



Article

Evidence Based Practice Using Formative Assessment in Library Research Support

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Abstract

Objective – The purpose of this study was to develop and review the effectiveness of a new evidence-based approach for teaching library research support.

Methods – Formative assessment, through two variations of the One Minute Paper model, is used to poll the experiences of university researchers in library research support sessions. Prior to a session, Polling One Minute Papers (POMPs) assess what researchers know about topics that will be covered in the session. After a session, Reflective One Minute Papers (ROMPs) review whether university researchers achieved the intended learning outcomes of the session. POMPs were used for 16 sessions and ROMPs were used for a subset of 11 of these sessions. Examples of responses from the POMPs and ROMPs were presented to describe and analyse the effectiveness of this approach for library support of research.

Results – POMP and ROMP responses were remarkably informative given their simplicity and the little effort required on the part of the instructing librarian or researchers. The completion rate of POMPs was 72.7%. They gave researchers the opportunity to self-assess their current level of knowledge or skills about the topic to be covered in the upcoming session. The librarian could then tailor the session content to this level of knowledge. POMP responses were shared as part of the session content, enabling researchers to benchmark themselves against their peers.

Completion rate of ROMPs was 20.9%, with the level of reflection in the individual researchers' responses varying from shallow to insightful. Deeper responses stated how the researchers would use what they learned or pose new questions which emerged from their learning.

Conclusion – Polling One Minute Papers (POMPs) and Reflective One Minute Papers (ROMPs) are an effective and efficient approach for guiding the learning of researchers and closing the feedback loop for librarians. These tools extend the opportunity for librarians to engage with researchers and, through tailoring of session content, assist to maximise the benefit of library research support sessions for both librarians and researchers. Sharing of POMP and ROMP responses can assist librarians to coordinate the teaching of the researchers that they support. At an institutional level, evidence in POMPs and ROMPs can be used to demonstrate the value that the library has contributed to improving awareness and performance of its researchers.

Introduction

Researchers in universities are working in an increasingly complex and competitive environment (e.g., Frances, Fletcher, & Harmer, 2011; Kennan, Corral, & Afzal, 2014; Richardson, Nolan-Brown, Loria, & Bradbury, 2012). Factors driving these changes include Internet and digital technologies and greater accountability through performance management and institutional benchmarking. These changes are requiring researchers to adapt faster than most would achieve through their traditional discipline-based networks, including information sharing among colleagues.

The Internet and digital technologies have transformed scholarly communication. Research outputs, although still published as books and journals, are now also made available in an array of other digital options including blogs and other social media, multimedia formats, and data files which may be displayed through sophisticated visualization tools. The numbers of research outputs have vastly increased and are distributed through a growing range of publishing models, many offering some form of Open Access. Researchers, as creators of research outputs, need to consider copyright and licensing for managing their rights, in balance with maximizing accessibility to their research outputs. The quality of publishers also

needs to be assessed, to ensure that researchers avoid unethical publishers (e.g., see Beall, 2014).

To measure and benchmark performance, researchers and their institutions rely on citation ranking metrics. Researchers need to understand how these metrics are calculated and how citation indexes (e.g., the h-Index) are calculated. Researchers are also expected to have an online presence, ideally as a professional profile to promote their research interests and achievements. Altmetrics are emerging as an additional measure of impact, by measuring the online activity of a researcher or their outputs (Priem, Taraborelli, Groth, & Neylon, 2010).

University libraries can assist researchers to work in this environment and make the most of emerging opportunities. To provide this support, university libraries are moving their core business from provision of information resources to provision of information services and information solutions (Association of College and Research Libraries, 2010; Kaufman, 2009; Parsons, 2010). Information resources have traditionally involved the development and management of collections. In contrast, information services and solutions include infrastructure such as repositories (Simons & Richardson, 2013) and instructional support on topics such as scholarly and open access

publishing, managing research data, maximizing research visibility, and measuring research performance (e.g., Auckland, 2012; Haddow, 2012; Kennan, et al., 2014).

Effective communication skills are essential for building a rapport with researchers and providing a valued service (Auckland, 2012; Creaser & Spezi, 2013; Parker, 2012). Research support librarians need to be confident in talking about the range of topics that researchers need to learn, match the information they provide with the skill level of the researcher, and explain the information in a way that is understandable for the researcher. This study investigates a teaching and learning approach which can assist librarians to achieve this.

Literature Review

Teaching and Learning in Library Research Support

Teaching and learning for researchers is best suited to the learning theory of andragogy. This theory is based on the assumption that adults are self-directed learners who are interested in immediate application of knowledge (Merriam, 2001). According to this theory, adults take the initiative in diagnosing their learning needs, including formulating objectives, identifying resources, implementing strategies, and evaluating outcomes (Knowles, 1975). Other learning theories of relevance to library research support include problem-based learning (Knowles, 1975), experiential learning (Kolb, 1984), and informed learning (Hughes & Bruce, 2012). In problem-based and experiential learning, learners draw on their prior knowledge and experience (Brodie, 2012), enabling learning to be built on a researcher's existing practices. Informed learning describes how learners develop flexibility and confidence to use information in constantly evolving information environments, shifting the focus of information literacy education from mastering skills to learning to use information critically, ethically, and creatively (Hughes & Bruce, 2012).

In addition to self-directed learning, another key aspect of researcher learning is that researchers frequently learn from their peers. The peer is a defining figure in research practice. For example, it is implicit in the institution of "peer review" (Boud & Lee, 2005). As described for higher degree research students, research learning can be usefully construed in terms of entry into communities of practice, where peer learning becomes a powerful tool for describing and developing a rich understanding of the learning resources available (Boud & Lee, 2005). Peer interaction can enhance learning by stimulating the production of deeper thought through the desire to know what a colleague knows, prompting self-assessment and clarification of uncertainties (Draper, 2009).

Assessment in Library Research Support

Library research support needs to contribute to improving research performance without adding additional burden to a researcher's workload. Researchers operate in a constant environment of research performance assessment (Parker, 2012), e.g., through funding or promotion applications, performance management acquittal, or as part of institutional assessment exercises such as those in Australia and the United Kingdom (Australian Research Council, 2014; REF2014, 2014). Research librarians need to be acutely aware of this research assessment landscape (Parker, 2012). The learning needs of researchers must form the core content of library research support material, in terms of what researchers need to know as well as their current status of understanding a particular topic.

Within a teaching and learning framework, assessment of the performance of researchers is analogous to summative assessment, and library support is analogous to formative assessment. Summative assessment tasks focus a student's learning on "what counts," while formative assessment provides a fine tuning mechanism which guides the learner's learning progress (Boud, 2000). Summative assessment occurs

after the learning process for the purpose of certification (Sadler, 1989). In contrast, formative assessment occurs as part of the learning process. Through formative assessment, the learner gains feedback which is intended to shape and improve their learning, leading to independent learners who are able to self-monitor their learning needs (Sadler, 1989). To implement this analogy of formative assessment in library research support, research librarians will be most effective if they develop teaching materials which incorporate the established practices of researchers' self-directed and peer learning.

Learning is a cyclical process, as explained in experiential learning theory (Kolb, 1984). In the context of library research support, there is no starting point in the researchers' learning process, but rather, they build on what they already know or have experienced. Within the learning cycle of assessment (Figure 1, Crisp, 2009), there may be many feedback loops

between the phases of diagnostic, learning, and formative assessment (Sadler, 1989). Often, formative assessment leads to summative assessment, as researchers take on tasks to advance their careers or to meet institutional requirements.

Research Framework: Formative Assessment of Researchers

The One Minute Paper (OMP) is a formative assessment tool that has been successful in improving the teaching of, and learning by, undergraduate students (Bartlett & Morrow, 2001; Chizmar & Ostrosky, 1998). OMPs are effective for gaining student feedback in return for a modest amount of student and instructor effort (Bartlett & Morrow, 2001; Chizmar & Ostrosky, 1998; Drummond, 2007; Stead, 2005). The OMP is a questionnaire which asks:

1. What was the most important thing you learned today?
2. What was the most confusing point in today's lecture?

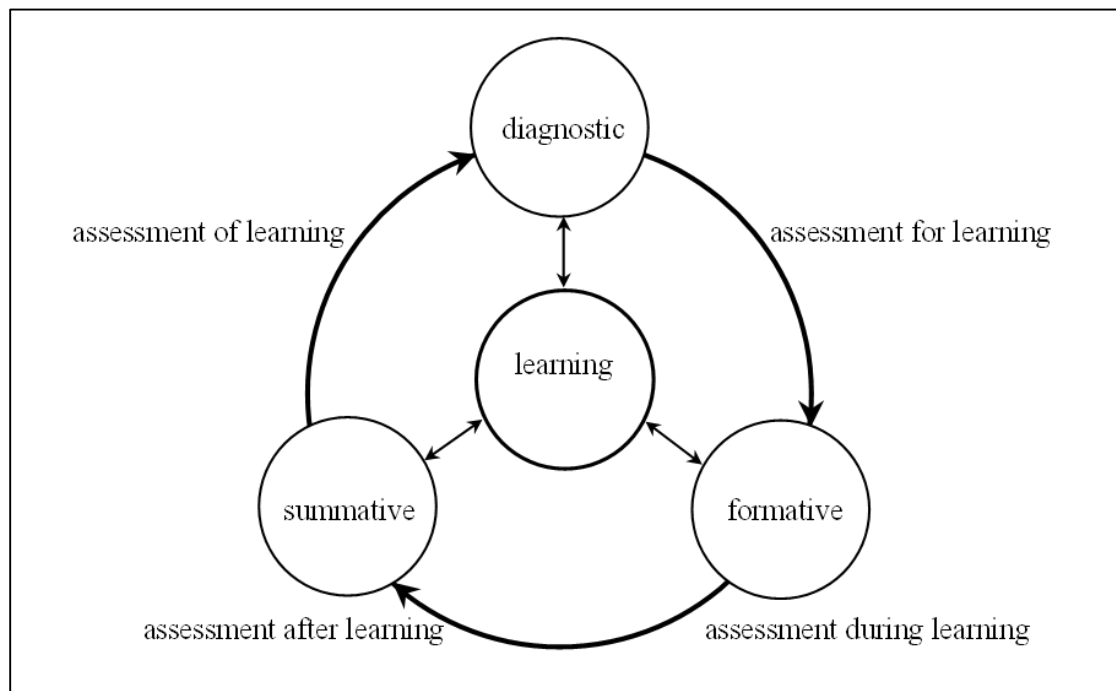


Figure 1
Relationship between diagnostic, formative, and summative assessments (redrawn from Crisp, 2009)

The addition of a third question was recommended by Bartlett and Morrow (2001:

3. What was the most interesting fact that you learned today?

The OMP benefits both instructors and students, regardless of their teaching or learning ability (Chizmar & Ostrosky, 1998). OMPs can provide specific and immediate feedback to the instructor about student learning, helping to set the pace and content of future instruction. This is useful for inexperienced instructors or instructors of new material (Stead, 2005), as is often the case in library research support. Instructors can also use the feedback to identify and then address misconceptions (Bartlett & Morrow, 2001). This closing of the feedback loop demonstrates that the instructor values student opinion and encourages students to actively contribute to their own learning experience (Stead, 2005). Class discussion of issues raised in OMP's have reassured students by enabling them to benchmark their learning against their classmates, often revealing that the problems that others are experiencing are the same as their own (Bartlett & Morrow, 2001).

The simplicity of the OMP makes it an ideal tool for identifying the learning needs and learning outcomes of researchers. Content of library research support sessions can then be tailored accordingly. The OMP is typically assigned at the end of a class, but could also be adapted for implementation prior to a class (Stead, 2005). Pre-class formative quizzes encourage students to think critically about course content prior to a session (Dobson, 2008), offering the benefits of identifying current learning needs or learning gaps, providing an indication of what will be covered in the upcoming session, and creating an opportunity for self-assessment.

Aims

This study describes a method, adapted from formative assessment in teaching and learning, to assist research support librarians to develop

an evidence-based foundation to support their teaching. Two variations of the One Minute Paper (OMP), Polling OMPs and Reflective OMPs, are developed in this study. A case study approach, from a series of multiple workshops on a range of topics, is used to investigate whether the two variations of the OMP are an effective and efficient approach for guiding the learning of researchers and closing the feedback loop for librarians.

Questions asked are:

1. Do POMP's stimulate researcher engagement and interest?
2. Can POMP's identify learning needs of researchers?
3. Are POMP's or ROMP's effective tools for gaining feedback about researcher learning?

Methods

This study reports on the outcomes of a series of case studies, to explore the effectiveness of using the One Minute Paper (OMP) model for the purpose of library research support sessions. Two variations of the OMP were developed in this study: POMP's, i.e., Polling One Minute Papers, and ROMP's, i.e., Reflective One Minute Papers.

Both the POMP's and ROMP's are intended as tools which guide the formative learning of researchers. POMP's were distributed prior to a session and ROMP's were distributed after a session. Sessions were organized in response to specific requests from researchers on behalf of a research group, rather than according to a specific schedule.

Overview of the James Cook University Research Profile

The OMP's described in this study were developed for library research support sessions at James Cook University (JCU). The Strategic Intent of JCU is to create a brighter future for life

in the tropics world-wide (James Cook University, 2015). The number, distribution and turnover of JCU researchers make it challenging to identify and meet their evolving library research support needs. There are approximately 2600 academic staff and more than 600 Higher Degree Research students (James Cook University, 2014) across Townsville, Cairns, Singapore and other smaller, regional centres.

Research needs vary with disciplinary research practices and career stage. At JCU, the largest and fastest growing area of research is in the medical disciplines, with many of these researchers having a strong applied knowledge but limited research experience. In contrast, internationally recognized researchers in the biological and environmental sciences tend to have metrics-driven library support needs. Humanities and social sciences, including Law and Creative Arts, have the most discipline-centric research needs. Career stage also influences library research support requirements: postgraduate students and early career researchers need to develop their research skills, mid-career researchers may be concerned about keeping up with technological changes, and senior researchers may be under pressure to maintain their high research standing.

Polling One Minute Papers (POMPs)

POMPs are a self-assessment tool. The questions asked in a POMP were structured around the topic of a library research support session, polling researchers to gauge their understanding of the topic. Session content was then tailored for this level of understanding. The questions and response options in POMPs are listed in the Appendix. POMPs were also intended to promote a session and stimulate interest about the content that would be covered in that session.

Sessions were organized in collaboration with research leaders, e.g., key researchers or research managers. This strategy helped to

increase attendance and facilitate discussion because participants shared common research interests and usually knew each other prior to the session. POMPs were distributed approximately one week prior to a session in an email. This email was sent by the research leader to all researchers who he felt should attend the session. POMPs were voluntary, with participants being encouraged to submit their responses prior to the session. A summary of the POMP results were shared during the corresponding session to enable peer benchmarking and therefore further self-assessment. POMP responses were presented as descriptive data in tables, histograms or pie charts.

Reflective One Minute Papers (ROMPs)

ROMPs are a feedback tool which encouraged voluntary reflection about a session. The same three questions were asked in all ROMPs:

1. What was the most important thing you learnt?
2. What was the most confusing thing I covered?
3. What was the most interesting thing you learnt?

ROMPs were completed on a voluntary basis. By responding to these three questions, researchers were able to provide feedback about the session and their learning to the librarian. ROMPs were developed partway through this project in order to close the formative assessment loop. ROMPs were used for 11 sessions, as listed in Table 1. A link to the three ROMP questions was usually distributed on the last slide of a session presentation or immediately after a session. In one exception (Session 16), the ROMP link was sent out 2 weeks after the session. ROMP responses were in an unstructured, free text format. Thematic analysis, also known as analytic coding, was used to interpret the responses and quantify them according to themes (Guest, MacQueen, & Namey, 2012; Richards, 2015).

Data Collection

POMPs and ROMPs were created in Google Forms (Google, 2014). The selection of Google Forms was based on a number of criteria: Google Forms is a free service with no limit on the number of questions that can be asked; checklists of multiple options per question can be selected, enabling quick standardized responses; and, the OMPs could be shared through an online link, enabling participation by both local and remote researchers.

POMPs and ROMPs were anonymous, a decision based on the presumption that anonymity would make researchers more likely to provide honest responses and therefore enable more realistic benchmarking amongst peers (Dillman, Smyth, & Christian, 2009). Respondents were also not required to log in using Google Forms, building researcher confidence that the OMPs were anonymous.

Results

The results report on a series of case studies to explore the effectiveness of POMPs and ROMPs to respond to the three questions stated in the Aims.

Response Rates of POMPs and ROMPs

The numbers of researchers attending the sessions for which POMPs and ROMPs were distributed are summarized in Table 1.

The completion rate of POMPs was high, at 72.7%, i.e., 136 from a pool of 187 researchers who attended the 16 sessions. A likely factor contributing to this high rate of completion was the simplicity of the POMP form. In one click from a link in an email, it was immediately evident what the researcher needed to respond to. The entire POMP could be viewed on a desktop screen without scrolling, visually emphasizing that the form would be quick to complete, with the format of all or most responses being checklists. Promoting the

POMP as a “1 minute quiz” with endorsement from a research leader was also effective. For example, the Director of a research centre for one of the Life and Environmental Science sessions included the following statement of support in his email:

As part of the prep for the planning day, and to help with our understanding of the use of Research Profiles, can I ask you to take this 1 minute quiz? I took it and it took even less than 1 minute.

The completion rate of ROMPs was lower, at 20.9%, i.e., 23 from a pool of 110 researchers who attended the 11 sessions for which ROMPs were distributed. A major factor contributing to this low response rate may have been that the response format was free text.

Researchers were from the disciplines of Life and Environmental Science, Health Science, Social Science and Humanities, and Mixed Disciplines (Table 1). The librarian was present in the same room with participants for sessions 1-10, 15 and 16. Sessions 11-14 were conducted remotely via videoconference (Table 1). Sessions 1-15 were presented by the author. Session 16 was presented by another research support librarian who provided peer feedback about the value of OMPs.

Aim 1: Do POMPs Stimulate Researcher Engagement and Interest?

POMPs enhanced the engagement of researchers. Completion of a POMP and then the sharing of POMP results provided researchers with two opportunities for self-assessment. Firstly, POMPs could provide additional incentives to go to a session if researchers identified gaps in their knowledge or skills based on questions asked in the POMP. In at least one case, a researcher started to use some of the tools listed in the POMP prior to the session. Secondly, in sessions, researchers showed great interest in the activities and tools

Table 1

Summary of Attendance, POMP's and ROMP's for each Session

Session #	Discipline / Client Group	Session Topic	Remote*	Session date	Attendance	# POMP's submitted	% POMP's submitted	# ROMP's submitted	% ROMP's submitted
1	Life and Environmental Sciences: Post-Docs	Altmetrics	No	9 October 2013	23	17	73.9	----	----
2	Life and Environmental Sciences	Managing research profiles	No	11 October 2013	28	28	100.0	----	----
3	Life and Environmental Sciences	Research profile update and management	No	12 August 2014	8	9	112.5	6	75.0
4	Life and Environmental Sciences	Research profile update and management	No	29 August 2014	8	6	75.0	1	12.5
5	Life and Environmental Sciences	Research profile update and management	No	19 September 2014	5	4	80.0	1	20.0
6	Life and Environmental Sciences	Research profile update and management	No	9 October 2014	4	4	100.0	0	0.0
7	Life and Environmental Sciences	Research profile update and management	No	10 October 2014	4	2	50.0	0	0.0
8	Life and Environmental Sciences	Research profile update and management	No	24 November 2014	9	8	88.9	0	0.0
9	Health Sciences	Publishing academic research	No	23 October 2013	11	6	54.5	----	----
10	Health Sciences	Research and social media	No	27 August 2014	14	15	107.1	4	28.6
11	Health Sciences	Quality publishing	Yes	28 August 2014	3	2	66.7	3	100.0
12	Social Sciences and Humanities	Researcher identifiers	Yes	9 September 2014	2	3	150.0	2	100.0
13	Social Sciences and Humanities	Altmetrics	Yes	18 September 2014	5	4	80.0	4	80.0
14	Social Sciences and Humanities	Promoting and maximising research impact	Yes	2 December 2013	2	6	300.0	----	----
15	Mixed disciplines: Academic teaching staff	Research impact and publishing	No	13 February 2014	13	9	69.2	----	----
16	Mixed disciplines: Higher Degree Research students	Intellectual Property & Copyright	No	2 and 9 October 2014**	48	13	27.1	2	4.2
Total Attendance and number of POMP's/ROMP's submitted for all sessions					187	136		23	

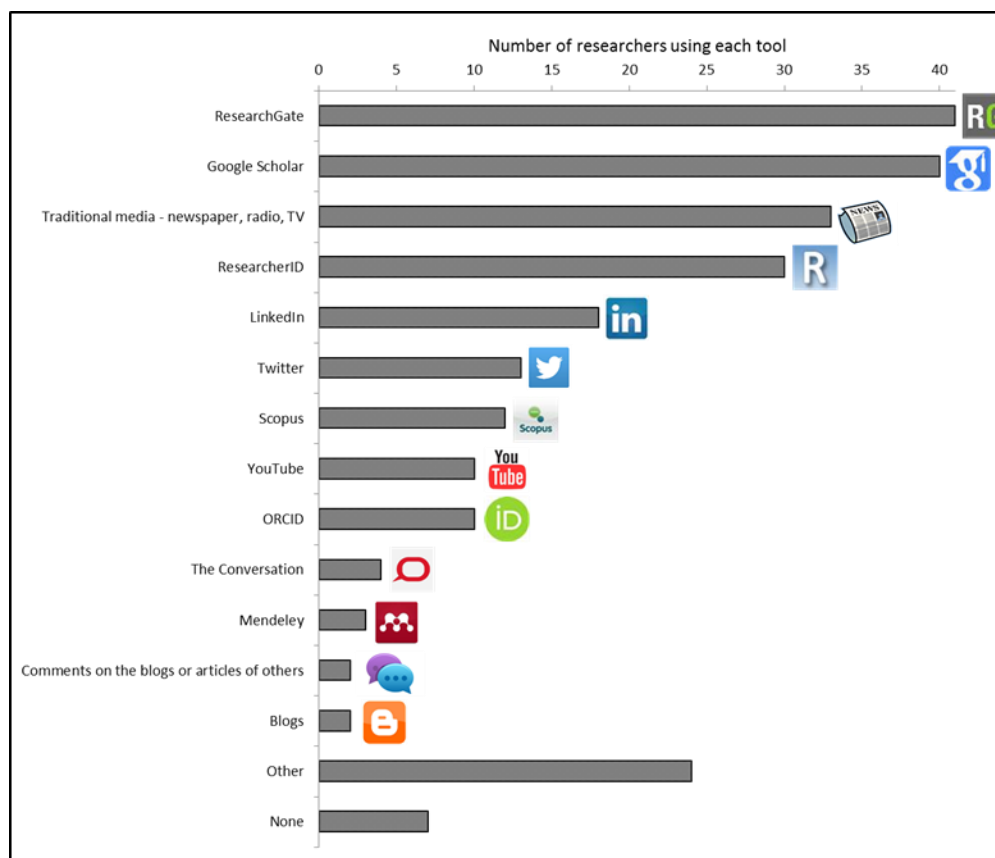


Figure 2

Display of results for the POMP question "Have you used any of the following to promote or discuss your research?" (Responses from 78 submitted POMP distributed to 89 researchers, compiled progressively and presented in sessions 1-8).

being used by their peers. Figure 2 displays the combined responses for eight sessions on the same topic (Managing research profiles) for researchers from the same discipline (Life and Environmental Sciences). The cumulative responses were shared in each of the eight sessions. The opportunity to benchmark against peers and resulting discussion gave endorsement to the advice provided by the librarian. For example, one researcher reported that he now has a new international collaborator with substantial funding through a LinkedIn™ connection. Hearing how their peers were using such tools gave context-relevant evidence, making it easier to sell the concept of using social media tools in a research context. Researchers were also able to see which tools were widely used by their peers, giving an

indication of where to get started, or a confidence boost if they were already using those tools. Learning about lesser used tools such as The Conversation (<http://theconversation.com/au>) gave researchers ideas for how they could increase awareness of their research.

Aim 2: Can POMP Identify Learning Needs of Researchers?

POMPs were effective and efficient in identifying current learning needs of researchers and what the focus of the session content should be prior to a session. POMP responses indicated what researchers understood or were doing well and also gaps in their current knowledge or activities.

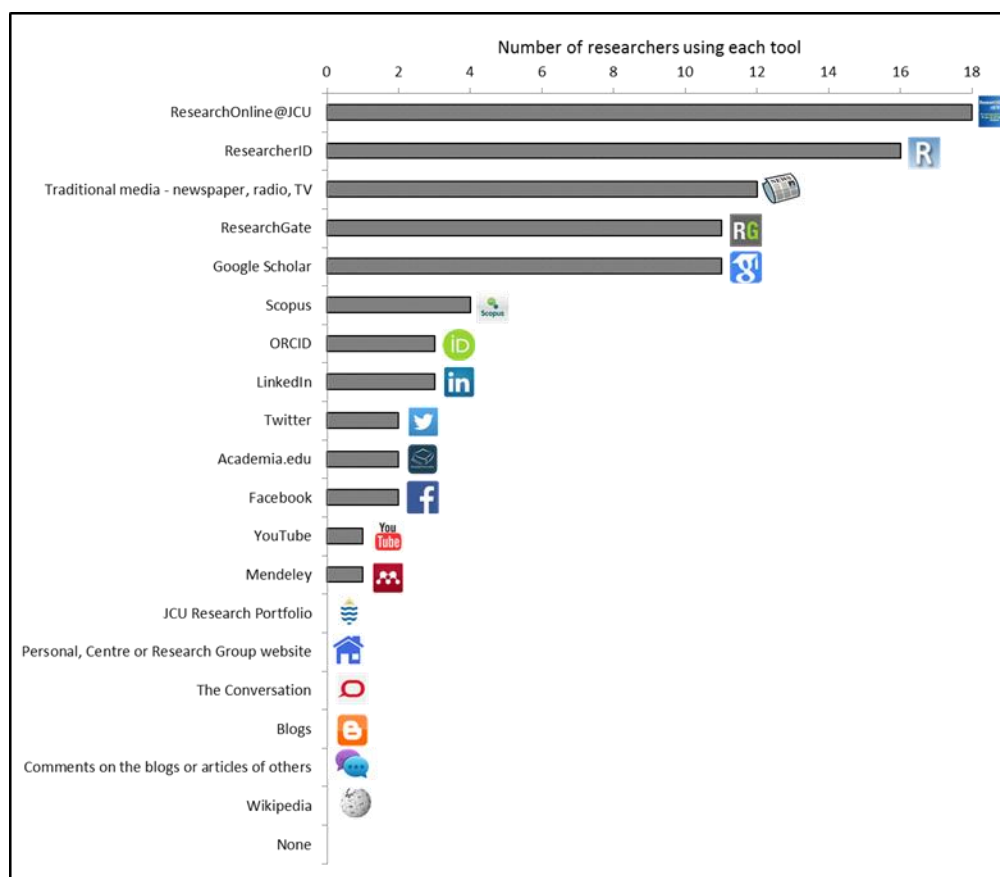


Figure 3

Display of results for the POMP question "Have you used any of the following to promote or discuss your research?" (Responses from 28 submitted POMP's distributed to 28 researchers, presented in session 2).

Responses from Life and Environmental Science researchers attending one of the eight sessions represented in Figure 2 (Session 2, as listed in Table 1) indicated that participants in this session were using some online tools and almost half had used traditional media to communicate and promote their research (Figure 3). This suggested that they were generally aware of the importance of communicating and promoting their research. Despite this apparent awareness, the moderate to nil use of more than half the listed tools (Figure 3) also highlighted areas for further instruction.

As a further example of how POMP's were useful for identifying learning needs, Health Science and Life and Environmental Science

researchers were mostly aware of whether an article processing charge (APC) had been paid for their article, but were less clear about whether they had signed copyright ownership over to the publisher. Approximately one third of responding researchers from each discipline had authored a paper in which an APC had been paid and less than 10% were not sure (Figure 4). For authors who had paid an APC, a serious issue for discussion was highlighted: eight of the Life and Environmental Science researchers (Figure 5) and the four Health Science researchers who indicated they had paid an APC were not sure if they had retained copyright ownership of their work. This finding highlighted the need to focus on the importance of understanding the conditions of a publisher

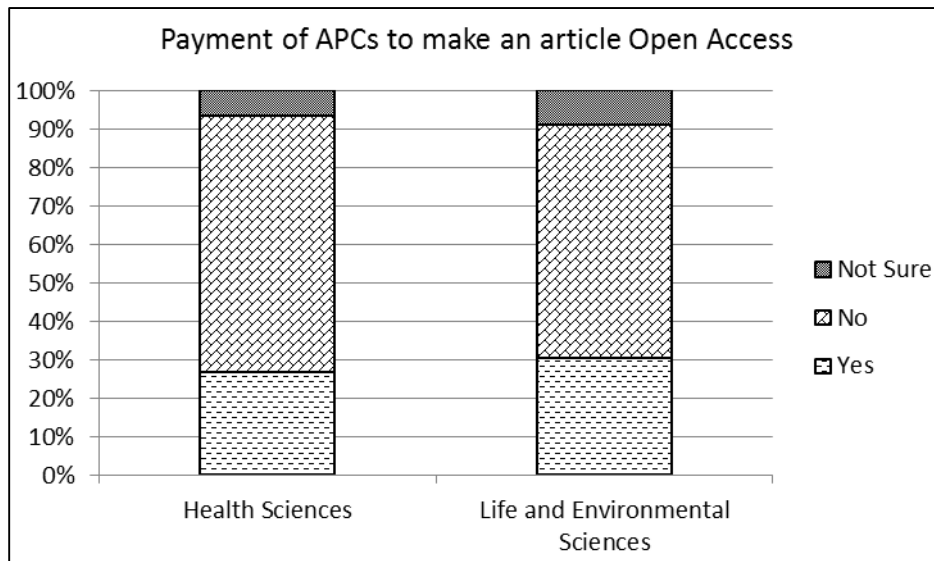


Figure 4

Relative proportions of researchers, based on POMP responses, who have paid an Article Processing Charge (APC) to make an article Open Access; Health Science (15 responses, Session 10) and Life and Environmental Science (33 responses, Sessions 3-8)

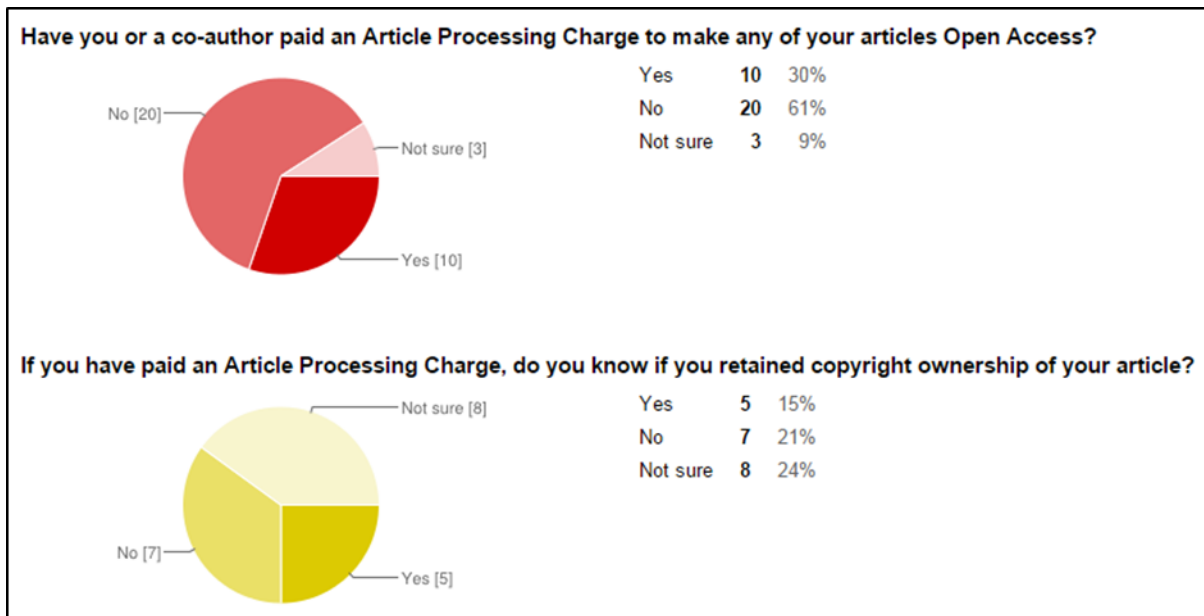


Figure 5

Display of results for the POMP questions 5a: "Have you or a co-author paid an Article Processing Charge to make any of your articles open access?" and 5b "If you have paid an Article Processing Charge, do you know if you retained copyright ownership of your article?". (Responses from 38 submitted POMP distributed to 38 researchers, compiled progressively and presented in sessions 3-8).

copyright agreement in the session. This was pertinent given that ResearchGate™, a site which facilitates the sharing of research publications, was a frequently used social media tool (Figures 2 and 3).

Despite the anonymity of POMP responses, examining answers to each question from individual responses was also useful for identifying learning needs. In relation to scholarly publishing, researchers attending session 9 each had some publishing experience, mostly with journals and conferences (Table 2). However, only three researchers were familiar with the Australian Government Higher Education Research Data Collection (HERDC) (Department of Education, 2014) and Excellence in Research for Australia (ERA) (Australian Research Council, 2014). Although this group of researchers was aware of the importance of publishing, most were not using the HERDC and ERA specifications, a form of summative assessment for researchers in Australian universities, to guide their publishing decisions. Session content was therefore adapted to explain the specifications at an introductory level. Similarly, of the 12 researchers in Figure 3 who had used traditional media to promote their research, only 6 identified ResearchOnline@JCU, the institutional repository, as a tool for communicating and promoting their research. This identified a point for discussion in the session, revealing that some researchers had only considered the institutional repository as an administrative reporting tool and not an avenue for communicating and promoting their research.

Aim 3: Are OMPs an Effective Tool for Gaining Feedback about Researcher Learning?

Polling One Minute Papers (POMPs)

POMPs created an opportunity to learn about the audience prior to an upcoming session, freeing up time in a session for discussion and teaching additional content. POMPs also created the opportunity to 'hear' from researchers who

would normally not speak up in a session or who were only prepared to share information anonymously. Even when the number of responses was low, due to a small number of researchers attending a session, POMPs were still useful because all or most of the audience responded.

POMP responses were useful for refining how sessions were taught. For example, only a small proportion (14.7%) of researchers indicated that they had a good understanding of the term altmetrics, but all who selected this option provided an appropriate description of the term (Table 3). In contrast, of the 75 researchers who responded to this question, 42% indicated they had no understanding and 22% indicated they had some understanding of altmetrics. Given this range, discussion was encouraged in sessions to facilitate learning from peers who provided explanations that other session participants could easily relate to.

POMPs created an unexpected insight from one group of remote researchers (session 14). Enquiry as to why only one researcher had responded to the POMP revealed cultural differences as the underlying issue. The group's research manager explained that the researchers were embarrassed that they had no or few publications and so were reluctant to respond to the POMP. This information was useful in itself as it indicated that the session content needed to be directed at getting the researchers started with publishing. Further explanation about the POMP boosted the response rate to 6, although only 2 researchers attended the session. These insights will be considered in the planning of future sessions with this group of researchers.

Feedback from a colleague who trialed the use of a POMP (session 16) reported that it was very interesting and useful to see the range of disciplines and prior knowledge of the researchers who had registered for the session. In this POMP, respondents were asked to table any prior questions, which gave the librarian time to prepare for complex questions.

Table 2
POMP Responses from Health Science Researchers about Their Experience in Publishing Academic Research*

Have you published any of the following types of journal articles?	Have you published any of the following types of conference works?	Have you published any of the following types of books or book chapters?	Have you co-authored other types of works that are derived from your research?	Familiarity with HERDC or ERA	Use of journal ranking tools
Peer reviewed article	Peer reviewed paper, Poster, Abstract or summary			ERA: Excellence in Research for Australia	
Peer reviewed article, Short note or commentary	Abstract or summary				Journal Citation Reports
Peer reviewed article, Non-refereed article, Case study	Peer reviewed paper, Non-refereed paper, Poster				
Peer reviewed article, Non-refereed article, Short note or commentary	Poster, Abstract or summary, Edited a conference proceedings	Teaching material		HERDC: Higher Education Research Data Collection, ERA: Excellence in Research for Australia	Journal Citation Reports
Peer reviewed article, Non-refereed article, Short note or commentary	Abstract or summary	Non-commercial		HERDC: Higher Education Research Data Collection	Journal Citation Reports
Non-refereed article					Journal Citation Reports, Scopus analytics

Reflective One Minute Papers (ROMPs)

ROMP responses gave an insight into what researchers gained from their session. They were used by the librarian to determine whether intended learning outcomes were achieved, and consider how the teaching or content of future sessions could be improved. ROMPs were particularly effective in facilitating reflective feedback from remote sessions with small numbers of participants. In discussions at the end of sessions with 2-5 participants (Sessions 11-13), responses were received from all or most participants. In some cases, immediate clarification was given in the session by the librarian. For more complex issues, future

sessions were offered as a response. Although response rates were lower for larger sessions, the ROMPs were still beneficial for encouraging reflection, receiving feedback, and continuing the conversation with session participants. ROMPs were least effective for Sessions 4-8, which were hands-on computer sessions with substantial discussion and feedback throughout the sessions. When asked to complete the ROMP, the researchers repeated comments they had made during the session, but only 2 of 30 recorded their feedback in a ROMP. Feedback from these hands-on sessions was mostly positive, with the exception of one researcher who was frustrated with the work she needed to do to manage her online presence.

Most researchers responding to the ROMPs gave a response for each of the three questions. Within the 23 ROMP responses, 17 researchers responded to all 3 questions, 4 responded to 2 questions, and 2 responded to only 1 question. Using thematic analysis, responses were grouped into one of five categories (Table 4). The number of responses to each of the three questions is presented in Table 5. The categories “topic named” and “positive statement” suggest a relatively shallow level of learning and limited engagement with the session content. “Reflective statement” suggests some level of engagement, while responses coded as “reflective statement with further insight” and “reflective question” each provide evidence of deeper learning. Most responses to the question about the most important things learned were reflective statements. The majority of responses to the question about the most confusing thing covered were positive, indicating that respondents felt that they understood the session content. Responses to the question about the most interesting thing learned indicated a range of levels of engagement from positive

statements or a reflective statement with some demonstrating further insight.

Discussion

This study describes a new approach to providing library support for researchers. The defining feature of this approach is that it is simple yet informative. The approach adapts and combines two strategies derived from a formative assessment framework. The first strategy is polling researchers using the One Minute Paper concept to (1) identify their learning needs and (2) increase levels of engagement (e.g., Hoppenfeld, 2012). The Polling One Minute Paper (POMP) is designed to be quick for researchers to complete, and easy for librarians to interpret and gain a snapshot of current learning needs of the target group of researchers. Completing the POMP prior to the session gives responding researchers an indication of the session content, raising their interest and allowing them to self-assess their understanding. During the session, a summary of the anonymous POMP responses is presented.

Table 3
POMP Responses from Researchers Who Indicated that They Had Some or a Good Understanding of Altmetrics

Discipline	Understanding of altmetrics	If you have heard of the term altmetrics, briefly describe what you understand it to mean?
Health Sciences	Good	stats of research acknowledgement
Health Sciences	Good	It appears to be a count of twitter mentions (although it might include more than that)
Health Sciences	Some	heard it but not sure of it's meaning
Health Sciences	Some	No much I understand it
Health Sciences	Good	A measure of the social media impact of your paper
Health Sciences	Good	means of measuring research impact
Life and Environmental Sciences	Good	Non-traditional metrics, number of mentions on websites, social media, media etc
Life and Environmental Sciences	Good	proposed/potential alternative to Impact Factor, as a measure of influence
Life and Environmental Sciences	Good	Another way of measuring research 'impact'
Mixed Disciplines	Good	A number that represent the amount of attention an article receives from blogs, twitter, etc.
Mixed Disciplines	Good	measure of attention an article has received relative to 'lifespan'

Table 4
Categories Used to Group ROMP Responses

Response category	Explanation of category	Example responses from this study
Topic named	Simple listing of an aspect covered in the session, with no insight to the researcher's learning	<ul style="list-style-type: none"> • open access • altmetrics
Positive statement	Indicates session was worthwhile, with no insight to the researcher's learning	<ul style="list-style-type: none"> • Nothing was confusing - excellently done • All of it. Informative and interesting presentation. Thank you. No negative feedback was recorded in any responses.
Reflective statement	Repeats content from the session, highlighting specific aspects	<ul style="list-style-type: none"> • labouring the points about "dodgy" journals. I liked the tips to improve your Altmetric score. • I also didn't know that Twitter can be so useful.
Reflective statement with further insight	What the researcher learnt and how it applies to their personal situation or how they will use what they have learnt	<ul style="list-style-type: none"> • The most interesting thing I learn was about the importance of open access. I am going to bring some of this information to my lab group and postgrads. Overall, thank you so much for taking the time and going over these things - you are so knowledgeable and kind, it was a wonderful workshop! • The importance of twitter to academics. I always thought it was meant for teenagers. I will definitely sign up for a twitter account after this session.
Reflective question	Indicates deeper thinking by new issues that the session content raised for the researcher	<ul style="list-style-type: none"> • Probably not covered entirely, but I am interested how publications in journal with lower impact, but receive higher citations, might influence the indices we looked at during the session • Nothing was confusing. However would have liked an example of how to tweet a publication. I have tweeted a publication but there are no doughnuts associated with the corresponding author publication list in Research Portfolio.

Table 5
Number of Responses to Each of the Three ROMP Questions

Response category	ROMP Question and number of responses		
	What was the most important thing you learnt?	What was the most confusing thing I covered?	What was the most interesting thing you learnt?
Topic named	2	1	1
Positive statement	1	10	6
Reflective statement	13	3	8
Reflective statement with further insight	4	2	5
Reflective question	0	4	1

Sharing the POMP responses is effective in that it provides context relevant information against which session participants can benchmark themselves, and prompts peer to peer discussion within the context of the participants' discipline. Increased levels of discussion provide informal evidence of the effectiveness of this strategy, which would be unlikely to occur through didactic delivery of the session content. At the end of the session, participants are asked to complete a Reflective One Minute Paper (ROMP), encouraging researchers to reflect on the session content and provide feedback which

enables the librarian to review what the researchers gained from the session. This second strategy is adapted from the original One Minute Paper (Chizmar & Ostrosky, 1998), which was first used in library instruction by Choinski and Emmanuel (2006).

The POMP-ROMP approach can improve the value of library research support sessions for researchers. It offers a responsive approach to the current learning needs of researchers. Variation in undergraduate students' competencies represents a significant challenge

in information literacy pedagogy (Dunaway & Orblych, 2011). Researcher learning needs may be more diverse than that of undergraduate students, varying with career stage, discipline, current research priorities or activities, and previous training. The increasingly complex and competitive environment that researchers now work in (Richardson, et al., 2012) also makes it difficult to identify and track researcher learning needs. Given this variability, the two complementary OMP tools described in this study are an effective means of rapidly obtaining a snapshot of the current learning status of a specific research group, immediately prior to and following a library support training session. Librarians can use this snapshot to determine the level of detail that they teach in a session, with the aim of meeting the learning needs of researchers and providing the right amount of challenge to spark engagement in the topic. Using a tailored approach also creates proactive rather than passive library services, providing “just-in-time” and “just-for-me” assistance (Association of College and Research Libraries, 2010).

The POMP-ROMP approach is designed to slot into researchers’ workflow. The simplicity of both the POMP and ROMP mean that they can be prepared at short notice and used for small, large, remote, face-to-face, lecture, or hands-on sessions. The flexibility of these tools enables the library to contribute to improving researcher learning without adding additional burden to a researcher’s workload (Parker, 2012). The POMP and ROMP also extend the opportunity for discussion with researchers beyond the defined period of a library research support session, creating further opportunity to build and strengthen the researcher-librarian relationship (Auckland, 2012; Parker, 2012). In this study, ROMP feedback received in discussion at the end of sessions was responded to directly, with the offer of future sessions where relevant. Further consideration is needed for how to respond to written responses. One option would be to ask researchers to include their name on the ROMP if they would like

further information. Another option would be to provide a single response, shared with all session participants, which responds to all issues raised in each ROMP from the corresponding session.

Many academic libraries are now developing or offering support programs for their researchers (Auckland, 2012; Richardson, et al., 2012). Maximizing the benefit for researchers attending library research support sessions will also benefit libraries by efficiently using the time that librarians spend in supporting researchers. Efficient use of the time of librarians is important because it is likely that libraries will develop research support services with no or little additional resources (Kennan, Cole, Willard, Wilson, & Marion, 2006; Kennan, et al., 2014). Therefore, as more librarians become involved in supporting researchers in their institution, a coordinated approach will be necessary to make efficient use of limited library resources. Aggregating POMP and ROMP data from all library research sessions could be used as a professional development tool for research support librarians, as also described for peer review of teaching data (Drew & Klopper, 2014). From the perspective of academic libraries, aggregated POMP and ROMP data could be used for identifying learning gaps, sharing evolving perspectives in researcher feedback, and optimizing content in library research support programs. Such a community of practice could fast track the development of research librarians (Drew & Klopper, 2014). As more librarians become involved, the opportunity for peer review of library instruction could also lead to new insights (Drew & Klopper, 2014) which may improve POMP, ROMP and other strategies for teaching library support to researchers. One of the most important but often overlooked parts of the assessment cycle is for teachers or instructors to close the loop by reflecting on results and making appropriate changes, such as adjusting teaching methodologies or changing the structure of a program (Oakleaf, 2009; Swoger, 2011). Ultimately, the goal of all

instruction and assessment efforts is to engage in reflective practice (Oakleaf, 2014). Teaching programs can nearly always be improved (Swoger, 2011) and should evolve to keep pace with new teaching strategies and content. POMP and ROMP are a viable means of gaining regular, systematic feedback from researchers to assist with developing and improving library research support programs. If implemented as a routine practice, the POMP-ROMP model could support a cyclical process of quality control and improvement.

Academic libraries and librarians must demonstrate their value. Libraries and librarians can no longer rely on an assumed belief by stakeholders that they are important (Association of College and Research Libraries, 2010). This is particularly true for the context of library research support. In this relatively new enterprise of research support, libraries are trialing various models of operation and entering spaces that were previously the domain of other sections of the university, e.g., research offices. Assessing impact, to demonstrate value, is made more complicated because academic libraries operate in a changing environment in which people, services, and needs are constantly evolving (Association of College and Research Libraries, 2010). It is also difficult to prove that actions taken by the library contributed to improvements in the performance of researchers (Association of College and Research Libraries, 2010). Implementing the POMP-ROMP approach as standard operating practice for library research support will develop a data source which provides evidence of a library's value and how its contribution to the support of the institution's researchers has changed over time.

Limitations

The strength but also limitation of the POMP-ROMP model is that collected information applies to a specific situation, with respect to a topic and point in time. POMP-ROMP responses should not be extrapolated to other contexts.

Each POMP-ROMP dataset provides a snapshot of the status of the learning of a specific group of researchers. No control groups are used and sample sizes are often small and not randomly selected. All responses are analyzed and samples are comprised of researchers with similar interests or skill levels. Questions asked in POMP are tailored to the topic of an upcoming session, so are not intended to provide a detailed or comprehensive insight to library research support issues.

It should also be recognised that POMP and ROMP responses may not reflect the learning or experience of all researchers in a corresponding session. The needs of researchers who do not submit a POMP may not be considered in the preparation of session content. Non-responses are most likely due to the researcher having other priorities, not seeing a personal benefit in submitting a response, or being reluctant to share his thoughts. In the most extreme situation, non-response could be due to a lack of understanding of the question. Given these assumptions, an unexpected finding was that the number of POMP responses for sessions 3, 10, 12 and 14 was higher than session attendance. As a result, the needs of the responding researchers may be addressed but not actually apply to the researchers who attended the session. In the current study, non-response to ROMPs seemed mainly due to researchers not having anything to report that was not already expressed during the session. Unfortunately, this verbal feedback was not recorded for longer term analysis and comparison. In future sessions, the value of completing a ROMP will be emphasized, to encourage researchers to reflect on the session content and to record feedback to the librarian.

Conclusions

Polling One Minute Papers (POMPs) and Reflective One Minute Papers (ROMPs) offer a new approach for librarians to guide the learning process of the researchers they support. This study demonstrates that POMPs and

ROMPs have the potential to be remarkably informative, despite requiring little effort on the part of the researchers or librarians. POMP and ROMP are adaptations of conventional formative assessment tools which extend the opportunity for librarians to engage with researchers, both before and after a library research support session. POMP allows researchers to benchmark the status of their learning needs and assist librarians to identify learning gaps. ROMP encourages researchers to reflect on what they learned in library research support sessions and assist librarians to determine whether intended learning outcomes were achieved. The simplicity of POMP and ROMP enable them to be slotted into researchers' workflow. As librarians take on research support duties, these tools can be used to share recorded evidence of the evolving learning needs of researchers. Responses to POMP and ROMP also document evidence of the value that a library has contributed to supporting its researchers.

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Appendix

Session #	Discipline / Client Group	Questions	Response Options
1	Life and Environmental Sciences: Post-Docs	How would you rate your understanding of altmetrics?	None; Low; Good
1	Life and Environmental Sciences: Post-Docs	Which of the following do you use to do your research, or to talk about your research interests?	Academia.edu; Blogging; CiteULike; Comments on other sites; Facebook; Mendeley; Newspaper interviews; Radio interviews; ResearchGate; Slideshare; Twitter; Wikipedia; YouTube; Other
1	Life and Environmental Sciences: Post-Docs	Which of the following sites do you use to manage your research profile?	JCU Research Portfolio; ResearchOnline@JCU; ResearcherID; Scopus; ORCID; Google Scholar; Other
2	Life and Environmental Sciences	Is the information in your JCU Research Portfolio profile up-to-date?	Yes; No; Other
2	Life and Environmental Sciences	Which of the following do you use to do your research, or to talk about your research interests?	ResearchOnline@JCU; ResearcherID; Scopus; ORCID; Google Scholar; Other
2	Life and Environmental Sciences	Which of the following sites do you use to manage your research profile?	Academia.edu; Blogging; CiteULike; Comments on other sites; Facebook; Mendeley; Newspaper interviews; Radio interviews; ResearchGate; Slideshare; Twitter; Wikipedia; YouTube; Other
3, 4, 5, 6, 7, 8	Life and Environmental Sciences	Have you used any of the following to promote or discuss your research?	ResearcherID; Scopus; Google Scholar; ORCID; The Conversation; Traditional media - newspaper, radio, TV; Blogging; Comments on the blogs or articles by others; Twitter, ResearchGate; YouTube; LinkedIn; Mendeley; Other
3, 4, 5, 6, 7, 8	Life and Environmental Sciences	Have you heard of the term altmetrics?	Yes; No; Not sure
3, 4, 5, 6, 7, 8	Life and Environmental Sciences	If you have heard of the term altmetrics, briefly describe what you understand it to mean?	[Free text]
3, 4, 5, 6, 7, 8	Life and Environmental Sciences	If you have paid an Article Processing Charge, do you know if you retained copyright ownership of your article?	Yes; No; Not sure

3, 4, 5, 6, 7, 8	Life and Environmental Sciences	Have you or a co-author paid an Article Processing Charge to make any of your articles Open Access?	Yes; No; Not sure
9	Health Sciences	Have you published any of the following types of journal articles?	Peer reviewed article; Non-refereed article; Case study; Short note or commentary; Other
9	Health Sciences	Have you published any of the following types of conference works?	Peer reviewed paper; Non-refereed paper; Poster; Abstract or summary; Edited a conference proceedings; Other
9	Health Sciences	Have you published any of the following types of books or book chapters?	Research; Non-research; Teaching material; Non-commercial; Reference; Later edition; Report
9	Health Sciences	Tick the box if you are familiar with the following government reporting or assessment exercises:	HERDC: Higher Education Research Data Collection; ERA: Excellence in Research for Australia; Other
9	Health Sciences	Tick the box if you have used any of the following for ranking the value of a journal:	Journal Citation Reports; Scopus analytics; Beall's list of predatory publishers; Other
10	Health Sciences	Have you used any of the following to promote or discuss your research?	ResearcherID; Scopus; Google Scholar; ORCID; The Conversation; Traditional media - newspaper, radio, TV; Blogging; Comments on the blogs or articles by others; Twitter, ResearchGate; YouTube; LinkedIn; Mendeley; Other
10	Health Sciences	Have you heard of the term altmetrics?	Yes; No; Not sure
10	Health Sciences	If you have heard of the term altmetrics, briefly describe what you understand it to mean?	[Free text]
10	Health Sciences	Have you or a co-author paid an Article Processing Charge to make any of your articles Open Access?	Yes; No; Not sure
10	Health Sciences	If you have paid an Article Processing Charge, do you know if you retained copyright ownership of your article?	Yes; No; Not sure
11	Health Sciences	Have you published any of the following types of journal articles?	Peer reviewed article; Non-refereed article; Case study; Short note or commentary; Other

11	Health Sciences	Have you published any of the following types of conference works?	Peer reviewed paper; Non-refereed paper; Poster; Abstract or summary; Edited a conference proceedings; Other
11	Health Sciences	Have you published any of the following types of books or book chapters?	Research; Non-research; Teaching material; Non-commercial; Reference; Later edition; Report
11	Health Sciences	Would you consider that you have a fair understanding of:	HERDC: Higher Education Research Data Collection; ERA: Excellence in Research for Australia; Other
11	Health Sciences	Are any of your publications Open Access:	In ResearchOnline@JCU?; On the publisher's website?; Other
12	Social Sciences and Humanities	Are you the author of a peer reviewed journal article?	No; Yes
12	Social Sciences and Humanities	Are you the author of a peer reviewed conference paper?	No; Yes
12	Social Sciences and Humanities	Are you the author of a commercially published book or book chapter about a research topic?	No; Yes
12	Social Sciences and Humanities	Do you have publications available in ResearchOnline@JCU?	No; Yes
12	Social Sciences and Humanities	Do you have a Google Scholar profile that lists your research outputs?	No; Yes
12	Social Sciences and Humanities	If you have answered yes to Questions 1,2 or 3, have you searched for your publications in Web of Science?	No; Yes
12	Social Sciences and Humanities	If you have answered yes to Questions 1,2 or 3, have you searched for your publications in Scopus?	No; Yes
12	Social Sciences and Humanities	Is there any topic or question that you would like me to talk about in the session?	[Free text]
13	Social Sciences and Humanities	Have you used any of the following to promote or discuss your research?	ResearcherID; Scopus; Google Scholar; ORCID; The Conversation; Traditional media - newspaper, radio, TV; Blogging; Comments on the blogs or articles by others; Twitter, ResearchGate; YouTube; LinkedIn; Mendeley; Other
13	Social Sciences and Humanities	Have you heard of the term altmetrics?	Yes; No; Not sure

13	Social Sciences and Humanities	If you have heard of the term altmetrics, briefly describe what you understand it to mean?	[Free text]
13	Social Sciences and Humanities	Have you or a co-author paid an Article Processing Charge to make any of your articles Open Access?	Yes; No; Not sure
13	Social Sciences and Humanities	If you have paid an Article Processing Charge, do you know if you retained copyright ownership of your article?	Yes; No; Not sure
14	Social Sciences and Humanities	How many HERDC eligible publications do you have? This includes peer reviewed publications or commercially published books or book chapters.	[give number]
14	Social Sciences and Humanities	Have you heard of the term altmetrics, and how would you rate your understanding of altmetrics?	I have not heard of the term; I have some understanding; I have a good understanding
14	Social Sciences and Humanities	Which of the following do you use to manage your research profile?	JCU Research Portfolio; ResearchOnline@JCU; ResearcherID; Scopus; ORCID; Google Scholar; Other
14	Social Sciences and Humanities	Which of the following do you use to do your research, or to talk about your research?	Academia.edu; Blogs; Comments on any sites; Facebook; Mendeley; Newspaper interviews; Radio interviews; ResearchGate; Slideshare; Twitter; Wikipedia; YouTube; Other
15	Mixed disciplines: Academic teaching staff	Have you published any of the following outputs about your research?	Peer reviewed journal article; Non-peer reviewed journal article; Non-peer reviewed conference paper; Book or book chapter; Report; Other
15	Mixed disciplines: Academic teaching staff	Have you published any of the following outputs about your teaching?	Peer reviewed journal article; Non-peer reviewed journal article; Non-peer reviewed conference paper; Book or book chapter; Report; Other
15	Mixed disciplines: Academic teaching staff	Do you use any of the following social media tools to talk about or promote your teaching and learning?	Blogs; Comments on other people's posts; Twitter; Facebook; Academic.edu or ResearchGate; Slideshare; Wikipedia; YouTube; (Your) JCU Research Portfolio; (Your) Google Scholar profile; Other

16	Mixed disciplines: Higher Degree Research students	What is the discipline or subject area of your research?	
16	Mixed disciplines: Higher Degree Research students	Are you a:	Research Masters student; PhD student; Early Career Researcher i.e. are you within 5 years of starting your post-PhD research career?; Other
16	Mixed disciplines: Higher Degree Research students	Are you using (or planning to use) material in your thesis for which the copyright may have expired? Select Other if you would like to provide more information.	Yes; No; Not sure; Other
16	Mixed disciplines: Higher Degree Research students	Are you using (or planning to use) material in your thesis which is still under copyright? Select Other if you would like to provide more information.	Yes; No; Not sure; Other
16	Mixed disciplines: Higher Degree Research students	Have you ever requested copyright permission to use someone else's work in your research?	Yes; No; Not sure; Other
16	Mixed disciplines: Higher Degree Research students	Are you planning to publish your research in:	Journal article(s); Conference paper(s); book or book chapter(s); Other
16	Mixed disciplines: Higher Degree Research students	Have you heard of Creative Commons?	Yes; No; Not sure
16	Mixed disciplines: Higher Degree Research students	Do you have a copyright question that you would like answered in the workshop? Please provide more details here.	[Free text]