



Bates, L. S. W., Warman, S. M., Pither, Z. A., & Baillie, S. (2016). Development and Evaluation of vetPAL, a Student-led Peer-Assisted Learning Program. *Journal of Veterinary Medical Education*, 43(4). <https://doi.org/10.3138/jvme.1015-163R1>

Peer reviewed version

Link to published version (if available):
[10.3138/jvme.1015-163R1](https://doi.org/10.3138/jvme.1015-163R1)

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1 **Development and Evaluation of vetPAL, a Student-led Peer-Assisted Learning Program**

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20 **ABSTRACT**

21 A student-led peer assisted learning program, vetPAL, was introduced at Bristol Veterinary School,
22 based on an idea of a final year student. vetPAL involved fifth (final) year students acting as tutors
23 and leading sessions for fourth year students (tutees) in clinical skills and revision (review) topics.
24 The initiative aimed to supplement student learning while also providing tutors with opportunities to
25 further develop a range of skills. All tutors received training and the program was evaluated using
26 questionnaires collected from tutees and tutors after each session. Tutee's self-rated confidence
27 increased significantly in clinical skills and for revision topics. Advantages of being taught by students
28 rather than staff included the informal atmosphere, willingness to ask questions and the relatability
29 of the tutors. The small group size and the style of learning in the revision sessions (i.e., group work,
30 discussions and interactivity) were additional positive aspects identified by both tutees and tutors.
31 Benefits for tutors included developing their communication and teaching skills. The training
32 sessions were considered key in helping tutors feel prepared to lead sessions, although the most

33 difficult aspects related to a lack of teaching experience and keeping to time. Following the
34 successful pilot of vetPAL, plans are in place to make the program permanent and sustainable, while
35 incorporating necessary changes based on the evaluation and the student leader's experiences
36 running the program. A vetPAL handbook has been created to facilitate organization of the program
37 for future years.

38 **Key words:** near peer-assisted learning, clinical skills, revision, review, group learning, veterinary
39 medical education

40 **INTRODUCTION**

41 Peer-Assisted Learning (PAL) has many definitions, but one used regularly is "people from similar
42 social groupings who are not professional teachers, helping each other to learn and learning
43 themselves through teaching".¹ Strictly, PAL refers to learning between peers at the same academic
44 level, while Near Peer-Assisted Learning (NPAL) refers to PAL between peers in the same academic
45 field but with a difference of at least one year.²

46 At all levels of education, people can be seen turning to their friends and colleagues for clarification,
47 explanation and academic advice. This in itself is a form of PAL, albeit an informal one. At the other
48 end of the spectrum, PAL (or NPAL) can be a compulsory part of the curriculum,³ with some
49 programs assessing content taught by peers.⁴ In between is an array of different forms of PAL, from
50 informal study groups to time-tabled and structured sessions.

51 In the medical and veterinary field, PAL has been shown to be beneficial when teaching professional
52 skills such as communication,³ clinical reasoning,⁵ practical skills^{5,6,7} and clinical examination.⁸
53 However, PAL is about more than just the tutee gaining skills and knowledge. Tutors also develop
54 communication and teaching skills,^{7,9,10,11} as well as gaining self-confidence,^{5,6,7} all important to being
55 a good veterinary or medical practitioner. This highlights one of the key points about PAL: that it
56 benefits both the individuals acting as tutee and tutor.^{1,5,10,11} Teaching is well-recognized as a form of
57 learning,^{9,12} and as such the tutor's knowledge and understanding may benefit as much or more than
58 the tutee.^{1,12} Tutees gain from learning in an unthreatening environment, in which they can more
59 closely relate to their tutor,^{2,7,13} and often in smaller groups than would be possible if being taught
60 by staff.^{6,7} Institutions also stand to benefit from PAL programs, which can be used to supplement
61 core-learning without requiring additional staff.^{3,7,14}

62 Despite the advantages, various factors must be considered before setting up a PAL program. The
63 initiative may not save the institution any time or resources, especially during initial set-up.¹⁵
64 Difficulties between the personalities of peer tutors and tutees has been reported as causing

65 problems⁶ and potential lack of knowledge of tutors has also been identified as an area of concern
66 that should be monitored.^{2,6,7} Choosing the correct subject to incorporate into such programs is an
67 important factor.¹³

68 This paper describes the development, implementation and evaluation of a student-led NPAL
69 program, called vetPAL, at Bristol Veterinary School, United Kingdom. vetPAL was the idea of a final
70 year student and was created to provide extra learning opportunities and to help students learn by
71 teaching, born from the observation that many students teach their peers informally but could
72 benefit from a more structured approach. Fifth (final) year students taught fourth year students in
73 clinical skills and also led interactive revision sessions, involving the review of previously taught
74 material.

75 **METHODS**

76 **Staff-student Consultation**

77 Ideas for a voluntary NPAL program were proposed by a final year veterinary student (LSWB).
78 Following discussion with staff it was decided to run a pilot year of the vetPAL initiative which would
79 be student-led with university support. The program involved fifth (final) year students leading
80 informal sessions for fourth year students, in clinical skills (during teaching block 1, in October and
81 November) and revision topics (during teaching block 2, in February and March).

82 Initial discussions among staff and the student leader (the final year student who proposed vetPAL)
83 resulted in a decision that the program should aim to supplement learning for fourth years while
84 consolidating knowledge for fifth years, in addition to developing fifth years' communication and
85 teaching skills. Additional objectives were to evaluate the initiative regarding student benefits and
86 feasibility with the intention of creating a sustainable program. A timeline of key stages in the
87 development and running of the program was written, including provisional dates where relevant.
88 Dates were chosen according to the fifth year clinical rotation timetable and student availability. For
89 each point on the timeline, any potential issues were identified and solutions proposed. This enabled
90 the student leader to organize the program with only limited input from staff. All correspondence
91 with participating students was via the student leader.

92 The clinical skills to include in the program were selected from a list of competences expected of
93 students during clinical rotations, including those assessed using DOPS (Direct Observation of
94 Procedural Skills). Skills were chosen based on discussions with final year students and staff, focusing
95 on those students were known to find difficult at the start of rotations, in addition to allowing
96 utilization of the new clinical skills laboratories. Skills selected were: clinical examination of the dog;

97 suturing (simple interrupted and simple continuous); and bovine intramuscular injection and jugular
98 blood sampling using a vacutainer. It was decided that fourth year tutees would practice all three
99 sets of skills in one session and rotate among them. Broad revision topics were outlined in advance
100 based on the fourth year timetable (tutors only led sessions already taught formally in the
101 curriculum) and specific topics were to be selected by tutors once recruited. It was decided that
102 fourth year tutees would attend just one subject for the whole session and would be given the
103 opportunity to choose which subject in advance.

104 **Implementation of the vetPAL Program**

105 *Tutor recruitment*

106 All tutors were recruited at the beginning of the program. An email was sent to all fifth year students
107 on the veterinary course which advertised the scheme, described potential benefits to being
108 involved and detailed what would be required of a tutor. It was requested that all tutors attend one
109 session in teaching block 1 (on clinical skills) and one session in teaching block 2 (revision topics). Out
110 of 118, 24 final year students replied and 17 tutors were recruited on a first come, first served basis,
111 according to dates available. The student leader also acted as a tutor, making a total of 18 tutors (14
112 female, 4 male; similar to the gender distribution within the veterinary school's student population).

113 Once recruited, tutors were added to a private Facebook page, which was created to manage all
114 subsequent communication to and among the tutors. Through this, tutors were given the list of
115 clinical skills and potential revision topics and were asked to indicate which they would prefer to
116 teach, would not mind teaching and would not feel comfortable teaching. Clinical skills and revision
117 topics were then assigned according to these preferences. None of the tutors was asked to teach in
118 an area in which they did not feel comfortable. Three or four tutors were allocated to each clinical
119 skill and two to each revision topic. Once revision topics were assigned, tutors were asked to write a
120 more specific lesson title and learning objectives based on an area they considered to be important
121 but often misunderstood.

122 *Tutor training*

123 All training sessions took place in the evening, on campus and were held twice, to account for
124 differences in the fifth years' timetables. Tutors were provided with food (pizza and snacks) to cater
125 for those coming straight from the clinics.

126 In preparation for leading a clinical skill session, all tutors attended a one hour training session in
127 teaching block 1 led by a member of staff (SB) from the veterinary school. The training covered how
128 to structure a session, different learning preferences, use of questioning in teaching and how to

129 teach a clinical skill.¹⁶ The session included time in the Clinical Skills Lab and tutors were encouraged
130 to re-visit the Clinical Skills Lab as part of their preparation and/or to practice at home.

131 A training session was held in teaching block 2 to prepare tutors for leading an interactive revision
132 session and to facilitate group learning. This lasted 90 minutes and was led by a member of staff (ZP)
133 who runs training sessions for peer tutors as part of the central university PASS Program (Peer-
134 Assisted Study Sessions).³ The training covered experiential learning, techniques for gathering ideas
135 and information from a group, different approaches to learning and asking questions, how to open
136 and close a session and how to plan a session. It was emphasized that the tutors' role was to
137 facilitate revision of previously taught material, rather than teaching new material.

138 After each training session, tutors were given a week to plan their session in their designated
139 groups/pairs and return the plan to a member of staff to be checked (SB or SW). For the clinical skills
140 session, tutors were given a blank lesson template designed specifically for teaching a clinical skill.
141 For the revision session, tutors were free to create a plan in any format, providing it covered the
142 learning outcomes, listed required resources (e.g., flip charts, pens, etc.) and specified the time
143 allocation for each section.

144 *Tutee recruitment*

145 Seven to ten days prior to each event, an email was sent to all fourth year students. The email
146 advertised the program and emphasized that anyone could participate. It also stated that places
147 would be assigned on a first come, first served basis.

148 Out of 126 students, 30 fourth year students replied within 24 hours to attend the first clinical skills
149 session which had 24 places. An email was then sent informing students that the session was full but
150 explaining there would be a second session. The second clinical skills session six weeks later covered
151 the same skills led by a different group of fifth years, and a further 24 fourth years signed up.

152 When advertising the revision session, a list of available topics was included in the email and fourth
153 years were asked to rank these in order of interest when replying. Allocation was on a first come,
154 first served basis, while maintaining an approximately equal number of tutees (6) per subject. The
155 second session involved different tutors and one topic was the same as the first session while the
156 rest were different (Table 1). All fourth year tutees were asked to revise in advance, with the aim of
157 helping to make the sessions more interactive.

158 *Running the sessions*

159 All vetPAL sessions took place in the evening, on campus, with a member of staff in the building but
160 not actively involved. Tutors arrived 30 minutes before the start of the session in order to set up and
161 prepare. As for the tutor training, food was provided for tutors (although not tutees).

162 Any tutees who did not turn up to a session without informing the student leader beforehand, were
163 politely emailed the following day asking for an explanation. There were few absences, all due to
164 forgetfulness and the student explanation was acknowledged by the leader. The aim was to indicate
165 that having signed up for a session attendance was expected. It was also intended to serve as a
166 mechanism to identify any more serious reasons for non-attendance which would then be referred
167 to a member of staff.

168 Any common tutee misconceptions (skills or knowledge) identified by tutors or areas tutees were
169 finding particularly difficult were forwarded to relevant members of staff via the Head of Teaching
170 (SB).

171 **Evaluation of the vetPAL Program**

172 All tutees and tutors were asked to complete questionnaires at the end of every event. Feedback
173 was anonymous and voluntary.

174 *Tutees*

175 Similar questionnaires were used for both types of session although a few questions were included
176 specific to session type (clinical skills or revision). At the beginning of each questionnaire, a free text
177 question was used to ask tutees why they had wanted to attend vetPAL and then a 5-point Likert
178 scale (1="not at all", 2="slightly", 3="somewhat", 4="moderately" or 5="extremely") was used for
179 tutees to rate how beneficial the session was overall and their confidence in each skill or revision
180 subject before and after attending. Free text questions were used to ask tutees to identify the most
181 useful aspect/s of the sessions and to suggest improvements.

182 For the clinical skills sessions, tutees were asked to comment on the main advantages and
183 disadvantages of vetPAL compared to being taught by staff. For the revision sessions, tutees were
184 asked what they would do differently in their studies/revision afterwards. As the revision sessions
185 were at the end of the pilot year, tutees were asked if they would recommend vetPAL to other
186 students (yes/no). Both questionnaires finished by asking for any other comments.

187 *Tutors*

188 Similar questionnaires were used for both the clinical skills and revision sessions. Tutors were asked
189 why they had volunteered, whether they had any previous teaching experience and if so, had they
190 received any training. A 5-point Likert scale (as outlined above) was used for tutors to indicate how
191 well prepared they had felt to lead the vetPAL session. Free text questions were used to ask what
192 had helped tutors feel prepared and what (if anything) would have enabled them to feel more
193 prepared. Free text questions were also used for tutors to comment on the parts of the session
194 considered to be successful or not, and the most difficult aspects of leading the session. At the end,
195 tutors were asked to list any skills developed as a result of being involved in vetPAL and how the
196 session could be improved.

197 *Data analysis*

198 Quantitative data were summarized and analyzed using non-parametric methods in SPSS 21.^b
199 Descriptive statistics were calculated, and the Wilcoxon signed-rank test used to test for significant
200 differences (significant if $p < 0.05$) between the tutees' perceptions of their confidence before and
201 following the vetPAL sessions.

202 Qualitative data from the free text questions were transcribed and hand coded by two members of
203 the project team (LSWB and SB) to identify themes. Themes were identified as comments
204 mentioned by respondents which could be grouped together into a single category. Results were
205 compared, discrepancies regarding categorizations discussed and agreement reached. *Ethics*

206 *Approval*

207 The project received ethical approval from the University of Bristol's Faculty of Medical and
208 Veterinary Sciences Research Ethics Committee (ID 13221).

209 **RESULTS**

210 **Tutees**

211 At the clinical skills sessions, of the 48 tutees signed up, 42 attended (Table 1) and 40 completed a
212 questionnaire. For the revision sessions, of the 46 tutees signed up, 41 attended (Table 1) and 39
213 completed a questionnaire. All questionnaires were included in data analysis.

214 *Quantitative results*

215 Results of the Likert-style questions indicated tutees found both the clinical skills and revision
216 sessions beneficial (Figure 1).

217 Based on self-rating, the confidence of tutees increased significantly for both the clinical skills and
218 topics (Table 2). Data from different revision topic areas were combined due to low group sizes for
219 individual topics.

220 After the revision sessions (which were at the end of the pilot year), tutees were asked if they would
221 recommend vetPAL to another student and 97% (38/39) selected 'yes'.

222 *Qualitative results*

223 The most common reason for tutees choosing to be involved in clinical skills sessions was the
224 opportunity to practice, while for the revision sessions most comments related to the opportunity to
225 learn, revise and consolidate knowledge. When asked to identify the most useful aspects of each
226 session the themes were similar, e.g., "Practice!" and "reinforcing knowledge", as well as aspects of
227 peer-assisted learning, i.e., the relatability of tutors, being able to ask "silly" questions and the
228 informal atmosphere. Comments included: "being run by fifth years that can remember how it felt
229 this time last year"; "much less intimidating!"; "you can ask questions you might feel silly asking
230 staff"; and "highlighting the key points". In the revision sessions tutees also appreciated the value of
231 learning differently with references to discussions, group work and interactivity while in the clinical
232 skills sessions a few noted the advantage of the small group size.

233 Tutees attending the clinical skills session were asked to compare vetPAL with being taught by staff
234 and identified benefits relating to the informality, being able to relate to tutors and not worrying
235 about asking questions. The main concern related to the knowledge (or potential lack of) of the peer
236 tutors.

237 Tutees attending the revision sessions were asked to reflect on what they would now do differently
238 in their revision/studies and the main theme related to changes in individual's approaches, for
239 example "I will break it up and look at key points in each topic instead of trying to learn it all" and "I
240 will build up from basics". The value of working as a group also featured as a theme: "group
241 discussion was very useful - will try and get together with friends".

242 When asked what improvements could be made to vetPAL, the text box was often left blank or
243 tutees stated "none". The most frequently suggested improvements were more time for clinical
244 skills and more revision sessions.

245 Both the clinical skills and revision session questionnaires finished by asking "Any other
246 comments?". Both received many responses such as "Very good! Thank you!" and "Really enjoyed it,
247 great idea".

248 **Tutors**

249 *Quantitative results*

250 All 18 tutors (including the student leader) attended one clinical skills session and one revision
251 session. Of these, 17 completed the questionnaire after the clinical skills sessions and 16 after the
252 revision sessions. All questionnaires were included in data analysis. Although 16 had done some
253 form of teaching previously, only 7 had received specific training. Tutors were asked immediately
254 after each vetPAL event how well prepared they had felt to lead the session and responded that they
255 perceived themselves to be moderately to extremely well prepared (Figure 2).

256 *Qualitative results*

257 Three key themes were identified when tutors were asked why they had volunteered: enjoying
258 teaching; to help others; and to practice skills and/or consolidate their own knowledge.
259 Enhancement of their curriculum vitae also featured to a lesser extent, although in no case was this
260 the solitary reason for signing up. Quotes included “to practice my skills, because I enjoy teaching
261 and to put something on my CV!” and “I know I would have liked this as a fourth year”.

262 When asked what had helped them feel prepared for vetPAL sessions, tutors identified the training
263 sessions as being the most valuable aspect for both the clinical skills and revision sessions. It was
264 also considered important to have practiced the clinical skill and for the revision sessions to have
265 revised the topic and discussed the lesson plan with the other tutor. When asked what would have
266 helped them feel more prepared, tutors mentioned more practice of clinical skills and more
267 experience in leading a session for revision, although the question was often left blank or tutors
268 stated “nothing”.

269 Tutors identified the most successful aspect of vetPAL sessions as being the small group size which
270 “enabled individual help and attention” and also recognized the value of the informal atmosphere
271 and tutees being able to ask “silly questions”. Other minor factors included having the extra
272 opportunity to practice for clinical skills sessions and the format of the revision sessions. For
273 example, the “interactive parts were successful because the tutees were engaged” and the use of
274 “brainstorms - lots of answers to discuss and lots of input”.

275 When asked to reflect on aspects that were less successful, time (or lack of) was the major issue for
276 clinical skills, although less so for the revision session. The greatest difficulties tutors encountered
277 around teaching (other than managing time) related to lack of experience, including struggling to
278 choose an appropriate subject, “selecting a topic that was detailed enough, but not too detailed”,
279 and “trying to prompt, but without giving the answers”. Tutor knowledge (or lack of) was considered

280 only a minor issue. When asked how the vetPAL sessions could be improved, the main themes were
281 more time for clinical skill and simply “more” revision sessions.

282 Tutors were asked to list skills they thought they had developed as a result of taking part in vetPAL
283 and the most commonly mentioned were teaching and communication skills. Comments included “I
284 know better how to structure teaching”; “I have learnt how to explain things in a way people will
285 understand”; and “summarising information and being concise”. As minor themes, improvement in
286 the tutor’s own ability was referenced for clinical skills and overall increased confidence with quotes
287 such as “I’ve realised you know more than you think you do”.

288 **DISCUSSION**

289 vetPAL was well received and popular with both tutees and tutors. Overall the comments were
290 positive with the importance of the tutor training being highlighted while a few aspects that may
291 need to be changed were identified.

292 One of the aims of vetPAL was to supplement learning of fourth year students and tutee feedback
293 after sessions showed self-rated confidence significantly increased for all clinical skills and the
294 revision topics. Although a change in ability or knowledge was not specifically measured, an increase
295 in confidence is likely to indicate that some learning has occurred. Others have demonstrated that
296 PAL can be used effectively to teach clinical skills⁶ and clinical examination⁸ and students regularly
297 attending peer-assisted study groups achieved higher exam or test results than other students.^{17,18}

298 Several factors contributed to creating a positive learning environment including the informal
299 atmosphere and willingness to ask questions; these have been identified in other PAL programs as
300 an advantage when compared to teaching by staff.^{2,7,19} The reliability of the tutors also featured
301 and may be linked to the development of increased confidence and learning in tutees. Others have
302 indicated that peers are sometimes better placed than senior academics to identify difficulties that
303 tutees experience and establish points to learn¹⁹ and tutees in our program commented that the
304 tutors helped them determine important aspects within a revision topic. The small groups in vetPAL
305 were mentioned more frequently as an advantage by tutors than tutees; this may be because tutees
306 were more focused on other benefits. The different style of learning in the revision sessions (i.e.,
307 group work, discussion and interactivity) was considered as one of the most useful aspects by the
308 tutees and key to achieving success by tutors. Discussion of a topic is known to be beneficial to
309 learning,²⁰ which is a natural component of group work.

310 Another aim of vetPAL was to benefit learning for those acting as peer tutors. Increased ability in the
311 relevant clinical skill was cited by some tutors, but, there was no reference to learning by tutors at

312 the revision events. This may be due to the question phrasing; tutors were asked to list “skills”
313 developed, and as such increased knowledge may not have appeared to be an appropriate answer.
314 Other initiatives cite an increase in tutors’ perceived understanding of a subject, although it was not
315 specifically measured.^{9,17} Increased confidence in their own ability was cited as a benefit and
316 informal discussions between the student leader and tutors did suggest that tutors felt their
317 knowledge in the areas taught had increased. It is likely that learning occurred in tutors but was
318 simply not elicited via the questionnaires. The question has since been rephrased to ask tutors what
319 they have learnt as a result of taking part in vetPAL, in the hope this will allow responses regarding
320 both knowledge and skills.

321 As commonly cited in PAL programs, our tutors reported development of their teaching and
322 communication skills following vetPAL,^{7,9,10,11,17} as well as a general increase in confidence.^{5,6,7,8}

323 The provision of training was crucial in helping the tutors feel prepared for both the clinical skills and
324 revision sessions. Tutors mentioned that formulating the lesson plan was also useful preparation,
325 especially for the revision sessions. Other PAL programs involve training of tutors,^{3,6,7,8,19} most have
326 not specifically investigated the impact although in one study tutees did consider that after
327 extensive training the tutors were sufficiently prepared.⁶ In vetPAL, despite most of the difficulties
328 reported by tutors being related to a lack of teaching experience, more training in teaching
329 techniques was not mentioned when tutors were asked what could have helped them feel more
330 prepared. The difficulty of teaching tutees with a different personality^{5,6} was not mentioned in
331 vetPAL and could have been mitigated by discussing different approaches to learning in both the
332 training sessions. The tutors cited their own level of knowledge as only a minor concern when
333 delivering sessions whereas others have noted it as a potential issue.^{2,7} In vetPAL the tutees were
334 more concerned about tutors’ lack of knowledge when asked about the differences to being taught
335 by staff; dealing with uncertainty and gaps in knowledge was also discussed during the training. In
336 setting up a similar program, we would strongly recommend training tutors how to teach, facilitate
337 group learning and address perceived lack of knowledge. Since the development of the vetPAL
338 initiative, “the provision of training in teaching” has been added as an explicit aim of the program.

339 vetPAL has been mainly run by students, unlike many other PAL programs implemented by
340 institutions.^{3,6,7,17,19} PAL programs are cited as giving students greater responsibility for their own
341 learning.¹ Although not elicited in the feedback, we consider that the student-led nature of vetPAL
342 strengthened the perception of responsibility, may have contributed to tutors’ confidence in their
343 abilities and to generating a relaxed, informal learning environment.

344 There are a number of limitations to our study as the benefits of the program were self-rated; the
345 assessment of tutees' learning was based on self-confidence ratings and the development of skills in
346 tutors were reported in free-text responses. Increased confidence is a perception not an
347 observation and self-confidence ratings do not necessarily reflect competence.²¹ Further evaluation
348 of the benefits of the program could be undertaken in the future; for example tutee proficiency in
349 clinical skills could be assessed using an Objective Structured Clinical Examination (OSCE). Although
350 this program involved one cohort of students at one veterinary school in the UK, it is likely that the
351 approach and results are relevant to other institutions due to the similar structure and overall aims
352 of veterinary and medical curricula.

353 In conclusion, following the success of the pilot year, it has been decided to continue vetPAL, with
354 the intention of making the program permanent. Two new vetPAL leaders (from 21 interested
355 students) have been recruited following a student-led selection process.

356 A 'vetPAL Student Leader Handbook' has been written describing how to run the program and
357 includes a detailed timeline (when and how to book all activities), key contacts, risk assessment
358 documentation and a flow chart of 'potential problems and solutions'. A Google Form^c will be used
359 to collect tutor and tutee details rather than via email. An online Dropbox^d folder has been created
360 to store resources including all current lesson plans and draft emails to ease organization for future
361 years. Questionnaires are also available, in the same format as the pilot year, to allow comparisons
362 year on year. It is hoped that the booklet and resources will enable the program to be a sustainable
363 student-led initiative requiring minimal input from staff. A copy of the handbook is available to view
364 online.^e

365 **ACKNOWLEDGEMENTS**

366 The authors would like to thank and acknowledge all students who participated in vetPAL at School
367 of Veterinary Sciences, University of Bristol, especially the peer tutors.

368 **NOTES**

369 a: Peer Assisted Study Sessions <http://www.pass.manchester.ac.uk/>

370 b: SPSS Inc., Chicago, IL.

371 c: Google Forms <https://www.google.com/forms/about/>

372 d: Dropbox <http://www.dropbox.com/>

373 e: [vetPAL Handbook](http://www.bris.ac.uk/vetscience/media/docs/vetpalhandbook.pdf) <http://www.bris.ac.uk/vetscience/media/docs/vetpalhandbook.pdf>

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