Author's response to reviews

Title: Investigating the impact of a research-based integrated curriculum on self-perceived research capabilities of medical students in rural and regional placements: a pre- and post-test analysis of three student cohorts

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Author's response to reviews: see over
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Dear Editor,

Thank you for reviewing our manuscript entitled: “Investigating the impact of a research-based integrated curriculum on self-perceived research capabilities of medical students in community placements: a pre- and post-test analysis of three student cohorts” Mullan J, Weston K, Rich W, McLennan P.

The reviewers’ comments are much appreciated and have been very helpful in enhancing the content of the manuscript. We have carefully considered the reviewers’ feedback and have amended the manuscript accordingly. The changes are outlined below and are highlighted on the accompanying amended manuscript.

Our manuscript has been revised and each of the reviewer’s comments addressed, as outlined below.

A. Responses to comments made by Reviewer 1: Ellie Schoenbaum

Major Compulsory Changes

1. It was unclear to me when the various elements of the research program were offered during the 4 years. Also the 12 month offsite placement was the fourth phase but was that a gap year? How were the phases integrated during?

Response:
The research program is offered to each of our medical students as part of the third phase of their four phase curriculum, which is completed over a four year. The University of Wollongong Graduate School of Medicine program is different to traditional medical degree programs, in that it is an integrated Case Based Learning program, inclusive of the following four phases: Phase One (18 months duration) is university based; Phase two (12 months duration) is hospital based; Phase 3 (12 months duration) is community based; and Phase 4 (6 months duration) is the final advanced elective training and preparation phase for medical internship.

To ensure that this information is clearer in the revised manuscript, the following has been added to the background section (page 4) of the revised manuscript:

- “The RCA curriculum is taught throughout the four-year graduate-entry medical degree program at UoW, which is based on an integrated Case Based Learning program, and inclusive of the following four phases: phase one (an 18 month university based phase); phase two (a 12 months hospital based phase); phase three (a 12 month regional/rural community-based phase); and phase four (a six month advanced elective training and preparation for medical internship phase).”
Response:
Even though this is a good point made by the reviewer, we did not assess mentoring as part of this research study. To provide further clarification however, students’ final manuscript style reports were independently assessed by two markers and their conference style presentations were assessed by a research-experienced academic. We also agree that the success of the medical student research experiences is being reflected in the growing number of reports being submitted and accepted for publication in peer-reviewed journals, as well as the increasing number of abstracts (based on their research projects) being accepted for presentation at national and/or international conferences, as suggested in the discussion section of the revised manuscript.

To make this matter clearer in the revised manuscript, the following information has been added to the

- The abstract: “Improved research capability among medical students was evidenced by increased scores in various areas of research experience in the context of successful completion of relevant summative assessment tasks. The results suggest that research capability of medical students can be positively influenced by the provision of a research-based integrated medical curriculum and further consolidated by authentic learning experiences, gained through conducting ‘hands-on’ research projects, under the supervision and mentoring of research-qualified academics.

- The background section (page 5 & 6): “Each of these requirements are summative assessment tasks, with the final journal-style report being marked independently by two assessors and their conference style presentations being assessed by a research-qualified academic staff member.”

3. I am not surprised that students perceived enhanced knowledge, given the curriculum provided to them. I also agree that the control element of grant writing was not including in their perceived competencies bolsters the finding. However I am concerned that students designed their own projects, chose the methodologies to use, worked with local or med school institutional review boards. This is empowering but may not represent feasible projects or correct analytic methods. Defining a research question is one of the most challenging things for a neophyte. Correctly interpreting results is also not something that should be unsupervised.
Response:
We completely agree with everything that the reviewer has stated which is why each of these student tasks was carefully supervised and mentored by a research-qualified UOW academic staff member, who gave each student regular ongoing advice and feedback throughout the 12 month period. Students received advice and feedback regarding their projects, research questions, methodologies, ethics applications, data collection and analysis, report writing and poster presentations. Furthermore, the relevant ethics committees did not approve projects which they felt did not address appropriate ethical issues, which is why in certain cases, research questions had to be changed and/or specific participant groups were not allowed to be approached to take part in the research studies.

We feel that most of these issues had been addressed in the following sentences on page 6 of the revised manuscript:

- "As these phase 3 students are widely dispersed geographically for their regional/rural community-based placements, each is provided with individual supervision and mentoring by allocation of a research-qualified and experienced UoW academic staff member. Regular supervision and mentoring is largely conducted by email, teleconference and/or videoconference, and in some cases, primary care preceptors and/or experienced local supervisors also choose to collaborate with the students on the research project."
- For reinforcement purposes however, the following words have also been included on pages 5 & 6 of the background section in the revised manuscript "... under the supervision and mentoring of a research-qualified academic."

4. Information on the publishing and presenting at meetings belongs in the results. Was this a goal? Was it systematically assessed? It is strong evidence that the program is working.

Response:
Thank you for this advice. The following information has now been included in the results section of the resubmission (page 12)

- "To date, findings from ten of the student projects have been published in peer-reviewed journals, or are on a publication pathway, and/or have been presented at either national or international conferences. These additional findings, which were not part of the original study goals, provide strong evidence that the program is effective."
- As well as the inclusion of the following sentence on page 15 of the discussion section "Moreover, the peer reviewed journal publications, as well as the national/international conference presentations based on the students’ projects, to date, ...

"
5. The spider diagrams were interesting but the amount of data presented was too much. Could the differences in cohorts be discussed and not presented.

Response:
We were a little unsure about what to do with this comment, given that reviewer 2 has made no comment about the spider diagrams, and as such will leave it up to the editor to decide. This change would be very easy to address, if the editor so wished.

Minor Essential Revisions

1. Abstract Introduction: insert “self-perceived” before “research capabilities” in the 4th line. The author can be trusted to make these. For example, missing labels on figures, the wrong use of a term, spelling mistakes.

Response:
The word “self-perceived” has been added in the background section of the abstract, spelling mistakes have been corrected, and labels on figures have been revised and corrected.

We thank reviewer 1 for suggesting that our article is of importance in its field.

B. Responses to comments made by Reviewer 2: Kaye Lasserre

We thank reviewer 2 for her comments regarding the importance and relevance of our submission for medical educators who need to design curricula which meet accrediting bodies' requirements, including the development of students' research skills which typically feature community placements.

Major Compulsory Revisions

1. While the aim of the research is clearly stated, clarification on the authors' definitions of 'capabilities' and 'experience' and how this was explained to the participants in the questionnaires is necessary. Experience does not equate to capability, so it may not be possible to reach the conclusions outlined in the manuscript based on the line of questioning- i.e. asking students to indicate their level of experience with a particular research area and describing these as capabilities.

Response:
We have interpreted the students’ survey responses in conjunction with the outcomes of successfully completing summative RCA assessment tasks inclusive of a journal-style report and conference style presentation as clear demonstration of research capability. Nonetheless, we acknowledge the reviewer’s comment and have addressed the issue as follows:

- Wherever the term ‘research capability” has been mentioned, we have amended it to read ‘self-perceived research capability’ or to include the
phrase 'based on their research experiences' when referring to research capability. E.g. *this study examined whether the self-perceived research experiences of our medical students, and consequent research capability, were influenced by exposure to this innovative research and critical analysis curriculum, which incorporated a 12-month community-based research project, and associated summative assessment tasks (abstract).*

- We have clarified the term ‘capabilities’. E.g. “Improved research capability among medical students was evidenced by increased scores in various areas of research experience in the context of successful completion of relevant summative assessment tasks.” (Abstract conclusions) The aim now reads (Background section, page 8): “This study explored medical student research capability, as measured by self-assessed levels of research experience in conjunction with the successful completion of RCA summative assessment tasks. Furthermore, the study investigated whether such research capability was influenced by student exposure to the integrated RCA curriculum, which incorporated a 12-month regional/rural community-based research project as part of their phase 3 clinical placements.

We have also included the following sentences

- in the Methods section (pages 8 & 9): “Their research capabilities were established using their self-reported score for research experience as assessed by the ‘research spider’ tool [22], in the context of concurrent successful completion of the following research-related summative assessment tasks: the development of a research proposal, completion of University research ethics requirements, development of a research tool, collection and analysis of research data, completion of a journal-style report, and the preparation and presentation of a conference-style poster to peers and academics.”

- In the results section (page 10) “All medical students included in the analysis successfully completed the required summative research-related assessment tasks by the end of the research period.”

- In the discussions section (pages 12-13) “Research training is widely recognised as an important component of a medical curriculum (24,25) and involving students in the practicalities of research can be instrumental in developing a sound appreciation and understanding of research (9). This study investigated the influence of a research-based curriculum and hands-on research experience in the development of medical student research capability. Our interpretation of increased research capability was made after assessing the student scores in ten research areas represented in the ‘research spider’ self-assessment tool [22], in the context of their successful completion of various research-based assessment tasks by the end of the research period.”

- In the conclusion section (page 18) “Moreover, in association with successfully completing assessment tasks that are also research-related, the data provide evidence for a positive impact on the students’ research capability.”

- In other circumstances we have changed the term research capability to research score, research area or research experiences; and/or removed the word capability from the text.
Response:
We agree with the reviewer’s comments and have included more literature regarding traditional approaches, and how the new UOW GSM curriculum links with more recent evidence about how to actively engage medical students in research activities.

The following information has now been added to the background section on page 5 of the revised manuscript.

- “Active research opportunities are becoming more commonplace in a medical curriculum, and typically include a dedicated research elective. (5,6). In keeping with the new integrated UoW medical curriculum, as well as recommendations from the Australian Medical Council (2) to prepare and support student engagement in medical research, our challenges were to provide a research opportunity for every student and to integrate the research experience within their curriculum. This is achieved with the completion of a research project during their 12-month, phase 3 regional/rural community-based clinical placements [7], under the supervision and mentoring of a research-qualified UOW academic staff member. In an attempt to avoid students’ perceiving research as activities devoid of patient contact or relevance (8), our students are encouraged to undertake community-based research projects which are of personal interest to themselves. Based on evidence that students should be involved in the research activity from planning to execution (9), our students are required to identify and develop a research proposal, submit relevant ethics applications, collect and analyse data, write a journal-style final research report, prepare an abstract and present a conference-style poster to their academic supervisors and fellow students”

Furthermore, it is important to note that the traditional allocations of medical students to research groups rarely provided a full gamut of research experience. The “spider” information in our paper however, is evidence that the UoW student projects expose them to a broad range of research experiences.

Response:
We agree with reviewer 2 that this sentence, now on pages 7 & 8, may have been confusing and have therefore changed it to include
“The supervisors support the students in designing their own research projects, around the research question they wish to answer, making each project individual and unique”, as well as the additional information provided in response to first reviewer’s 2\textsuperscript{nd} and 3\textsuperscript{rd} comments.

4. While the background section concludes with the research question, the authors do not explicitly state what their study will contribute to the field. By providing more background about the successes/failures of existing approaches (as suggested above) the contribution could be more easily drawn.

Response:
In addition to the information provided in response to comment 2 above being added to the background section of the revised manuscript, the following has also been added to page 8 which identifies the further contribution that the our paper is providing to the existing approaches.

- “Providing them with the opportunities to participate in research activities and disseminate their findings, after graduating from university. An opportunity, which many medical students have not had in the past (20,21)”

5. It seems that the intervention consists of three components: the 'hands on' research project, the online learning materials and the academic supervisor (plus possibly a local clinician/mentor). More detail about the nature of the online materials and the role of the supervisor would be useful. Were students assessed while undertaking the online materials (e.g. online quiz) and by their supervisors? Additional, alternative data sources on research skills development would strengthen the study.

Response:
Additional information regarding the role of the academic supervisor and the summative assessment tasks undertaken by the students have been provided on pages 5 and 6 of the revised manuscript and described in more detail in the responses to the first reviewer’s 2\textsuperscript{nd} and 3\textsuperscript{rd} comments. With regard to the online resources, they were simply power-point slides, developed by the RCA team which helped guide the students in: formulating a research proposal; undertaking a literature review; ethical considerations when undertaking human research; collecting and analysing quantitative and/or qualitative data; constructing research questionnaires and/or focus group/interview questions; analysing quantitative and/or qualitative data; writing a journal style research report; and conference style abstract and poster preparation.

- The words “PowerPoint\textsuperscript{®} and “developed by the RCA team” have now been included on page 6 of the revised manuscript.

Finally, the authors believe it to be outside the scope of the current manuscript to describe alternative data sources on research skills development.

Other comments:
6. I am not an expert statistician. While the statistics within the results are relatively standard, it would be preferable if the other reviewer could provide an expert assessment.

Response:
We can assure both the reviewer and the editor that we have paid every attention to the correct use of statistics based on our collective experience with statistically analysing quantitative data.

7. The Instructions to Authors suggest ethics statements appear in the Methods.

Response:
We have included the following sentence at the beginning of the methods section (page 8) of the revised manuscript

- “Human research ethics approval was granted by the University of Wollongong Human Research Ethics Committee (HREC).”

8. Abstract: Replace Introduction with Background and Conclusion with Conclusions. It would be useful to provide more details about the intervention – What were the students required to do for their research project? Describe the online materials and the role of the supervisors and mentors.

Response:
These changes have been made to the abstract and in addition to the responses and changes made based on this reviewer’s 5th comment, the following has also been added to the last line of the abstract conclusions

- “...under the supervision and mentoring of research-qualified academics”

9. The paper is well written. There’s a typographical error on p.13, line 13 ‘hep’ instead of ‘help’.

Response:
Thank you for the compliment and the typographical error has been amended on page 13.

10. References: journal titles are not abbreviated according to Index Medicus/Medline.

Response:
All journal titles identified in the Medicus/Medline index have been abbreviated.

11. Reference 17: Is Harrison the author of the book or of the chapter? Who is the publisher?

Response:
Harrison is the author of the chapter as well as co-editor of the book. The citation has been changed to reflect this.
We thank reviewer 2 for suggesting that our manuscript is a topic of importance and an article of importance in its field. We have also addressed any language corrections within the revised manuscript.

We hope that the above amendments are satisfactory and address the reviewers’ comments. Please do not hesitate to contact us should you require any further information or detail.

Kind regards,

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