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What's Your Problem? Writing Effective Research Questions for Quality Publications

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Abstract

Research questions play a central role in papers, indicating the phenomenon or problem that is being addressed, and clearly stating what is being investigated. Indeed, the presence of research questions within a research article is an established quality indicator, and research questions form the basis of determining hypotheses, methodology, methods, and how interpretations and analysis of outcomes are undertaken. Given the key purpose of a research article is to communicate the phenomenon or problem that is being addressed, research questions play a central role in clearly stating what is being investigated. The Journal of University Teaching and Learning Practice (JUTLP) seeks to publish high quality research papers which offer impactful guidance for teaching and learning practice in higher education. In this editorial, we explore what research questions are, how they are used, their key characteristics, different types of questions, and how to write them. We also make practical recommendations for authors, reviewers, and editors in how to use research questions, what to look out for when reviewing manuscripts and making decisions, and how to best support authors in producing quality publications by ensuring impactful research questions are included.

Keywords

Citation

Introduction

When embarking on a research project, it is easy to get excited about how the work could make the world a better place, focussing particularly on the potential social impact of the findings or interventions that we might be implementing. We might be interested in examining the experience or perceptions of a particular group, or the impact of a new program. While excitement makes it easy to rush ahead and plunge into the doing, to satisfy research quality and rigour demands, it is first important to pause and take stock of how the project fits into the broader landscape of existing research and practice. Alignment between intentions, the way we undertake the work, and what we report afterwards is important to ensure quality and impact. A key co-ordinating factor across these elements is the research question: it helps situate the research within the literature, and offers a point to which aims, data collection, data analysis, and reporting of outcomes can be checked against. These considerations are especially important in the sharing, communication and dissemination of our work, such as through journal articles or conference presentations, since it can help like-minded people identify a work of interest, and facilitate connections, collaborations or replications in other contexts.

Many articles in educational research do not frame their reporting of projects with research questions (Merchant et al., 2021). Without research questions, there is no thread to connect the aim with the method and back to questions. Similarly, without clear research questions the evidence provided in the results are disconnected, and subsequently the discussion cannot answer questions or fulfil the purpose of the study. Such papers may struggle to tell a coherent story about the work, and therefore fail to clearly articulate the purpose of the research and its outcomes. Without this veracity, it is also impossible for readers to determine the quality or authenticity of the research such as the Rosenhan fraud described in Scull (2023). The study falsely claimed that pseudo-patients had faked entry into psychiatric hospitals and that psychiatrists were unable to diagnose mental illnesses correctly. The fabricated paper was not clear in the research questions being explored or how the ethical considerations had been carried out. The journal editors were also unable to provide details of the scrutiny that the manuscript had been subject to prior to publication. This is obviously problematic, not just with respect to the quality of contribution to knowledge for that piece of research and the impact on practice, but also for future research synthesis in which many studies are pooled together to reveal further insights (such as in a meta-analysis or systematic review). In this editorial, we seek to highlight the importance of research questions, presenting an overview of their purpose and functions, identifying relevant quality indicators, synthesising how to formulate a good question, and finally making recommendations for authors, reviewers, and editors.

Background

"A good research question takes time to create, but time invested in this process is always worthwhile" (Mattick et al., 2018, p. 107). Research questions are a common feature across many forms of research – quantitative, qualitative, and mixed methods (Tomaszewski et al., 2020). They "represent the facets of inquiry that the researcher most wants to explore" (Miles et al., 2014, p. 25) and offer a focus for investigation. A research question should logically link to the conceptual framing of the research project, at a level of detail which is neither too broad, nor too narrow, but clearly articulates the problem or phenomenon being investigated. In other words, a well-phrased

research question has several key uses: clarifying the questions that the research aims to answer, ensuring the methods have the appropriate approach, and providing a clear focus for the analysis and reporting of results. Through careful phrasing of these questions and referring to them throughout the research design, delivery, and reporting, the research will maintain its original intentions.

Strong research questions are critical not only for individual manuscripts, but also for research synthesis, e.g. systematic review and meta-analysis, which usually require a quality assessment of included studies (Bearman et al., 2012). The presence of an explicit research question in papers is one indicator of quality, and so those studies without stated research questions are more likely to be ranked poorly or not even selected as quality assessment criteria can result in exclusion of low-quality papers. An example of quality assessment is the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018a). The MMAT specifically asks two screening questions: firstly, "Are there clear research questions?"; and, secondly, "Do the collected data allow [the reader] to address the research questions?". A guidance note reinforces the fundamental and critical nature of research questions by stating, "further appraisal may not be feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions." Of the 27 total questions in the tool, eight specifically mention research questions (Hong et al., 2018b, p.2). Similarly, the Quality Assessment Tool for Theory-Based and Literature Review Studies (QATTL) states that "the introduction includes problem explication, scoping criteria, research objectives, and manuscript structure" and that "the research question(s) are justified and clear" (Crawford et al., in press).

It is likely that the first research question a researcher devises will not be 'the one'. Refinement and iteration will be necessary to arrive at a question (or set of questions) that appropriately address(es) the phenomenon or problem that is the subject of the investigation. It may be that the initial draft formulation of the research question has already been addressed by others or requires a different approach to data collection and analysis than initially imagined for the project. For example, the questions: *What are student outcomes when participating in oral assessments?* and *How do students experience oral assessments?* are relatively general but have a clear focus on students and oral assessment. The first question might require the collection of quantitative performance data or recordings of the oral assessment itself. In contrast, the second question might be pursued through a (qualitative or quantitative) survey of students, focus groups, individual interviews, or biometric data such as brainwaves, heart and respiratory rates. These considerations of different potential research methods that will be used to address the question are likely to inspire some refinement of the research question so that it aligns with the conceptual framing of the work.

Different research traditions may have varied expectations about the form and function of a research question. Many scholars undertaking higher education research will have a discipline or profession of origin which informs their approach to developing research questions. When working collaboratively, it can therefore be helpful to establish a shared understanding of what the research question *does*. For instance, research questions in biomedical fields are frequently supported by a series of hypotheses which must be developed and declared prior to a study commencing. In qualitative educational research, it may be that the research question shifts and is reformulated when the data collected reveals something unexpected. If researchers with

different epistemic approaches are collaborating on a project, this could result in misunderstandings or tensions and the clarification of research questions can help avoid these errors.

Where hypotheses are used, it is the quality of the research question that drives their merit, and the subsequent value of the collected data (Farrugia et al., 2010). Barroga and Matanguihan (2022) provide further detail concerning the connection between questions and hypotheses, and the different types of hypotheses. In quantitative research a research question can be linked to a testable hypothesis, which predicts the expected relationships between variables and essentially provides a suggested answer to the research question. In qualitative research hypotheses can be tested in the research but they are much less commonly used due to the nature of qualitative research exploring complex phenomena and gaining insights rather than testing specific theories or predictions. Qualitative research is more likely to generate new hypotheses as an outcome compared to quantitative research. Mixed methods approaches may include qualitative and quantitative types of research questions and a mixture of both hypothesis testing and generation. In all types of research, the hypothesis is based on the research problem identified by the research question (Chigbu, 2019).

While a single publication should address one main theme, there may be multiple routes of enquiry within that theme. In large projects, the overall research question for the broader endeavour may also serve as an umbrella for a series of sub-questions. The research question presented in a published paper might also vary from the original research project's question, depending on the focus of the article. For example, the larger project might have been framed around "What are students' experiences of oral assessment?", and the paper's question might be framed as "What is the role of peers in students' experience of oral assessment?" if peers arise as an important topic during data collection. Therefore, it is not uncommon for journal articles to contain more than one research question, linked by an underlying problem for the overall paper. If a research project is expansive and has many perspectives there may be as many as 12 research questions for the whole project but there would usually be no more than four for a typical research paper (Thelwall & Mes-Bleda, 2020; White, 2017). Typically research publications for JUTLP and other higher education journals are 7-8,000 words, with some disciplines and specific journals encouraging shorter communications of 5,000 or longer pieces of 15,000 words. Therefore, the appropriate number of questions that can be answered effectively and thoroughly within a paper should also be part of the writing process. There are often situations where the outcomes of research are different from your original expectations and therefore the research publication has adapted research questions to respond to the changed narrative of the paper compared to the overall research project.

Spending time refining the research question therefore supports the effective determination of methods, the refinement of the tools for research, and what ethical standards need to be considered. Sharing the research question with others and talking through why this problem and why this question is important to answer can help to clarify what is salient to the topic, what research question works best, and the overall purpose of the research. This approach is iterative in nature and therefore sufficient time should be spent thinking about the right research questions.

How to Develop Effective Research Questions

The Characteristics of Good Research Questions

A good research question frames the academic enquiry or exploration of an area of uncertainty. Writing research questions appears simple, but effective questions can be challenging to develop. Research questions should provide clarity about the niche of a topic that requires more investigation:

> The research process starts with developing a question about a specific health-related area of interest. This is important because once the research question is defined, it has an impact on every remaining component of the research process, including generating the hypothesis and defining the appropriate study design, as well as the study population, study variables, and statistical approach (Patino & Ferreira, 2016, p.403).

A good research question enables the author to take a broad topic and focus into a specific and researchable area of interest (Barroga & Matanguihan, 2022). It will also help to guide the author in the literature review as well as in the choice of method and analysis. However, there is often a tension between the research question being sufficiently detailed without becoming unnecessarily lengthy or complex (Bouchrika, 2024). The use of research question frameworks can help to find the right balance. The FINER – or feasible, interesting, novel, ethical, relevant – principles can be used to outline effective questions which are capable of being researched. The approach aims to ensure that research questions lead to providing new insights and fill gaps in understanding (Fandino, 2019). The FINERMAPS approach adds further principles of "manageable, appropriate, potential value/publishability, systematic" into the process of writing research questions (Ratan et al., 2019, p.16). Other common tools include the PICOT framework, originally developed for clinical quantitative research (Riva et al., 2012), the principles of "population, intervention, comparator, outcome and time frame" can be useful for a range of disciplines. The limitations of this tool for qualitative research have resulted in development of other frameworks. The SPICE framework uses prompts of "setting, perspective, intervention, comparison, and evaluation" (Booth, 2006, p.363), and SPIDER uses "sample, phenomenon of interest, design, evaluation, and research type" (Cooke et al., 2012, p.1435). The SPIDER Framework is expanded in Table 1 as an example of how a framework approach can be used to write research questions.

Table 1

Using the SPIDER Framework to develop a focused research question

Prompt	Definition	Example
Sample	Who is the group being studied?	Neurodivergent students
Phenomenon of **I**nterest	What are the reasons for their behaviours and decisions?	Experiences of the first year of university
Design	What is the research method being used?	Interviews
Evaluation	What is the outcome?	Feeling of belonging
Research type	Is the research qualitative, quantitative or mixed methods?	Qualitative
Research Question	What are the feelings of belonging in neurodivergent students in their first year of undergraduate study in a UK university?	

Tables 2 and 3 provide definitions and examples of different types of questions. Note that a question can fall into more than one category and the types are indicative and illustrative to support researchers thinking about how research questions can be written to clearly communicate the research approach and focus to readers. These tables have been developed through the process of our research into this editorial. We present our own definitions, example sentence initiators, and example questions to guide authors in their endeavours to understand and then write better research questions.

Table 2

Types of quantitative research questions

Type	Description	Example Question Initiators	Example Question	Further Guidance
Comparative	Comparative questions seek to compare two or more groups on one or more variables.	What is the difference …? What are the differences …? Is there a difference …?	Is there a difference between the assessment outcomes of students who spend 5 days a week on campus compared to those who spend 3 days or less on campus?	Esser and Vliegenthart (2017)
Descriptive	Descriptive questions seek to identify, explain and describe the response to a variable and includes variables that can be measured.	How often …? How much …?	How often do students access academic skills development sessions during their first semester of an undergraduate course?	Kamper (2020)
Relational	Relational questions seek to understand the causal relationships, associations, trends or interactions.	What is the relationship between …? Is there a relationship between …?	What is the relationship between taking a placement year and graduate salary?	Dumas et al. (2013)
Prediction	Predictive questions seek to understand future outcomes.	What is the likely outcome of …? What could be the unintended consequences of …? Does x result in y …?	Do unrestricted extensions for assessments result in higher grades?	Horn et al. (2009)
Explanatory	Explanatory questions seek to clarify an existing phenomenon and to explain why it occurs or understand relationships and associations.	What effect do/does …? What factors influence …? How can x affect y …?	How does learner assessment performance change following a support intervention?	Taguchi (2018)

Quantitative research questions result in methods that collect numerical data either in the form of continuous (interval), ordinal, or categorical data. Where numerical data is combined with non-numerical (qualitative data) it is of course, mixed methods research. Research questions may therefore be a combination of qualitative and quantitative questions in mixed methods research. As shown in Table 3, the key characteristic of qualitative questions compared to quantitative is

that they are likely to be more open ended, allowing the phenomena of the lived experience to explored in more depth.

Table 3

Types of qualitative research questions

Type	Description	Example Question Initiators	Example Question	Further Guidance
Contextual	Contextual questions seek to understand the context and nature of what exists.	What are the experiences of …?	What are the experiences of students with dyslexia in online asynchronous learning activities?	Bouchrika (2024)
Descriptive	Descriptive questions seek to describe a phenomenon.	What are the characteristics of…? What is the cause of …? What are the [phenomenon] experienced by …? Who is …?	What are the different types of microaggressions experienced by students of colour whilst undertaking work-based learning?	Kim et al. (2017)
Emancipatory	Emancipatory questions seek to understand a phenomenon for the purpose of action and benefit of disadvantaged people.	What are the barriers for …? How do members of [under-represented group] …?	What are the barriers to success for students with disabilities in laboratory class environments?	Barton (2005)
Ethnographical	Ethnographical questions seek to clarify the nature of people, their activities, interactions, and outcomes of behaviours in specific contexts.	What are the characteristics …? What are the demographics …? What is the culture of …? How does the culture …?	How do students of different demographic backgrounds utilise and interact with student support services?	Friberg (2015)
Evaluative	Evaluative questions seek to examine the effectiveness of an intervention, activity, or programme.	How effective is/was …?	How effective is a student support chat bot in supporting students finding the information and support they are seeking?	Jones-Devitt & Austen (2021)
Explanatory	Explanatory questions seek to clarify an existing phenomenon and to explain why it occurs or understand relationships and associations.	Why is/has/are/does …? How is/has/are/does …? To what extent does …?	Why has there been an increase in cases of academic misconduct in first year computing students' year-on-year for the last three years?	Bentouhami et al. (2021)
Exploratory	Exploratory questions seek to fully understand a phenomenon without bias, influence, or a set expectation.	What effect do/does …? What factors influence …? How can x affect y …?	What effect do blended learning approaches have on the digital capabilities of students?	Casula et al. (2021)

Grounded theory	Grounded theory questions seek to understand interactions, behaviours, and relationships through inductive reasoning to generate theories.	What motivates …? What are the factors that influence …? How do [group] respond to…?	What motivates tutors to provide additional assessment support sessions to students?	Urcia (2021)
Predictive	Predictive questions seek to understand future outcomes.	What is the likely outcome of …? What could be the unintended consequences of …?	What are the potential consequences of changing our extension policy on student well-being?	Mõttus et al. (2020)
Phenomenological	Phenomenological questions seek to understand a lived experience.	How do [individuals with a specific category] experience …? What is it like to …? What are the experiences of …?	How do students experience resitting an exam after failing to pass their first attempt?	Williams (2021)

Where to include research questions

Research questions are typically included at the end of the introduction and/or literature review. In this way, the questions are formed from topics highlighted in the introduction and/or literature review following a clear identification and articulation of the problem and then lead into, and are built upon, in the methods. When research questions are stated at the end of the introduction and/or literature review, they can then be explicitly or implicitly picked up in the results and discussion sections. In other words, once articulated in the introduction, research questions should then be threaded through the rest of the paper and therefore guide the effective presentation of the methods, results and discussions. Where the sections in a paper differ compared to the typical research paper structure, for example where a 'findings' section combines results and discussion in a single section, the research questions should still be threaded through the paper so that the 'answers' and question-led outcomes are eventually clear.

Research that does not clearly identify the problem may not actually be ethical to carry out because it does not address a meaningful problem that would result in a change that benefits participants (Purvis & Crawford, 2024). By being clear about the research question(s) at the outset of the research and taking a rigorous and methodical approach to the research process and how it relates to those questions supports maintaining both ethical standards and the quality of the research. A good example of where research questions demonstrate the quality and veracity of a paper has been articulated by Head et al. (2015) and the issue of p-hacking (select analysis of data to publish 'positive' results). Head et al. (2015, p. 12) suggest that researchers clearly label their research as "prespecified (i.e., designed to answer a specific question, where detail of methods and analyses can be fully reported prior to data collection)", indicating that research questions can be an effective tool in maintaining high quality research practices.

Steps to constructing *genuine* research questions

Frameworks such as those cited previously can help to support the construction of valid research questions. Knowing that design of research questions and the overall research design are interwoven, in educational research there is always a place for consideration of how learners can be engaged in co-design of research, including research questions (Austen & Donnelly, 2023). As shown in Barroga and Matanguihan's (2022) outline of the overall process of constructing research questions and hypotheses in research, by designing effective research questions, effective research design follows:

1) clarify the **background** of the study.
2) identify the **research problem** at the outset of the research.
3) review or conduct **preliminary research** such as via a literature review approach to understand the current knowledge and research questions that remain to be answered.
4) **construct research questions** to investigate the identified research problem. The variables to be accessed to answer those questions can be clarified.
5) formulate the **research hypotheses** to test to then be able to answer those questions (Gasparyan et al., 2019).
6) clarify the **objectives** to test those hypotheses and state the study **aims**.

All steps are necessary to ensure that useful questions are asked, and the ethical standards and value of the research are fully considered alongside development of the research design (Purvis & Crawford, 2024). The research questions form the foundations for the research and the quality of those initial questions will determine the quality of the research overall. Research questions are also a communication tool and throughout the process of research and subsequent preparation for publication these questions are iterative.

The fuller process of research question development also includes revisiting the initial questions and presenting them appropriately and in a considered way for publication and effective communication. We present this as the **IDEA-ARC Model** of constructing and communicating genuine research questions in research publications (Table 4). The model provides a structured and clarified approach to using research questions throughout a research process. Note that the iterative refinement of research questions, even towards the latter part of the research, is different to 'salami slicing' of research where a coherent set of data and analysis is deliberately fragmented and split. Time spent constructing, refining and reflecting on research questions is a substantial part of the research process, and may currently be overlooked or undervalued by researchers (Fandino, 2019; Riva et al., 2012).

Table 4

The IDEA-ARC Model for the development and communication of research questions

Stages	Step	Definition
'IDEA' STAGE The **ideas** and approaches of the potential research design are explored and the research questions are developed	**1. Identify**	Identify the problem space for the research question. This should draw both on literature review and understanding phenomena or problems in practice. The initial investigation should establish the need and ethical considerations for the research to be conducted (Purvis & Crawford, 2024).
	2. Draft	The background investigation, such as a literature review or systematic review, leads to research questions being drafted. Generate and iterate potential research questions which are appropriately targeted to the problem space identified in the initial step
	3. Explore	Consider different methods and approaches to the research questions, how suitable and feasible they might be, and ethical considerations associated with the anticipated methods. This may result in revision of the research question(s).
	4. Agree	Once the methods have been explored and an approach is confirmed, the questions should be revisited and further developed. Undergo informal or formal processes for confirmation of the best fit of research question and proposed project. This could involve consultation with research team members or a supervisor, award/approval of a granting body, and/or ethical review processes.
'ARC' STAGE The research questions **arc** across the research process through being used to develop and articulate the research story.	**5. Apply**	Undertake the research project, using the research questions to guide throughout the research methods, data collection, and analysis of the findings.
	6. Reflect	Once the analysis has been completed, reflect further upon the research questions. This step is not about substantially altering questions to suit findings, but an opportunity for further refinement of the questions for optimal clarification of how the findings address the problem or phenomenon in focus. In the reflection stage authors are likely to identify incomplete answers or additional questions for a subsequent piece of research.
	7. Communicate	The presented research within a paper may address some of all the original research questions. Careful presentation of an accurate question or set of questions should be considered in preparation of a manuscript.

Recommendations

Research questions, when used effectively, should provide the reference point, inherent thread, and narrative hook, for the methods, results, discussion and conclusion sections. By guiding the reader (including reviewers and editors as well as eventual journal readers) through your paper and using the research questions as the thread, you can avoid the common mistake of not presenting suitable findings that answer the research questions (Celik et al., 2014). Multiple clear and explicit references back to research questions throughout the manuscript is advisable to ensure that the narrative is clear and well structured. A recent editorial in the Australasian Journal of Educational Technology (Lodge et al., 2024) provides "A step-by-step guide on how NOT to get published". While a lack of research questions as a route to avoid publication is not included in the paper, the role of methods and reporting of results are key areas mentioned. Effective use of research questions will support authors in developing methods and results sections that meet the expectations of editors and provide clarity to readers, including reviewers. When preparing a manuscript for submission to a journal, and reviewing or making decisions about the quality of the paper, we make the following recommendations for authors, reviewers and editors:

Recommendations for Authors

1. Include research questions at the end of the introduction and/or literature review. The number of questions for journal articles is typically four or less.
2. Follow through with the research question from the introduction into the methods, results and discussion. Use research questions to guide your writing and thread a narrative through the paper.
3. Describe and set your methods, results and discussion in a way that shows you are answering the research questions and provide a summary of the answers to the research questions in the conclusion.

Recommendations for Reviewers

1. Ensure research questions are clearly communicated, and situated in both a genuine problem and current research.
2. Ensure the authors have used research questions explicitly, whether as a structural element (e.g. as subheadings, or referred to by notations such as RQ1) or embedded into the flow of the study.
3. Recommend clear, investigable and aligned research questions and advise on improving the quality of the questions if they do not meet this standard.

Recommendations for Editors

1. Be clear in your journal guidelines that research questions are good practice, and a mandatory requirement. If research questions are not included in a submission, your guidelines should be clear that this a reason for rejection.
2. Provide additional guidance to authors about how to write research questions. Share open access resources to support your authors in producing high quality papers.
3. Be clear in your expectations with reviewers and editors so they can guide authors in the effective use of research questions to enhance the quality of publications.

Conclusion

Research questions are the thread that should weave through each section of a research paper and provide the author, reviewer and the reader a coherent narrative in each section. By providing clear research questions, authors can demonstrate the quality of their research and how the methods address the questions. Provision of strong research questions also guides authors to focus on the results that answer the questions and clarify the meaning of the outcomes in the discussion. Including research questions does not guarantee the quality of a paper, but not having the questions clearly stated does disadvantage the calibre of the paper and its likelihood of acceptance.

Conflict of Interest

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