

SUPPLEMENTARY MATERIAL

Schultz, M., Chiavaroli, L. M., Healy, J., Lim (林百君), K. F., & Wevill, T. (2022). Empowering Teaching Assistants to support students: Impact of training and experience on perceptions and practices. *International Journal of Innovation in Science and Mathematics Education*, 30(5), 20-38.

Supplementary Material

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Additional introduction to context

A significant relevant difference between the Australian, UK and Singapore post-graduate programs when compared with the US, Canadian or most European contexts is that in the former, almost all science graduate research students have a stipend that does not require teaching duties. Therefore, in these contexts, working as a TA is a choice, making this a largely self-selected group likely to have some motivation to teach. In contexts where teaching responsibilities form part of a graduate program, as is typical in north America and Europe, professional development can be mandated but some participants may have no interest in teaching, which forms a barrier to influencing TA beliefs and practices (Fong, Gilmore, Pinder-Grover, & Hatcher, 2019).

Survey development and validation

After informed consent, participants provided an identifying code in each survey response, allowing their responses at the three time points to be linked while maintaining anonymity. Demographic questions exploring the discipline(s), educational level, role and training in teaching of participants were included in the pre-survey. The demographic questions were written specific to the local context based on academic staff knowledge of the typical circumstances of TAs.

A single set of 11 Likert-style questions (Table 1) was used in all three surveys to explore changes in participants' beliefs. Most of the Likert questions were taken from existing instruments (Flaherty, O'Dwyer, Mannix-McNamara, & Leahy, 2017a, 2017b). These were developed for the TA laboratory teaching environment based on the definitive empowerment literature from Spreitzer (1995), which differentiates four cognitions of empowerment: impact, competency (which is synonymous with self-efficacy, p. 1443), self-determination and meaningfulness. Minor modifications to the original wording of some questions were required to be applicable to our cohort.

Table 1. Likert survey items, their sources and corresponding cognitions (Spreitzer, 1995). These items were asked on a five point Likert scale from Strongly agree to Strongly disagree in pre-, post- and follow-up surveys.

Likert item	Source	Spreitzer cognition
L1. My impact on undergraduate student learning is large.	My impact on what undergraduate students learn in the laboratory is large. (Flaherty et al., 2017b)	Impact
L2. I am confident in my teaching ability.	I am confident about my ability to do my job. (Spreitzer, 1995)	Competency
L3. I can decide on my own what my undergraduate students learn.	I can decide on my own what undergraduate students learn. (Flaherty et al., 2017b)	Self-determination
L4. I can decide on my own how to teach my undergraduate students.	I can decide on my own how to go about doing my work. (Spreitzer, 1995)	Self-determination
L5. My teaching role is personally meaningful to me.	The work I do is personally meaningful to me. (Flaherty et al., 2017b; Spreitzer, 1995)	Meaningfulness

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L6. I am prepared for and thoroughly understand my teaching sessions.	I am prepared for and thoroughly understand GC laboratory sessions. (Flaherty et al., 2017a)	Competency
L7. I am good at explaining concepts within my teaching.	I think I am good at explaining chemical concepts in the GC laboratory. (Flaherty et al., 2017a)	Competency
L8. An important part of my teaching role is to make undergraduate students aware of safety issues.	I make GC UGs aware of safety issues in the laboratory. (Flaherty et al., 2017a)	Safety
L9. In my teaching role, I am concerned about student understanding.	I am concerned about GC UGs understanding chemical reactions. (Flaherty et al., 2017a)	Competency
L10. I feel that undergraduate students would feel comfortable to ask me a question if they did not understand something during my teaching sessions.	I feel that GC UGs would feel comfortable to ask a demonstrator a question if they did not understand a GC experiment. (Flaherty et al., 2017a)	Competency
L11. I identify more with students than with academic staff although I know more than students.*	(Nyquist & Sprague, 1998)	Identity

* Note: This question was only asked in pre- and follow-up surveys, because it was not expected that this perception would be impacted by the program.

Item L4 was added to Flaherty et al.'s (2017b) original instrument because in many cases TAs have no control of the content of their teaching (Flaherty et al. (2017b) item L3) but may have choices about their teaching approach.

Item L11 was added to explore the development of the TAs according to the Nyquist and Sprague (1998) model.

In addition to the Likert questions, open-ended questions were asked at each time point. In the pre-survey, they were asked about their hopes for the program and challenges they had faced in their teaching. In the post-survey, they were asked what was useful about the program, whether they expected to change their teaching practice, whether the program addressed their concerns and for any suggested improvements. Finally, the follow-up survey asked participants about the time they actually required for their teaching role, whether their practice changed as a result of the program, and whether there was a situation that was not covered by the program that they faced in their teaching. The 2020 follow-up survey also included two new questions and slight modifications to existing questions specific to teaching online during COVID-19 restrictions; these data are being analysed separately. The three instruments were checked for face validity through critical review by a team of five experts, including three who were involved in delivering the program described here but were not part of the research team, and two from other institutions who were not involved in the project. No pilot testing of the instruments was conducted, partly due to time constraints.

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Pre-survey

Impact of professional development training on sessional staff teaching practices

Please enter your 4 digit code (last 3 digits of your phone number and first letter of your street name):

____ _
D1. Into which discipline(s) will you be contributing to teaching (including demonstrating, tutoring, marking, giving seminars and/or lecturing) at LES and/or Deakin College in 2020? (you may select more than one option)

- Chemistry
- Life sciences including biology and biomedical science
- Forensic science
- Ecology/environmental science
- Geography/paleogeography
- Marine biology
- Zoology
- Environmental management & sustainability
- Wildlife conservation biology
- Physics

D2. Thinking about the main discipline into which you teach, what is your highest level of **completed** studies in this discipline (excluding studies that you are currently enrolled in)?

- I have never formally studied this discipline
- Secondary school studies in the discipline
- Undergraduate degree (BSc or equivalent) in the discipline
- Honours or Masters (or equivalent) in the discipline
- PhD in the discipline

D3. Which one of the following best describes your current occupation?

- Honours or masters student in the discipline selected above
- PhD student in the discipline selected above
- Technical staff member at Deakin University (contract longer than 2 years or on-going)
- Academic staff member at Deakin University (contract longer than 2 years or on-going)
- Primarily sessional or short-term contract teaching at Deakin University
- Casual academic (demonstrator, tutor, marker) at Deakin College
- Student in a different discipline
- Other (please specify)

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D4. For each aspect of teaching listed below, please indicate in the table below how much experience you have *in that role in this discipline* at the tertiary level (at any institution). Please also indicate in the first column which of these roles will you be performing at LES and/or Deakin College in 2020.

	Teaching in this role in 2020	This is my first year in this role in this discipline	1 - 2 years	3 - 6 years	7 or more years
Laboratory demonstrating					
Field work demonstrating					
Tutoring/ giving seminars					
Marking					
Lecturing					
Campus coordinator/unit chair					

D5. How much formal training have you had in educational theory, pedagogy or how students learn?

- None.
- One or a few sessions or a short course.
- Several courses, equivalent to at least four Deakin units of study (Graduate Certificate or equivalent).
- A degree in education, equivalent to at least eight Deakin units of study (Graduate Certificate in Education, BEd, BA in Education, MEd or equivalent).

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Please indicate your level of agreement with the following statements.

	Strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
L1. My impact on undergraduate student learning is large.					
L2. I am confident in my teaching ability.					
L3. I can decide on my own what my undergraduate students learn.					
L4. I can decide on my own how to teach my undergraduate students.					
L5. My teaching role is personally meaningful to me.					
L6. I am prepared for and thoroughly understand my teaching sessions.					
L7. I am good at explaining concepts within my teaching.					
L8. An important part of my teaching role is to make undergraduate students aware of safety issues.					
L9. In my teaching role, I am concerned about student understanding.					
L10. I feel that undergraduate students would feel comfortable to ask me a question if they did not understand something during my teaching sessions.					
L11. I identify more with students than with academic staff although I know more than students.					

Q1. What do you hope to gain from today's session?

Q2. Can you give an example of a scenario or situation that you have encountered in teaching that you did not feel confident dealing with?

Thank-you for participating in this survey.

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Post-survey

Impact of professional development training on sessional staff teaching practices in LES

Please enter your 4 digit code (last 3 digits of your phone number and first letter of your street name):

Please indicate your level of agreement with the following statements.

Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree

- L1. My impact on undergraduate student learning is large.
- L2. I am confident in my teaching ability.
- L3. I can decide on my own what my undergraduate students learn.
- L4. I can decide on my own how to teach my undergraduate students.
- L5. My teaching role is personally meaningful to me.
- L6. I am prepared for and thoroughly understand my teaching sessions.
- L7. I am good at explaining concepts within my teaching.
- L8. An important part of my teaching role is to make undergraduate students aware of safety issues.
- L9. In my teaching role, I am concerned about student understanding.
- L10. I feel that undergraduate students would feel comfortable to ask me a question if they did not understand something during my teaching sessions.

Q1. What was the most useful aspect of today's workshop for you?

Q2. Do you think your teaching practice will change as a result of attending today?

Q3. Was there anything that you would have benefitted from in the workshop today that was not included?

Please be specific.

Q4. Was there anything that you feel could be improved in how the workshop was structured? Please be specific.

Q5. Was there anything that you feel was unhelpful and could be omitted from the workshop? Please be specific.

Thank-you for participating in this survey.

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Follow-up survey (2019)



Impact of professional development training on sessional staff teaching practices in LES

Please enter your 4 digit code (last 3 digits of your phone number and first letter of your street name):

D1. How did the workload in your teaching role at LES compare with your expectations?

- Significantly more work than expected
- About what was expected
- Significantly less than expected

D2. How much time did you spend preparing for each of your teaching sessions in T1?

- I did not need to prepare
- Less than 15 minutes per class
- 15 - 30 minutes per class
- 30 - 60 minutes per class
- More than 30 minutes per class

Please indicate your level of agreement with the following statements.

Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree

L1. My impact on undergraduate student learning is large.

L2. I am confident in my teaching ability.

L3. I can decide on my own what my undergraduate students learn.

L4. I can decide on my own how to teach my undergraduate students.

L5. My teaching role is personally meaningful to me.

L6. I am prepared for and thoroughly understand my teaching sessions.

L7. I am good at explaining concepts within my teaching.

L8. An important part of my teaching role is to make undergraduate students aware of safety issues.

L9. In my teaching role, I am concerned about student understanding.

L10. I feel that undergraduate students would feel comfortable to ask me a question if they did not understand something during my teaching sessions.

L11. I identify more with students than with academic staff although I know more than students.

Q1. Did attending the workshop in February influence your teaching practice? Please explain how, with specific examples if possible.

Q2. Can you give an example of a scenario or situation encountered in your teaching that you felt confident dealing with because of the workshop?

Q3. Can you give an example of a scenario or situation encountered in your teaching that you did not feel confident dealing with, that was not covered in the workshop?

Q4. What were the most rewarding aspects of your LES teaching this year?

Q5. Do you have any suggestions for improving teaching within LES?

Thank-you for participating in this survey.

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Follow-up survey (2020) (modified due to COVID-19 changes to teaching)



Impact of professional development training on sessional staff teaching practices in LES

Please enter your 4 digit code (last 3 digits of your phone number and first letter of your street name):
Your role and workload may have changed significantly due to the transition to online teaching in 2020.

D1. Please indicate how the transition to online delivery impacted your sessional role. Select all that apply.

- I did not work in a sessional role at all in T1 2020 due to the transition to online delivery.
- I worked in a sessional role in T1 2020, but I did not have any interaction with students due to cancellation of face to face classes.
- The tasks that I undertook in my sessional role in T1 2020 were significantly different to what I expected due to cancellation of face to face classes.
- I interacted with students in online environments in T1 2020 as part of my sessional role, when I had expected to interact with students face to face.
- I interacted with students in online environments in T1 2020 as part of my sessional role, which was how I expected and planned to interact with students.

Open text: Please briefly describe the nature of your sessional role in T1 2020 (what you had expected to do and what you actually did).

D2. How did the workload in your sessional role (including marking) at LES in T1, 2020 compare with your expectations?

- Significantly more work than expected
- About what was expected
- Significantly less than expected

D3. If you conducted online teaching sessions with student interaction (e.g. tutorials, laboratories, consultations) in T1 2020, how much time did you spend preparing for each of your teaching sessions?

- I did not need to prepare
- Less than 15 minutes per class
- 15 - 30 minutes per class
- 30 - 60 minutes per class
- More than 60 minutes per class
- Not applicable – I did not have any teaching sessions

Please indicate your level of agreement with the following statements. Please leave questions blank if they do not apply to you.

Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree

L1. My impact on undergraduate student learning is large.

L2. I am confident in my teaching ability.

L3. I can decide on my own what my undergraduate students learn.

L4. I can decide on my own how to teach my undergraduate students.

L5. My teaching role is personally meaningful to me.

L6. I am prepared for and thoroughly understand my teaching sessions.

L7. I am good at explaining concepts within my teaching.

L8. An important part of my teaching role is to make undergraduate students aware of safety issues.

L9. In my teaching role, I am concerned about student understanding.

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L10. I feel that undergraduate students would feel comfortable to ask me a question if they did not understand something during my teaching sessions.

L11. I identify more with students than with academic staff although I know more than students.

L12. Compared to working face to face with students, I find working online easier because of lack of interruptions or difficult interactions.

L13. Compared to working face to face with students, I find working online easier because I can refer to my notes during teaching sessions.

L14. Compared to working face to face with students, I find working online more difficult because of the lack of personal connections and interactions.

L15. Compared to working face to face with students, I find working online more difficult because of the lack of immediate feedback from students.

Open text: If you have worked as a demonstrator in the past with face to face interactions, what aspects did you find easier or more difficult to navigate in the online environment?

Q1. Did attending the workshop in January influence your teaching practice? Please explain how, with specific examples if possible.

Q2. Can you give an example of a scenario or situation encountered in your teaching that you felt confident dealing with because of the workshop?

Q3. Can you give an example of a scenario or situation encountered in your teaching that you did not feel confident dealing with, that was not covered in the workshop?

Q4. What were the most rewarding aspects of your LES teaching this year?

Q5. Do you have any suggestions for improving teaching within LES?

Thank-you for participating in this survey.

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Statistical analysis of Likert items

Statistical analyses of Likert responses were performed using Excel. For the chi-squared calculations, the responses were bundled in two different ways:

- “strongly agree” (SA) or all other (A, N, D, SD)
- All agree (= SA + A) or all other (N, D, SD)

This was found to lead to meaningful comparisons because of the patterns of the responses to the Likert items, where for some items almost all responses were either SA or A, whereas for others a range of responses was observed. For each item, the following three sets of tests were conducted:

- Within inexperienced group, compare pre vs post and pre vs follow-up
- Within experienced group, compare pre vs post and pre vs follow-up
- Compare inexperienced vs experienced group at pre-, post- and follow-up

In addition, to check whether L3 did measure something different from L4, within each group and time point, the comparison L3 vs L4 was performed.

The results of these tests are provided in the Table below. Pairs for which $p < 0.05$, indicating that the null hypothesis can be rejected and there is a statistically significant difference between the proportions in the two groups, are highlighted in yellow.

Item	Groups	Time points	Response	chi-squared	p
1	Inexp	Pre-Post	SA vs other	19.12263408	1.22583E-05
1	Exp	Pre-Post	SA vs other	6.58143053	0.010304804
1	Inexp	Pre-Follow-up	SA vs other	1.164766543	0.28047919
1	Exp	Pre-Follow-up	SA vs other	0.032485912	0.856965345
1	Inexp	Pre-Post	All agree vs other	11.40618588	0.000732
1	Exp	Pre-Post	All agree vs other	3.187692308	0.074194682
1	Inexp	Pre-Follow-up	All agree vs other	5.140289991	0.023376743
1	Exp	Pre-Follow-up	All agree vs other	0.76780367	0.380897363
1	Inexp-Exp	Pre	All agree vs other	4.374416078	0.036482328
1	Inexp-Exp	Post	All agree vs other	1.788571044	0.181100364
1	Inexp-Exp	Follow-up	All agree vs other	1.48994709	0.222224669
2	Inexp	Pre-Post	SA vs other	8.745403672	0.003103834
2	Exp	Pre-Post	SA vs other	0.737099857	0.390591484
2	Inexp	Pre-Follow-up	SA vs other	7.058823529	0.007887578
2	Exp	Pre-Follow-up	SA vs other	2.549374497	0.110337931
2	Inexp	Pre-Post	All agree vs other	3.082482993	0.079139622
2	Exp	Pre-Post	All agree vs other	0.379318326	0.537968283
2	Inexp	Pre-Follow-up	All agree vs other	3.025210084	0.081979703
2	Exp	Pre-Follow-up	All agree vs other	1.688570424	0.193789526
2	Inexp-Exp	Pre	All agree vs other	9.855072464	0.001693641
2	Inexp-Exp	Post	All agree vs other	1.298170091	0.254547748
2	Inexp-Exp	Follow-up	All agree vs other	0.145502646	0.702870783
3	Inexp	Pre-Post	SA vs other	3.203547672	0.073478718
3	Exp	Pre-Post	SA vs other	0.008252687	0.927616309
3	Inexp	Pre-Follow-up	SA vs other	N/A	N/A
3	Exp	Pre-Follow-up	SA vs other	0.291105121	0.589513211
3	Inexp	Pre-Post	All agree vs other	5.699111523	0.016973503

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3	Exp	Pre-Post	All agree vs other	0.068433818	0.793630937
3	Inexp	Pre-Follow-up	All agree vs other	0.094745909	0.758228256
3	Exp	Pre-Follow-up	All agree vs other	0.513586957	0.473590199
3	Inexp-Exp	Pre	All agree vs other	0.992248062	0.319193549
3	Inexp-Exp	Post	All agree vs other	0.435106899	0.509493651
3	Inexp-Exp	Follow-up	All agree vs other	0	1
4	Inexp	Pre-Post	SA vs other	0.951986067	0.329214276
4	Exp	Pre-Post	SA vs other	0.697184458	0.403731377
4	Inexp	Pre-Follow-up	SA vs other	1.662571663	0.197256461
4	Exp	Pre-Follow-up	SA vs other	1.981283422	0.159255266
4	Inexp	Pre-Post	All agree vs other	1.171417109	0.279110254
4	Exp	Pre-Post	All agree vs other	0.47910527	0.488827872
4	Inexp	Pre-Follow-up	All agree vs other	3.632031118	0.056677607
4	Exp	Pre-Follow-up	All agree vs other	2.441433566	0.118168188
4	Inexp-Exp	Pre	All agree vs other	1.414285714	0.234346241
4	Inexp-Exp	Post	All agree vs other	1.113869198	0.291242415
4	Inexp-Exp	Follow-up	All agree vs other	0.180845543	0.670647599
3-4	Inexp	Pre	all	15.61305243	0.00358487
3-4	Inexp	Post	all	44.65417658	4.69169E-09
3-4	Inexp	Follow-up	all	13.39887958	0.009482643
3-4	Exp	Pre	all	26.96981924	2.01602E-05
3-4	Exp	Post	all	53.0874558	8.17011E-11
3-4	Exp	Follow-up	all	3.383861864	0.495755619
5	Inexp	Pre-Post	SA vs other	6.388002662	0.011489424
5	Exp	Pre-Post	SA vs other	0.073396048	0.786454831
5	Inexp	Pre-Follow-up	SA vs other	10.36316578	0.001285546
5	Exp	Pre-Follow-up	SA vs other	0.25621118	0.612735156
5	Inexp	Pre-Post	All agree vs other	0.273690961	0.600866522
5	Exp	Pre-Post	All agree vs other	0.857919255	0.354321629
5	Inexp	Pre-Follow-up	All agree vs other	2.746953808	0.097439909
5	Exp	Pre-Follow-up	All agree vs other	0.309506264	0.57798332
5	Inexp-Exp	Pre	All agree vs other	5.043222033	0.024722466
5	Inexp-Exp	Post	All agree vs other	5.053729456	0.024572993
5	Inexp-Exp	Follow-up	All agree vs other	0.47751938	0.489548089
6	Inexp	Pre-Post	SA vs other	2.82567668	0.092767786
6	Exp	Pre-Post	SA vs other	0.908627428	0.340478865
6	Inexp	Pre-Follow-up	SA vs other	2.061076514	0.151103388
6	Exp	Pre-Follow-up	SA vs other	0.001686293	0.967244475
6	Inexp	Pre-Post	All agree vs other	3.681695199	0.055012891
6	Exp	Pre-Post	All agree vs other	0.008381577	0.92705482
6	Inexp	Pre-Follow-up	All agree vs other	7.46466483	0.006292175
6	Exp	Pre-Follow-up	All agree vs other	0.16563147	0.684023806
6	Inexp-Exp	Pre	All agree vs other	7.142013806	0.007529855
6	Inexp-Exp	Post	All agree vs other	1.511746506	0.218872778
6	Inexp-Exp	Follow-up	All agree vs other	0.003406891	0.953455041

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7	Inexp	Pre-Post	SA vs other	0.001094609	0.973606904
7	Exp	Pre-Post	SA vs other	0.081810946	0.774858109
7	Inexp	Pre-Follow-up	SA vs other	1.10442958	0.293296048
7	Exp	Pre-Follow-up	SA vs other	0.017746229	0.89402337
7	Inexp	Pre-Post	All agree vs other	0.143056714	0.705260938
7	Exp	Pre-Post	All agree vs other	0.060302017	0.806019226
7	Inexp	Pre-Follow-up	All agree vs other	1.064244234	0.302249166
7	Exp	Pre-Follow-up	All agree vs other	0.372670807	0.541552036
7	Inexp-Exp	Pre	All agree vs other	2.070261889	0.150195728
7	Inexp-Exp	Post	All agree vs other	1.874292025	0.170984317
7	Inexp-Exp	Follow-up	All agree vs other	0.174065934	0.676523278
8	Inexp	Pre-Post	SA vs other	2.383400768	0.12263033
8	Exp	Pre-Post	SA vs other	0.49117823	0.483402193
8	Inexp	Pre-Follow-up	SA vs other	0.852052122	0.852052122
8	Exp	Pre-Follow-up	SA vs other	4.661064426	0.030854058
8	Inexp	Pre-Post	All agree vs other	2.662716885	0.102725135
8	Exp	Pre-Post	All agree vs other	0.01908344	0.890127541
8	Inexp	Pre-Follow-up	All agree vs other	1.094032701	0.295579417
8	Exp	Pre-Follow-up	All agree vs other	6.58125	0.01030585
8	Inexp-Exp	Pre	All agree vs other	4.234664846	0.039606443
8	Inexp-Exp	Post	All agree vs other	0.577540107	0.447278139
8	Inexp-Exp	Follow-up	All agree vs other	2.448979592	0.117601295
9	Inexp	Pre-Post	SA vs other	0.641808232	0.423056768
9	Exp	Pre-Post	SA vs other	0.502674882	0.478327154
9	Inexp	Pre-Follow-up	SA vs other	3.807285546	0.051030087
9	Exp	Pre-Follow-up	SA vs other	0.037035608	0.847392567
9	Inexp	Pre-Post	All agree vs other	1.060262376	0.303155351
9	Exp	Pre-Post	All agree vs other	0.013985709	0.905860709
9	Inexp	Pre-Follow-up	All agree vs other	2.329259526	0.126962259
9	Exp	Pre-Follow-up	All agree vs other	0.309506264	0.57798332
9	Inexp-Exp	Pre	All agree vs other	4.385045001	0.036255535
9	Inexp-Exp	Post	All agree vs other	1.491864895	0.221927336
9	Inexp-Exp	Follow-up	All agree vs other	0.47751938	0.489548089
10	Inexp	Pre-Post	SA vs other	0.128240537	0.720263331
10	Exp	Pre-Post	SA vs other	0.62287571	0.429980657
10	Inexp	Pre-Follow-up	SA vs other	5.383759733	0.020325031
10	Exp	Pre-Follow-up	SA vs other	1.164440821	0.280546454
10	Inexp	Pre-Post	All agree vs other	2.067577579	0.150460341
10	Exp	Pre-Post	All agree vs other	0.074031494	0.785554901
10	Inexp	Pre-Follow-up	All agree vs other	0.025396825	0.873382246
10	Exp	Pre-Follow-up	All agree vs other	0.846979108	0.357408341
10	Inexp-Exp	Pre	All agree vs other	1.071210218	0.300672246
10	Inexp-Exp	Post	All agree vs other	4.655696657	0.030950671
10	Inexp-Exp	Follow-up	All agree vs other	0.007351713	0.931671412
11	Inexp	Pre-Follow-up	SA vs other	0.489932983	0.483957201

SUPPLEMENTARY MATERIAL

Schultz, M., Chiavaroli, L. M., Healy, J., Lim (林百君), K. F., & Wevill, T. (2022). Empowering Teaching Assistants to support students: Impact of training and experience on perceptions and practices. *International Journal of Innovation in Science and Mathematics Education*, 30(5), 20-38.

11	Exp	Pre-Follow-up	SA vs other	0.016524217	0.897716459
11	Inexp	Pre-Follow-up	All agree vs other	0.152613679	0.696050042
11	Exp	Pre-Follow-up	All agree vs other	0.402375402	0.525865043
11	Inexp-Exp	Pre	All agree vs other	5.120347775	0.023646877
11	Inexp-Exp	Follow-up	All agree vs other	0.200530504	0.654292979

Open ended response coding

Inductive coding of themes within the open-ended responses across the three surveys was performed using NVivo as follows. Preliminary themes were identified for each question by two members of the project team, one of whom was not involved in delivering the program, through reading the same set of 10 responses (three pre-, three post- and four follow-up) independently. These preliminary themes were then compared and discussed, and common themes agreed upon in consultation with a third member of the project team. This final set of themes was used to code the remaining data by two authors, who cross checked for any statements that they were unsure about. The themes found for responses to each question, along with numbers of responses within each theme are listed in the Table below.

	Number of comments
Pre Q1. What do you hope to gain from today's session?	
Teaching strategies/pedagogy	74
Confidence	12
Role/job expectations	11
Student well-being	10
Networking/staff interactions	7
General "improve" responses	22
Total responses	136
Pre Q2. Can you give an example of a scenario or situation that you have encountered in teaching that you did not feel confident dealing with?	
Student negative behaviour	41
Own lack of confidence/skill	22
Administrative/colleague	10
Student diversity/special needs	9
Total responses	82
Post Q1. What was the most useful aspect of today's workshop for you?	
Feedback	21
Pedagogical theory	21
Specific teaching strategies	18
Teaching context	16
Staff interactions	15
Dealing with difficult situations (2020 only)	12
General "all"	8
Total responses	111
Post Q2. Do you think your teaching practice will change as a result of attending today? Please provide a specific example if possible.	
"yes" only	45
greater awareness of student needs	18
feedback	13

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engagement	6
administrative/colleagues	6
Pedagogy/approach	6
Total responses	94
Follow up Q1. Did attending the workshop in February influence your teaching practice? Please explain how, with specific examples if possible.	
greater awareness of student needs	5
"yes" only	5
pedagogy	4
handling difficult students	3
teaching context	3
specific teaching strategies	3
confidence	2
Total responses	25

References

- Flaherty, A., O'Dwyer, A., Mannix-McNamara, P., & Leahy, J. J. (2017a). Aligning perceptions of laboratory demonstrators' responsibilities to inform the design of a laboratory teacher development program. *Journal of Chemical Education*, 94, 1007-1018. doi:10.1021/acs.jchemed.7b00210
- Flaherty, A., O'Dwyer, A., Mannix-McNamara, P., & Leahy, J. J. (2017b). The influence of psychological empowerment on the enhancement of chemistry laboratory demonstrators' perceived teaching self-image and behaviours as graduate teaching assistants. *Chemistry Education Research and Practice*, 18, 710-736. doi:10.1039/C7RP00051K
- Fong, C. J., Gilmore, J., Pinder-Grover, T., & Hatcher, M. (2019). Examining the impact of four teaching development programmes for engineering teaching assistants. *Journal of Further and Higher Education*, 43(3), 363-380. doi:10.1080/0309877X.2017.1361517
- Nyquist, J. D., & Sprague, J. (1998). Thinking developmentally about TAs. In M. Marinkovich, J. Prostko, & F. Stout (Eds.), *The professional development of graduate teaching assistants* (pp. 61-87). Bolton, MA: Anker Publishing.
- Spreitzer, G. M. (1995). Psychological Empowerment in the Workplace: Dimensions, Measurement, and Validation. *Academy of Management Journal*, 38(5), 1442-1465. doi:10.5465/256865