLLN 2009

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2) What was the main reason that you attended the KSS session today:


3) Can you describe any specific statistical problems you are having in research methods:


4) Please state which statistic you are most and least comfortable with:

   Most comfortable: ___________________    Least comfortable: ____________________

5) Can you indicate in the boxes below, using a scale from 1 (not at all confident) to 10 (completely confident), how confident you felt with research methods both before and after your KSS visit today?

<table>
<thead>
<tr>
<th>Confidence Before visit</th>
<th>Confidence After visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________ (out of 10)</td>
<td>__________ (out of 10)</td>
</tr>
</tbody>
</table>

Please turn over...
6) Can you please rate how helpful & knowledgeable you found the KSS tutor today:

Not at all helpful 1 2 3 4 5 6 7 8 9 10 Incredibly helpful

7) Can you please rate how useful overall you found the KSS session today:

Not at all useful 1 2 3 4 5 6 7 8 9 10 Incredibly useful

8) Regarding the advertising and delivery of the KSS program, how well organised was it?

Not at all organised 1 2 3 4 5 6 7 8 9 10 Incredibly organised

9) How strongly would you recommend attending the KSS sessions to research methods students next year?

Not at all 1 2 3 4 5 6 7 8 9 10 Very strongly

Please state what you found most useful in today’s KSS Session
What would you suggest might improve today’s KSS Session

Thank you so much for taking the time to complete this. If you are still at TVU next year we hope to see you again. If you have completed your studies may we take this opportunity to wish you good luck for the future!

If you have any questions or comments please e-mail Catherine.Lido@tvu.ac.uk

The KSS Team
Appendix C: Qualitative Tutor Prompts

Hello Research Methods tutors,

As part of the KSS report, I need to gather qualitative feedback about the Key Statistical Skills (KSS) surgery sessions which ran this past academic year. I would be really grateful if you could answer the following questions as best you can. I will include quotes verbatim into the report, but I will anonymise them, so please do answer honestly. Please feel free to leave blank or write n/a for any questions you feel don’t apply to you, or that you would rather not answer.

1. Which specific research methods courses are you involved in teaching?

2. Were you aware of the Key Statistical Skills (KSS) program which ran this past academic year, and if so how would you describe it?

3. In your opinion, were the KSS surgeries beneficial to the students? And if so how?

4. Was the KSS program beneficial to you as a tutor? And if so how?

5. Do you think the ability to email KSS tutors was helpful to you and/or the students?

6. Would you like to see the KSS run again next year? And if so, what would you change about the program to improve it?

7. How would you compare your experience of teaching of research methods in 07-08 to this past academic year (08-09)? And do you think the KSS affected this change?

Thank you so much for your thoughts on this and all of your help,

Catherine

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THE STATS DOCTOR IS IN!