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Advanced Information Research Skills (AIRS)

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Advanced Information Research Skills (AIRS)

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EDITED BY LYNDELLE GUNTON; DR SAL KLEINE; AND RANI MCLENNAN

QUEENSLAND UNIVERSITY OF TECHNOLOGY
BRISBANE

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Generative AI declaration

The authors declare the use of generative AI in the research and writing process. The following tasks were delegated to GenAI tools under full human supervision:

- Reviewing and generating feedback about module content and structure

- Drafting WCAG 2.2 compliant alternative text (alt text) for complex images
- Drafting contributor biographies

The GenAI tool used was: Microsoft Copilot. Responsibility for the final manuscript lies entirely with the authors. GenAI tools are not listed as authors and do not bear responsibility for the final outcomes.

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Version	Date	Change	Details
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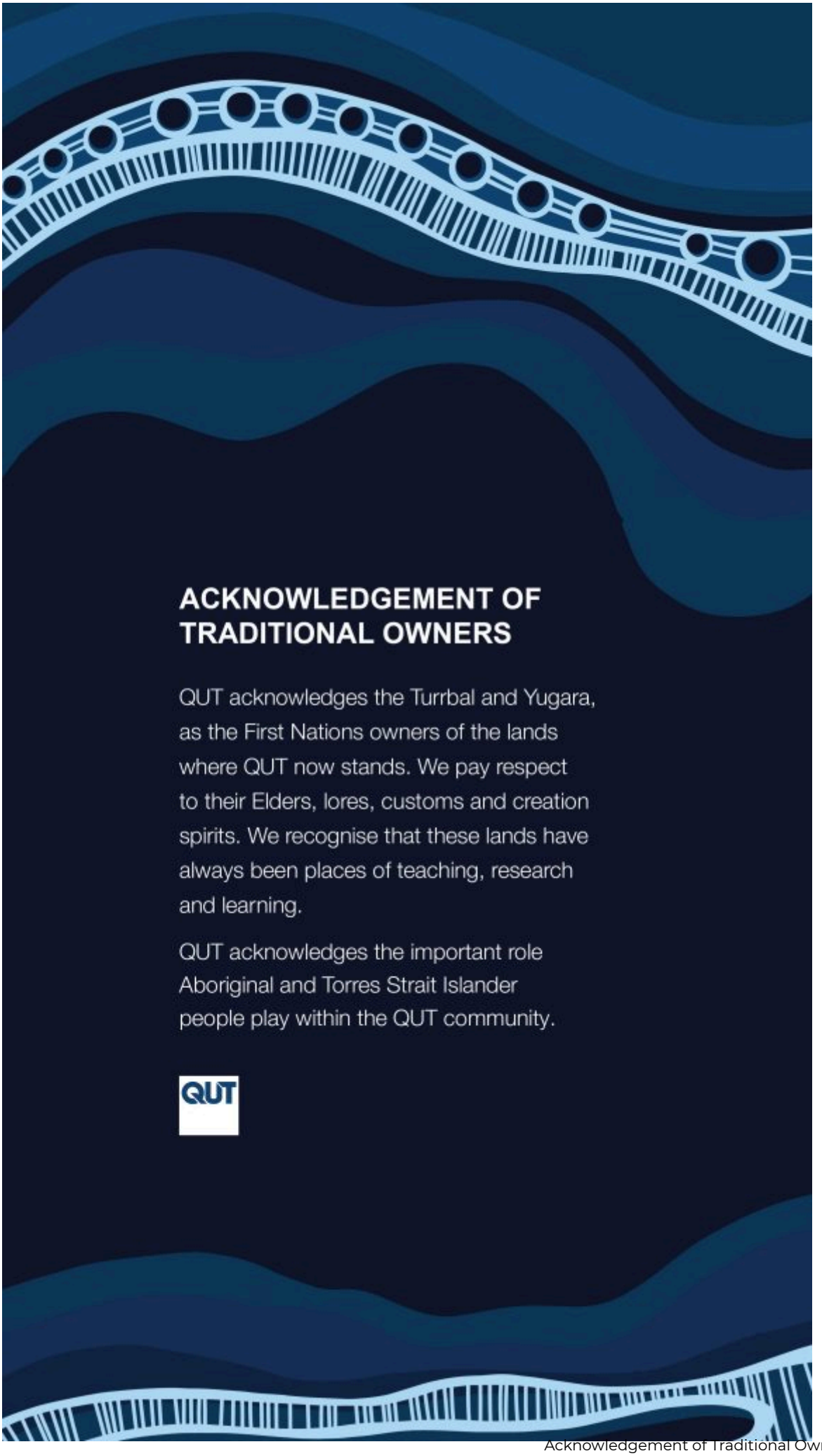

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QUT acknowledges the Turrbal and Yugara, as the First Nations owners of the lands where QUT now stands. We pay respect to their Elders, lores, customs and creation spirits. We recognise that these lands have always been places of teaching, research and learning.

QUT acknowledges the important role Aboriginal and Torres Strait Islander people play within the QUT community.

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We sincerely thank everyone for their time, insight, and commitment. Their contributions have been instrumental in shaping this resource into a robust and valuable learning tool.

The history of AIRS

The AIRS program has played a pivotal role in shaping research skills development at QUT for more than 35 years.

In 1988 Prof Christine Bruce (then librarian), redeveloped a series of undergraduate level information literacy workshops to meet the needs of postgraduate engineering students. Titled *Advanced Information Retrieval Skills (AIRS)*, the program was adopted as a mandatory condition of undertaking an Engineering doctorate.

As momentum gathered around the necessity for all higher degree research (HDR) students to develop research skills and capability, QUT Library successfully championed the full accreditation of AIRS. In 1989, *IFN001: Advanced Information Retrieval Skills (AIRS)* was introduced as a unit of coursework study attached to the doctorate program. Until 2024, IFN001 remained a 4-credit point coursework requirement of enrolment for HDR students at QUT, the first and only mandatory unit of its kind in Australian higher education.

In 2011, QUT Library commissioned an external review of the unit to assess its capacity to respond to the dynamic research landscape and meet the needs of contemporary researchers. Based on the recommendations of the review, QUT Library undertook the AIRS redevelopment project in 2012. By 2014, IFN001 had undergone a comprehensive redesign, transforming its pedagogical foundation from an instructivist approach to an active, blended learning experience. These changes, along with a more defined scope of learning, were reflected in the updated unit name: *Advanced Information Research Skills*.

The AIRS website was developed in 2012 to make learning resources openly available under a Creative Commons license, offering current students, QUT alumni, researchers, research students at other institutions, librarians, and research professionals the opportunity to access the content and to reuse or adapt the materials for further application.

In 2023, another significant review of IFN001 AIRS was conducted to ensure the unit continued to meet the evolving needs of QUT's higher degree research (HDR) student cohort, remained aligned with QUT strategy, policies, and guidelines, and complied with external accreditation requirements. This review also aimed to deliver sustainable service improvements that reflected contemporary approaches to learning and teaching and student engagement.

Following this review, the QUT University Research Board approved the replacement of IFN001 with a new unit, IFN006, which commenced in 2024. Having celebrated 35 years of AIRS in 2024, the program continues to set the standard in research skills training for HDR students, providing valued contributions to the QUT research community, the broader Australian higher education sector, and the national research context. It remains a current, relevant, and essential program that engages students through innovative, high-quality learning and teaching strategies.

QUT Library continues its commitment to open access and the provision of open education resources with the redevelopment and publication of the AIRS program by QUT Open Press in QUT's Pressbooks platform. As before, learning resources remain openly available and licensed for reuse and adaptation. It is hoped that access to AIRS through the Pressbooks platform will provide new and improved opportunities for engagement with training for researchers in the effective use of information for research.

Introduction

Welcome to Advanced Information Research Skills (AIRS).

AIRS is an open educational resource (OER) created to empower learners and researchers with the confidence and capability to navigate today's complex information landscape. It is designed for anyone who wants to strengthen their skills in finding, evaluating, managing, and using information effectively for research. Whether you are a research student, supervisor, librarian, or research support professional, AIRS offers practical strategies and tools to help you, and those you support, develop advanced information skills that make a real difference in research success.

At Queensland University of Technology (QUT), AIRS is also a core component of the research journey. It is a mandatory coursework requirement for Higher Degree Research (HDR) students enrolled in a Doctor of Philosophy (PhD), Doctor of Education (EdD), or Master of Philosophy (MPhil). The unit is offered in blended learning mode, delivering online content and live workshops. These offerings enable students to choose how and when they interact with the learning resources.

Modules 1 through to 7 and Module 10 closely align with the IFN006 unit. If you are a QUT HDR student, you can explore these modules at any time. You may wish to engage with this material prior to commencing the unit in your assigned teaching period to build confidence and get a head start. If you have questions or need guidance, the AIRS team is here to help. Contact us at airs@qut.edu.au.

AIRS Learning objectives

On successful completion of this learning resource, you will be able to:

1. Formulate and apply advanced search strategies to find relevant information using appropriate databases and other repositories.
2. Create a strategy to store, organise and maintain current awareness of information for easy and efficient retrieval.
3. Analyse and evaluate key information based on your research project.

QUT only

QUT staff and students can find information about the QUT unit, IFN006 AIRS, in the unit outline (QUT access only).

How to use this Pressbooks platform

Getting started with Pressbooks

If you're new to Pressbooks, this guide will help you navigate the platform. Pressbooks is a user-friendly publishing tool designed to make open educational resources (OER) accessible, interactive, and easy to use.

How to explore this resource

- **Navigation:** Use the table of contents in the left sidebar or at the top of the page. Click **Contents** in the top-left corner to display it.
- **Interactive elements:** Pages may include videos, images, and activities you can engage with directly.
- **Translation:** Click **Translate** on the landing page to open the book in a new tab with Google Translate. Select your language from the dropdown menu. Note: translations do not apply to H5P activities and may not be perfect.
- **Links:** All links open in the current window for accessibility. To open in a new window, use your middle mouse button.
- **Accessibility:** Adjust font size and contrast using built-in options for a comfortable reading experience.
- **Download:** Access PDF (for print) and PDF (digital) options from the AIRS homepage for offline use. Note that interactive quizzes and exercises are not available in the PDF versions.
- **Search:** Use the search bar in the top-right corner to find topics or keywords quickly.
- **Interactive activities:** Complete quizzes and exercises directly on the page.

Pressbooks works on desktop, tablet, and mobile devices, ensuring a responsive and inclusive experience.

List of acronyms

Acronym	Meaning
AIRS	Advanced Information Research Skills
ARC	Australian Research Council
CC BY-NC	Creative Commons Attribution-NonCommercial
CNCI	Category Normalized Citation Impact
CRAAP	Currency, Relevance, Authority, Accuracy, Purpose
CSV	Comma Separated Value
DOAJ	Directory of Open Access Journals
DOI	Digital Object Identifier
EdD	Doctor of Education
FWCI	Field Weighted Citation Impact
GenAI	Generative artificial intelligence
GRC	Graduate Research Centre
H5P	HTML5 Package
HDR	Higher Degree Research
ICIP	Indigenous Cultural and Intellectual Property
JIF	Journal Impact Factor
LLM	Large Language Model
MeSH	Medical Subject Heading
MPhil	Master of Philosophy
NTRO	Non-traditional Research Output
OER	Open Educational Resources
ORCiD	Open Researcher and Contributor ID
PDF	Portable Document Format
PhD	Doctor of Philosophy
QUT	Queensland University of Technology
ROBOT	Reliability, Objective, Bias, Ownership, Type
RSS	Really Simple Syndication
SJR	Scimago Journal Rank
SNIP	Source Normalized Impact per Paper
TOC	Table of Contents
WCAG	Web Content Accessibility Guidelines

MODULE 1 GETTING STARTED WITH AIRS

LYNDELLE GUNTON, ELLEN THOMPSON

Module learning objectives

By the end of this module, you should be able to:

1. Understand the purpose of AIRS and how it supports your research journey.
2. Navigate the AIRS modules.
3. Identify tools and resources to help you achieve your research goals.

Learning plan

In this module, we will:

- Explain the AIRS learning objectives and how they may be important as part of developing advanced information skills for research.
- Discuss the delivery of the program and describe the different ways in which learners can engage.
- Explore how to navigate through the Pressbooks platform to use the AIRS program.
- Identify ways in which you can seek additional help.

1.1 The purpose of AIRS

Advanced Information Research Skills (AIRS) prepares learners for research by systematically introducing the theories and practical applications of information literacy. It emphasises the development and transferability of these skills across disciplines and fields of study. It will support researchers to create new knowledge by engaging deeply with a wide range of information sources. Learners will acquire strategies to find, organise, analyse, and evaluate information. These information skills are essential for scholars operating in a contemporary, digital research environment. They facilitate the capacity for critical evaluation of a field of research and enable personal information skills development during the research degree and beyond.

What this means is you will develop the advanced skills and techniques to search for relevant and quality information. You will learn how to manage that information to ensure efficient access in the future and you will develop strategies for continuing to build your knowledge and maintain current awareness of research in your field. These practices will be a strong foundation for building solid critical thinking and academic writing skills, leading to quality research outputs and publications.

Establishing sound information searching and management practices will form part of the essential groundwork you will need to do for any research project going forward, regardless of your career pathway or source of employment.

QUT only

If you are a QUT higher degree research (HDR) student, the AIRS open program provides early access to foundational research skills training materials before you formally begin the IFN006 unit.

AIRS is a general open education resource designed to support all HDR students, while IFN006 is a QUT-specific, credit-bearing unit with tailored content, assessment tasks, and support aligned to QUT's research environment.

Once enrolled in IFN006, you should transition to the IFN006 Canvas site, which includes additional materials, activities, and assessment requirements specific to your QUT research degree.

As you progress through this resource, remember to keep in mind the differences between AIRS and IFN006:

AIRS vs IFN006

Factor	AIRS	IFN006
Audience	All HDR and other students, researchers, supervisors, librarians, research support professionals	QUT HDR students
Format	Open, self-paced	Mandatory, accredited unit with assessment
Content	General information research skills for throughout your research degree and beyond	QUT-specific research context for commencing HDR students
Modules	1-12	Assessment relates to Modules 1-7, 10
Support	Self-directed	Provided
Platform	Pressbooks	QUT Canvas

1.2 How AIRS works

This resource comprises 12 modules, each introducing a different research skill.

- Module 1 Getting started with AIRS
- Module 2 Preparing to search for information
- Module 3 Finding information for research
- Module 4 Maintaining current awareness
- Module 5 Managing information for research
- Module 6 Using information responsibly and ethically
- Module 7 Evaluating information for research
- Module 8 Managing research data
- Module 9 Planning to publish
- Module 10 Finding and using indicators of research impact
- Module 11 Before you finish AIRS
- Module 12 AIRS for supervisors

Learning approach

AIRS is a self-paced, online learning resource comprising text, multimedia, and interactive learning objects.

You will engage with a variety of content including pre-recorded videos, readings, learning activities, and knowledge checks to develop your understanding of the theory underpinning information skills in your discipline. You will have opportunities to practice these skills, thereby building your capability for practical application in your field of research. Your work in these activities should be relevant to the problem or questions you are investigating in your research project.

The Pressbooks platform allows you to progress through the AIRS program in sequential modules, and once you've completed a full read-through, you can easily revisit specific topics using the table of contents links.

Each module begins with an overview and clearly defined learning objectives. A *Knowledge check*, delivered as an online quiz, provides an opportunity to confirm your understanding of the module content. Following this, the *Reflecting on your learning* section invites you to consider guiding questions to help consolidate and apply what you've learned. Finally, the *Module summary* confirms the completion of the module and your readiness to move onto the next section.

As you work through the modules you will find coloured text boxes to direct your attention to tasks to complete and how to do them. These are as follows:

Watch/Read/Activity/Reflect/Knowledge check/

Dark blue-coloured text boxes provide opportunities for you to engage more deeply with a topic by following instructions to complete a task.

QUT only

Orange-coloured text boxes provide information that is relevant for QUT users only.

Grey-coloured boxes highlight important information.

Additional resources

Bright blue-coloured boxes contain information and links about additional learning resources to further support your learning on a specific topic.

1.3 Support for learning

This resource is designed to enable independent, self-paced learning. However, additional benefits may be gained by using it in partnership with other resources and supports, such as research supervisors, fellow research students, research librarians, or other training providers.

QUT only

Do you have a burning question or need more help?

Your Liaison Librarian is a critical part of your HDR support team. Contact them with any questions about your AIRS assessment or anything else. They are here to help you!

1.4 Reflecting on your learning

In this section, you will have an opportunity to stop and consider the information provided in Module 1. You can reflect on the questions provided, complete the knowledge check, and identify whether you understand the content or have any questions for your research support team.

Knowledge check

These quiz questions help assess your current skill level before starting AIRS. If you're unsure about some responses, you may find it helpful to explore QUT's Study Smart resources – openly accessible, self-paced online modules that cover the fundamentals of information research and literacy skills for university success. Alternatively, support may be available through your employer, school, or community library.

Knowledge check

Confirm what you have learned in Module 1 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=500#h5p-70

Reflect

Consider:

1. What were your expectations for this resource when you began?
2. How, if at all, have your expectations changed?
3. In what skill areas are you feeling confident?
4. What skills or knowledge do you feel less confident in or want to develop further?

1.5 Module summary

You have completed Module 1.

You are now ready to move onto *Module 2 Preparing to search for information*.

Additional resources

The following resources offer insights into how the library can support your research training and activities:

Kirth, K. (2019, October 10). The Insider's view from the Library: 7 things I bet you didn't know librarians could help you with. *Research Degree Insiders*. https://researchinsiders.blog/2019/10/10/the-insiders-view-from-the-library/

QUT. (2020). *Study Smart*. https://studysmart.library.qut.edu.au/

MODULE 2 PREPARING TO SEARCH FOR INFORMATION

GABRIELLE HAYES, DR SAL KLEINE, MEEKA MOESSNER, PETER SONDERGELD

Module learning objectives

By the end of this module, you should be able to:

1. Understand the role of a literature review.
2. Make a start on your systematic plan for information searching.
3. Unpack your research question to shape your search strategy.
4. Identify types of literature and determine which are appropriate for your research needs.
5. Consider appropriate databases and other search tools to find literature.

Learning plan

In this module, we will:

- Discuss the search process in the context of a literature review.
- Discuss why you need advanced information searching skills as a researcher.
- Deconstruct a research question to identify keywords for information searching.
- Discuss the benefits of a systematic approach to searching the literature using a search methodology.
- Outline some of the available search tools and resources.

2.1 Getting started

This module supports your research journey as you progress toward confirming your project and formulating one or more research questions.

In this initial stage, you explore, organise, and analyse literature relevant to your topic as part of the literature review – an evaluative summary of research in your field. The review serves both as a process and an output, enabling you to identify and become familiar with existing studies and information in your research area.

One of the questions you may have as you commence this process is how to conduct the review in a systematic and efficient way that covers all sources and ensures you don't miss any key information or publications. This module will explore this question by discussing in more detail what the literature review is, why it is important, and how to get started. The remainder of the module will cover preparing to search for the literature that will inform your review.

It's important to familiarise yourself with the expectations and requirements of your chosen review type before you begin. Depending on the type of review you are conducting, you may need to follow a specific guideline or framework to ensure methodological rigour and transparency. For example, systematic reviews in health disciplines often use the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) guidelines to structure the review process and reporting. In business research, however, you might use the *Population, Concept, Context* (PCC) framework to shape your review question and search strategy.

Not sure which approach meets your needs? Explore Which Literature Review is Right for You?

QUT only

For help with formulating research questions, work through the QUT self-paced online module, Writing Your Research Proposal (QUT access only) or participate in the Write Your Research Questions activity (QUT access only).

2.2 The literature review

> *"A literature review is an integrative summary of published research on a specific topic. The literature review seeks to synthesize what is already known about the topic, and sometimes, explicitly state what is not known, or not well understood."*
>
> Dermody et al. (2024).

A definition

The literature review is both the process of analysing existing research and the written evaluative summary of literature related to your chosen area of study. The review should describe, summarise, analyse, synthesise, and clarify the existing literature. This will establish a foundation for your research and provides a clearer understanding of its scope and direction.

Conducting and preparing the literature review allows you to demonstrate advanced skills in the areas of information-seeking, evaluation, and critical appraisal. It will also provide a mechanism by which you will become familiar with who has said what and when in the evolution of research for your specific topic and in related fields or areas of research.

"Pile of Covered Books" by Pixabay, CC0

Why conduct and prepare a literature review?

> *"A literature review provides a comprehensive review of the literature in a specific area of*

interest. It is an integral part of doing research, necessary to learn about the current state of knowledge of a topic."

Southern Cross University Library (2025).

Beyond meeting the requirements for your higher degree research milestones and final thesis, conducting, writing, and sometimes publishing a literature review is widely regarded as valuable and best practice for researchers.

A literature review can:

- be a framework for grounding and focusing a research project
- provide a means of justifying a research project
- help to avoid the selection and application of inappropriate research methodologies and instruments
- assist researchers to identify themes for sense-making
- refine research questions
- create a framework for comparison
- establish a collection of descriptive data
- provide guiding questions for preliminary data collection
- prompt questions during data analysis
- confirms findings or demonstrates how they reveal gaps, inaccuracies, or limitations in the existing literature
- suggest strategies for presenting your research findings and demonstrating the potential impact of your work.

What does a good literature review look like?

Conducting a literature review deepens your understanding of the topic, highlights existing knowledge, and positions your research within the broader academic context. Once you have your sources, you will read and critically evaluate them to determine their credibility and relevance to your topic. As you review and synthesise the literature, look for recurring themes and significant issues. This approach will help you create a well-rounded and insightful analysis.

A literature review should:

- locate existing literature in your research field
- identify subject matter experts in your field
- identify major seminal works
- identify main methodologies in your field and research techniques
- group studies into schools of thought
- discuss what studies agree on
- discuss what studies disagree on
- identify the gaps in the literature
- critically evaluate assumptions and reasoning in existing research
- provide context for your own research
- be organised using clear headings and subheadings.

Read

[Orientations to reading – the literature as 'resources'](#)

Read this short blogpost by Professor Pat Thomson, from the University of Nottingham. Pat addresses the challenges of working with literature. While reading this blogpost, consider how you might approach literature when preparing a review.

QUT only

Do you need to learn more about literature review writing?

Read about and register for QUT's Principles of Literature Review Writing workshop (QUT access only) to understand the key functions of a Literature Review and learn how to plan and write engaging and informative literature reviews.

How do I start my literature review?

Start with a question

"Question marks on craft paper" by Leeloo The First via Pexels, Pexels licence

Begin your review by formulating guiding questions to direct your research. Writing a clear and specific **research question** will focus your search on finding the most relevant literature for your topic amongst the vast amount of information that is available.

A research question is not the same as a thesis title, research problem, hypothesis or research focus, although they are interrelated and support one another:

- A *research question* summarises the significant issue your research will investigate.
- The *title* consists of the topic and outcome of a research project.
- The *research problem* defines the knowledge gap your study addresses.
- A *hypothesis* is a testable prediction based on prior research that answers the research question.
- *A research focus* specifies the scope or domain of inquiry.

A good research question is clear, focused, concise, arguable and doable. It provides a structure for your searching and will help you to construct a logical argument.

What if you don't have a research question yet? If you haven't decided on your question, there is no need to panic. While it can be beneficial to use your own research question for learning how to search, it doesn't need to be finalised.

Read

Formulating a research question

Read this section in Dermody et al., about devising your research question and consider how it can help to guide your research process.

2.3 Preparing to search

Pause before you start...

A high-quality literature review requires an effective and extensive literature search. The process of developing an effective search methodology will help you to complete a literature review for your research project.

When you start searching, your aim is to find relevant and high-quality literature to inform a comprehensive and critical analysis of your topic. Applying a systematic approach to searching that carefully considers and documents the search steps will ensure you get the results you need. This approach requires some preparation before searching, but it also allows you to continue gathering and scoping literature as new material becomes available throughout your project.

Finding information is rarely a linear process and you will probably need to revise your search multiple times before getting it right. This can feel messy, even uncomfortable, particularly for those new to research. While this does ease as you gain experience, it also pays to become comfortable with the idea that you may need to revisit earlier parts of the search process to capture all the information you need.

Watch

See the video below for an overview of the information searching process.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=658#oembed-1

Information searching lifecycle (QUT YouTube video, 1m46s).

Stepping through the search process

Depending on the stage you are at in your research, or your search objective, a variety of different types of searches may be appropriate. Consider the search process below as a way to ensure systematic and effective searching. As this module is about *preparing* to search, we will focus on unpacking the research question, identifying information types and considering where to search, with the remaining steps covered in more depth in *Module 3 Finding information for research*.

Select the arrows in the accordion list below to find out more about each of the steps:

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=658#h5p-25

Read

How do you get from “pre-research” to search, and then research?

Read this blogpost by Dr Katherine Firth from the University of Melbourne. Katherine steps through her process for preparing to search and how that helps with searching and then research. While reading this blogpost, consider whether this approach, or parts of it, could help you.

2.4 Unpacking the research question

You will commence the search process by unpacking your research question to identify the keywords, synonyms, and related terms that will guide and shape your overall search strategy. Your specific terms will be drawn from sources such as:

1. The **key concepts** of your **research question.**
2. Brainstorming meaningful **synonyms** and/or **related terms.**
3. Database **subject headings** (covered in Module 3).

1. Identify key concepts

Your key concepts are the most important words in your research question. These key concepts will form the words and terms you use to start constructing your search.

One of the best ways to quickly understand what you are researching is to identify the key concepts in your research question. These concepts describe the kinds of information you need to investigate to answer your question. You will do this by analysing your question to identify the exact things you want to know more about and then documenting those concepts in a list, table, or visual map, and showing how they relate to one another in order to guide your searching.

Maintain flexibility, as your research question may evolve with growing knowledge in your field, emerging terminology, and advances in related research.

In this example question, the key concepts have been identified to help construct a search to find related literature.

*"Does the experience of **moving interstate** to commence **first-year university** have an influence on established **study routines** for **school-leaving teenagers**?"*

Watch

See the video below for a research supervisor's perspective about preparing to find information by identifying research concepts and keywords.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=718#oembed-2

Preparing to find information (QUT YouTube video, 0m58s).

2. Finding synonyms and related terms

After identifying your key concepts and keywords, explore relevant synonyms and related terms. This helps refine your search strategy within the theoretical framework of your topic and ensures you capture all pertinent research, even when different terminology is used.

To begin this process:

- list synonyms that come to mind for each key term
- include singular and plural forms of the words
- include alternate spelling variations.

You might like to use a dictionary to explore the meaning of terms or look for synonyms in a **thesaurus**.

Generative Artificial Intelligence (GenAI) can be a useful tool to help you brainstorm synonyms and related terms for keywords in your research question. Whether you use AI functionality within a database or a stand-alone tool designed to support this type of activity, you should use the generated terms as words as a starting point for your own exploration of the topic.

Next, consider more **broad associations** with other words and concepts that have a highly relevant and contextual relationship to your research question. For example, when looking for information about the *common cold*, it could help to include the term *virus* because a type of virus causes the common cold. Similarly, if you are researching *heart attacks,* you might to include the related term *emergency room* as many people who experience a heart attack will attend hospital. These additional words will become your **alternative** and **related search terms**.

Watch

See the video below for advice about how to unpack the research question to identify key research concepts and key search terms using GenAI tools.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=718#oembed-3

Unpacking your research questions with AI tools (QUT YouTube video, 2m59s).

Activity

Identifying your key terms and synonyms

Try using a GenAI tool to identify alternative terms and synonyms. Did the tool provide useful responses? Did you have to further evaluate the outputs?

Concept mapping

To help expand your search terms, you can create a concept map or mind map, like the example below, which situates the main topic in the centre of the map and graphically represents the key concepts that relate to the main topic. This can help you to clarify the logic of these concepts and illustrate their relationships to other words.

This concept map has been created from the example research question:

"Concept map" by QUT Library, CC BY-NC-SA 4.0

Watch

View the video below about creating a concept map when identifying search terms relating to your research question.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=718#oembed-1

Creating a concept map (QUT YouTube video, 1m38s).

Activity

Consider the hypothetical questions in the examples below to understand how analysing your research question can help generate ideas about other terms you could incorporate into your search.

Move the slider at to bottom on the image to reveal three additional images with further hypothetical queries.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=718#h5p-53

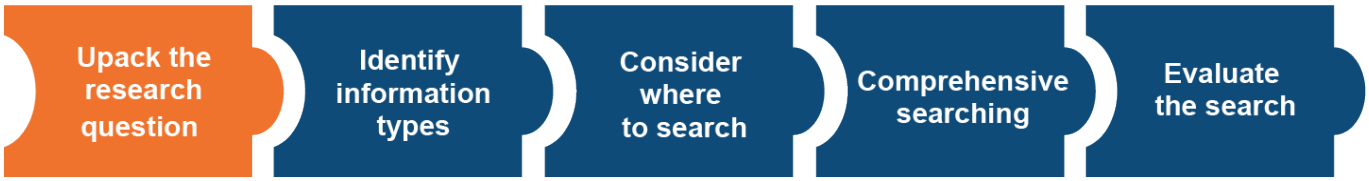
3. Subject headings instead of keywords

Up to this point, we have focused on keyword searching. However, in some cases, it can be beneficial to explore advanced features available in certain tools, such as subject headings searching.

Subject headings are standardised terms (specific words or groups of words) used to describe the content of articles/books. They are assigned by trained experts called indexers (some tools also allow keyword searching). These use a *controlled vocabulary* and are also referred to as *subject terms*. One example of controlled vocabulary is *Medical Subheadings (MeSH)*. Subject headings can be easily selected using library search filters, and MeSH terms can be explored individually for relevance within field-specific databases.

Review subject headings before beginning comprehensive searches to improve effectiveness.

2.5 Determining the types of information you need



Identify information types

After identifying the key concepts, words and related terms from your research question, you want to consider the types of information needed to inform your research.

In today's complex information landscape, just about anything that contains information can be considered a potential source. Being able to categorise a source helps you understand the kind of information it offers. This can guide you in deciding whether it meets your information needs, where to look for it, and how you can use it to find similar sources.

One of the most often used categorisations of information sources is by the expertise of their intended audiences. Broadly speaking, information can be scholarly or popular. A scholarly or academic resource is generally written by experts in the field *for* experts in the field and contributes to the body of knowledge in that discipline area. Scholarly sources can be useful for researchers, students, and other people who want a deep understanding of a subject. An example of scholarly information is an article written by an academic at a university published in a journal aimed at other researchers within that discipline.

Trade publications commonly report industry news and trends aimed at a specific sector, industry, or trade. They are aimed at practitioners and are not necessarily written by scholars or experts in a specific field.

Popular information is more typically written by authors who are not experts in a particular field and are targeted towards a more general audience. Popular information could be an article in a magazine or a newspaper. While they may be reporting current information, they are written for entertainment rather than knowledge generation.

Journal types

	Scholarly	Trade	Popular
Authority	Author(s) are identified Expertise in the subject able to be easily established	Author(s) are usually identified Industry expertise is expected but not necessary	Author(s) are often not identified No industry or subject should be assumed
Purpose	To inform – readers are assumed to have a high level of knowledge in the subject Writing is often detailed and uses subject terminology	To inform – the writer assumes some level of knowledge in the area by the reader May use subject or industry terminology	To entertain/sell – no knowledge of subject matter is assumed Use of subject terminology is limited
Currency	Slow turnaround Original research Thorough editorial process takes time	Medium/fast turnaround Often addresses current industry issues	Fast turnaround Key purpose is to be on trend
Objectivity	No advertisements Conflicts of interest are stated	Can contain advertisements and sponsored content	Usually contains advertisements and sponsored content
Reliability	Contains extensive references to other scholarly publications Often includes data to justify conclusions	May refer to other publications or data depending on the purpose	No references or in-text citation No data or evidence provided.
Use	With confidence	After careful assessment	Only as an exception

Primary, secondary and tertiary sources

It is important to understand the difference between primary, secondary and tertiary sources so you can determine what you need for your research.

Click on the arrows in the accordion below to learn more about different kinds of information sources.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=771#h5p-58

Note that the meaning of these source types may vary across disciplines. For example, in legal research, primary sources are case law and legislation.

Types of publications

There are many kinds of publications that you may need for your research. The range will vary depend-

ing on your topic and discipline. These can include, but are not limited to, all in the hotspot image below. Click on the ticks to link to more information about each publication type.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=771#h5p-59

What is grey literature?

Grey literature is research and information that has not been commercially published and may not be available in academic databases or discoverable by general search engines.

This type of literature is often produced by government bodies, businesses, industry groups, or academic institutions, which might be how you recognise them. Examples could include policy documents, theses, conference papers, patents, government reports, and unpublished clinical trial data.

More about journals

Journals are one of the most commonly used types of publications for research. Depending on your topic and discipline, you may need to access one or more types of journals. Scholarly journals provide original research and commentary on recent developments in specific disciplines. They:

- are published regularly (weekly, monthly, biannually, etc.) by an academic institution, research body, professional organisation, or scholarly press
- contain journal articles written by researchers or academics in a particular field
- are specific to a discipline or subject area
- can be found in print and online formats
- are often peer reviewed.

Scholarly journals publish different types of articles:

- Empirical articles report on original research using data collected from experiments or observations. Also known as research articles.
- Review articles summarise existing research from multiple empirical articles or studies. Also known as literature reviews, systematic reviews, or book reviews.
- Case studies report on specific examples of a particular phenonemon as a means of demonstrating a research problem or a solution to a research problem.
- Methodologies present new or improved research methods, tests, or procedures.
- Short reports or letters. Also known as brief communications.

What about peer review?

Peer review is a rigorous approval process used by scholarly journals, where one or more experts evaluate manuscripts before they are accepted for publication. This process ensures the article is accurate, well-researched and contributes to the body of knowledge in a field. Peer reviewed is also known as refereed. You will learn more about peer review in *Module 6.2 Evaluating scholarly journal articles*.

Read

Read Finding information by type

Explore QUT Library's guide to finding different types of information. QUT students can follow links in the guide to additional library resources. Non-QUT readers can use the guide to generate ideas on the broad range of information types you can search for.

2.6 Considering where to search

Deciding where to search for literature is another important part of your preparation. This decision is heavily influenced by the types of information you need. Using appropriate search tools is key to finding relevant and accurate information and might include searching across library catalogues, databases, and online search tools.

It is likely at this point you might also be thinking about how GenAI tools can support your literature searching. When used ethically and responsibly, these tools can be used to supplement some research activities, including finding relevant literature. There's more information on this in *Module 2.6.3 Considering where to search – what about generative AI tools?*

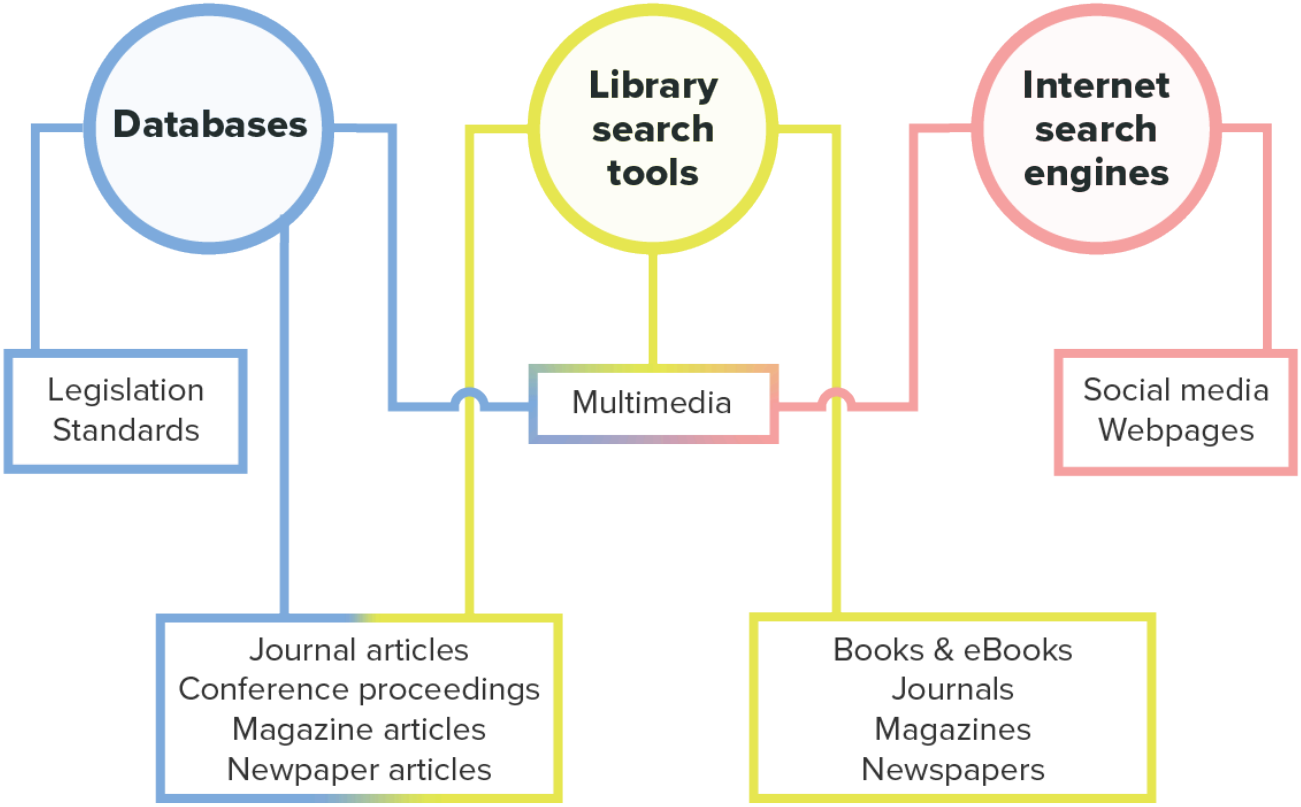
Watch

See the video below for a research student's perspective about preparing to find information.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=805#oembed-1

Preparing to find information (QUT YouTube video, 0m58s).

Over the next few pages, we will explore examples of different kinds of search tools. You may choose to start searching for literature in a discipline specific database or, perhaps, your institutional library platform. Each will have its strengths and limitations to consider. For research level literature searching, it is likely you will need to use multiple tools.



2.6.1 Considering where to search - specialist databases

In most cases you will find the literature for your research project in specialised databases but there will be exceptions for certain disciplines and projects.

A **database** is a regularly updated collection of online resources and may contain journal articles, ebooks, conference papers, maps, videos, and other electronic resources. Databases can be related to specific subject areas or cover multiple subjects (multidisciplinary). Identifying and using discipline relevant databases is very effective for finding information on a topic.

Databases can be used for many different aspects of your research, including developing your research proposal and research question, completing your literature review or research activities, writing up your results, and discussing the significance and impact of your research.

Searching using specialised databases

Advantages to using specialised databases	But, keep in mind...
• Initial searching can inspire creative ideas • Form deeper understanding of your research area • Search multiple format types • Databases related to specific subject areas or cross multiple subjects • Databases (such as Scopus) index millions of high-quality resources • Can offer filters and thesaurus for more precise searching • Most databases offer full-text access	• Some index and abstract databases only provide bibliographic details and abstracts for publications, not the full-text • Individual platforms often require specific search techniques to effectively retrieve results. Tip: Navigate to the 'search tips' or 'search help' pages for each • If you find useful resources in one database but there is no full-text option, try searching Google Scholar, the lead author's institutional repository, or request it from another institution via your library's document delivery service

Selecting appropriate databases to search

Take time to explore

Review a few different databases to see what sorts of information they contain. Your library's database list is a good place to begin your exploration of appropriate databases for searching for research infor-

mation. If your research question is cross-disciplinary, remember to look at all relevant database lists for related topic areas.

Become adept at searching many databases

For comprehensive searching (covered in *Module 3 Finding information*), it is recommended to use more than one database to access a broader range of resources as a single database will not index all the literature on a specific topic. Searching multiple specialist databases will ensure you find all the literature to inform your research.

Become familiar with the databases relevant to your research area and how they work

Even if they cover the same topic areas, individual databases are developed to do different things.

Many databases offer full-text access, but there are index and abstract-only databases that provide just bibliographic details and the abstract of the resources. These consolidate a broad range of resources within a subject area and additional useful functionality that is specific to the field, such as a thesaurus or subject headings.

Some of the specialised databases may be categorised as citation indexes. These databases, such as *Web of Science* or *Scopus*, tend to be cross-disciplinary in nature and only include high quality, peer reviewed journals. Over time you will learn which databases are most relevant to your field of study.

Evaluating databases – strengths and limitations

Being aware of the strengths and limitations of a database will help to maximise their potential as well as decide when it is time to select or move to another. Click on the arrows in the accordion below to find guiding questions to help you decide on the value of individual databases for your research.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=819#h5p-26

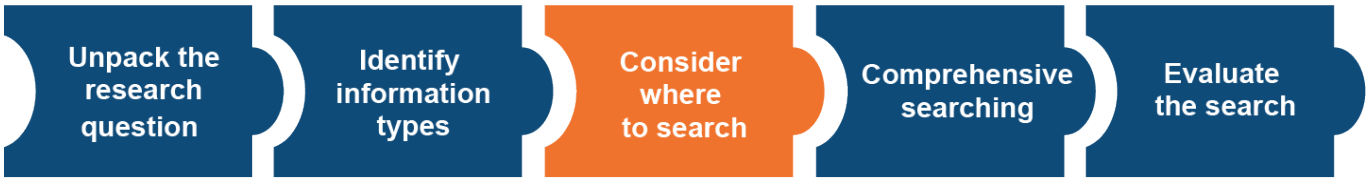
QUT only

A good place to start searching for discipline specific or specialised information is QUT Library's list of databases.

QUT Library databases access

As a QUT student or staff member, you can access databases on campus and off campus by logging into the Library's website.

2.6.2 Considering where to search - other search tools



What about other search tools for finding information for research?

While academic databases are essential search tools for finding research information, there are others that are also important to help you find the information you need. See below for resources that will complement your database searching.

Library searching

Searching your library's holdings is a great starting point to look for a range of information sources.

This option is ideal for general searches, especially when you are beginning a new search, and it is good for known item searching – such as textbook titles.

The library search tool brings together results from many databases and covers different types of sources, including print books and other physical resources, ebooks, journals and journal articles, DVDs, newspaper articles and much more.

Searching using Library tools

Advantages to using a library search tool	But, keep in mind...
• Useful for preliminary searching as a starting point to identifying key terminology • Commonly combines results from physical collections, eBook collections, many databases and open access sources • Searching is fast, easy, and uses a familiar interface • Search results include citations of many kinds of sources: books, journal articles, newspaper articles, conference proceedings, dissertations, photos, multimedia, and more • Options for basic and advanced searching	• It may not appropriate for comprehensive searches; use subject-specific databases instead • **It may not include all databases/search tools made accessible by your library. Some specialised information (e.g. standards, legislation, maps, evidence-based resources, statistics, company data) is likely to be only available through specialised databases (see below)** • Vague or short searches will return too many results; searches using well-refined search terms or phrases in quotes will return fewer, more refined results • The search mechanism is less sophisticated than those available within individual database platforms

QUT only

Get started with your searching by reviewing the tips for using QUT Library Search.

QUT Library Search also enables searching for specific types of information via facets, such as the Aboriginal and Torres Strait Islander Search Facet, where you can find books and eBooks, videos, music, audio recordings, and theses by, and/or about, Aboriginal and Torres Strait Islander peoples.

Search engines

Academic search engines are known for delivering comprehensive coverage and include most journals. They are particularly useful if you are looking for information sources that are other than scholarly in nature, such as working papers or grey literature. As an example, Google Scholar searches for scholarly papers including journal articles, conference papers, theses, technical reports, limited eBooks, and has significant coverage of open access publications.

Searching using academic search engines

Advantages to using academic search engines	But, keep in mind...
• There can be comprehensive journal coverage • They are useful for finding other information sources, such as working papers, grey literature (conference papers, reports, policy documents), or preprints • They will link to open access versions of full-text where available • You can set up Google Scholar to show you when full-text articles are available in a database through your own library and link directly to them	• Full-text may not be searchable • You may experience poor search functionality • You may find unreliable and inaccurate records

Preprint servers

A **preprint** is a version of a paper that has been made publicly available but has not yet been submitted to an academic or scholarly journal for formal publication. Preprints servers or repositories provide access to new research that may not yet be available or are behind a **paywall**. Sharing approved manuscripts (i.e. early versions of research papers) on a preprint server or repository can expose your research to a broader audience. Some examples include arXiv. SSRN, OSF Preprints.

Searching using preprint servers

Advantages to using preprint servers	But, keep in mind...
• They make research findings available earlier than publishers and vendor platforms • They assign a public time stamp so that researchers can be acknowledged for their work earlier than traditional publishing allows • They create a citable output with a DOI • They enable searchers to identify emerging research topics • They provide opportunities to identify weaknesses and gaps in research outputs, which can then be eliminated or improved before publication	• Some uncertainty still exists about whether traditional scholarly publishers will reject submissions on the basis that a preprint exists

Open repositories

Open repositories provide free access to discover, read, and download research papers, datasets, and non-traditional research outputs, without paywalls and subscription fees. These repositories cover outputs from different disciplines, with the sciences typically being better represented than other areas. Open repositories increase the transparency of research and facilitate the reproducibility of studies by making content available to use, share, and track.

Some examples are arXiv (a preprint server and open repository), QUT ePrints, Dryad, Figshare, Open Science Framework.

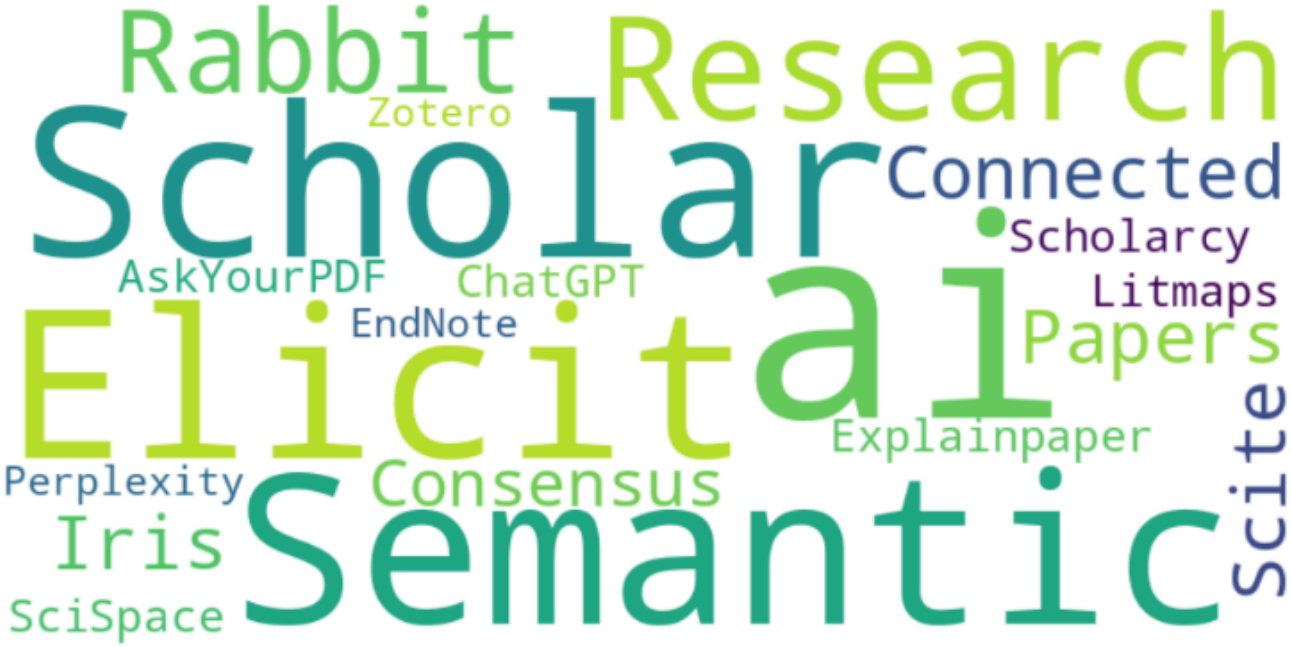
Searching using open repositories

Advantages to using open repositories	But, keep in mind...
• They provide free access to research outputs • They promote transparency and reproducibility • They facilitate data sharing and reuse • They support interdisciplinary research	• Quality and reliability may vary; not all content is peer-reviewed • They may have limited coverage of certain disciplines, with some fields not represented as well as others • There is the potential for outdated or incomplete data, impacting the relevance and/or accuracy of the information • Navigating and effectively using different open repositories requires practice

2.6.3 Considering where to search - what about generative AI tools?

Generative Artificial Intelligence (GenAI) is a form of **artificial intelligence** that uses predictive modelling to create new content by learning from vast amounts of existing data. GenAI uses algorithms to identify patterns in datasets to generate content, such as written text, images, videos, or music, based on the input it receives.

AI has the potential to streamline some aspects of research when used ethically and appropriately. For example, some GenAI tools can efficiently generate basic explanations of broad and complex topics or summarise and synthesise bodies of literature (although not always accurately). Their strength lies in producing highly structured responses to highly structured tasks. There are tools specifically designed to identify literature and make suggestions about related scholarly material. Many of these tools are particularly useful in the exploratory research phase, where you are scoping the range and depth of available resources on your topic.



Note: Image generated using Microsoft Copilot, 2025 (https://copilot.microsoft.com/).

Prompt: 'Create a wordle image with names of GenAI tools that are useful for searching for research or academic literature.'

It is important that you choose the right tool for your purpose. Microsoft Copilot, ChatGPT, and Perplexity AI are examples of GenAI that can engage in text-based discussion and can assist with the generation of foundational explanations and ideas. This differs from other AI tools, such as Elicit, Research Rabbit. and Scite.ai, which focus on finding and synthesising scholarly literature in response to plain language queries.

Some traditional databases are also introducing AI powered natural language searching. Depending on the database, you can enter your search as a question or statement, which is then interpreted by the tool based on the context and intent of the query. Some tools also display the equivalent Boolean search statement to provide additional clarity around how it has been processed by the large language model. Take a look at the functionality offered by your preferred databases and read the help information they provide.

While technologies offer significant advantages for supporting research, using GenAI also carries risks and ethical implications. You are responsible for understanding the laws, policies, and codes that govern the ethical use of AI in research. In many cases, the scope and legality of datasets used to train large language models (LLMs) is unclear and may include diverse sources, such as scholarly articles, websites, and social media posts, some of which are openly accessible, while others are commercially published and copyright-protected. To ensure compliance and transparency, discuss your approach with your supervisor and maintain a detailed log of when and how you use AI prompts throughout your research process.

Searching generative AI tools

Advantages to using generative AI tools	But, keep in mind...
• AI tools can be useful for searching with the right questions/prompts and can help you find hidden patterns, relationships and research gaps • Some tools can assist with finding papers without exact keyword matches • Other tools can assist with finding and evaluating book chapters, preprints, and datasets • Some tools summarise key findings from the papers to help you evaluate their relevance to your research or to compare and evaluate how you have interpreted a research paper • AI tools can automate repetitive tasks, such as data collection, cleaning, and organisation, thereby allowing more time for higher-level analysis and interpretation	• There are legal and ethical considerations when using AI tools for research purposes. Ensure you are familiar with relevant university and/or publisher license policies • You will be expected acknowledge the use of AI tools in your work • The data you enter may be collected and used to train and refine AI models. Always read the terms and conditions • It isn't easy to know the sources on which a GenAI tool has been trained. As a result, they can provide incorrect and inaccurate information, analysis, and references (also known as hallucinations) • AI tools are unable to reproduce results or explain how they came to an answer • More tools are being placed behind paywalls, which can make accessing them difficult and costly

Read

Explore more tools that have applicability in the research context with the Generative AI Product Tracker by Ithaka S+R.

Evaluating GenAI tools for research

Artificial intelligence is just one tool a researcher has at their disposal, but unlike a human, it has no sense of morality or reason. AI can only combine and recombine the data it has been given in ways that potentially satisfy a given prompt; it is up to you to make sense of the answers. It is important to **think critically and evaluate the reliability, accuracy and context** of the content generated and the dataset used. Developing your own knowledge and understanding of your research domain will enable you to effectively augment your research with GenAI or other AI tools.

To assist you with evaluating both the tool and outputs, you can apply a rubric to document your evaluation and decision making. There are several openly licensed rubrics that have been developed for this purpose, including the Evaluating AI Tools for Research Rubric prepared by QUT Library and adapted from Evaluative information literacy rubric for AI tools by Caico et al., (2024) and Evaluating AI Tools and Output by University of Texas Libraries (CC BY-NC).

Completing a rubric like this, *before* you input *anything* into a tool, will help minimise risk and save you from potentially using a tool that is not fit for purpose and will end up costing you time rather than saving it.

The rubric requires you to answer specific questions related to factors such as purpose, relevance, currency, transparency, reproducibility, legal, and ethical considerations. It will help highlight if something is a red flag or if the tool performs well in a certain area.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=841#h5p-69

Watch

See the video below for advice about the strategies and tools researchers can use to find literature.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=841#oembed-1

Strategies and tools to find literature (QUT YouTube video, 0m36s).

Read

More information about generative AI can be found in the QUT Library guides Using generative AI and Generative AI in Research and Teaching.

Read Reviewing the Literature in Deakin University's Library Guide on GenAI: responsible use in research [CC BY-NC 4.0].

QUT only

Find out more about the responsible use of AI in research at QUT (QUT access only).

Using articles, ebooks and other library resources in AI tools is not permitted unless explicitly authorised by the publisher or vendor. Your use of library resources must comply with the Library databases and search tools conditions of use.

2.7 Reflecting on your learning

In this module we have unpacked the steps involved in preparing to search for literature. To confirm your learning, take a moment to complete the knowledge check, reflect on the questions provided and identify whether you understand the content or have any questions for your research support team.

Knowledge check

Confirm what you have learned in Module 2 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=849#h5p-27

Reflect

Consider:

1. What are you researching?
    - What are the key terms and synonyms that define your question?
    - Are there subject terms that encompass the identified concepts?
    - What type of information is important in your discipline area? For example, journal articles, conference papers, definitions from dictionaries, etc.
2. Where will you search?
    - Which tools will you use to find information?
    - Will you use Library Search and Google Scholar to get started to get a sense of how others describe your topic area?
3. How will you express your search terms in the search tools?
    - How will you construct your search statements and which search techniques will you use?

4. How well did your search retrieve results?
    - How will you broaden or narrow your search.
    - How will you evaluate your results?

2.8 Module summary

You have completed Module 2.

You are now ready to move onto *Module 3 Finding information for research*.

Additional resources

The following resources offer further practical guidance, tools, and theory to support your understanding and development of skills for conducting literature reviews and developing effective search strategies.

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MODULE 3 FINDING INFORMATION FOR RESEARCH

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Module learning objectives

By the end of this module, you should be able to:

1. Locate, understand, and apply database specific techniques.
2. Formulate effective searches using advanced search techniques.
3. Apply discipline specific searching methodologies.
4. Evaluate the efficacy of the search and relevance of results.
5. Use cited reference searching to find other relevant resources.

Learning plan

In this module, we will:

- Look at the mechanics of comprehensive searching.
- Explain and demonstrate what effective information searching looks like.
- Outline search techniques (syntax) to develop effective search statements.
- Practise preliminary and comprehensive searching across a range of databases and other tools.
- Explain how to determine if your search is effective.
- Identify additional strategies for finding information, such as cited reference searching.
- Provide information about accessing and retrieving information from libraries.

3.1 Comprehensive searching

Once you have a good understanding of your research question and the types and sources of information you might need, it's time to begin searching for information for your literature review. You will search across many different tools and adapt your search strategy based on your results, the notes from your reading, and what you learn about your topic. Depending on the scale of your research, you may exhaust your searching within hours if you have a very clearly defined or narrow topic or you may continue searching for literature over many weeks or months for higher degree research level literature reviews.

Building your search strategy

As we covered in *Module 2 Preparing to search for information*, the first step in the search process is to identify the key concepts from your research question or search objectives. These concepts describe the kinds of information you need to investigate in order to answer your research question.

To perform a search, the concepts that have been identified need to be arranged in a way that a database can understand. While search engines like Google are great at understanding a natural language search, which is where you would use language like you were speaking with another person, databases require structured input to locate relevant results. The following sections cover how to construct an effective search.

3.2 Develop an effective search

An effective search uses correctly applied search language in an appropriate **database**.This involves using one or, more commonly, a combination of the following techniques collectively known as search syntax:

- search (Boolean) operators
- phrase searching
- truncation and wildcards
- nesting terms
- proximity operators
- limiters (or filters).

Search syntax can change across databases. This section uses the most common syntax for each of the search techniques. Check specific database or search engine help guides for any variations to the syntax before searching, as the syntax could be applied differently, use different words and symbols, be irrelevant due to automated search behaviour, or the functionality isn't available.

Search (Boolean) operators

Search operators form the basis of database logic. They connect your search words together to either narrow or broaden your search. The three main search operators are **AND**, **OR**, and **NOT**.

The 'AND' operator

Use the AND operator to connect different concepts. Using AND directs the database to show results that include all the search terms that were included in the search. The more search terms connected by AND, the more specific your search will be, and fewer records will be retrieved.

Example: productivity AND writing

The 'OR' operator

Use the OR operator to connect like terms, synonyms, alternate spellings, or abbreviations together.

Using OR broadens the search to include all records that contain any of the terms linked together using OR. Each time you add another term with the OR operator, you are potentially increasing the number of records that will be retrieved.

Example: productivity OR efficiency

The 'NOT' operator

Use the NOT operator to exclude certain words from your search. Using NOT narrows the search by excluding specific terms. Be aware that this is a powerful search operator and may also exclude important records. This operator is best used when paired with a field filter, such as excluding a term from only the title or summary fields.

Example: productivity NOT production

Watch

Watch the video below for a visual overview of Boolean operators.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1297#oembed-1

Boolean operators (QUT YouTube video, 1m48s).

Phrase searching

Some databases assume that a string of words will be searched as a phrase, whereas others will search on each individual word. Phrase searching tells the database to look for two or more words in the exact order they are entered. Most databases use quotation marks (" ") to enclose a phrase.

Example: “right to disconnect”

Watch

Watch the video below for a visual overview of phrase searching.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1297#oembed-2

Phrase searching (QUT YouTube video, 38s).

Truncation and wildcards

Use truncation symbols to look for the root or stem of a word. The most commonly used truncation symbol is the asterisk (*). Be careful to use a word stem that relates to your meaning, to ensure your search doesn’t become cluttered with irrelevant results.

Example: The search *creat** will retrieve create, creates, creator, creative, creativity etc.

Example: The search *polic** will return policy and policies, as well as police and policing.

A wildcard symbol is used to substitute for a character either within a word or at the end of a word. This symbol is particularly useful for American or British variations or when you’re unsure about the spelling of the word.

Example: The term *organi?ation* will find both ‘s’ or ‘z’ spellings.

Truncation and wildcard symbols vary between databases and search engines, and their compatibility with other search techniques may vary, so check the help section of each database to make sure your search syntax has been applied correctly.

Watch

Watch the video below for a visual overview of truncation and wildcards.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1297#oembed-3

Wildcards and truncation(QUT YouTube video, 46s).

Nesting terms

Nesting search terms within parentheses or rounded brackets ( ) controls the logic of the search so you can group synonyms in sets. The part of the search within the parentheses is performed first.

Example: The search *(policy OR governance) AND "right to disconnect"* finds articles about policies or governance around the right to disconnect.

Watch

Watch this video to check your understanding of nesting.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1297#oembed-4

Nested searching (QUT YouTube video, 2m38s).

Proximity operators

Proximity or adjacency operators allow you to locate one word within a determined distance from another. Words that are close to each other are more likely to be related than those that are further apart. Using proximity operators will limit your search returning a smaller, group of results. Proximity operators differ between databases. Check the database help screens to find out which operators are appropriate for the database you are using.

Watch

Watch this video to check your understanding of proximity searching.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1297#oembed-5

Proximity searching (QUT YouTube video, 1m38s).

Limiters

You may also use limiters or filters to narrow your search. This is often best done in the results screen to increase the relevancy of results after a comprehensive search. Limiters can include:

- subject
- format
- date
- institutional affiliation
- geographic region
- publication source
- full text or peer reviewed articles.

Search engines such as Google have their own limiters including:

- domain – restrict to a country, type of organisation or information provider (.au; edu or .gov for Australian, educational or government information)
- format or file type – such as PDF, PPT, Excel, audio or video files to focus your search
- region
- last updated.

Read

Using filters

Explore QUT Library's guide to using filters for examples of ways in which you can limit your searches and remove unwanted items from your search results.

Knowledge check

Do the following interactive activity to check your knowledge of Boolean operators, phrase searching and truncation. There are four activities, do them all to see how well you have understood search techniques.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1297#h5p-34

3.2.1 Linking search terms

Before commencing comprehensive searching, you can test your keywords, synonyms and terms with some preliminary searches using some of the techniques that have been introduced so far in this module.

Preliminary keyword searching helps you determine if you are on the right track with your terms by conducting basic searches to scope the available literature. You may find thousands of results or none, depending on where and what you are researching. This process will help to confirm if you are using appropriate search terms and potentially highlight if there are any other synonyms or related terms for your key research concepts.

Testing your search terms

Below is a simple search statement based on the example question covered in *Module 2*, *"Does the experience of* ***moving interstate*** *to commence* ***first-year university*** *have an influence on established* ***study routines*** *for* ***school-leaving teenagers****?"*

(moving OR re-locating) AND (university OR tertiary) AND "study routine" AND Australia*

This search statement (also referred to as a search string) shows how we are beginning to link our search terms with Boolean Operators, nesting the related terms, and applying truncation and phrase searching.

The terms you include in each search will appear somewhere within the sources that are retrieved (e.g. within the title, abstract, author keywords, or subheadings). Beginning your search in this way will retrieve resources where the author(s) used the specific terms you have identified as being important to your research. As you review the results, you can identify further search terms by highlighting, underlining, or circling the main ideas from the more relevant sources you find.

Remember to test and recheck each of your search terms to ensure that your terms are not too broad or too narrow. Figuring this out takes practice and may differ with each search. You will begin to see which terms are more relevant for your research question or project as you undertake preliminary keyword searching and preliminary reading.

As you conduct these preliminary searches, aim to record basic details of each search, i.e. the database or search tool used, the search statement used, and your results. This record will help to save time and frustration when it comes to more in-depth searching and when managing large number of results.

Knowledge check

Complete the following interactive activity to check your knowledge of search strategies and correct search syntax. This activity uses the search syntax described in this module.

An interactive H5P element has been excluded from this version of the text. You can view it online here:

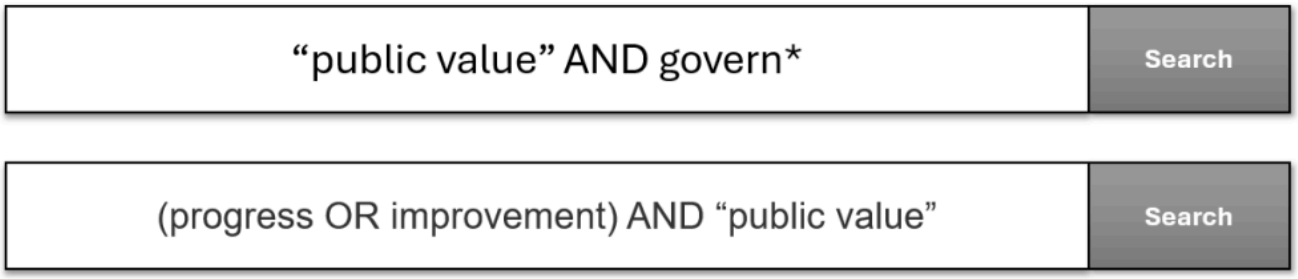
https://qut.pressbooks.pub/airs/?p=782#h5p-35

3.3 Types of searching

As you develop more comprehensive searches, we recommend using a combination of strategies, such as keyword, field and subject searching. Each approach offers unique strengths and produces different results, helping you achieve greater efficiency and effectiveness.

Keyword searching

Most databases search **keywords** or words anywhere unless you choose another type of search. The database looks for a match for your keyword in any field in the record. This means that your search will retrieve more information or have higher recall but be less precise than other searches.



Watch

See the video below for information about keyword and subject searching.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1303#oembed-1

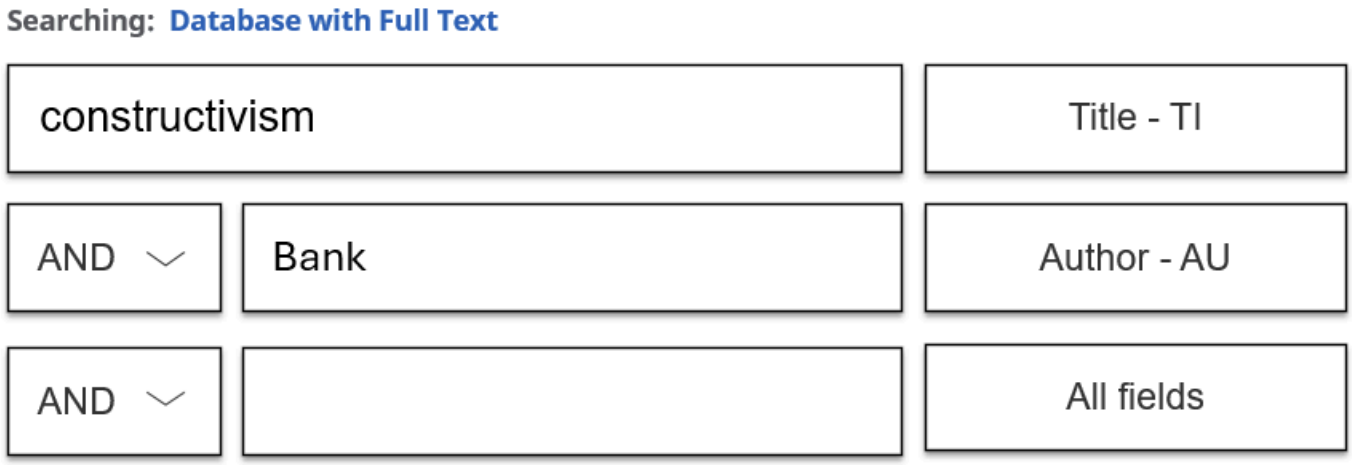
Search techniques: Keyword and Subject searching (QUT YouTube video, 2m34s).

Field searching

Some databases allow searching in specific fields, such as title, author, abstract, or subject. By using field searching, you can increase the precision of the search so that it retrieves fewer results.

Example: Searching for bank in the author field retrieves results by authors called 'Bank', while searching for bank in the keyword field might retrieve results about financial institutions or rivers.

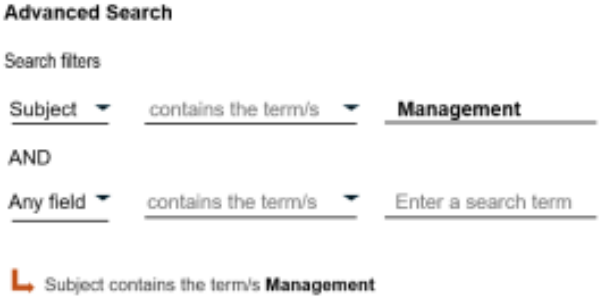
Example: Searching for constructivism in the article title field is a quick way of finding articles about that theory, rather than articles that merely mention it in passing.



Subject searching

As discussed in *Module 2.4 Unpacking the research question*, if a database provides subject headings, you can use these to perform a subject search that will increase the relevance of your results. Subject headings are a set of standardised terms or controlled vocabulary that are defined and used by indexers of a database to describe a subject so it can be easily found. Often, a single concept may be referred to by a variety of terms; using subject headings aims to bring these like terms together under a single term or phrase.

Subject headings may also go by other names, such as descriptors, **Subject headings**, or index terms. Check the help pages of a database to confirm whether subject headings or their equivalent are available.



Watch

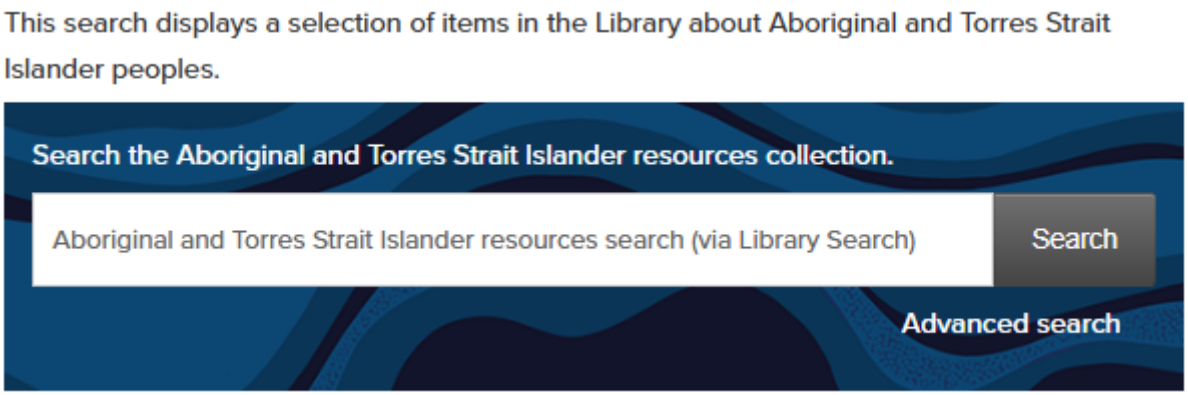
See the video below for information about using subject headings when searching.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1303#oembed-2

What is a subject heading? (QUT YouTube video, 5m12s).

Search facets

Search facets help with finding specific information. Search facets organise information into pre-defined subsets of library holdings. For example, QUT Library Search includes the Aboriginal and Torres Strait Islander Search Facet where you can find books and eBooks, videos, music, audio recordings, and theses by, and/or about, Aboriginal and Torres Strait Islander peoples.



Searching by discipline

We've taken you through some of the generic searching techniques that many databases use. Additionally, there are a lot of specific and more advanced features available to take your searching to the next level. You should familiarise yourself with the search techniques specific to any of the databases you use.

We recommend consulting a liaison librarian, preferably with discipline or subject-specific knowledge. If one is not available, seek the advice of your research supervisor, other members of your research support team, or your peers.

QUT only

IFN006 students can access more support through the IFN006 Canvas site or contact your QUT Liaison Librarian for expert guidance in relation to your specific research topic.

3.4 Performing the search

In practice, searches are rarely conducted using a single method. Instead, the search will typically combine multiple techniques to improve the precision and comprehensiveness of the results. Below, we will look at how these techniques can be used together to enhance your search strategy.

There are two general ways in which you can prepare to search:

- using a single search line or basic search
- using an advanced or multi-tiered search.

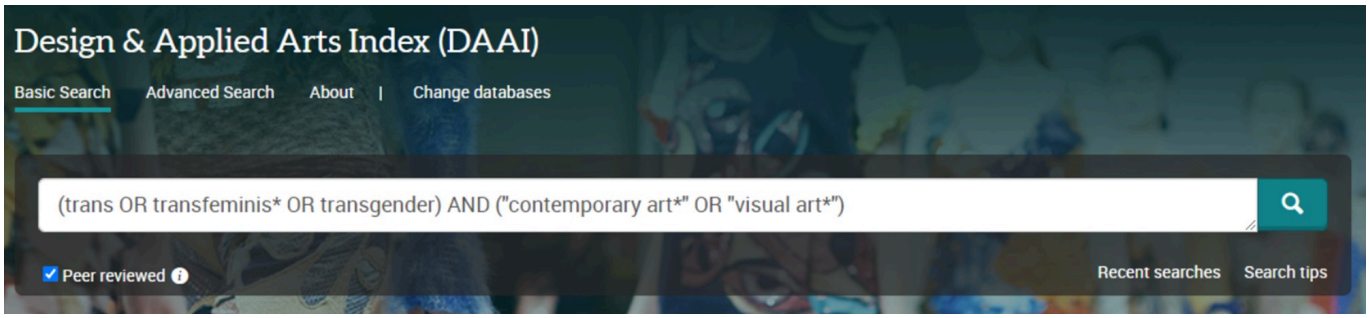
Many academic databases, search engines, and other search tools offer both options.

Single search line or basic search

The basic search function is often the first option you see on a search tool. It requires you to create your search strategy in a single string or line.

The example below uses five techniques simultaneously, including:

- Boolean operators [AND, OR, NOT]
- truncation
- nesting
- phrase searching
- peer reviewed limiter or filter.



"Design & Applied Arts Index (DAAI) basic search" © ProQuest

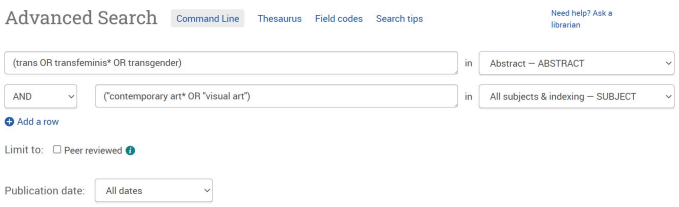
Advanced or multi-tiered search

The advanced search function is often found via a link from the search tool's home page. In the above example, you can see the *Advanced Search* link above the search box. This way of searching provides

additional search boxes as needed to allow you to separate elements of your search strategy while still searching them all at once.

The example below uses six techniques simultaneously, including:

- Boolean operators [AND, OR, NOT]
- truncation
- nesting
- phrase searching
- field searching [Abstract]
- subject searching.



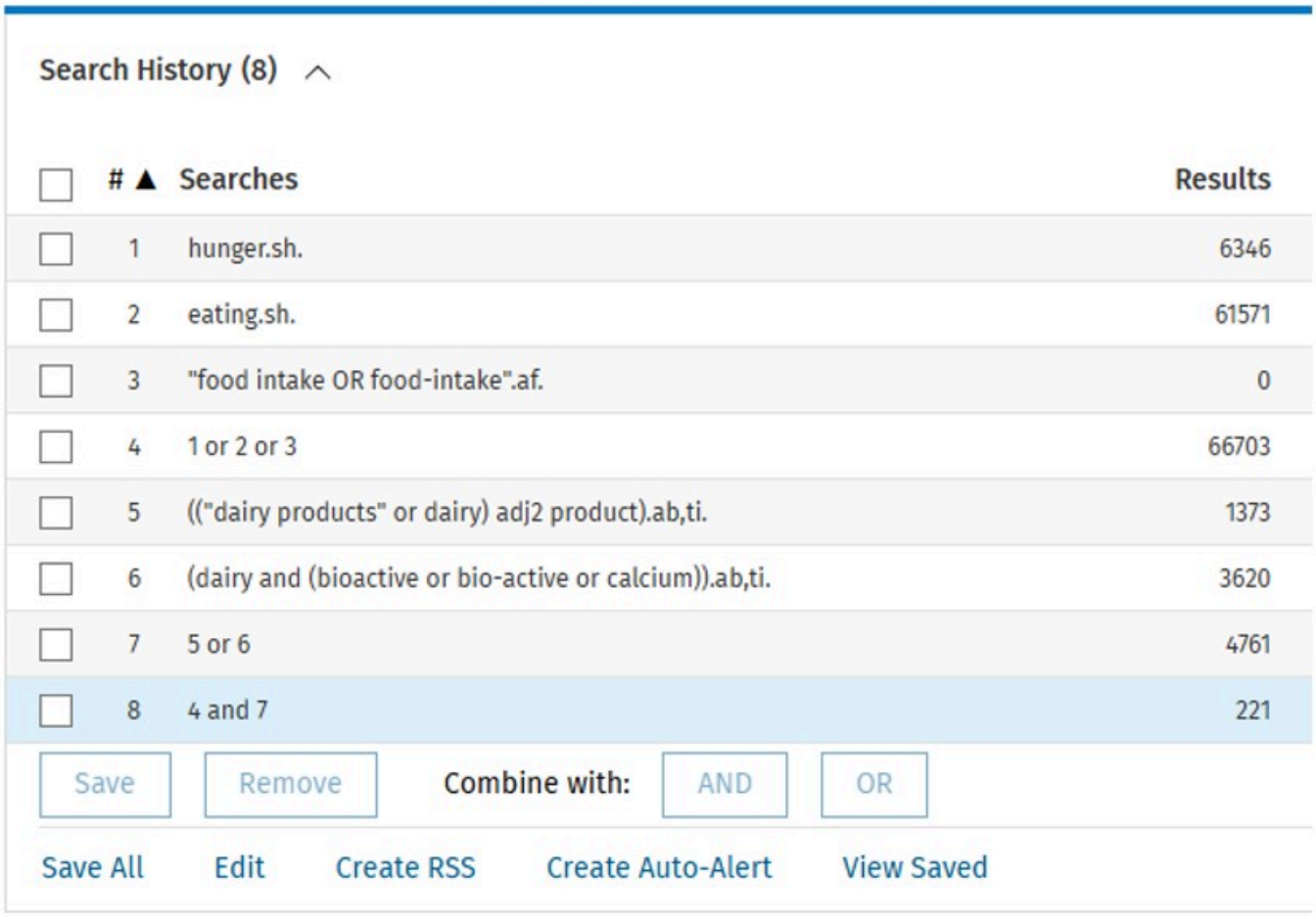
"Design & Applied Arts Index (DAAI) basic search" © ProQuest

Building a search from search history

In addition to basic and advanced searches, you can also create a thorough and comprehensive search strategy by performing individual searches on each of your key concepts. Once you have run your searches on each unique concept to identify the breadth of information available, you use the search history function found within many databases to combine them. This is particularly useful when constructing complex searches, as it lets you focus and evaluate your search on one concept at a time.

See below for an example of building a search strategy based on a search history from the database Medline (Ebscohost). The search lines also use an array of search techniques, including searching by:

- **MeSH Subject Headings**
- proximity
- truncation
- wildcard
- limiting by publication date.



"MEDLINE search history" by Ovid Technologies. © Ovid Technologies, Inc.

Using GenAI to build your search

Using GenAI can make the searching process more efficient. There are tools that can help you define your key concepts and also create and refine your search strategy. By specifying your keywords and terms and the database you are using, you can ask a GenAI tool to assist with crafting an effective search. Importantly, using GenAI tools should not replace your own understanding of the search process and critical evaluation of the results, which was covered in detail in *Module 2.6.3 Considering where to search – what about generative AI tools?*

Watch

View the recording below to learn how to use Microsoft Copilot to help you build an effective search statement for use in a database or other search tool.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1313#oembed-1

Constructing your search strategy with AI tools (QUT YouTube video, 4m14s).

Activity

Practise using the above search techniques with your search terms.

1. Select a relevant specialist database or an academic search engine and practise creating searches.
2. Identify if your chosen search database or tool doesn't have certain functions or requires you to use different steps to use advanced features or filters in order to expand or narrow your results.

3.5 Documenting your search process

Translating your search

Comprehensive searching will involve searching across a number of different databases and search tools, to ensure that you find all the relevant information. However, you can't always just copy and paste a search from one database directly to another without revision.

Some ways that databases differ can include:

- proximity, truncation and wildcards: some databases might use different symbols or operators for advanced techniques, and some databases might not support them at all. In particular, proximity operators can vary widely between databases (n/, w/, NEAR/, etc.)
- subject headings and any controlled vocabulary could be unique for each database
- filters and limiters can vary as well, depending on the database and the type of information they contain
- the sophistication of the search interface: are you searching in an academic database, with an array of features and limiters to choose from, or are you searching in a platform with a simpler search interface?

Recording your search methodology

For some tasks, such as preparing a systematic or systematic-like review, documenting your search methodology is an important part of the research process, particularly for large projects. This record can help you:

- evaluate your searches and identify the best combination of keywords and tools to look for your information
- retrace the steps you took to find results
- keep track of what you've searched and where, and record which keywords you found useful and those that provided irrelevant search results
- report your search in your writing, including the methodology or an appendix if necessary
- translate your search across different databases and platforms
- develop **search alerts** from the most effective searches.

The type of information useful to record can include:

- date the search was conducted
- databases searched
- search strategy used, including any filters that you applied
- number of results retrieved
- notes on the effectiveness of the search.

Tracking your searches

Creating effective search strategies takes time and practice. Every topic and every search tool is different, which means you will spend a lot of time experimenting with various **keywords** and **synonyms**, search techniques, and syntax. It's important to document your searches, effective or otherwise, to show your process and avoid unnecessary duplication of work in the future.

You can use the template below to set up your own search tracking record. Delete the example records before you add your own data.

Search tracking spreadsheet template (Excel file, 13.1KB)

Topic /Search objective	Database	Search Statement	Fields / Results / Limiters	Date	Comments
Organisational behaviour	Scopus	(corporate or business or organi?ation*) and (cultur* or behavio* or "work practices")	Title, Abstract: 123 [2004-present, peers reviewed] ; Title 53 [2004-present, peer reviewed]	13/04/2015	Good for theoretical. Not great for case study
Organisational behaviour	Scopus	(mintzberg) and (organizational culture)	Author-Subject: 14 [2004-present, peer reviewed]	13/04/2015	V. relevant. Content duplicated across multipe articles
Organisational behaviour	Web of Science	(corporate or business or organi?ation*) and (cultur* or behavio* or "work practices")	Title, Abstract: 43 [2004-present, peers reviewed]; Title 5 [2004-present, peer reviewed]	13/04/2015	Only a few relevant
Organisational behaviour	PsycArticles	(mintzberg) and (organizational culture)	Author-Subject: 25 [2004-present, peers reviewed]	13/04/2015	Many too clinical or specific. But some highly Relevant and value add
Work efficacy	Proquest	(bandura) and (efficac* or efficien* or effective*)	Author, abstract: 2,523 [Business databases, 2004-present, peer reviewed]	13/04/2015	Many too vague, but worth scanning abstracts.

3.6 Evaluating your search

Researching is an iterative process. You will have to spend time reviewing your search results and refining your search strategy to find the best and most relevant results for your topic or task.

When reviewing your search results, consider the following questions to determine your own 'evaluation toolkit.' Select the questions that are relevant to the search you are performing, as some may not be applicable in certain circumstances.

Did it retrieve too few or too many results?

There is no such thing as an ideal number of search results. Depending on your research, you may identify many relevant sources of information. Conversely, if your topic is emerging or niche, you may discover that there is very little material available.

As you get to know your topic, use the table below to 'troubleshoot' the possible issues described and try the recommended solutions (if applicable) to see if your results can be refined. These steps can help you learn what the information landscape looks like for your topic.

Troubleshoot the search

Problem	Possible issues	Solution
Low number of search results	• Incorrect keywords • Little or no synonyms included • Incorrect database	• Correct or adjust keywords • Identify and include additional synonyms • Changing discipline-specific database or switch to a multi-disciplinary database
Large number of search results	• Keywords are too broad • Search operators not correctly applied to database • Database selected is not specific enough	• Adjust keywords to be more specific • Remove irrelevant synonyms • Select a subject-specific database • Reviewing use of search operators to identify any errors in search syntax

You shouldn't have to spend hours sifting through results, but neither should your search retrieve 0 results. If this is proving difficult, consider contacting a librarian in your institution or at your local library for assistance.

Does it include information types that aren't suitable for the topic being researched?

The type of resource you are looking for will depend on your topic. Consider whether your topic requires the use of non-scholarly sources, like newspaper articles or opinion pieces, or if you should focus on scholarly material like journal articles.

Once you have considered the type of resources you are focusing on, you'll need to ensure that you are using the appropriate language to match. For example, a scholarly paper might use the term *uranium fission*, while a news article may use the term *nuclear power*. Review your keywords each time you begin searching for different types of information to ensure a match.

Finally, you will need to select an appropriate location to search for the type of resource you're focusing on. For example, high quality scholarly sources are often found on academic databases, while government reports could be accessible through search engines like Google. While there will always be exceptions to the rule, such as news articles being available via databases or the news providers' website, use your best judgement to decide which tool matches your research needs.

Are the results relevant to the topic?

In databases, examine the title, subject headings, table of contents, abstract, and summary to determine the relevance of your results to your topic. In search engines, examine the title and summary information (text or other media from the search result). Seeing your keywords and synonyms in your search results list can help to confirm your search effectiveness.

If you cannot see your keywords in these areas and the results being returned are not relevant, consider using advanced search functionality (where available) to identify resources that have your keywords in the title, subject heading, table of contents, abstract, and/or summary.

Are the authors credible?

Look through the search results to identify if key researchers or other expert sources are the authors of the resources listed. Seeing authoritative authors in your search results list, whether that be individuals or organisations, can confirm your search effectiveness.

For all authors, consider if they are the most appropriate source for the topic being discussed. Check whether the individual or organisation publishing the material has the correct expertise to discuss the topic, or if their expertise may alter their perception.

> *Example*: Both a dermatologist and a cosmetic chemist would be appropriate sources to discuss sunscreen efficacy; however, a dermatologist may be better suited to discuss its effect of reducing skin cancer, while a cosmetic chemist would be better suited to discuss improving formulations.
>
> *Example:* When discussing solutions to youth crime, a police department may reach different conclusions regarding a solution compared to youth support services.

Also keep in mind that while some authors publish well-researched, evidence-based material with proper referencing, others may provide content with minimal supporting evidence. These patterns can often serve as indicators of an author's overall credibility.

Are the publications or publishers reputable?

Check if the publications or publishers are recognised in your research field or discipline as reputable publications with appropriately qualified or knowledgeable authors. This applies to both scholarly and non-scholarly sources.

For academic sources, recognising highly ranked journals and known publishers or conferences in your search results list can confirm your search effectiveness.

Are the search results current?

Check that the publication dates of the search results reflect current research. Depending on your research field and discipline, you may need to ensure that the information you find is cutting edge and published very recently, such as in the last two years or five years. For other disciplines, this may not be essential, but recency should still be considered.

Don't forget that important or seminal contributions to research in your field may be older. You can identify these to explain their inclusion in your search results, if recent research would usually be more appropriate.

Does the search need revising?

After reviewing your search results, you may decide that you need to revise your search to find more relevant, reliable or credible resources. To broaden your search, try adding other synonyms, spelling variations or try a different database or tool. To reduce the number of irrelevant results, try phrase searching or subject searching. You can also use filters to refine your results. For example, you might exclude non-scholarly sources or limit your search to online news outlets, depending on your research needs. There are many other strategies you can apply to improve the effectiveness of your search, but this process of refining will take time.

Have all the relevant information sources been found?

Knowing when you have exhausted all the relevant literature can be challenging at first. A common indicator that you have exhausted the literature is when your searching starts to retrieve the same or similar information sources each time.

Read

When to Stop Searching

Read this short chapter from Dermody et al., for additional tips on determining how much more searching you need to do.

We will be looking at evaluating your sources more closely in *Module 6 – Evaluating and using information ethically.*

Need more help?

For more information and solutions refer to Study Smart – Review and revise your search.

For subject-specialist help with searching, contact a librarian in your institution or at your local library for assistance.

3.7 Other techniques for finding information

Cited reference searching

Cited reference searching is the process of tracking research through time to situate it in the wider context of the field. It is also known as snowballing.

Cited reference searching can look backwards in time, examining the sources that informed a work, or forwards in time, to see how the article has been used and built upon by other researchers.

Citation searching allows you to track research strands to current practice, identify gaps in the research, and see how often an author or work has been cited. Knowing how often an author has been cited can give an indication of their standing in the field and may help you discern the quality of a paper. Use cited reference searching for a quick set of results with great currency for your literature review, or for advanced analysis, comparison, and tracking.

Watch

See the video below for a HDR student's perspective on cited reference searching.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1324#oembed-1

Keeping up to date using cited reference searching (QUT YouTube video, 0m25s).

Cited reference searching in practice

In practice, cited reference searching can feel chaotic, as you jump backwards and forwards in time, trying to figure out the connections and scholarly conversation between the different articles and resources in your field. There are three different types of cited reference searching that many databases will allow you to perform:

- backwards citation tracking
- forward citation tracking

- finding related articles.

Activity

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1324#h5p-36

There are a number of search engines and databases that allow searching by citation, including:

- Google Scholar allows linking under any item listing to 'Cited by' articles and has a 'Search within citing articles' option.
- Scopus allows a simple 'Cited by' as well as advanced options.
- Web of Science allows a simple 'Times Cited' as well as a comprehensive cited reference search.
- IEEE Xplore, for electrical engineering, computer science and electronics, provides 'Cited by' searching and 'Citation Map' navigation.
- CiteSeer focuses primarily on literature in computer and information science fields. CiteSeerX provides autonomous citation indexing, statistics and context.

Databases are only able to show citations from within their database, so you may find that different databases will show a different citation count or point to some different articles. It is important to check across a range of databases when cited reference searching to make sure you are capturing the full breadth of information available.

GenAI tools have strengths in citation mapping and analysis. Like databases, the mapping only captures literature indexed by the tool, so be mindful that gaps may exist in what they find, and results can potentially include hallucinations. If the use of GenAI is appropriate and permitted for your research project, use it as one of many methods employed for finding and tracking literature.

Read

Found the perfect article? Follow the citation trail.

QUT Library's guide to citation searching within the Library Search.

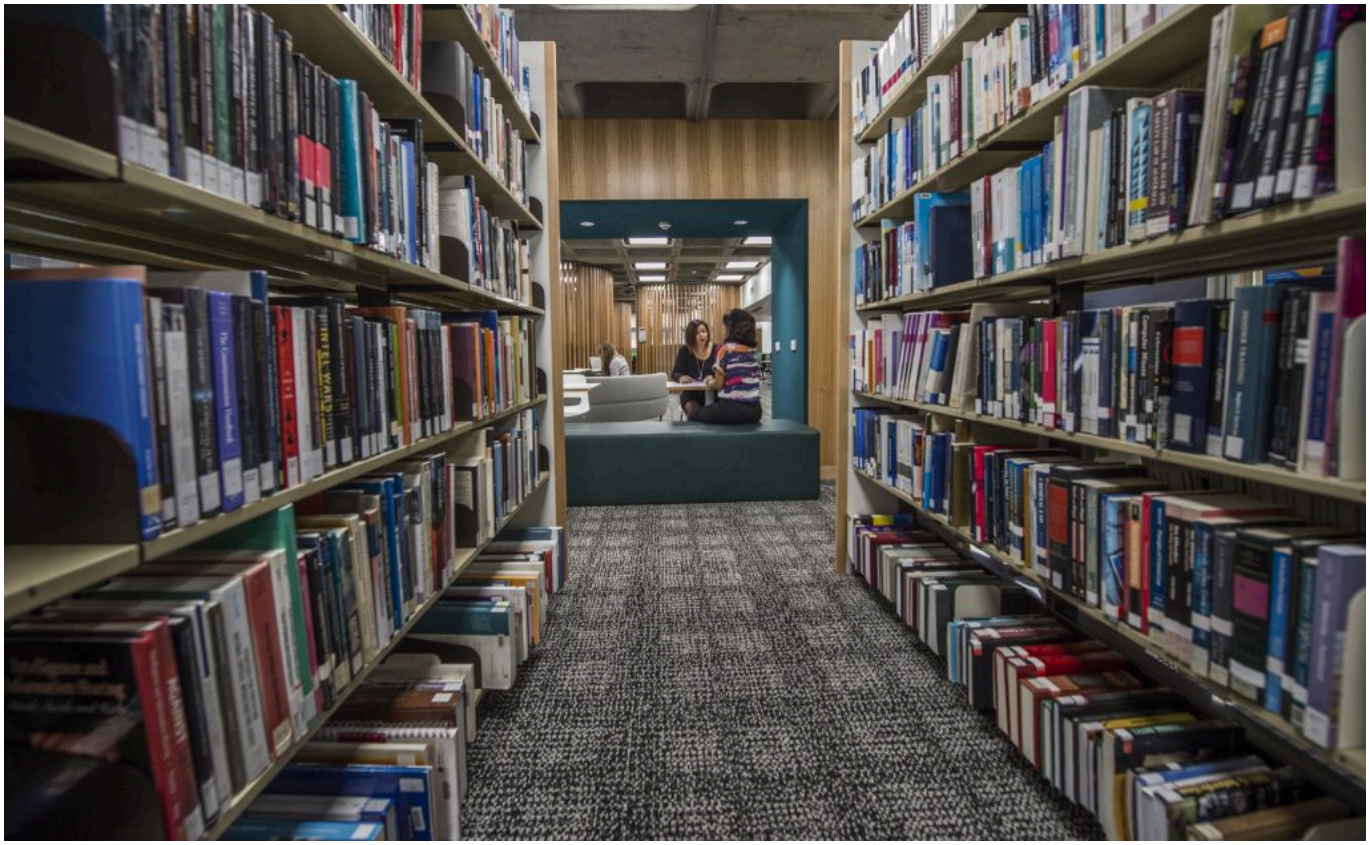
Activity

1. Choose a seminal journal article in your research area.
2. Conduct an article title / cited reference search in Google Scholar, Scopus and Web of Science.
3. Find the 'Cited by' link and click it to display the literature citing your article. At this point you could select relevant items, save the search or export the results to EndNote.
4. Compare the results from each tool to consider which citation database(s) are best for your research.

3.8 Accessing information

Once you have found information that could be relevant to your research question, you will then need to locate a copy of the resource to view. This section outlines methods for locating resources across the web and in libraries.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=1334#h5p-71



"Gardens Point Library" by QUT. © Queensland University of Technology.

QUT only

Students of IFN006 can find QUT-specific advice on how to access the resources outlined above in the following list. Click on the arrows to read more.

An interactive H5P element has been excluded from this version of the text. You can view it online here:

https://qut.pressbooks.pub/airs/?p=1334#h5p-72

3.9 Reflecting on your learning

In this module we have worked through the steps and different options for comprehensive searching of information. To confirm your learning, take a moment to complete the knowledge check, reflect on the questions provided below, and identify whether you understand the content or have any questions for your research support team.

Knowledge check

Confirm what you have learned in Module 3 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1330#h5p-65

Reflect

Consider:

1. Explain the difference between keyword searching and subject searching.
2. What are Boolean operators and how are they used in building search strategies?
3. What is the purpose of proximity operators and how they might be used in a search.
4. What are truncation and wildcard symbols, and how do they enhance search strategies?
5. What are limiters (or filters) and how can they be used to refine search results?
6. Explain the concept of cited reference searching and its significance in research.
7. How can forward citation searching complement backward citation searching?

3.10 Module summary

You have completed Module 3.

You are now ready to move onto *Module 4 Maintaining current awareness*.

Additional resources

The following resources offer further practical guidance, tools, and theory to support your understanding and development of skills for comprehensive and advanced information searching.

Brinkerhoff, C. (2020). *Doing research.* Kwantlen Polytechnic University. https://kpu.pressbooks.pub/doingresearch/

Buljung, B. (2024). Finding special types of information. In .B Buljung, E. Bongiovanni & Y. Li (Eds.) *Navigating the research lifecycle for the modern researcher* (2nd ed.). https://pressbooks.pub/researchlifecycle/chapter/finding-special-types-of-information/

Dermody, K., Farnum, C., Jakubek, D., Petropoulos, J., Schmidt, J., Steinberg, R., & Kovacaj, F. (2024). *Advanced Research Skills: Conducting Literature and Systematic Reviews* (3rd ed.). Toronto Metropolitan University Library. https://pressbooks.library.torontomu.ca/graduatereivews2/chapter/identify-search-terms-keywords/

Mauer, B. & Venecek, J. (2022a). Database search strategies. In B. Mauer & J. Venecek (Eds.) *Strategies for conducting literary research, 2e.* https://pressbooks.online.ucf.edu/strategies2e/chapter/database-search-strategies/

Mauer, B. & Venecek, J. (2022b). Finding trustworthy sources. In B. Mauer & J. Venecek (Eds.) *Strategies for conducting literary research, 2e.* https://pressbooks.online.ucf.edu/strategies2e/chapter/finding-trustworthy-resources/

Mauer, B. & Venecek, J. (2022c). Using Google Scholar. In B. Mauer & J. Venecek (Eds.) *Strategies for conducting literary research, 2e.* https://pressbooks.online.ucf.edu/strategies2e/chapter/chapter-7-objectives/

Mewburn, I. (2023, May 26). Mind the gap (in the literature). *The thesis whisperer.* *https://thesiswhisperer.com/2023/05/26/literaturereviewpain/*

QUT Library. (2025, January 31). *Books and ebooks.* https://www.library.qut.edu.au/search/getstarted/howtofind/books/#usingebooks

RMIT University Library. (2022). *Research and writing skills for academic and graduate researchers.* RMIT Open Press. https://rmit.pressbooks.pub/researchwritingmodules/chapter/developing-a-search-strategy/

Teaching & Learning, University Libraries. (2015). *Choosing & using sources: A guide to academic research.* The Ohio State University. https://ohiostate.pressbooks.pub/choosingsources/chapter/search-statements/

Module 3 References

Dermody, K., Farnum, C., Jakubek, D., Petropoulos, J., Schmidt, J., Steinberg, R., & Kovacaj, F. (2024). *Advanced Research Skills: Conducting Literature and Systematic Reviews* (3rd ed.). Toronto Metropolitan University Library. https://pressbooks.library.torontomu.ca/graduatereviews3/chapter/when-to-stop-searching/

QUT Library. (2025, February 28). *Keeping up to date using cited reference searching*. [Video]. https://www.youtube.com/watch?v=UEy__eXOnqc

QUT Library. (2025, September 8). *Constructing your search strategy with GenAI* [Video]. YouTube. https://www.youtube.com/watch?v=9L3GUwtjWZ0

QUT Library. (2023, January 24). *What is a subject heading?* [Video]. YouTube. https://youtu.be/2HmkaMd_lgohttps://youtu.be/2HmkaMd_lgo

QUT Library. (2023, July 6). *Search tips for finding articles*. https://www.library.qut.edu.au/search/get-started/librarysearch/articles/#citation

QUT Library. (2022, February 21). *Search techniques: Keyword and subject searching* [Video]. YouTube. https://youtu.be/559fLEpT0AQ

QUT Library. (2022, October 19). *Search techniques: Understanding nesting* [Video]. YouTube. https://www.youtube.com/watch?v=d8i60B7JfAk

QUT Library. (2020, May 5). *Using filters*. https://www.library.qut.edu.au/search/getstarted/librarysearch/filters/

QUT Library. (2020a, July 30). *Boolean operators* [Video]. YouTube. https://www.youtube.com/watch?v=iC28LydS_I8

QUT Library. (2020b, July 30). *Phrase searching* [Video]. YouTube. https://www.youtube.com/watch?v=urWRpqXpWFM

QUT Library. (2020c, July 30). *Proximity searching* [Video]. YouTube. https://www.youtube.com/watch?v=_mXh-NzAL6A

QUT Library. (2020d, July 30). *Wildcards and truncation* [Video]. YouTube. https://www.youtube.com/watch?v=Mkgbz_YrKjc

QUT Library. (n.d.-a). *Review and revise your search*. Study Smart information research and literacy skills. https://studysmart.library.qut.edu.au/modules/3/1/1/

QUT Library. (n.d.-b). *Found the perfect article? Follow the citation trail.* https://www.library.qut.edu.au/search/getstarted/librarysearch/articles/#citation

MODULE 4 MAINTAINING CURRENT AWARENESS

LYNDELLE GUNTON, THOMAS MULLINS, EMMA NELMS

Module learning objectives

By the end of this module, you should be able to:

1. Develop strategies for maintaining awareness of current literature in your field of research.

Learning plan

In this module, we will:

- Explain the importance of keeping up-to-date about emerging research, publications and commentary in your field of research.
- Discuss some different approaches and tools that you can use to do this efficiently.
- Practice setting up table of contents, citation and search alerts.

4.1 Why bother?

You have started to map the current literature, gaining insight into the state of research in your field, identifying key contributors, and understanding the approaches they are taking. As part of this process, you may also be working on your initial **literature review**, which will represent a moment in time.

But what happens when you progress onto other parts of your research, such as data collection and analysis? When you become immersed in that work, it is sometimes challenging to find time to keep across all the emerging work going on around you and across your field of research.

When it comes to writing up your findings, it will be necessary to include an up-to-date review of the literature. This can feel like a huge task, almost as if you're starting the literature search all over again. This doesn't have to be the case! By putting some systems in place, and using digital tools to automate your searching, you can keep informed, gather and collate information about new publications, research outputs, commentary, and other information sources in your field. This means when you are ready to update your literature review, you have the information you need to proceed.

"Office stress work business" by mrkaushikkashish via Pixabay, Pixabay licence

It can also seem like there is so much information and so much research happening, you would be forgiven for feeling overwhelmed about how to find it and keep track of it all. This is an excellent reason why setting up systems and scheduling regular time for attending to current awareness is valuable.

Key reasons for maintaining current awareness are:

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=440#h5p-93

Read

Keeping up with the literatures

Read this short blogpost by Professor Pat Thomson from the University of Nottingham. Pat shares seven tips for what they call their keeping-up reading routine. While reading this blogpost, consider which strategies might be useful for your own current awareness practice.

4.2 Setting up alerts for keeping up-to-date with literature

What is an alert?

New research on your topic will continue to be published as you are writing your thesis. Keeping up to date with the latest research is essential. Automating this process by setting up alerts will save time, effort and assist you to stay up to date with research in your area of expertise. An alert is an easy and effective way to find out about and access recent publications in your research area. Depending on the kind of alert, you may be able to receive it via email or by accessing an **RSS feed**.

Watch

See the video below to learn more about using tools to maintain your current awareness.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=926#oembed-1

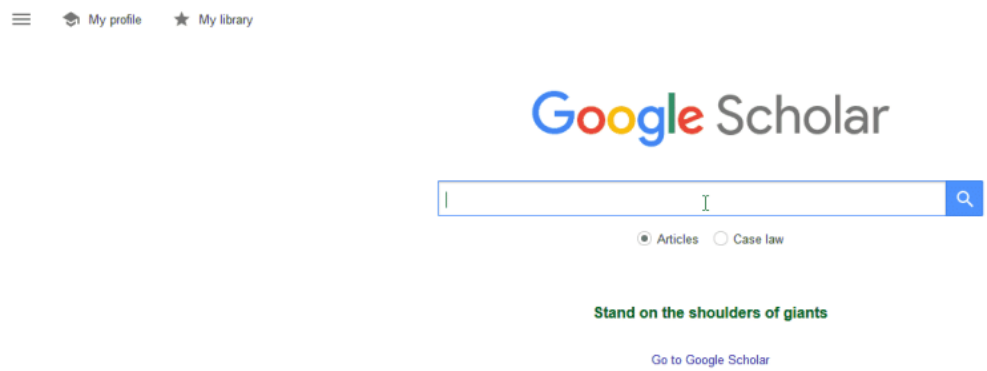
Keeping up to date with current literature and emerging research (QUT YouTube video, 1m11s).

There are many different types of alerts, many of which can be accessed by registering with your favourite databases or **Google Scholar**.

Select the arrows in the accordion below to find out more about different types of alerts.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=926#h5p-66

See below for a visual example of how to set up a Google Scholar search alert.



"Google Scholar search" by Google LLC. Google and the Google logo are trademarks of Google LLC

QUT only

Saving to My Favourites in QUT Library Search

Read the instructions about saving searches and setting up search alerts in QUT Library search.

Activity

Setting up database alerts.

1. Identify and login to a large and/or subject specific database that is highly relevant for your research.
2. Register to create a profile. This enables you to create alerts and have them sent to you.
3. Develop a comprehensive search statement. The results should be good enough for you to wish to receive via email.
4. Find the 'create alert' functionality and add the details about the alert you want to set up.

4.3 More strategies for keeping up-to-date

There are many other strategies you can use in combination with alerts for keeping up-to-date with research outputs, publishing, trends, and commentary within your field of research. Select the arrows in the list below to explore a range of approaches to keeping up-to-date that may suit your field of research and personal preferences.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=932#h5p-30

Watch

See the video below for one HDR student's perspective on using social media for maintaining current awareness.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=932#oembed-1

Keeping up to date using social media (QUT YouTube video, 0m32s).

Periodic or regular searching

For databases that don't have an alerting service, you will need to consider how best to monitor the literature. For example, you could add a new worksheet or tab to your search tracking spreadsheet (see the example we introduced in *Module 3.5 Documenting your search process*), with a column for best relevant searches and the date you last ran each search.

You can use the searching plan template below for maintaining current awareness. Delete the example records before you add your own data.

Searching plan template for current awareness (Excel file, 19.6KB).

Sample Search Statement	Search filters	Databases	Date Last Searched	Notes
Organisational culture AND commercial fisheries	Peer-reviewed	Academic Search	2/04/2025	
Organi?ation* culture OR corporate culture AND "commercial fisher*" OR "commercial fishing industry"	Date range: last 5 years	Academic Search	3/04/2025	
Workplace AND ("commercial fisher*" OR "commercial fishing industry") AND culture	Language: English	ProQuest Central	4/04/2025	Modified search string for database limits
Values AND commercial fishing	Exclude dissertations	Google	5/04/2025	
"Organi?ational climate" AND "commercial fisher*"	Full text available	ProQuest Central	6/04/2025	
Organi?ational climate AND commercial fisher*	Peer-reviewed AND English	Google Scholar	7/04/2025	Track in Google Scholar

For those journals that don't have Table of Contents (TOC) alerts, you can set a note in your diary to check the latest issues for articles pertinent to your research. By adopting an organised approach to searching, you reduce the possibility of missing important work, increase your efficiency, and reduce research anxiety.

4.4 Reflecting on your learning

In this module we have worked through the steps and different options for developing a personalised strategy for maintaining current awareness about new and emerging research in your field of interest. To confirm your learning, take a moment to complete the knowledge check, reflect on the questions provided, and identify whether you understand the content or have any questions for your research support team.

Knowledge check

Confirm what you have learned in Module 4 with the activity below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=938#h5p-31

Reflect

Consider:

1. Why is maintaining current awareness important, even after completing an initial literature review?
2. What is an alert, and how can it be beneficial for researchers?
3. How can attending conferences and workshops contribute to maintaining current awareness?
4. Why is it important to consider interdisciplinary insights when maintaining current awareness?
5. How can social media be used to stay informed about new research and trends in your field?
6. Briefly discuss how staying current with ethical policies and guidelines is important for research.

4.5 Module summary

You have completed Module 4.

You are now ready to move onto *Module 5 Managing information for research*.

Additional resources

The following resources offer further practical guidance, tools, and theory to support your understanding and development of skills for creating and using a comprehensive current awareness strategy for research.

Harzing, A-W. (2018 May 14). How to keep up to date with the literature but avoid information overload? https://harzing.com/blog/2018/05/how-to-keep-up-to-date-with-the-literature-but-avoid-information-overload. *Harzing.com*.

RMIT University Library. (2022). *Research and writing skills for academic and graduate researchers*. RMIT Open Press. https://rmit.pressbooks.pub/researchwritingmodules/chapter/staying-current/

The University of Melbourne Library. (2025, July 1). *Staying Current: keeping up-to-date*. https://unimelb.libguides.com/stayingcurrent

Module 4 References

QUT Library. (2025a, February 28). *Keeping up to date using social media* [Video]. YouTube. https://www.youtube.com/watch?v=bDdz8Rtfvvc

QUT Library. (2025b, February 28). *Keeping up to date with current literature and emerging research* [Video]. YouTube. https://www.youtube.com/watch?v=KFbz19GNh2Y

QUT Library. (2022). *Save to My Favourites*. https://www.library.qut.edu.au/search/getstarted/library-search/myfavourites/

Thomson, P. (2023, October 2). Keeping up with the literatures. *Patter*. https://patthomson.net/2023/10/02/keeping-up-with-the-literatures/

MODULE 5 MANAGING INFORMATION FOR RESEARCH

ZACHARIAH DOMINELLO, GABRIELLE HAYES, DR SAL KLEINE, ELLEN THOMPSON

Module learning objectives

By the end of this module, you should be able to:

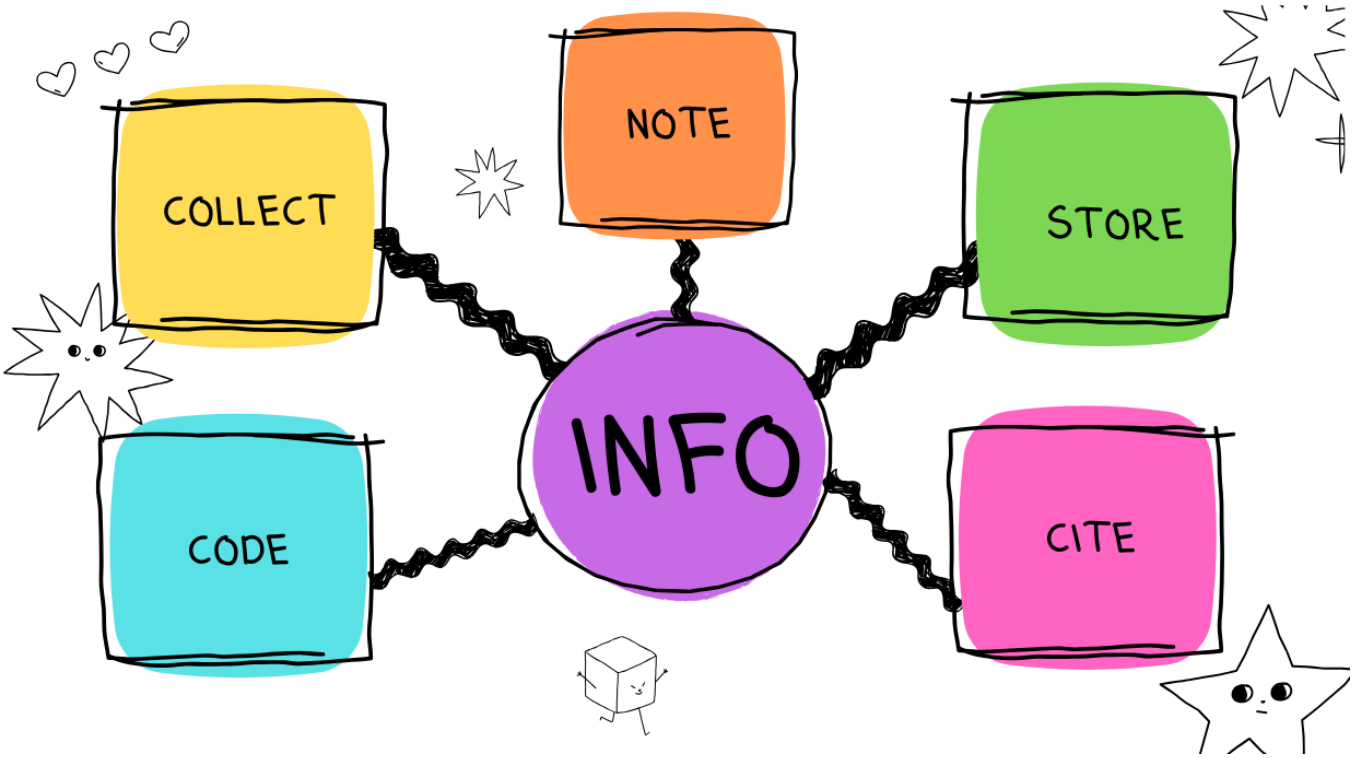
1. Develop an organisational strategy to store and manage literature and associated notes.
2. Recognise and select key tools and systems to manage information effectively.
3. Understand effective techniques for reading and notetaking.

Learning plan

In this module, we will:

- Discuss available tools, systems and software for storing and managing bibliographic data and associated notes throughout your research.
- Identify a range of approaches for reading literature and taking notes.

5.1 Why does an intentional approach to information management matter?



'Organising information' adapted by QUT Library via © Canva.

As you undertake your research, you'll be collecting, reading, and recording large quantities of information. Over time, this may include hundreds or even thousands of references, files and notes that will inform your writing. To manage this effectively, it's essential to establish a system for recording, storing, and retrieving information and references when needed. This will help you efficiently handle the volume of information typically involved in a literature review.

Once your information management system is in place, you can begin engaging with the literature, that is, reading, taking notes, and coding sources to identify their relevance to your research question. This process will also support the development of an annotated bibliography, if required.

The key is to be intentional in how you read, take notes, and organise your materials. You might choose to use one or two consistent strategies across all your readings or adapt different approaches depending on the context. This will help you stay in control of your research, synthesise key concepts, and draw meaningful connections between ideas.

The level of complexity and the range of tools you use to manage this information is up to you. You might prefer using separate software for storing notes and another for managing references. Alternatively, you could opt for an all-in-one solution like EndNote, which allows you to store, annotate, and cite your readings in one place. Whatever approach you take, establishing consistent systems and practices early in your research project, and maintaining them throughout, will help ensure your work progresses smoothly and efficiently.

Watch

View the video below for one research supervisor's explanation of how they organise their information for research.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1179#oembed-1

Managing information (QUT YouTube video, 1m01s).

5.2. Organising your folders and files

Organising the information and literature you identify during your search will support easier access and retrieval later in your research process. Taking the time to name your folders and files appropriately can have a significant impact on your ability to locate and use resources when you begin reading, note-taking, and writing.

By implementing a few key strategies early on, you can work more efficiently and stay focused during the later stages of your research project. This can include:

Creating a logical structure

It can be useful to start with broad categories for your top level folders and then create sub folders.

For literature, you could organise your folders by information type (e.g. journals, books, grey literature) with subfolders for different themes (e.g. housing policy, economic theory, environmental impact) or status (to read, review in progress, reviewed), or even a combination of both.

For notes, folders organised by purpose might be more appropriate, such as annotated bibliography, quotes, reflections, and summaries.

Naming your files

Your institution may have a recommended format for naming your files. Whatever you decide, your goal is to make your files searchable and discoverable. As you will likely be collating large volumes of information, it is important that your naming conventions are practical and consistent.

Depending on the type of information you might include:

- author name
- publication date
- brief description of the content/title
- version number.

Choose descriptors that make sense to you and will help you to locate resources later on. This will save you time and stress when trying to find that really important article you know you read early on in the literature review!

Saving and backing up

Backing up your work is important for ensuring continued access to your files. In the unfortunate event of file corruption, accidental deletion or hardware issues, you can avoid significant stress and save time and effort by setting up a regular back up schedule. You can back up your files on local hard drives, cloud storage locations, or other secure options provided by your institution. While these files should

not contain sensitive material, you should still be aware of any institutional policies around information storage and file sharing.

See more information in *Module 8 Managing research data* for advice on options for storing your digital research data.

QUT only

More information is available about managing digital files in QUT's HiQ website.

5.3 Reading strategies

A well-designed reading strategy enhances the quality of your literature review by guiding you through the process of selecting, analysing, understanding, and synthesising relevant sources. A reading strategy will save you time and help you focus on the readings that are most relevant to your literature review while being able to identify and put aside readings that are irrelevant or inappropriate for the purpose of your project.

There are various strategies you can employ to enhance your comprehension, critical thinking, and synthesis while reading. Remember that different strategies work best for different types of reading material and learning styles. Experiment with these strategies and find the ones that work most effectively for you. You can read below about two of the most recognised reading techniques. These can save you a lot of time and frustration as you explore and categorise literature for your research.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=1184#h5p-75

Skimming

Skimming is a rapid reading technique used to quickly get an overview of a text's content without reading every word. It's particularly useful when you want to assess whether a text is relevant to your needs, identify the main ideas, and decide whether to invest more time in detailed reading. Skimming involves looking at headings, subheadings, introductory and concluding paragraphs, and other visual elements to extract essential information.

Remember that skimming is not about reading every word but about quickly grasping the structure and main ideas of the text. It's a strategy to help you decide if the text is worth reading in detail or if you can move on to another source. Skimming is particularly helpful when you have a limited amount of time and a large volume of material to go through, such as conducting research or preparing for a presentation.

Scanning

Scanning is another a rapid reading strategy that involves quickly searching for specific information within a text without reading every word. This technique is particularly useful when you're looking for specific details, keywords, or phrases in a text. Scanning is more involved than skimming as you are engaging with the text more deeply to identify specific information. Scanning allows you to locate information efficiently and saves time compared to reading the entire text.

Scanning is especially valuable when you have limited time and need to locate specific facts quickly. It's commonly used for tasks like finding a name in a phone directory, locating a reference in an aca-

demic paper, or finding a specific topic in a textbook. By mastering the scanning technique, you can efficiently extract information from texts without reading every word.

Watch

The practical strategies video gives some tips on how to best skim and scan journal articles.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1184#oembed-1

Practical Strategies (QUT YouTube video, 5m30s).

You can view other videos in this series to gain further tips about how to engage meaningfully and critically with your reading via the Reading Strategies for Research Students playlist.

Practising these techniques will make you a more efficient and effective researcher.

Activity

Practice skimming and scanning the remainder of this module then return for a deeper reading of those sections that you identified as most important while skimming.

5.4 Notetaking methods

Effective notetaking will save you time and help you make connections between readings and identify themes and gaps. Notetaking strategies can help you summarise and synthesise ideas and retain information more effectively.

There are various note-taking strategies that you can use to capture and organise information. Some are described briefly below.

Watch

See the video below for one research supervisor's explanation for how they take and organise notes for research.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1192#oembed-1

Digital tools to support information management (QUT YouTube, 0m48s).

Notetaking methods

Select the arrows in the accordion below to read more about different notetaking methods.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=1192#h5p-88

Activity

Watch the video, and make notes while watching. Remember the summary!

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1192#h5p-32

Read

Exploring the Inescapable Suffering Among Postgraduate Researchers: Information Overload Perceptions and Implications for Future Research

Consider the implications of information overload as experienced by HDR students and researchers and reflect on the suggested strategies for reducing the negative impacts and managing large quantities of information in research and whether they can be of benefit to you.

Activity

Click on the hotspots to learn more about the parts of the Literature Grid method. You can download and use the Example template (DOCX, 13.5KB) to try this kind of notetaking.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1192#h5p-39

Activity

Notetaking with the Two-column method.

When you read the following section on Notetaking software, take notes using the Two-column method.

5.5 Notetaking software

Using an electronic system for notetaking allows you to manage your notes more efficiently through the use of tags, keywords, or metadata. These tools establish a consistent format that allows you to easily distinguish your own thoughts and ideas from quotes or ideas of others. They become searchable databases for your notes and original ideas.

Using these tools in combination with specific notetaking systems can be a useful strategy for managing your notes from reading the literature and notes from attending research seminars or meetings with your supervisor or research team.

Select the arrows in the accordion below to see some popular examples of some digital tools that you might like to consider for your notetaking and managing notes.

Digital tools to support notetaking

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=1207#h5p-77

All of these platforms can be formatted to support notetaking methods such as the LATCH system, the Cornell Note Taking System or Templates and Literature Grids. However, it's important to review the privacy and security policies of any tool you use. Avoid uploading sensitive information or licensed PDFs to platforms that permit model training. Keep metadata, such as article title, authors, publication, and date, in your reference manager, and store full-text documents only where licensing allows.

QUT only

QUT endorses and makes the following notetaking applications freely available to QUT students and staff:

- OrbitNote
- Microsoft OneNote
- Genio Notes

If you have a disability, injury or health condition that is permanent, temporary, episodic or fluctuating, you may need specialised equipment of software. QUT can assist you through the Assistive Technology Labs, which are equipped with standard and specialised equipment and assistive software. See further information on the HiQ website.

Watch

See the video below for a research supervisor's approach to managing their notes relating to the literature they found for their research.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1207#oembed-1

Organising information effectively (QUT YouTube, 1m19s).

Some bibliographic or referencing management tools (e.g. EndNote, Mendeley, Zotero) include additional functionality, enabling you to add notes on each reference, code or tag references, group them thematically, and mark up stored PDFs. We will cover bibliographic management tools in *Module 5.7 Citation and reference management*.

Whatever reading or notetaking strategies you use will depend upon the type of information you are managing and your personal preference. Whether you stick with one reading and one notetaking technique and/or tool for all your work, or use a combination of methods and tools for different purposes, having a reading and notetaking strategy in place will make managing the information associated with your literature review much easier.

Activity

Notetaking tools for you

Select one of the notetaking tools discussed above and experiment with adding notes on literature you have already collected.

Reflect on what worked and did not work for you. Do you need to try a different tool?

5.6 Coding the literature

Coding the literature is a crucial step in the process of conducting a literature review, especially when dealing with a large number of sources. Coding not only helps you synthesise the literature but also provides the foundation for analysis, synthesis, and the generation of insights in your literature review.

Coding involves categorising, organising, and extracting key information from the literature to identify patterns, themes, and relationships.

There are many coding methods available for use. Select the arrows in the accordion below to read about these techniques.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=1210#h5p-41

Watch

See the video below for one HDR student's approach to organising literature using coding.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1210#oembed-1

Tools to organise information effectively: Coding (QUT YouTube video, 1m08s).

Activity

Categorising and coding your literature

Using literature or other resources you have already collected:

1. List the different categories of literature or other information. For example, frameworks, policy,

empirical studies.

2. Define and assign simple and meaningful codes. Try using short labels (e.g., FRA, POL, EMP) for each category.
3. Tag your literature as you read or in your referencing management tool (e.g., EndNote). Label each source with relevant codes.
4. Review and refine. Adjust categories or codes as patterns emerge.
5. Search for all the literature with the same tag. Was this an efficient way of locating and retrieving the literature?

5.7 Citation and referencing management

Referring to and citing your sources are essential aspects of scholarly writing. This is a matter of **academic integrity** for avoiding **plagiarism** and for effective academic communication. In your research thesis the number of sources used may be very large, perhaps amounting to in the hundreds. It is important to develop practices or employ systems to manage these and the information about them effectively and efficiently for all the uses you will make of them.

Referencing management software was developed to store and manage large amounts of citation data about sources. The software allows you to create centralised, well managed collections of citation data for the essential referencing tasks in your documents. There will also be additional information organisation features. Some of these could assist with literature reviewing tasks.

Features may include:

- easy importing of records of sources from databases and search engines
- inserting of citations and references in documents using referencing styles' formatting rules
- storing of PDFs with source records to build and manage your collection of literature
- organising references in groups or folders for task processes, topic hierarchies, chapters, or projects
- coding with colours and numerical or text tags of references to organise the literature
- PDF viewing and document mark-up, such as highlighting, underlining, or comments
- note taking add-ons
- sharing of reference libraries or subsets for collaboration.

Referencing software will apply formatting rules but does not control the quality of source data. Source data will still need to be proofed and corrected. To be able to do this, it remains necessary to first be proficient in referencing.

QUT only

QUT does not mandate a specific software so select what is best for your situation.

QUT provides an introductory guide to citing and referencing for a number of referencing styles called cite|write, which also points to more comprehensive authorities for the styles. You can view more information regarding avoiding plagiarism at QUT on the QUT HiQ website.

In addition, the Graduate Research Centre (GRC) provides HDR students with access to the text matching software, iThenticate. You can use iThenticate to identify information in your work that may still require acknowledgement. You will learn more about these in *Module 7 Using information responsibly and ethically*.

For QUT students, HiQ provides introductory citing and referencing instructional videos, interactive resources and workshops.

Available software

When considering which tool to use to manage your citations and referencing, consider the following questions:

- What does my supervisor recommend?
- What do other researchers in my area use?
- Does the software easily work with the databases I need to use?
- Do I need the software to work easily across multiple devices?
- Do I have need for features beyond thesis referencing, for example for collaboration or storage?
- What support do I need or is available from peers, the university or the software vendor?

Reference management software comparison (information is correct at time of publication).

Software	Paperpile	EndNote	Mendeley	Zotero	JabRef (BibTeX)
Benefits	Easy to use Works with Google Docs and for the Google cloud-based environment Ideal for collaborative papers and projects Imports data from academic publishers and databases Stores PDF files on Google Drive	The most fully-featured reference manager Most used by HDR students Supported by training and consultations at QUT Easy quick or complex searching Use Groups and Smart Groups to organise your library Terms lists provide journal and author name consistency	Easy to use The 'Mendeley Reference Manager' product with added 'Mendeley Cite' and 'Web importer' provide a good full feature Reference Manager suite Suitable web based alternative to EndNote Use folders to group and organise documents	Light weight Reference Manager One click web importer Customisation features 3rd party plug-ins Support for major word processors Nesting folder options Unlimited private groups	A popular BibTeX Reference manager for LaTeX writers Supports macros and crossrefs Supports groupings based on keywords, tags, search terms Attempts to complete partial records by comparing with online sources
Challenges	Works best for Google Docs. Word plug-ins only in Beta Works best with Google Chrome	Not originally designed for cloud based environments so workarounds for some more specialised purposes can be complex For Mac exporting references is best using Firefox	The previous version of Mendeley, called 'Mendeley Desktop', may not work well or at all with newer Mac Operating systems	Free cloud storage limit of 300 MB ~ about 100 articles Address bar importer for Firefox only Data is not stored in Australia. Not to be used to store data owned by QUT or personal and sensitive information	Best for LaTeX writers Does not support collaboration well Complex configuration may be required
Operating system	Windows, macOS, Linux	Windows, macOS	Windows, macOS, Linux	Windows, macOS, Linux	Windows, macOS, Linux
Direct export of references from databases	Import from major databases and Google Scholar	Import from databases, library search, and Google Scholar	Import from many research databases	Import from many research databases via Firefox Plugin or RIS export in Firefox, Chrome or Safari	Indirect import using RIS, or Browser extension
Word processor compatibility	Best integration with Google Docs. Microsoft Word. LaTeX	Microsoft Word, Apache OpenOffice, Wolfram Mathematica, Pages, LaTeX through BibTeX, LibreOffice, Google Docs	Microsoft Word, LibreOffice	Microsoft Word, LibreOffice, Google Docs	LaTeX, Markdown, Microsoft Word, LibreOffice, OpenOffice
Citation styles		List of citation styles in EndNote	List of citation styles in Mendeley	List of citation styles in Zotero	

Syncing	Cloud based	Custom sync via Endnote online	Custom sync via Mendeley Reference Manager and Mendeley Web	Cloud based	No
Sharing	Via a Google account or sharing of folders and sub folders or a private link including PDF	Sharing groups or libraries. Library sharing includes PDF sharing. Only one library at a time can be shared EndNote guidance on how to share references in different versions of the software	Share and edit references and PDFs via Groups Information on collaborating in Mendeley	Share and edit Group libraries Information on collaborating with groups in Zotero	Share BibTex library including PDF folder on a shared network drive. Share SQL database
AI integration		EndNote 25 has built-in AI functionalities EndNote Click is a plugin that uses AI to find the best PDF version of an article ResearchRabbit allows users to import from and export to EndNote	No built-in AI functionalities yet. No plugins ResearchRabbit allows users to import from and export to Mendeley	No built-in AI functionalities yet. Some plugins and tools available (with subscriptions), including Aria, ResearchRabbit, and Scite, that allow users to import from and export to Zotero	
Maximum space /records	No set limit	999,999 records	100 GB personal, 100 GB shared	10,0000+ records /300 MB	No known limit
Import Export / Format	BibTeX, RIS	RIS	Mendeley	BibTeX, RefWorks, RIS	BibTeX
Web importer	Chrome browser extension	EndNote Click	Mendeley Web Importer	Zotero Connector	Windows, mac OS X Linux
Annotate PDF	Yes	Yes	Yes	Yes	Yes (3rd party)
Overleaf integration	No	No	Yes	No	No
Mobile: iOS or Android	IOS, Android	IOS	No	Android (3rd party)	No
Producer	Paperpile	Clarivate	Elsevier	Digital Scholarship	JabRef
Application		Desktop, web	Desktop, web, mobile app.	Desktop, web, mobile app.	
QUT licence?	Yes	Yes	Yes	Freeware	Freeware

Activity

Consider the features, strengths and weaknesses of a range of tools in relation to your own circumstances. Remember to look at the specific product information for any tool you select for current features and conditions of use.

- Bodleian Libraries Libguide: Managing your references
- RMIT University: Choosing a reference manager – what to consider

QUT only

QUT learners can read information about the most commonly used tools at QUT for managing your references. They include EndNote, Mendeley, Paperpile, Zotero, and for a small group of specialised users, BibTeX.

QUT pays for licensed versions for you for EndNote, Mendeley, and Paperpile. Free versions are available for Zotero and BibTeX. For all of these, there are links to self-help resources. There is a comparison table showing features as well as the benefits and challenges of the different tools. Consider what tool might best meet your referencing management needs.

EndNote support

Along with Mendeley, EndNote is the most fully featured referencing software paid for by QUT for use by students and staff. It is also the most fully supported, including:

- Availability on lab computers, for installation on QUT machines, or download to personal devices.
- Hands-on EndNote Essentials and Advanced training.
- QUT EndNote online instructions guide.
- Installation and IT help from HiQ.
- Clarivate EndNote instructions, FAQs and support.
- Individual how-to assistance and guidance from QUT Liaison Librarians.

Activity

1. Ask your supervisor whether they have a recommendation for referencing management software.
2. Ask peers in your research area about which software they use and why.
3. Compare the different software options available to you.
4. Explore the introductory training resources available through your institution or from the vendor to

evaluate the software.

5. If considering EndNote and training is available to you, register for an EndNote workshop or enrol in an online module.

Manual reference management

Referencing management software is efficient and comes with off-the-shelf functionality. It is technically possible to replicate some of the functionality of full systems manually, using a spreadsheet for bibliographic data in columns, and then manually building references in the appropriate style in your documents.

As well as exporting to referencing software, it is possible to export publication information in CSV format to be opened in a spreadsheet. And just like as part of notes tags or fields in referencing software, it could be possible to use the spreadsheet to collect quotations or page numbers, or organise a literature grid by theme or code manually.

You might choose to develop a manual method if you don't expect to have a lot of literature to scope or review. However, this would not be usually recommended for researchers or HDR students and is probably more suited to undergraduate and coursework programs level papers and projects with small numbers of references.

You are encouraged to select a referencing management tool early and spend time developing a workflow and upskilling yourself in the software. This is an essential step prior to, and as a basis for, starting to collect a large volume of literature and performing literature review tasks.

5.8 Reflecting on your learning

In this module we have explored the different aspects of managing information effectively for research. To confirm your learning, take a moment to complete the knowledge check, reflect on the questions provided, and identify whether you understand the content or have any questions for your research support team.

Knowledge check

Confirm what you have learned in Module 5 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1241#h5p-33

Reflect

Consider:

1. What is the purpose of using reading strategies when conducting research?
2. How does scanning differ from skimming as a reading technique?
3. How do electronic note-taking systems enhance the management of research information?
4. What advantages does reference management software provide for researchers?
5. What note-taking systems(s) do I think are the best fit for me?
6. Is there a new tool or software that I can explore to better manage my references going forward?
7. Do I know where to get further help at my institution?

5.9 Module summary

You have completed Module 5.

You are now ready to move onto *Module 6 Evaluating information for research*.

Additional resources

The following resources offer further practical guidance, tools, and theory to support your understanding and development of skills for evaluating information sources for quality and relevance.

Brinkerhoff, C. (2020). *Doing research.* Kwantlen Polytechnic University. https://kpu.pressbooks.pub/doingresearch/part/recognize-types-of-information/

Buljung, B. (2024). Citation management. In .B Buljung, E. Bongiovanni & Y. Li (Eds.) *Navigating the research lifecycle for the modern researcher* (2nd ed.). https://colorado.pressbooks.pub/researchlifecycle/chapter/citation-management-2/

Clark, L., & Jackson, C. (2021). Notetaking, in W. Hargreaves, C. Bartlett & K. Derrington (Eds.), *Academic Success.* University of Southern Queensland. https://usq.pressbooks.pub/academicsuccess/chapter/note-taking/

Cornell Data Services. (n.d.). *Writing READMEs for research data.* https://data.research.cornell.edu/data-management/sharing/readme/

Li, Y. (2024). Data management and sharing. In .B Buljung, E. Bongiovanni & Y. Li (Eds.) *Navigating the research lifecycle for the modern researcher* (2nd ed.). https://colorado.pressbooks.pub/researchlifecycle/chapter/citation-management-2/

Mauer, B. & Venecek, J. (2022). Citation management. In B. Mauer & J. Venecek (Eds.) *Strategies for conducting literary research, 2e.* https://pressbooks.online.ucf.edu/strategies2e/

Stapleton, A. (2023, March 2). *4 ways to read texts faster – Tips that ACTUALLY work!* [Video]. https://www.youtube.com/watch?v=GIWA_Kdv-xs

Thomson, P. (2022, May 16). Everyday annotation. *Patter.* https://patthomson.net/2022/05/16/everyday-acts-of-annotation/

Wilensky, J. (2022, July 29). *Take note: Popular study method has 'Cornell' written all over it.* Cornellians. https://alumni.cornell.edu/cornellians/cornell-notes/

Williamson, P. (2021). *Academic writing skills.* https://uq.pressbooks.pub/academicwritingskills/

Module 5 References

Al-Kumaim, N. H., Hassan, S. H., Shabbir, M. S., Almazroi, A. A., & Abu Al-Rejal, H. M. (2021). Exploring the inescapable suffering among postgraduate researchers: Information overload perceptions and implications for future research. *International Journal of Information and Communication Technology Education (IJICTE), 17*(1), 19-41. https://doi.org/10.4018/IJICTE.2021010102

Bodleian Libraries. (2025, September 12). *Managing your references: Home*. https://libguides.bodleian.ox.ac.uk/reference-management/home

GSBvid. (2018, February 23). *Practical strategies* [Video]. YouTube. https://www.youtube.com/watch?v=xMb2KIhY7yo

QUT Library. (2025, February 28). *Digital tools for information management* [Video]. YouTube. https://www.youtube.com/watch?v=3q7w28-nIsY

QUT Library. (2025, February 28). *Digital tools for managing information* [Video]. YouTube. https://www.youtube.com/watch?v=88uWwtrTeCE

QUT Library. (2025, February 28). *Organising information effectively* [Video]. YouTube. https://www.youtube.com/watch?v=J74JMQMN5HI

QUT Library. (2025, February 28). *Tools to organise information effectively – coding* [Video]. YouTube. https://www.youtube.com/watch?v=bjgwtG43B5I

RMIT University Library. (2022). *Research and writing skills for academic and graduate researchers*. RMIT Open Press. https://rmit.pressbooks.pub/researchwritingmodules/chapter/what-to-consider-when-choosing-a-reference-manager/

Williamson, P. (2021). *Academic writing skills*. https://uq.pressbooks.pub/academicwritingskills/

York Library, Archives and Learning Services. (2020, April 21). *Reference management software: How it works & what it does* [Video]. YouTube. https://www.youtube.com/watch?v=nYDAuT8sSco&t=4s

MODULE 6 EVALUATING INFORMATION FOR RESEARCH

LYNDELLE GUNTON, DR SAL KLEINE, CAMERON RUTTER, ALICE STEINER, STEPHANIE VILLIS

Module learning objectives

By the end of this module, you should be able to:

1. Critically analyse and evaluate the quality and credibility of information sources.
2. Develop and apply skills to prepare an annotated bibliography.

Learning plan

In this module, we will:

- Identify and apply criteria for evaluating information.
- Use tools to evaluate the credibility and quality of information.
- Discuss the purpose of and how to prepare an annotated bibliography.
- Practice evaluating literature.

6.1 The basics of evaluating information

Evaluating the information sources you find is an essential step in producing high-quality research. While checking for accuracy and relevance is important, higher degree research often requires a deeper analysis of the credibility and influence of a source. This section introduces key frameworks to help you make informed decisions about which sources to trust and use.

Watch

See the video below for advice about what to consider when evaluating information sources.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=448#oembed-1

Evaluating literature and information to determine research relevance (QUT YouTube video, 0m50s).

For advanced research, it's also important to consider the impact of a source within its field. Indicators such as publication metrics and journal rankings, can provide valuable context for your evaluation. For practical strategies on locating and interpreting these indicators, refer to *Module 10: Finding and using indicators of research impact*.

Criteria for evaluating information

Not all information you find will be suitable for your research. To help you evaluate sources effectively, there are a number of frameworks available to help you. These may differ depending on the type of information or sources you are considering. Over the next few pages, you'll find several options to explore and apply.

Watch

Watch the video below for an introduction to the how to evaluate information.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=448#oembed-2

Evaluating information [QUT YouTube video, 4m03s].

One set of criteria you can use is the **CRAAP Test**. This framework considers the elements of:

- Currency
- Relevance
- Authority
- Accuracy
- Purpose

The CRAAP Test prompts consideration of each element to inform your evaluation of a source in the context of your intended use. For example, most sources will provide a publication date, which enables you to determine the currency of the information and inform your decision on whether the information provided in the source material is appropriate to use based on your purpose.

Select the hotspots on the image below to find out more about each element of the CRAAP test for evaluating information.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=448#h5p-47

In the remainder of this module, we will focus on evaluating journal articles, websites, and content generated by artificial intelligence. Use the criteria that best aligns with your needs and the type of information you are assessing.

Evaluating quality is important, but understanding a source's impact can strengthen your research

decisions. Impact indicators can reveal whether a source has influenced thinking in a research field. Learn more in *Module 10: Finding and using indicators of research impact*.

QUT Only

Evaluating the quality of information is a key component of IFN006 *Assessment 2: Annotated Bibliography*.

- Students enrolled in the IFN006 unit should refer to Module 6 in the Canvas site.
- Download the Criteria for Evaluating Quality (PDF, 103KB) required for your annotated bibliography.

6.2 Evaluating scholarly journal articles

Journal articles are scholarly papers that report research findings or review research developments within a subject area. Articles from peer-reviewed journals go through a process of review by one or more experts in the subject area who are recognised as having academic credibility.

Peer review

The quality of information may vary according to the source where the information is published. Information in magazines and newspapers may have less academic credibility than information in peer reviewed journals and research reports. Peer reviewed journals – also known as refereed or scholarly publications – require that the information is reviewed by several experts in the field.

As we mentioned in *Module 2.5 Determining the types of information you need*, peer review is a strict approval process applied to scholarly journals with one or more experts reviewing the manuscripts before they are accepted for publication. This process ensures the article is accurate, well-researched and contributes to the body of knowledge in a field. Peer reviewed is also known as refereed.

Other publications require that the information is reviewed only by an editor. Be wary of publications that undergo no review process at all.

How do you know if a journal is peer reviewed?

Find the publisher's website by doing a Google Search for the journal title. Use quotation marks around the journal title to force a phrase search. The publisher should make clear if the journal is peer-reviewed.

Watch

See the video below to learn more about peer review.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1765#oembed-1

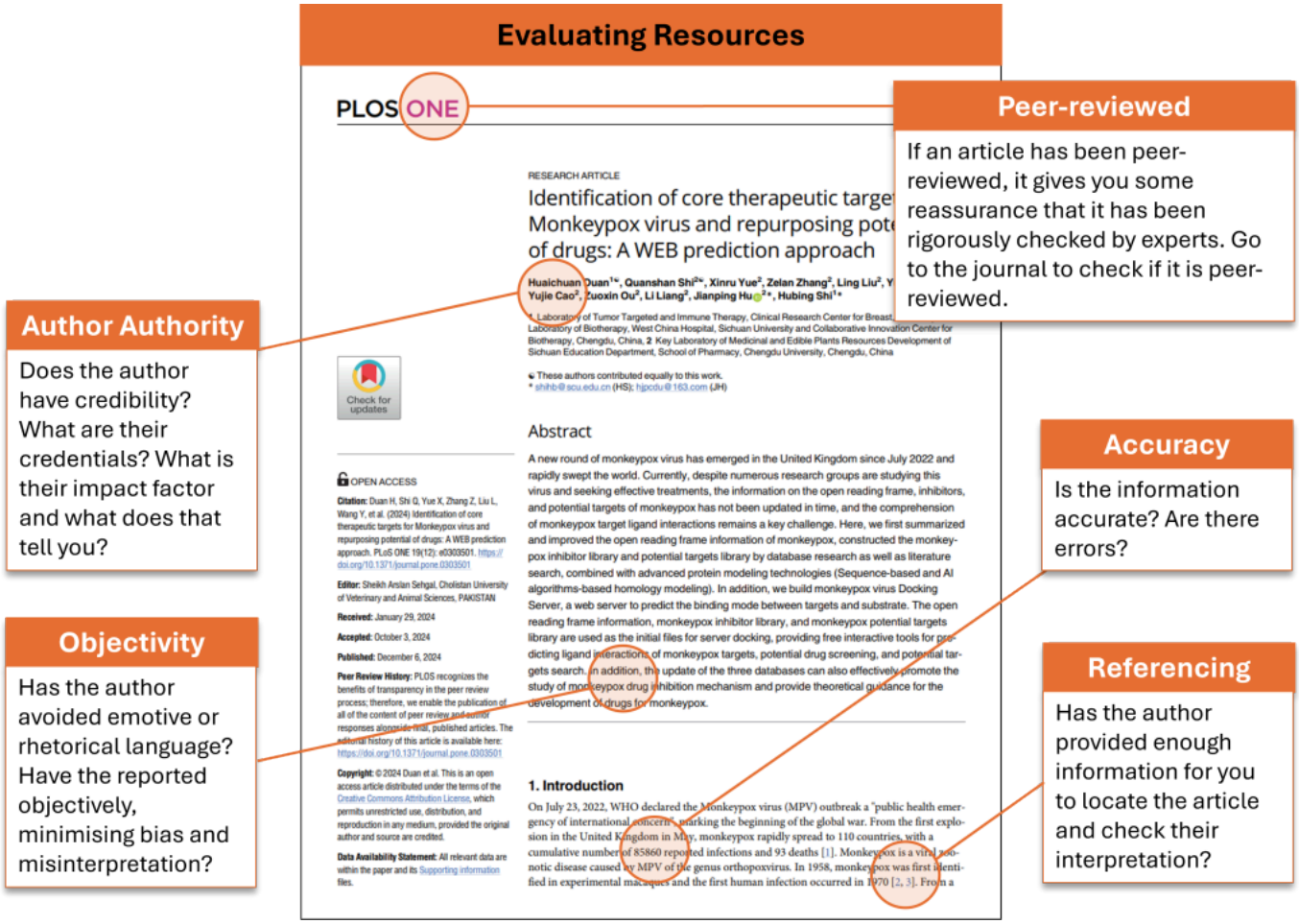
What is peer review? (QUT YouTube video, 5m0s).

Evaluation criteria for journal articles

When evaluating scholarly journal articles, you can use the following criteria.

- Peer-review
- Authority
- Accuracy
- Objective
- Referencing

For example:



"Evaluation of journal article by Duan et al." by QUT Library, CC BY 4.0

Activity

Search for a journal to identify whether it is peer reviewed.

1. Go to Google Scholar and conduct a sample topic or title search on e.g., “nursing research”
2. Select a journal article, then find the publisher website for that journal using Google
3. The journal website provided by the publisher should indicate whether the journal is peer-reviewed.

6.3 Evaluating online information sources

Information found online may be published by anyone and might not undergo peer review or editorial oversight. It may be incomplete, inaccurate, or written by non-experts, and can be unstable and changeable. It may be aimed to sell ideas, products, or services.

Consider author and authority, accuracy and completeness, stability, bias and misrepresentation, propaganda, and commercial agendas when evaluating online information.

Select the arrows in the accordion to read more about some of the key considerations when evaluating online sources.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=1779#h5p-51

Conference papers and proceedings

Some disciplines rely more heavily than others on conferences and conference proceedings as a means for speeding up the publication and distribution of scholarly research.

In addition to other considerations in evaluating the quality of a conference paper, you can look at the quality of the conference at which the paper was presented and from which it was published as part of its proceedings.

"Think. Check. Attend." by Think. Check. Attend. CC BY 4.0

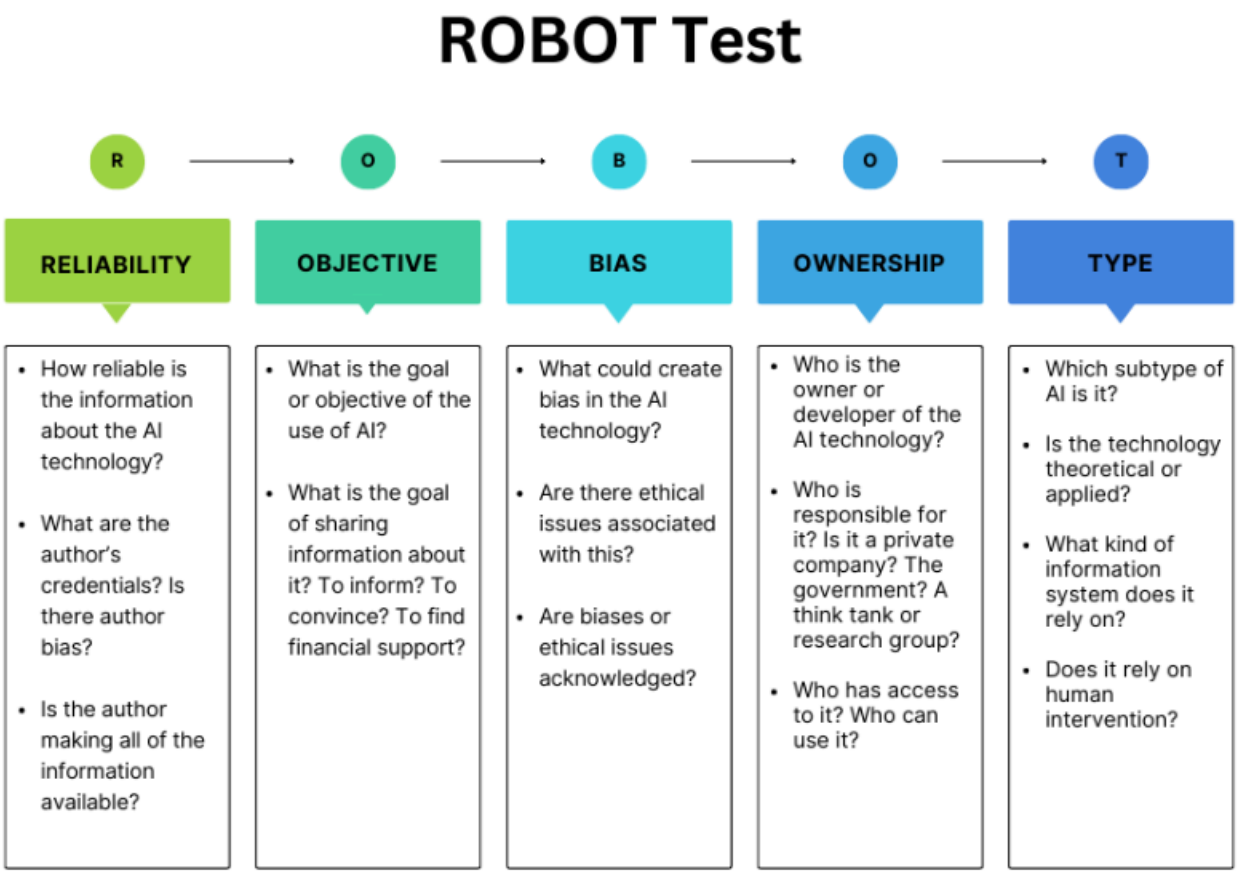
6.4 Evaluating outputs from Generative AI tools

GenAI tools have the potential to be powerful supplementary resources in our professional and personal lives. However, GenAI can only work with the data it has been trained on, which often results in inconsistent, unreliable, biased, inaccurate, or even nonsensical outputs. Critical thinking is essential to evaluate the authenticity and accuracy of what has been generated.

When reviewing content generated by AI, you should evaluate the output as you would with information from a Google search or academic database. Tools such as the CRAAP test, that was covered earlier in this module, and other criteria for evaluating information can be useful when applied to GenAI content as they allow you to question the information with which you have been provided.

An AI-specific test, the **ROBOT Test**, allows you to specifically evaluate GenAI content. ROBOT stands for Reliability, Objective, Bias, Ownership, and Type. The test encourages users to question and assess the information but also to evaluate specifically the technology itself.

An outline of ROBOT and the questions it prompts you to ask can be found below:



This is a rapidly changing space, and equal measures of enthusiasm and caution are desirable when considering the potential of generative AI tools to source information. As with any technology, ethical, critical, and appropriate use is key. For more reading recommendations about this, go to Additional Resources in the *Module 6.7 Module Summary*.

As mentioned in *Module 2.6.3 Considering where to search – what about generative AI tools?*, QUT Library's evaluation rubric is designed to help you to assess GenAI tools and the outputs they provide.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=1782#h5p-69

Activity

Identify an appropriate framework for evaluating information sources

1. Select an information source you have already found.
2. Consider that source in light of the different frameworks presented above and on the previous page.
3. Determine which one(s) works best for that source.
4. Note down the acronym or details for the framework so you can quickly refer to it when needed (you may decide you need more than one framework, depending on the types of information sources you use).

6.5 Evaluating literature through annotation

'An annotated bibliography is a list of citations to books, articles, and documents. Each citation is followed by a brief (usually about 150 words) descriptive and evaluative paragraph, the annotation. The purpose of the annotation is to inform the reader of the relevance, accuracy, and quality of the sources cited.'

"How to prepare an annotated bibliography" by Research & Learning Services, Olin Library, Cornell University Library, Ithaca, NY, USA. CC BY-NC-SA 4.0

"Books smartphone hand keep mobile" by geralt via Pixabay, Pixabay licence

Why annotate the literature?

Annotating the literature supports a structured approach to reading, note-taking, and critical engagement with research. It enhances your ability to evaluate scholarly work by providing a framework for identifying methodologies, limitations, gaps, quality, and relevance, which are key elements in assessing academic literature.

The annotation process strengthens your ability to speak and write about your topic with clarity and confidence. This can be used to contribute to your preparation of a literature review, which may be used for your research milestone or thesis documents, and maybe a manuscript for publication in the future

Annotating the literature will:

- bring together your searching and evaluation skills
- give you a framework for identifying, summarising, and evaluating literature for any research project in the future
- provide a systematic strategy for recording notes about any information source
- develop the necessary foundational skills for preparing a literature review

- help you to synthesise information to build your knowledge base about research in your field.

A word of caution!

While some GenAI tools can help you to locate and evaluate information sources, they should be used to support – not replace – your own thinking. If you want to become an expert researcher and contribute original research, take care to avoid shortcuts that bypass the intellectual effort required. Don't make the mistake of assuming they can do the critical thinking or synthesising for you; that's your role in the research process.

What does a good annotation look like?

> *"Many scholarly articles start with an abstract, which is the author's summary of the article to help you decide whether you should read the entire article. This abstract is not the same thing as an annotation. The annotation needs to be in your own words, to explain the relevance of the source to your particular assignment or research question."*
>
> CSUN University Library, 2025.

The annotation must provide:

1. the full citation for the source you are annotating
2. a summary of the main arguments or ideas presented by the author, which may include mention of methodology and findings/conclusions
3. an evaluation of the quality of the source – assess its currency, authority (or credibility), accuracy (or reliability), and purpose, and compare it with other sources you have used
4. a reflection on the significance of the source to the research field and how you are using or intend to use the source in your research and usefulness it is in answering your research question.

Five steps for writing your annotated bibliography

Flip the cards to learn more about the steps required for preparing an annotated bibliography.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1767#h5p-82

Read

[Writing an annotated bibliography]

This chapter by Zickel et al., in *Informed arguments: A guide to writing and research* further explains why preparing an annotated bibliography can benefit your research and how to go about it.

Select the hotspots in the image below to learn more about each part of an annotation.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=1767#h5p-81

Read

[From annotated bibliography to rough draft: How to develop your position]

This chapter by Terri Pantuso in *Informed arguments: A guide to writing and research* offers practical guidance on how to use annotations in your academic writing.

6.6 Reflecting on your learning

This module has considered frameworks to use for evaluating different kinds of information. To confirm your learning, take a moment to complete the knowledge check, reflect on the questions provided, and identify whether you understand the content or have any questions for your research support team.

Knowledge check

Confirm what you have learned in Module 6 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1788#h5p-57

Reflection

Consider:

1. Will I apply different criteria to different types of information?
2. Why are peer-reviewed journals considered more credible than other types of publications, such as newspapers or magazines?
3. What is the primary function of the peer-review process and how does it contribute to the quality of scholarly articles?
4. Where can I learn more about the ethical use of GenAI for research in my institution?
5. What is an annotated bibliography and what purpose does it serve for a researcher?
6. Describe the key components that must be included in a good annotation.

6.7 Module summary

You have reached the end of Module 6.

You are now ready to move onto *Module 7 Using information responsibly and ethically*.

Additional resources

The following resources provide further practical guidance, tools, and theory to support your understanding and development of skills for evaluating information.

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MODULE 7 USING INFORMATION RESPONSIBLY AND ETHICALLY

CAMERON RUTTER, ALICE STEINER, STEPHANIE VILLIS

Module learning objectives

By the end of this module, you should be able to:

1. Understand principles of academic integrity in the ethical use of information.
2. Identify ethical and copyright considerations in the use of GenAI tools for research.
3. Understand and apply principles of citation and referencing.
4. Understand the principles of copyright and how it applies to the use of third-party materials.
5. Recognise and respect Indigenous Cultural and Intellectual Property (ICIP) in line with protocols.
6. Access and apply copyright policies and guidelines specific to your institution.

Learning plan

In this module, we will:

- Explore the role of academic integrity in research and strategies to avoid plagiarism.
- Explain the considerations around citing and referencing in your writing.
- Introduce copyright and ICIP principles, and consider how they apply to your thesis and research outputs.

7.1 The basics of using information ethically

Once you've found and evaluated suitable information sources, the next step is knowing how to use them effectively. This includes not only integrating the information into your writing but also applying it ethically.

What is ethical use of information?

Ethical use of information is the thoughtful and considered application of all forms of information throughout your research, be it in your reading, thinking, writing, publishing or in your research data collection, analysis, management, and dissemination. Ethical use of information is one aspect of academic integrity.

QUT is committed to creating and fostering an environment that encourages and rewards academic integrity, and ensuring that students and staff have clear guidance and support so they may follow these principles.

What are the principles at QUT

QUT students are expected to maintain high academic standards to protect the value of QUT qualifications for all graduates. In practice, this means ensuring that all assessment items are approached and completed with the highest standards of academic integrity. Any actions or practice that defeats the purpose of assessment is regarded as a failure to maintain academic integrity. This involves representing another person's ideas or work as your own (plagiarism), including resubmitting their own work for another assessment item (self-plagiarism) or cheating in examinations.

QUT only

All QUT HDR students are required to to complete the Research Integrity Online training and quiz to further develop your research skills and help you fulfil your obligations under the Australian Code for the Responsible Conduct of Research 2018.

Academic misconduct – plagiarism

This involves representing another person's ideas or work as your own. It may also include resubmitting your own work for another assessment item. Common forms of plagiarism include:

- direct copying, summarising, or paraphrasing another person's work without appropriate acknowledgement of the sources
- using or developing an idea or hypothesis from another person's work without appropriate acknowledgement
- representing the work of another person as your own work
- copying non-word based material (such as diagrams, plans or audio-visual materials) and presenting them as your own work
- using another person's experimental results as your own or without appropriate acknowledgement.

Plagiarism detection

Some higher education institutions provide access to plagiarism detection software for researchers and HDR students. Some may require students to submit their milestone documents and/or final thesis through such a platform. Enquire with your research supervisor or your institution's research support services about plagiarism detection software available to you.

QUT only

For the purpose of QUT coursework, assessment will need to be submitted via the Turnitin submission portal in your Canvas unit site for the purpose of checking for plagiarism and AI writing. See information on the HiQ website about using Turnitin when submitting your assessment.

QUT HDR students have access to iThenticate for lodging milestone documents, including final thesis for examination, and manuscript checking.

See the HiQ website for more information about avoiding plagiarism for HDR students.

Why is detecting plagiarism important?

Plagiarism, intentional or otherwise, compromises the integrity of coursework and research assessments. It means you are not providing appropriate evidence of the learning you've undertaken and the knowledge you have acquired in your degree. As members of an academic community, students are expected to contribute to and uphold the standards of scholarly work. Engaging in plagiarism undermines the credibility of the institution, diminishes the value of its qualifications, and can negatively impact the reputation of fellow students and graduates.

Allowing you to obtain a degree with plagiarised assessment lowers the overall quality of graduates and undermines the value of the qualifications offered and the achievements of other students. Awarding a degree based on plagiarised work devalues the achievements of others and the quality of academic programs. Maintaining academic integrity is essential to preserving the trust, respect, and recognition associated with your qualification.

What about the use of generative AI tools?

As a research student, you are responsible for the integrity, rigour, and originality of your research, irrespective of any tools used. Ensure you familiarise yourself with your institution's policies and guidelines about the responsible use of GenAI. Most importantly, talk with your research supervisor before you use any GenAI or AI tools and clarify how use of specific tools is and is not appropriate. Review any information or license agreements.

Acknowledging the use of AI tools

Your institution likely has policies and guidelines for acknowledging the use of Gen AI or AI tools in academic work. You may be required to include an acknowledgement statement in your thesis or publication, outlining how the tool and its outputs were used ethically and responsibly. This could also involve providing the original prompt or chat history. Keep in mind that this is different from citing or referencing AI-generated content within your text.

For example,

> *I used AI to:*
>
> *(i) generate ideas or structure suggestions, for assistance with understanding core concepts, or other substantial foundational and preparatory activity for the assessment. I used Consensus (https://consensus.app/search/) and Scite (https://scite.ai/) to find relevant academic literature and ExplainPaper (https://www.explainpaper.com/dashboard) to help understand the arguments in the sources.*

Example sourced from AI acknowledgement by Monash University, licensed under a CC BY-NC-SA 4.0 license.

QUT only

Please note the requirements on the HiQ website for HDR students in relation to the use of generative AI tools in theses and other research milestone documents and research outputs.

IFN006 students can access information about GenAI in IFN006 in the unit Canvas site.

Read

Case study: Ethical use of AI for study

Read the short case study below about the use of GenAI for study purposes in QUT's accredited unit, IFN006.

Case Study: Ethical Use of AI for Study

Tool: NotebookLM is a Google tool that uses AI to help users understand information. It can summarise documents, generate explanations, and answer questions based on the provided documentation. It can also create personalised guides and "Audio Overviews" that summarise documents in a podcast-like format.

Use: Educators used NotebookLM, to provide an alternative way for students to access assessment task information. The team uploaded the assessment task sheet and marking rubric into NotebookLM. The tool scraped those documents to answer questions, create FAQs, and even generate audio overviews in a podcast-like format, thereby providing an additional mode for students to use for learning.

Ethical considerations: Educators ensured that all uploaded information and documentation were owned by QUT, Creative Commons (CC) licensed or public domain and not copyrighted by a third party or other creators. This careful selection of materials avoided any issues related to intellectual property rights. The terms and conditions of the tool were also checked and considered, to ensure intellectual property rights would not be contravened. The team clearly acknowledged how the AI-generated content was created.

Conclusion: This application of AI demonstrates how technology can be used ethically to support and enhance educational experiences. By ensuring the use of QUT-only materials and CC licensed or public domain materials, maintaining transparency, and distinguishing AI-generated content, the team upheld ethical standards while providing valuable resources to students in an accessible, efficient, and engaging learning environment.

Activity

Consider the following questions in relation to the case study above.

1. What ethical considerations should be taken into account when using AI in education?
2. How did the AIRS Coordination team ensure intellectual property rights were not violated?
3. How can we maintain transparency when using AI to create content?
4. Why is it important to distinguish AI-generated content from human-created content?
5. What parallels can be drawn between this case study and an ethical approach to using AI in research?

7.2 Citing and referencing

Academic writing is a significant part of any higher degree research program. Writing in a scholarly context involves the essential practice of acknowledging the work of others in your research. In the academic context, that acknowledgement takes the form of citing and referencing.

Learning to reference accurately and appropriately is very important as it is an indication that you understand the audience and the expectations of scholarly behaviour. Referencing gives you, as the author, a way to demonstrate how widely you have read in your field of research and it provides a map for the reader to understand what, who, and where the author has read. The citations provide directions or links for the reader to be able to access those sources.

The two components to academic referencing are in-text citations and the reference list.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=1837#h5p-54

In-text citations

An in-text citation must be provided for every direct quotation, paraphrase or summary of another's work or idea.

Quoting

Quoting is using the exact words of another author. If you use a quotation, the in-text citation should include the page (or paragraph) in which the words were found. Short quotations should be enclosed with single (' ') or double quotation marks (" "). See the APA 7th example below.

> Example: "Kind and new acts, performed daily over as little as 10 days, can increase life satisfaction" (Buchanan & Bardi, 2010, p. 236).

Long quotations should be indented. Quotation marks are not necessary. See the example below.

Example:

Some of the difficulties in carrying out competitor analysis are described by Hussey (2001):

> Without sound analysis and creative strategic thinking companies are unlikely to produce world-beating strategies. Creativity is about insight and the use of imagination and adaptability. It is also about harnessing personal creativity to corporate ends (p. 212).

Paraphrasing

Paraphrasing is writing the ideas of another author in your own words. If you paraphrase another author, or authors, you still need to provide an in-text citation.

Paraphrasing is a skill that takes time to perfect.

Summarising

Summarising involves condensing a large amount of text, or an author's work as a whole, into a few sentences. This is often an entire book, book chapter, or journal article. An in-text citation is still required for summaries, but a page number is not, unless you can identify a specific page or passage that the idea has come from.

Note about in-text citations

In-text citations can be formatted differently depending on the referencing style. For example, APA is an author-date style, which means that the in-text citation includes the author and date of publication within the body of the text. In numbered styles, such as Vancouver, the in-text citation consists of a number (either in brackets or superscript), which corresponds with the same number in the reference list.

Watch

Watch the video below to understand more about in-text citations with APA referencing style.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1837#oembed-1

APA 7th in-text referencing (QUT YouTube video, 5m34s).

Reference lists and bibliographies

In addition to in-text citations, you must also provide an accurate list of references for everything you use to prepare your assessment or write your manuscript. A reference provides the reader with all the information needed to accurately identify the original source of the authors you have cited in-text.

Did you know that reference lists and bibliographies are different?

Reference lists are lists of sources you have cited within a piece of writing and are a requirement of correct referencing. Bibliographies will also list these sources but, in addition, will include details of any other information sources you may have read or consulted during the research process, but haven't cited. Always check with your Unit Coordinator or supervisor if you aren't sure what is required.

Watch

Watch the video below to understand more about creating a reference list with APA referencing style.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1837#oembed-2

Referencing with APA 7th: Journal articles, websites and books (QUT YouTube video, 4m10s).

Using referencing style guides

During your studies and as a researcher, you may be expected to use a range of referencing styles for coursework assessment, milestone documents, your final thesis, or other publications. Adhering to the

guidelines for these referencing styles is critical. While there are numerous digital tools available to help you manage this information (see *Module 5.7 Citation and referencing management*), it is valuable to develop understanding of basic referencing principles and the skills to apply them.

Using QUT cite|write

QUT cite|write is an introductory guide to citing and referencing. It contains general information and tips about referencing and citing information regarding QUT Harvard, American Psychological Association (APA), Vancouver, and the Australian Guide to Legal Citation (AGLC) referencing styles. However, at a postgraduate or research level, you need to conform to discipline or faculty-specific referencing conventions. Check with your supervisor about which referencing style you are expected to use for your milestone documents and thesis.

Using automatically generated citations with QUT cite|write

Watch

Watch the video below to learn how to use automatically generated citations.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1837#oembed-3

Using generated citations with cite|write (QUT YouTube video, 8m5s).

Activity

Select a referencing style

1. Check with your supervisory team which referencing system you should use.
2. For samples of in-text referencing and Reference Lists used in your faculty you may view theses from other students in QUT ePrints.
3. Once you know which referencing style you will be using, make sure you record sufficient detail of each reference so that you avoid searching for them again.
4. Look at QUT cite|write or other guides to learn more about formatting references according to your chosen referencing style.

7.3 Copyright and using information

In this section, you will be introduced to the fundamentals of copyright and how it applies when using copyrighted materials in your thesis and other research outputs.

What is copyright?

Copyright is a form of Intellectual Property and is the automatic legal protection given to all original work that we create in a material form. In Australia, copyright law is governed by the Copyright Act 1968 (Cth).

Copyright protects materials, such as literary, artistic, dramatic and musical works as well as film, television, sound recordings and broadcasts. Works can include books, conference papers, web pages, computer programs, journal articles, play-scripts, artworks (including book jackets and album covers), videos, and music recordings.

Copyright does not apply to ideas or concepts, methods, styles, or techniques. So, it is the protection given to the expression of an idea, not the ideas themselves.

In Australia, you do not have to apply or register to be recognised as a copyright owner of your own work. There is no requirement to put a copyright notice on your work, nor is there a need to formally publish the work for copyright to apply. A copyright owner has an exclusive right to copy or reproduce the work and (if applicable) to perform it publicly. A copyright owner can sell rights to, or prevent others from, reproducing or performing their work. As a general rule, you cannot reproduce (copy) anything for publication, entertainment or sharing purposes, unless you have the copyright owner's permission. This includes any images or text you may find on the internet. Just because something is 'freely available' it doesn't mean it is free from copyright.

Watch

Watch the video below for a broad overview of copyright, created for QUT students and staff.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1839#oembed-1

Copyright 101: Getting started with copyright (QUT YouTube video, 6m03s). CC BY-SA.

Indigenous Cultural and Intellectual Property and copyright

Indigenous Cultural and Intellectual Property (ICIP) refers to the rights of Aboriginal and Torres Strait Islander peoples over all aspects of their heritage and culture. This encompasses cultural practices, traditional knowledge, and resources and knowledge systems developed by Indigenous people as part of their Indigenous identity (Terry Janke and Company, 2018). Unlike Australian copyright law, which protects individual creators and works fixed in material form, ICIP ownership can be communal, intergenerational, and governed by customary law. Many forms of cultural expression or knowledge that constitute ICIP may not exist in a material form due to existing as oral or performance-based traditions (Terry Janke and Company, 2018). Copyright may protect the expression of ICIP, but does not protect the underlying ideas, stories and knowledge behind the work. As such, copyright law and other intellectual property rights are limited in their ability to recognise and protect ICIP.

Researchers must go beyond legal compliance and engage ethically with ICIP. This includes seeking free, prior, and informed consent from Traditional Custodians, respecting cultural protocols, and ensuring appropriate attribution and benefit-sharing. ICIP rights do not expire and may include knowledge that is sacred or restricted. Responsible research practice means embedding ICIP principles throughout the project lifecycle and prioritising Indigenous self-determination and cultural safety.

Many organisations, including universities, across Australia have developed ICIP protocols to provide guidance on how to respectfully engage with Indigenous Australians and their ICIP.

Watch

View the video below to learn more about ICIP Protocols.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1839#oembed-2

What are ICIP Protocols? by Terri Janke & Company (YouTube video, 2m15s).

Research

Copyright and your thesis

Under the 'fair dealing' exceptions within the Commonwealth *Copyright Act 1968* (Cth), individuals are allowed to reproduce limited portions of copyright materials for the purpose of criticism, review, study,

research, parody, or satire without permission. Fair dealing for research or study covers the use of copyright materials in the writing and submission of your thesis for examination purposes.

After your thesis has been examined and approved, a digital copy will be made publicly available online via your institutional repository (e.g. QUT ePrints). At this stage you will need to consider obtaining copyright permission from the rights holder for the inclusion of any third-party works (e.g. images, figures, tables) in your thesis.

Check your university's copyright policies and guidance for more information.

QUT only

More copyright information for QUT HDR students is available on the HiQ website.

Publishing agreements and copyright

Authors often sign publishing agreements that may involve transferring copyright to the publisher. Authors should take the time to read and understand the implications of these agreements and consider what rights are retained.

Open access publishing offers authors the opportunity to retain their copyright, while allowing others to access and reuse their work in line with the terms of the Creative Commons licence applied. Funding bodies such as the Australian Research Council (ARC) and National Health and Medical Research Council (NHMRC) also require open access to funded research outputs, which may influence the publishing decisions of researchers.

See *Module 9* for more information about publishing your research.

Copyright and research data

Data can present unique copyright and licensing challenges to researchers and organisations and must be considered at the planning stage of the data lifecycle. Copyright and licensing considerations are particularly relevant when reusing existing data and publishing and sharing your research data.

See *Module 8* for more information about managing research data.

Activity

Know your rights and responsibilities and how to access guidance and support

1. Familiarise yourself with your institution's copyright and intellectual property policies to understand how copyright applies to you as a HDR student.
2. Check out the QUT Copyright Guide for more detailed information about using copyrighted materials and managing your own copyright.

7.4 Reflecting on your learning

In this module we have explored copyright and other considerations relating to ethical and responsible use of information for research. To confirm your learning, take a moment to complete the knowledge check, reflect on the questions provided, and identify whether you understand the content or have any questions for your research support team.

Knowledge check

Confirm what you have learned in Module 7 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1850#h5p-85

Reflect

Consider:

1. What does 'ethical use of information' encompass, and why is it a crucial aspect of academic integrity?
2. How does plagiarism undermine the value of a university's qualifications and achievements?
3. As a HDR student, what policies and guidelines do you need to be familiar with to understand your rights and responsibilities when using information for research?
4. What supports are available to you when considering copyright and intellectual property as a HDR student?

7.5 Module summary

You have reached the end of Module 7.

You should now be ready to move onto *Module 8 Managing research data*.

QUT only

If you are an IFN006 AIRS student, you can now move to Module 10 *Finding and using indicators of research impact*. Modules 8 and 9 are not included in the learning objectives and unit materials. However, you may find the information useful for your wider research activities.

Additional resources

The following resources offer further practical guidance, tools, and theory to support your understanding and development of skills for finding and using research impact indicators.

Firth, K. (2021, July 21) Do I need to cite everyone? *Research degree insiders*. https://researchinsiders.blog/2021/07/29/do-i-need-to-cite-everyone/

Hall, J., Salisbury, E., & Radbourne, C. (2021). Research integrity. In C. Radbourne, A. Steiner, & S. Jacobs (Eds.), *23 Scholarly Communication Things*. Queensland University of Technology. https://qut.pressbooks.pub/23scholarlycommunicationthings/chapter/research_integrity/

Henry, K., McLennan, R., & Cohen, D. (2021). Copyright and Creative Commons. In C. Radbourne, A. Steiner, & S. Jacobs (Eds.), *23 Scholarly Communication Things*. Queensland University of Technology. https://qut.pressbooks.pub/23scholarlycommunicationthings/chapter/copyright-and-creative-commons/

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QUT Library. (2023, January 24). *Using generated citations with cite|write* [Video]. YouTube. https://www.youtube.com/watch?v=1ynKJ6SQd5Q

QUT Library. (2021, April 22). *In-text referencing with APA 7th* [Video]. YouTube. https://www.youtube.com/watch?v=jgN2nekhUDU

Terry Janke and Company. (2019, March 4). *What are ICIP Protocols | Law Way* [Video]. YouTube. https://www.youtube.com/watch?v=DdQhzJvI-GA

Terry Janke and Company. (2018, January 29). Right to culture: Indigenous Cultural and Intellectual Property (ICIP), copyright and protocols. *Terri Janke and Company*. https://www.terrijanke.com.au/post/2018/01/29/rights-to-culture-indigenous-cultural-and-intellectual-property-icip-copyright-and-protoc

MODULE 8 MANAGING RESEARCH DATA

PHILIPPA FRAME, MARVIN VAN PROOIJEN

Module learning objectives

By the end of this module, you should be able to:

1. Understand your obligations as a researcher to manage research data ethically and responsibly.
2. Better understand the various factors to consider when managing research data effectively throughout a research project.
3. Understand the importance of research data management planning and begin to plan how you will organise, store, and manage your research data.

Learning plan

In this module, we will:

- Broadly define research data and identify relevant types of research data.
- Outline the major aspects relevant to managing your research data effectively and responsibly.
- Identify what is required of a data management plan (DMP).

8.1 What is research data?

Most research organisations will have their own research data management policy informed by national policies, laws and codes, including the Australian Code for the Responsible Conduct of Research 2018, which may include their own definition of research data.

At QUT, research data is considered in a broad sense as all the things that a researcher might use to provide evidence for their research. The QUT Management of Research Data and Primary Materials Policy defines research data as:

> *"...data in the form of facts, observations, images, computer program results, recordings, measurements or experiences on which an argument, theory, test or hypothesis, or other research output is based. It relates to data generated, collected, or used, during research projects, and in some cases may include the research output itself. Data may be numerical, descriptive, visual or tactile. It may be raw, cleaned or processed, and may be held in any format or media."*
>
> QUT, 2024, sect. 10.

Research data may be any combination of the above, depending on the nature of your field of research and the stage of your research project. As you work through this module, consider the various types of research data with which you may come to be working with.

Watch

Watch this video for an overview of research data.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1564#oembed-1

Why is Research Data Important? (QUT YouTube video 6m,15s).

Types of research data

Research data may vary depending on your discipline. It may be:

- data created in a digital form ('born digital')
- data converted to a digital form (digitised)
- primary materials or physical items.

The table below, adapted from University of Edinburgh's (2022) MANTRA, Research data in context (Classification of research data), shows research data that has been categorised according to processes used to gather or generate them.

Classification of research data

Data Type	Process	Content Examples	Data Examples
Experimental	Generated by lab equipment	Gene sequences; chromatograms	Laboratory notes; specimens; samples; methodology; slides; artefacts
Computational/ simulation	Generated from computational models – the actual model (and its metadata) may be more important than the output data	Climate models; economics prediction models	Methodology; data files; models; algorithms; scripts; workflows; standard operating procedures and protocols; simulation software
Observational	Recordings of specific phenomena at a specific time or location	Seismic data, medical imaging, opinion polls, climate data, interview or survey results	Transcripts; audio or video recordings; field notebooks; diaries; photographs; films; slides; questionaries; test responses; codebooks; text documents
Derived	Produced via processing or combining of other data	Data mining; compiled databases; GIS	Database contents; spreadsheet data; data files
Reference	Extracted from reference datasets	Genbank, HILDA datasets, ABS microdata	Spreadsheets; data files; contents of an application (schemas, input, output; log files for analysis software)

Watch

There are many forms of research data that do not fit traditional definitions or understandings. Watch the video below to learnabout different ways in which data can be understood and used in research.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1564#oembed-2

Non-traditional research data Interview with QUT's Dr Karike Ashworth (QUT YouTube video 4m,04s).

Activity

Learning about different kinds of research data

1. Watch the video above about non-traditional research data.
    - List all the types of research data that Dr Ashworth worked with throughout her research project and note the category for each type of data.
    - How did Dr Ashworth's understanding of what 'research data' is change throughout her project?
2. Think about the types of data that you will collect/collate and work with throughout your research project.
    - What category/ies best describes your research data?
    - Provide examples of what data you will be working with throughout your project. Keep in mind that this is a brainstorming activity and the actual type of data that you work with will evolve as you start to plan your research project.

8.2 What is research data management?

Research data must be properly managed because the data, and the primary materials from which they are derived, are valued assets and outputs for researchers as well as the institutions with which they are affiliated.

Research data management is all of the activities involved in storing, protecting, organising, and documenting your research data, a valuable asset both to yourself and to your organisation. Well managed research data can enable:

- verification of findings
- reproducibility and transparency
- protection against loss of research data
- protection of sensitive or confidential information
- data reuse (for yourself and others)
- compliance with the Australian Code for the Responsible Conduct of Research 2018 and institutional policies, procedures, and codes of conduct
- statutory retention, funding body and publisher policy compliance.

Other benefits of managing your data include:

- Increased research efficiency, saving time and resources.
- Facilitating future research by allowing others to build on or add to your research data.
- Increased citations of research data and of publications based on that data.

Planning for how data will be managed throughout a research project ensures these benefits are realised. Data management planning usually follows a research data lifecycle approach.

8.3 Your research data responsibilities

Most research institutions or organisations will have a research data management policy. It will apply to the management of all research data created by researchers associated or affiliated with the institution, including by postgraduate students engaged in research activities. Researchers are responsible for appropriately managing research data and primary materials throughout the research data lifecycle, by addressing issues of confidentiality, security, ownership, storage, recordkeeping, retention, and re-use. Each of these aspects should be included in your Data Management Plan where relevant.

Confidentiality

A dataset may contain confidential or classified information that should not be released to the public. If this is the case, you have a responsibility to guard against unauthorised access by using physical locks or digital encryption/password controls. Authorised access should be managed via the use of a signed confidentiality or non-disclosure agreement. Non-disclosure agreements are also used to prevent potentially patentable information from being leaked into the public domain.

For more information, see the ARDC Research Data Rights Management Guide.

Privacy

If your data includes personally identifying information, such as names and addresses, health information about identifiable individuals, or information about the movements of identifiable individuals, privacy restrictions will apply. Any personal information should be kept secure. Before collecting and using personal information in your research, you should seek consent from the person to whom it relates or use a process of de-identifying the data, so it no longer reveals their identity.

See the ARDC Research Data Rights Management Guide and the ARDC resources on identifiable data and sensitive data for more information.

Contracts

When a funding body or industry partner externally funds research, there may be conditions attached to the funding and/or obligations related to ownership, access, and dissemination. This information will be recorded in a contract that will be signed by the Chief Investigator, but the obligations apply to all researchers involved in the project.

Ownership of data

In general, the institution or university is the owner of any research data and primary materials generated in the conduct of research at the University. Research students can retain a copy of the research

data and primary materials for future use, subject to any contractual, statutory, ethical, or funding body requirements (Management of research data and primary materials – Ownership and custodianship).

QUT only

QUT's Management of research data and primary materials policy states that:

> *"researchers should apply the FAIR principles (findable, accessible, interoperable and reusable) and CARE Principles for Indigenous Data Governance (collective benefit, authority to control, responsibility, ethics) to their data and primary materials, subject to any constraints or considerations related to the funding body, contractual, commercialisation, ethical, cultural, privacy or confidentiality requirements."*
>
> QUT, 2024, sect. 1.5.

8.4 Introducing the research data lifecycle

Effective research relies on sound data management practices. It is important to plan how you will manage your data from the beginning of your project and throughout the research data lifecycle.

"The QUT research data lifecycle" by QUT (adapted from 'The life cycle of research data' by ARDC, CC-BY 4.0.

The research data lifecycle signposts the different stages your data goes through, from the beginning of the research project right through to publishing and reuse. It is important to note that data often has a longer lifespan than the research project that creates them, such as a PhD or MPhil. For example, a researcher might continue to work on aspects of their data after they've completed their thesis; follow-up projects might arise in which they re-analyse their data or combine it with other data. Their data might also be re-used by other researchers who pursue related research projects long after their thesis has been accepted. Well organised, well documented, and properly preserved data is easy to access, review, and share. As such, it is invaluable to the advancement of knowledge.

Having a good understanding of all phases of the lifecycle will help you to plan to manage your data effectively. In the next sections of this module, you will learn about the different stages of the lifecycle.

Activity

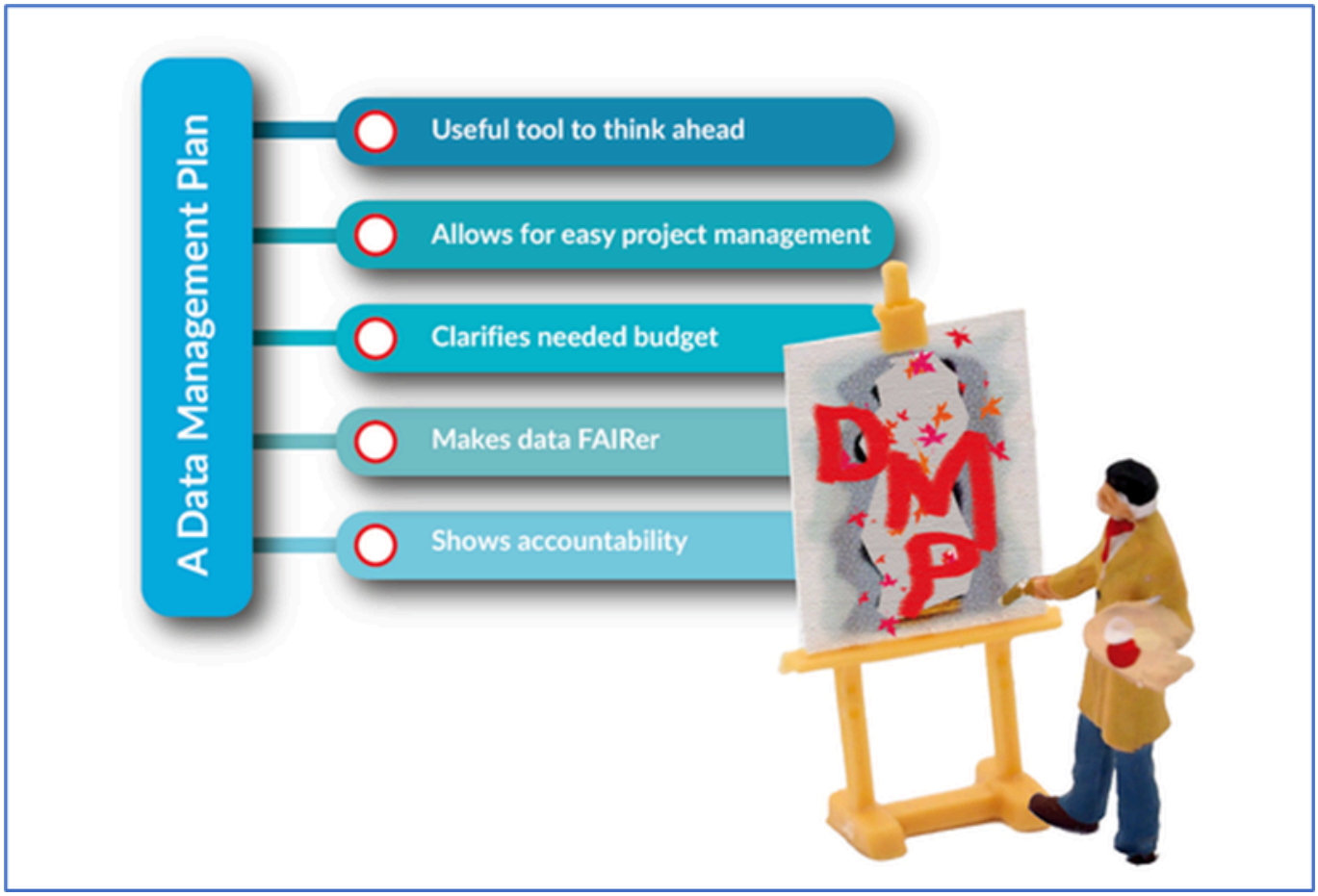
Find a research data life-cycle model from another institution. How similar or different is it to the above?

8.4.1 Research data lifecycle: plan and design

Researchers at Australian universities are required to collect, manage and retain their research data and primary materials in accordance with relevant legislation and University policies, which are consistent with the Australian Code for the Responsible Conduct of Research 2018.

The Code strongly encourages the development of a Data Management Plan (DMP) as early as possible (see the NHMRC's supporting guide on Management of Data and Information in Research)(PDF, 281KB).

To understand the value of DMPs, consider the following benefits:



"Benefits of data management" by CESSDA, CC BY-SA 4.0

Some key considerations in the planning stage include:

- Consult relevant policies, procedures and legislation to ensure you understand your responsibilities and obligations as a researcher, including your responsibilities in relation to confidentially, privacy, contracts, and ownership of data.

- Determine whether you will be collecting your own data or relying on a secondary dataset or a combination of both.
- Complete a DMP using the tools available at your research organisation.

8.4.2 The Data Management Plan

A **Data Management Plan (DMP**) is a document that records information about how you are going to manage your research data throughout your research project. It is a dynamic document that can be added to and further developed as you progress in your research so if you are unable to provide all of the information to begin with, do not despair. Use it as a springboard to investigate further and to discuss elements with your supervisor to ensure that all aspects of research data are well managed.

The information you put into a data management plan can be considered metadata (data about your data). It should include details such as:

- What is the research project about, and who will be working on it?
- Will you be working with primary or secondary data? If the latter, what confidentiality, privacy, or contractual and licensing requirements need to be considered?
- What ethics considerations and compliance with policies and legislation will apply to the data?
- Who will own and have access to the data?
- Where will you store the data and what level of security or protection will it require?
- What support infrastructure, such as equipment and facilities, will you need?
- How will you organise your data files and folders for ease of access and efficiency?
- Will you be able to share your research data to enable further re-use?
- How long will you need to retain your data and will it need to be preserved in particular formats?

Universities will provide tools, processes, and services to assist you with research data management planning. Guidance is available to help researchers align their practice with the principles set out in the Australian Code for the Responsible Conduct of Research 2018 and in other international consensus policies, such as the F.A.I.R. Data Principles and CARE principles.

QUT only

QUT's Data Management Planner

QUT provides the Data Management Planner (DMP) to support data management planning and ensure that your research data and primary materials are managed effectively during the course of your research project. It also helps you to comply with your obligations as per the QUT Management of Research Data and Primary Materials Policy. It helps you plan, start conversations with your supervisor, and facilitates the creation of data management plans through QUT-specific advice, resources, and contacts.

Stage 2/Research Proposal and your Data Management Plan

As a researcher, you need to be confident about the data you are collecting, ensuring that you store it in a way that complies with the requirements of your project, confidentiality considerations, and potential access requirements. As part of your Stage 2/Research Proposal, you are required to indicate whether you have completed your Plan.

8.4.3 Research data lifecycle: collect and create

In this stage of the research data lifecycle, researchers must ensure that all research data is stored securely and backed up regularly.

Data storage

Data storage solutions available to researchers will differ between institutions, who will most likely provide their own guidance on which of these they endorse and support. It is up to you to determine the most appropriate solution for the type of data with which you are working.

Care should be taken when storing and sharing research data. Consider who you may need to share data with, whether they are internal or external parties, and what level of security or protection is required to ensure any privacy, sensitivity, confidentiality, contractual, or legal obligations are met.

As an example, here are the solutions available to QUT researchers. The table highlights some of the considerations you need to think about when choosing where to store your research data.

Storage option	Research Data Storage Service (RDSS)	QUT OneDrive	QUT SharePoint	KeyPoint
For research data	✓	✓	✓	✓
Master copy?	✓	✗	✗	✗
For students	✓	✓	✓	✓
Very large data (>500GB)	✓	✓	✓	✓
Sensitive data	✓	✗	✓	✓
Remote access to data	✓	✓	✓	✓

Activity

Consider the research data options presented above. Investigate which options available to you at your own institution. How are they similar or different?

Backing up

To protect against possible loss or damage to digital files, ensure that you back up your research data files and folders regularly. One rule often applied is the **3-2-1 rule: Keep 3 copies of your data in 2 different locations, with 1 copy at an offsite location.**

- **Master copy:** Keep at secure location
- **Working copy:** Keep on a reliable/safe device or locations
- **Back up copy:** Keep off-site

Network drives may be accessible to a large number of people or can be configured for use by a single user or group of users. In addition, personal cloud storage options or portable storage devices are not recommended for the storage of master copies of research data.

QUT only

You can view an extended list of storage options under Store digital research data.

At QUT, the Research Folder on the U Drive is recommended for the storage of master copies of research data. Contact HiQ for more information.

The Office of eResearch provides QUT staff and Higher Degree Research students with specialised advanced computing facilities, storage and support. Submit a request for access and advice or apply for an account.

8.4.4 Secondary datasets

Before you begin your research project, consider whether secondary datasets are appropriate to answer your research question.

Secondary data refers to existing data collected or created by someone else for a different purpose and is reused for new research or analysis. Secondary datasets are sourced through indirect methods of data collection.

With more research data being made openly available for further research and analysis through data repositories and archives, there is a real possibility that useful datasets may be available to either fully or partially answer your research question. This could save you time and effort rather than collecting your own data.

There are different approaches possible:

1. Secondary analysis will rely on data that has been collected or produced by another researcher to answer a different research question.
2. Alternatively, you might use secondary data but engage in ancillary study, to add one or more additional measurements, for example, adding a questionnaire to an existing dataset or study.

Read

Secondary datasets case study

QUT researchers, Kaveh Deilami, Md. Kamruzzaman, and John Hayes used secondary datasets from NASA's Landsat program to test causal relationships between land cover/use and surface urban heat islands. Why use Landsat?

"... Landsat images are freely available for download, and their extended temporal coverage enabled the researchers to obtain datasets meeting some specific criteria", including five-year differences. To obtain images with similar air temperatures, data from Archerfield airport weather station was used to identify relevant dates for searching in Landsat. In addition, Australian Bureau of Statistics (ABS) socio-demographic datasets, IKONOS images and Google Earth images were used in the research.

Refer to:

Deilami, K., Kamruzzaman, Md., & Hayes, J.F. (2016). Correlation or causality between land cover patterns and the urban heat island effect? Evidence from Brisbane, Australia. *Remote Sensing*, *8*(9), Article 716. https://eprints.qut.edu.au/221640/

When sourcing secondary datasets, there are many options, including government websites such as Australian Bureau of Statistics (ABS) data, discipline-based data repositories, or institutional repositories such as QUT Research Data Finder, for datasets published by QUT HDR students and researchers.

To find a discipline-specific research data repository, search the Directory of Open Access Repositories (OpenDOAR) and the Registry of Research Data Repositories.

Activity

Working with secondary data sources

1. Consider the case study above and identify the various secondary sources used in this research project.
2. Consider the datasets and repositories available to you through your own institution or in the QUT guide for datasets in social science or the QUT guide for datasets in health and STEM.
3. Identify one or two that you can investigate for your own project.

You can ask your supervisor(s) for relevant repositories or archives that are prominent in your discipline/subject area.

8.4.5 Research data lifecycle: process and analyse

Research students and staff may have access to a number of resources to process and analyse research data, as well as access to research infrastructure including:

- advanced computing and storage facilities, including supercomputing (including for high performance computation), virtual workstations, and cloud computing
- support for tracking, collecting, and analysing dynamic digital data
- a range of allied facilities off-campus

You may also need to undertake additional training at your own institution, or through an external training provider to upskill in using data and digital tools and techniques. This may be free or fee-for-service. For example, training offered by the Queensland Cyber Infrastructure Foundation (QCIF) is free to participating Queensland universities (QUT research staff and HDR students can access QCIF services for free). Other free and paid training that may be suitable is listed by Digital Research Skills Australasia (DReSA).

It is recommended that working data (the copy of your master data that you are using for analysis) is stored for processing and analysis in a separate location from the master copy. This could be another folder on the same drive or a cloud storage solution e.g. QUT OneDrive.

8.4.6 Research data lifecycle: publish

Further into your research journey, you may consider publishing your data. This may be:

- a portion of your raw data shared to further research in your field
- an aggregated dataset that underpins a publication you have written
- a dataset published to meet funder requirements.

Publishing your data and citing its location in published works allows others to replicate, validate, and ensure accuracy of results. It increases the impact of your research as well as your visibility as a researcher.

Some research data would be impossible to collect again (e.g. recordings of a specific seismic event). Sharing data improves the scientific record and increases scientific integrity. The Australian Code for the Responsible Conduct of Research 2018 advises that researchers should share their data wherever possible.

To support best practice in publishing data, many institutions have adopted the F.A.I.R data principles to make research data **F**indable, **A**ccessible, **I**nteroperable and **R**e-usable. The benefits of sharing data publicly include:

- increase scientific integrity (replicate, validate and correct results)
- satisfy funding bodies/publisher requirements
- preservation for future use (reduce duplication efforts)
- increase impact and engagement (increased citation rates of up to 69%)
- defend validity (also new research methodologies)
- support applications for promotion, tenure and grants
- facilitate collaboration and networking with industry partners.

Care should be exercised when sharing data that is sensitive, confidential, or subject to privacy legislation. It may be possible to share such data through mediated access arrangements, however, relevant legislation and the conditions of any commercial agreements and ethics approvals must be adhered to. For more information, see the ARDC's Publishing Sensitive Data Guide.

Repositories

Consider sharing your completed datasets or subset with other researchers, publishers, and the public via a research data repository. Research data repositories may be general, discipline specific, or institutionally based. A data repository stores data along with metadata, whereas a data registry acts as a catalogue or index of research data and only stores metadata.

Some general repositories are specifically designed for the publishing of datasets to accompany journals that have data policies (such as the PLOS data policy). These repositories make the data underlying scholarly publications F.A.I.R, and include:

- figshare – A repository where users can make all of their research outputs available in a citable,

shareable, and discoverable manner.
- Dryad – An international disciplinary repository of open data underlying scientific and medical publications.

Examples of discipline-specific databases include:

- DataONE
- GenBank
- PANGAEA
- Scientific Data (Nature's data journal)
- Australian Data Archive (social sciences)
- TERN (terrestrial ecosystem data)

Source code:

- Github
- Git
- BitBucket
- SourceForge

To find a discipline-specific research data repository, search the Directory of Open Access Repositories (OpenDOAR) and the Registry of Research Data Repositories.

Read

Case study: QUT's Research Data Finder

Explore how a university's repository can help you make your research data F.A.I.R. by applying certain metadata.

QUT's Research Data Finder is a digital repository for research data created or collected by QUT researchers. Researchers can publish data, code, software, spatial images, and more.

Features include:

- DOIs and data citations generated for datasets
- Links to related research projects and people
- Creative Commons licence selection
- Machine and human readable records
- Meets funder and publisher requirements for publishing open access datasets.

Researchers can specify the level of access to their datasets

- open (publicly available for access, use, re-use and redistribution)
- mediated (access by others requires approval by the data owner).

Metadata and data stored in Research Data Finder is exposed to a wider research audience through selected external harvesters, including the Australian Research Data Commons (ARDC), through their national portal, Research Data Australia, as well as being highly indexed by the major search engines.

Activity

Working with research data repositories

1. Identify two repositories that are relevant to your area of research.
2. Identify one dataset within one of these repositories. Select one that is of interest and relevant to your research.

8.4.7 Research data lifecycle: preserve

Data preservation refers to the processes of curating your research data and metadata, converting it to appropriate formats or media, storing it in a safe and supported archive, and creating documentation to ensure that your research data is well protected and also available for re-use in the future. See Curtin University's Preservation tips.

Research data retention

You are obligated to retain research data and research records for as long as required by legislation, statutory requirements, funding agency guidelines, and contractual arrangements with research partners. It may seem a long way off but being aware of how long to retain your data beyond your research project, or whether you may need to dispose of certain data due to legal, confidentiality, or privacy reasons, can help you to plan other aspects of your project, such as collecting consent and managing contractual obligations. This should be documented early in your DMP.

Data retention periods vary depending on the kind of data involved, its significance to the research discipline and the public, and whether it may be of interest to future researchers for re-use. Retention periods are defined in section 2.1 of the Australian Code for the Responsible Conduct of Research 2018.

In Queensland, the Queensland State Archives University Sector Retention and Disposal Schedule specifies the statutory retention periods for research data (see section 601.2/A50). It is recommended that researchers in other Australian states or international locations, consult their own relevant data retention and disposal authority for statutory retention periods.

Activity

Identifying your data retention responsibilities.

1. Find and read your institution's data retention policy.
2. Identify how your current and future research data relates to the policy.
3. Confirm your understanding with your supervisor and/or other research support services at your institution.

8.4.8 Organising and documenting your research data

Data formats

When planning to store your research data, consider what data formats will be used. The choice of format will determine how the data may be used, analysed, backed up, stored, and retained for reuse in the future.

Read

See the UK Data Service page on File formats for further information on what to consider when choosing a file format.

Towards the end of your project you will need to think about the preservation of your research data in its various forms. You may need to transpose your data into more durable formats, or standard interchangeable formats that most software is capable of interpreting. Even though it may seem a long way off, consider some of the recommended file formats for long-term preservation, listed by the UK Data Service.

Activity

Identifying the formats of your research data

1. Brainstorm and list the data formats you think you might be working with, as well as any software you plan to use and the formatting and access requirements it relies on.
2. Add this list to your DMP. This list will likely develop over time so update the details in your plan as needed throughout your project.

Organising your research data

Wherever you store your research data, well organised and clearly described research data will make your data more findable and will benefit you in the long term as you will save time and effort.

Watch

Watch the video below from the Ghent University Open Science team (2021) for an overview of the importance of keeping your research data organised.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1604#oembed-1

Keeping research data organized by Ghent University Open Science team (2021).

Activity

Organising your research data

Keeping your research data well-organised is essential for efficiency and collaboration. Here's how you can start:

1. Discuss with your supervisor. Talk to your research supervisor about recommended practices for organising files and folders. They can guide you on what works best for your discipline and project.
2. Explore institutional guidelines. Check if your university or research organisation provides templates or standards for data organisation. These resources often include folder structures and naming conventions tailored to your field.
3. Create a system that works for you. Based on these discussions and resources, design a folder and file structure that suits your project. Make sure names are clear and meaningful so you can easily find and share your data.

QUT only

Read about QUT's recommendations for HDR students about file and folder organisation.

Describing your research data

As you begin to collect and capture your research data, and through all stages of the research data life-cycle, documenting your research data and creating metadata (data about the data) will enable you and others to find, access, interpret, validate, and reuse the data. Documentation should provide contextual information for the data so that it can be understood in the future – a gift to your future self and others.

Document your methods of data processing and analysis and capture metadata along the way throughout the project. Do not leave it to the end of the project to do this as the finer details of what you've done at each step will be forgotten.

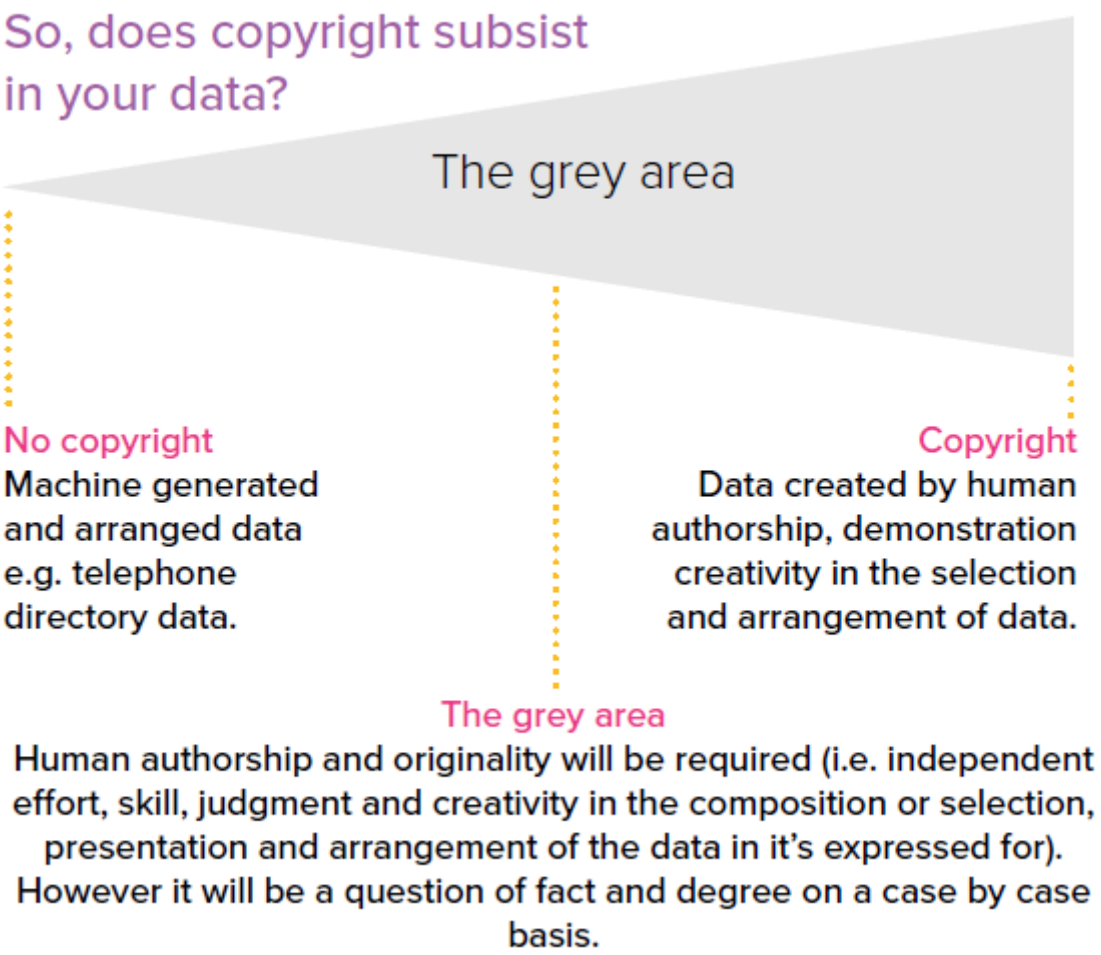
A simple way to capture metadata during the working phase of your research is to create a readme.txt type file. This is a collection of simple metadata that describes the details of the datasets and improves the long-term usability of the data. Save the readme.txt file with the data files in the same folder within your research storage.

8.4.9 Research data lifecycle: access and reuse

Copyright

Whether copyright exists in research data is often a grey area. In most circumstances, raw data will not attract copyright because there is no *"recognised human authorship and originality"* involved (ARDC, 2019, p. 2). Once data is manipulated with intellectual input, copyright may apply.

Compilations of data are protected by copyright law as 'literary works', provided the compilation involved intellectual effort, was not copied from another source, and supplies 'intelligible information' (i.e. is human/machine readable).



"So, does copyright subsist in your data?" from Research Data Rights Management Guide by ARDC, CC BY 4.0.

In Australia, it is usually the case that copyright protection will arise once the threshold tests of original-

ity, authorship, and creativity are met. For research data, the thresholds are most often reached when intellectual activity is directed at expressing the data, as opposed to collecting, creating, or inputting the data. As it is sometimes difficult to determine whether copyright subsists in a dataset, it is recommended that you apply a copyright licence.

Read

Creative Commons licensing case study

QUT post-doctoral researcher Christopher Noune has assigned a CC-BY-ND licence to his dataset, which means that others may use, copy and redistribute his work, even for commercial purposes, so long as they give appropriate credit. If they remix, transform or build upon the work, they may not distribute the modified material without seeking permission from Christopher.

See the datasets: HaSNPV-AC53 Genotyping and Abundance Datasets.

QUT only

At QUT, students retain the copyright ownership of their data unless assigned otherwise, and for staff, unless assigned otherwise, QUT retains ownership of the copyright in their research data.

Licensing data

In the interests of open science, researchers are encouraged to make research datasets available via open access or controlled access with research partners, collaborators, or requestors, for reuse by other researchers. In some cases there may be specific and valid reasons for needing to restrict access of a privacy, confidentiality, or legal nature. Applying a license can make the terms and conditions of re-use clear.

If you decide to share your data when you have completed your research, you may use a Creative Commons (CC) licence to specify the conditions that apply to reuse. When you apply a CC licence to your data, you retain ownership of the data but specify how others can use the work on liberal terms.

Licences can be exclusive or non-exclusive. An exclusive licence means that only the recipient (licensee) has the right to use the data in the manner covered by the licence – to the exclusion of the copyright owner. A non-exclusive licence means that the recipient (licensee) has the right to use the data in the manner covered by the licence – but not to the exclusion of the copyright owner who is free to use the

data in the same manner and to grant non-exclusive licences to other licensees. Data owners generally grant non-exclusive licences to repositories and other end-users of their data.

Some licences or agreements allow researchers to place their work in the public domain. When applying these to works, note that all rights and the protections offered by copyright, including the right to be credited as the creator, will be waived. This may have an impact on data citation counts, for which tool and standards are developing and which can be an important metric for research impact. If they are required by an archive or repository to use a copyright waiver of public domain dedication, find out whether any "community norms" statements can be applied. These will not be legally binding but can signal researchers' wishes to potential re-users, where this is practical.

Some researchers create specialised software to analyse their data. They may wish to publish their software and source code to allow their analyses to be reproduced by others. For more information, see the ARDC's Research Software Rights Management Guide.

QUT only

QUT recommends a Creative Commons licence, which allows data owners to specify the limits that apply to the reuse of their work. The four licence elements – Attribution, Noncommercial, No Derivative Works, and Share Alike – can be combined to create the required licence.

Activity

Use the Creative Commons Licence tool to explore how to choose the best licence for a research dataset.

Read

Understanding Creative Commons licences

Explore this chapter by Blake et al., in RMIT University's OER Capability Toolkit to learn about the six licences provided by Creative Commons and how they enable you to change copyright terms. Consider how you would use citation or attribution to acknowledge your use of CC licensed materials.

8.5 FAIR and CARE-ful research data

"#BeFAIRandCARE" by GIDA. © Global Indigenous Data Alliance.

FAIR data principles

The FAIR data principles describe how research data should be managed so they can be more **F**indable, **A**ccessible, **I**nteroperable and **R**eusable. They are designed to support knowledge discovery and promote the sharing and reuse of research data.

FAIR data should be:

- **Findable:** published in a repository with rich, descriptive metadata and a persistent identifier (DOI) and citation.
- **Accessible:** able to be retrieved by both humans and machines using standardised protocols and procedures (e.g. authentication and authorisation) that clearly communication who can access the data and how.
- **Interoperable:** stored and described in a manner that connects it to other systems and data assets including use of standard vocabularies/ontologies and formats.
- **Reusable:** have clear license conditions for access and reuse, and thorough description relating to data provenance.

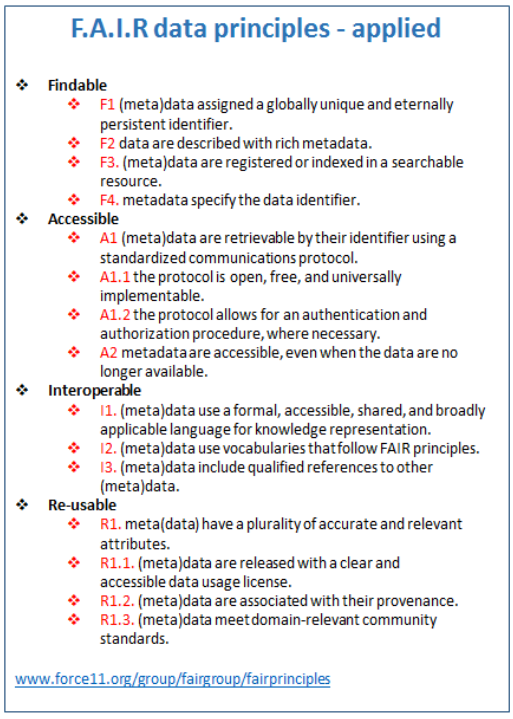
These principles encourage openness and re-use. FAIR data doesn't mean the data necessarily needs to be open access. Rather, it should be as open as possible, and as closed as necessary. FAIR data

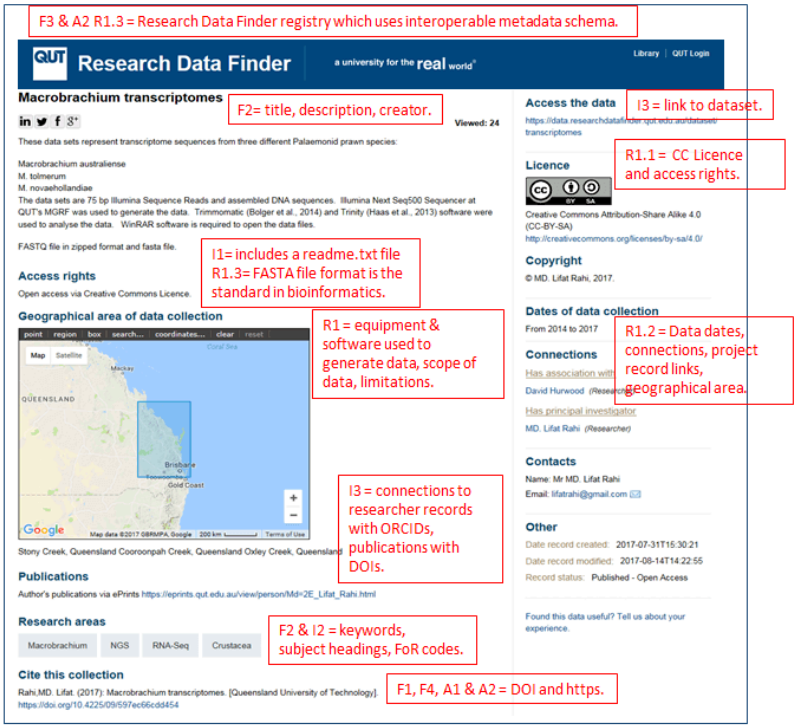
takes account of the type of data you might be working with and the obligations you might have as a researcher to meet contractual, legal, ethical, cultural, or privacy requirements. This could include, for example, keeping patient confidentiality, protecting endangered species by restricting knowledge of where the data was collected, or considering the rights and interests of indigenous peoples over research data about or involving them.

Read

Research data sets case study

Read about how QUT PhD candidate, MD. Lifat Rahi has applied the FAIR data principles to their published research data set.





"F.A.I.R. data principles – applied" on "Macrobrachium transcriptomes" in QUT Research Data Finder by QUT, CC BY-NC 4.0.

Publishing a dataset in QUT's Research Data Finder will assist you to make your data FAIR.

Activity

Use the ARDC's FAIR Data Self-Assessment Tool to determine how FAIR your data is.

CARE principles

Complementing the FAIR principles, the CARE principles for indigenous data governance (GIDA) acknowledge the rights and interests of indigenous populations over research data that involves them or is about them, including historical content.

While the FAIR principles are about making it easier to share and reuse data, the CARE principles aim to ensure that data is used ethically. It promotes the following aspects of research data management of indigenous research data:

- **Collective benefits:** Data ecosystems shall be designed and function in ways that enable Indigenous peoples to derive benefit from the data.
- **Authority to control:** Indigenous peoples' rights and interests in Indigenous data must be recognised and their authority to control such data be empowered.
- **Responsibility:** Those working with Indigenous data have a responsibility to share how those data are used to support Indigenous peoples' self-determination and collective benefit.
- **Ethics:** Indigenous peoples' rights and wellbeing should be the primary concern at all stages of the data lifecycle and across the data ecosystem.

Researchers should familiarise themselves with Indigenous Data Governance and Sovereignty principles, guidelines, and frameworks, which outline Indigenous peoples' right to govern the collection, ownership, and application of data about their communities, peoples, lands, and resources. See the Lowitja Institute's 'Indigenous Data Governance and Sovereignty' (PDF, 1.4MB), the Global Indigenous Data Alliance's Overview of the CARE Principles for Indigenous Data Governance and the Indigenous Data Network for further information.

8.6 Reflecting on your learning

In this module we have explored the lifecycle of research data and research data management. To confirm your learning, take a moment to complete the knowledge check, reflect on the questions provided, and identify whether you understand the content or have any questions for your research support team.

Knowledge check

Confirm what you have learned in Module 8 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1609#h5p-91

Reflect

Consider:

1. What new aspects of managing my research data have I learned?
2. How will I apply this new knowledge?
3. Do I have any unanswered questions about managing my research data? Where can I seek help to find these answers?

8.7 Module summary

You have reached the end of Module 8.

You should now be ready to move onto Module 9 *Planning to publish*.

Additional resources

The following resources offer further practical guidance, tools, and theory to support your understanding and development of skills for managing research data.

Australian Research Data Commons. (2025). *CARE Principles for Indigenous Data Governance*. https://ardc.edu.au/resource/the-care-principles/

Australian Research Data Commons. (2025). *FAIR data self-assessment tool*. https://ardc.edu.au/resource/fair-data-self-assessment-tool/

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MODULE 9 PLANNING TO PUBLISH

PAULA CALLAN, SANDRA FRY, KATE HARBISON

Module learning objectives

By the end of this module, you should be able to:

1. Recognise the main publication types and publishing models.
2. Create a basic publishing plan.
3. Select an appropriate journal for your paper.
4. Professionally communicate with publishers about your work.

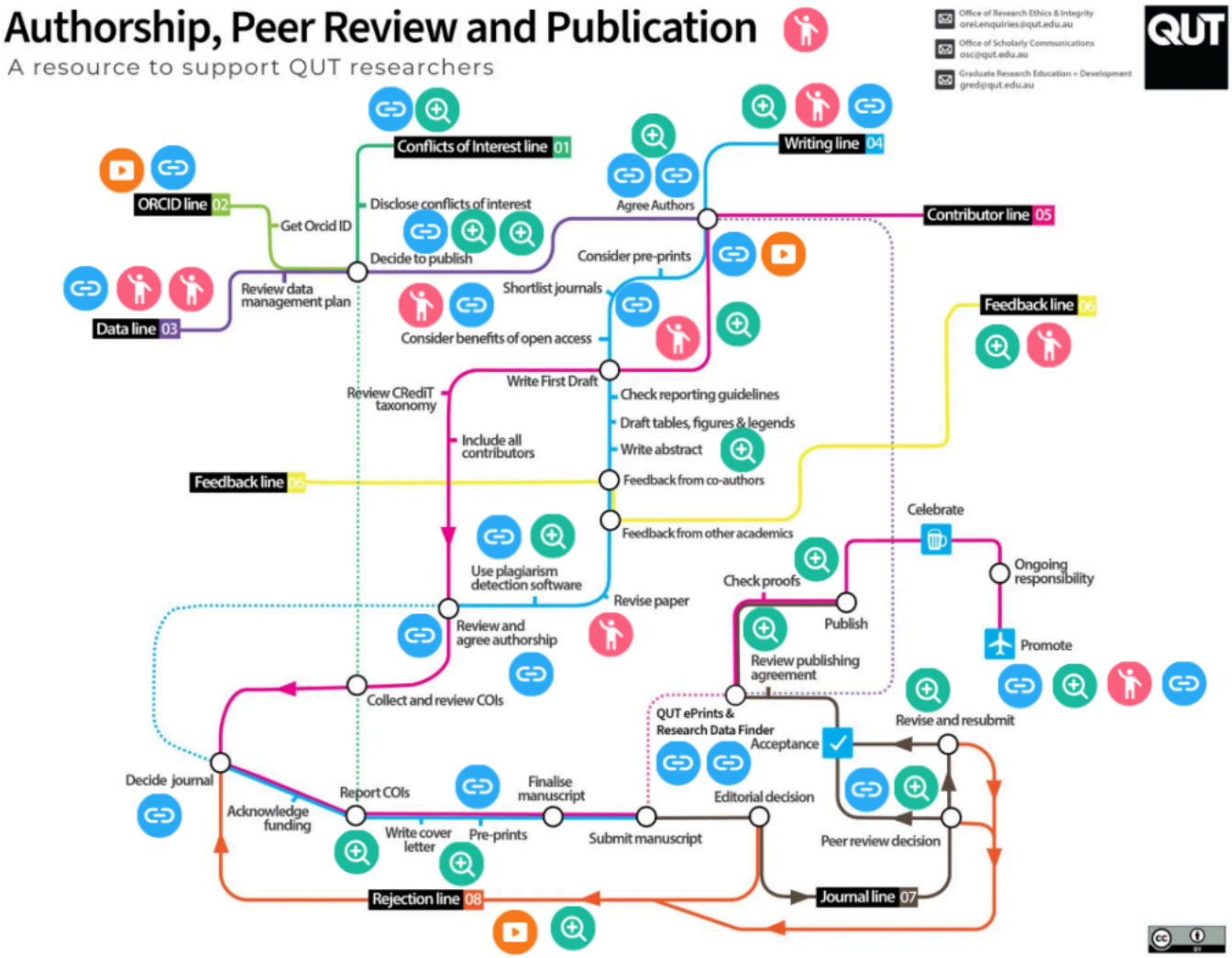
Learning plan

In this module, we will:

- Define different types of publications and publishing models.
- Identify tools that can assist when choosing where to publish.
- Explain how to identify and avoid deceptive publishers and journals.
- Learn how to promote your research to a broad audience.

9.1 The basics of getting published

In this section, you will learn about the different forms of academic publishing and look at how they may align with your overall publishing plan. We will also guide you through the process of choosing the right journal for your article and introduce some useful tools to support you in making that choice.



"Authorship, Peer Review and Publication map" by QUT Library, CC BY 4.0.

9.2 Defining different publication types and publishing models

Publication types

Publishing takes many forms, each exhibiting different characteristics and offering both opportunities and challenges. Research is typically published in two main ways, scholarly literature and grey literature. However, the publishing landscape also includes options, such as social (or other) media, including blogs and plain language summaries of your research. There are advantages and limitations associated with each type, and all may have a role to play in your publishing plan.

Scholarly publishing

Scholarly literature includes:

- peer-reviewed journal articles
- published conference papers
- chapters in edited books
- research monographs (books).

While scholarly publishing typically reaches a more limited but targeted academic audience, it carries significant weight, especially on a resume, because of the rigorous review process involved. Publishing in this space often involves collaboration with other researchers, which can be a valuable learning experience. However, one drawback is that the time between submitting your work and seeing it published can be quite long.

Grey literature

Grey literature includes:

- material such as government or corporate reports
- unpublished conference contributions
- theses.

Like scholarly literature, grey literature tends to have a limited but targeted audience, and often reflects current or emerging research. One of its key advantages is that authors usually have more control over the publication process, and, while some review may occur, it is generally less formal. Grey literature can still be a valuable addition to your resume. However, it does come with some limitations, for example, it may be influenced by author or funder bias, it lacks the rigorous peer review of scholarly publications, and is not necessarily archived in a way that ensures long-term access.

Self-publishing

Self-publishing can include:

- blogs
- social media posts
- digital news media stories
- plain language summaries.

These formats offer the fastest publication process, with the author generally controlling when and how the work is shared. This option is particularly useful for communicating research to a wide audience. However, many of these types of publications are not independently reviewed and may not carry the same academic weight on your resume as scholarly works.

Publishing models

Traditional subscription publishing

In the subscription publishing model, academic libraries or individual readers must pay the publisher for access to the articles in the journal. The fees cover the cost of publishing and, if the publisher is a commercial enterprise, provide a profit.

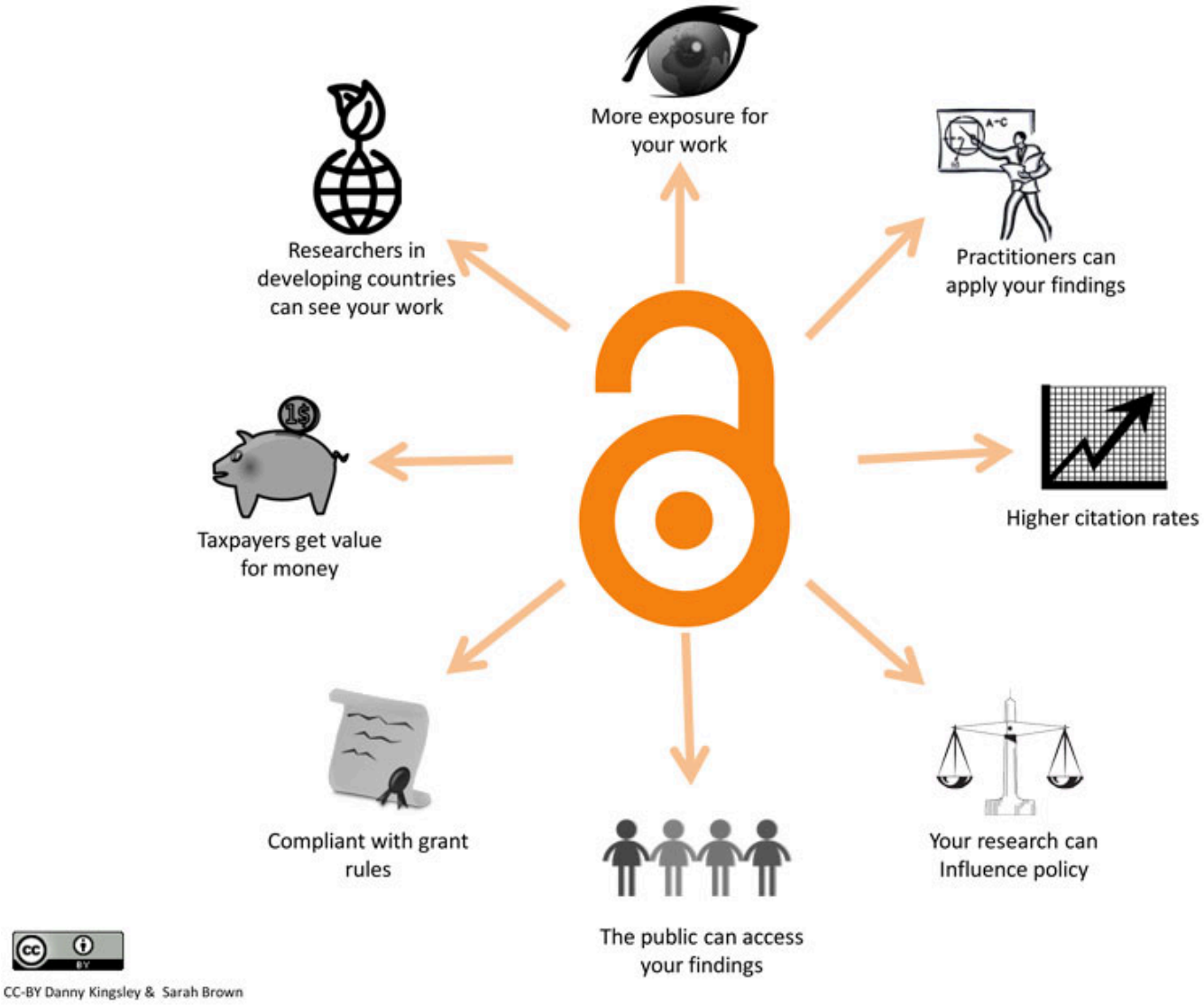
Downsides of the subscription model:

- the article may not be read, used, or cited as much as it would be if there were no barriers to access
- authors are generally required to transfer their copyright to the publisher despite this often being the work product of their jobs as researchers in institutions
- authors and/or their institution are not paid by the publisher for their work.

This model is generally unpopular with the institutions and funding bodies who have funded the research as they want to maximise the potential impact of the research they have funded by allowing as many people as possible to access it.

Open access publishing

When a paper is published under an **open access** publishing model, the published article is immediately accessible, free of charge, to anyone with access to the internet. These articles are generally published under a Creative Commons Licence, which means they can be redistributed and re-used under the terms of that licence, mostly ensuring the authors are attributed as the creators and the original publication source is acknowledged. Often the unlock symbol in orange (see below) lets you know the research is open access.



"Benefits of Open Access" by Kingsley, D. & Brown, S., CAUL Open Research Toolkit, CC BY 4.0

Under the Article Processing Charges (APC) (Gold Open Access) model, where there are no paid subscriptions, the publisher must find an alternative source of funding to cover the publication costs. Most Open Access journals are funded by APCs, which may be covered by the author's institution. Authors should consider this model carefully before proceeding and seek advice from library staff or scholarly publishing specialists where available. Consider tools like 'Think, Check, Submit' and quality criteria, such as the DOAJ index of OA journals, which only includes journals aligning to best practice (read more about this in *Module 9.5 Identifying deceptive publishers, journals and conferences* and *Module 9.6 Tools for selecting journals*).

Hybrid journals

Some subscription journals have a fee-based, open access publishing option. This means that some of the articles in the journal will be open access while others will be behind the publisher paywall. Managing the billing and payments associated with APCs is challenging for both publishers and institutions. This has led to a new type of contract between publishers and institutions – the institution pays the

publisher an annual fee that covers both 'read access' and open access publishing fees. These are commonly called **'Read and Publish' agreements**. They bundle together access to the publisher's journals (the read component) with open access publishing options for the university's researchers (the publish component) free of any article processing charges.

Read

Read more about Read and Publish (R&P) agreements negotiated by the Council of Australasian University Librarians (CAUL).

Explore frequently asked questions about Open Access on the Open Access Australasia Explore FAQs page.

QUT only

Learn more about open access services and support available to QUT staff and HDR students through QUT Library on the HiQ website, including about open access, Read and Publish (R&P) agreements, APC support, and QUT ePrints.

Many research funders require that grant recipients provide an open access version of any publications arising from the grant (e.g. Australian Research Council (ARC) and National Health and Medical Research Council (NHMRC)).

This does NOT mean you are required to publish in an open access journal – you can deposit the article in an institutional repository.

9.3 Publishing plans

As a HDR student, being strategic about where you publish can help to build your academic reputation and further your research career.

Your publishing goals are likely to evolve throughout your research project. In the initial stages, you might seek feedback on your methodology. Later, you may aim to formally document your research findings before anyone else (also referred to as establishing priority for a discovery), share your results with a broader audience, or strengthen your reputation within your discipline. Being aware of these changing objectives can help you make strategic publishing decisions at each stage and direct your publishing plan.

Creating a publishing plan can help you stay organised, make informed choices, and ensure your work reaches the right audience. As you prepare your plan, consider the following questions:

- What are your publishing objectives?
- What do you want to achieve by publishing?
- Who is your target audience?
- What are the relevant publication types or channels for your work?

A strong publishing plan includes a mix of formats, recognising that each has its own strengths and limitations. In some fields, conference proceedings are standard, while in others, peer-reviewed journal articles are the primary and preferred mode of scholarly communication. If timely dissemination is a priority, considering preprints in your plan can help you share your findings quickly.

Your plan should also reflect your intended audience and communication goals. If you aim to reach audiences beyond your peers, consider incorporating non-specialist platforms, such as The Conversation. Sharing plain language summaries of technical articles can further enhance the accessibility of your work. Finally, collaborate with your co-authors to confirm that your chosen formats align with shared goals and expectations.

9.4 Deciding where to publish

Deciding where to publish your research is a key part of your publishing plan. Scholarly journals are the most common format for disseminating original research. Books and book chapters may be appropriate for in-depth work. In some fields, conferences are highly valued for communicating emerging ideas and receiving early feedback. Preprints offer a way to share your findings quickly while awaiting formal peer review and may also offer open access pathways, which can help maximise the visibility and impact of your work.

Choosing a journal

Publishing in a scholarly journal is a common way to share original research with the academic community. Journals typically offer peer review, which strengthens the credibility and rigour of your work, and many are indexed in major databases, increasing the visibility and potential for citations.

Consider these questions when choosing a journal for your article:

- Do you and your colleagues read and cite this journal?
- Do experts in your field publish in this journal?
- Does the journal publish articles (similar subject and type) like yours?
- Do your more experienced colleagues hold this journal in high esteem?
- Can you find the journal in the major citation databases (Scopus or Web of Science), improving their discoverability?
- Does the journal use identifiers (DOIs for articles, ORCiDs for authors) to ensure works are correctly attributed and trackable?
- Have you compared the journal's metrics with others in the same subject area?
- If the journal is open access, have you confirmed it is listed in the Directory of Open Access Journals (DOAJ) to ensure it is legitimate, ethical, and peer reviewed?
- Have you checked if publishing fees apply? If yes, can you cover these fees?
- If the journal is not open access, is open access publishing available under a **Read and Publish Agreement**?

Other factors may influence your decision to publish in a specific journal. Click on the arrows in the accordion below to learn more about these factors.

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Books or book chapters

In some fields, such as the social sciences, publishing a book or book chapter can be more appropriate than a journal article or other publication type. This option can capture broader audiences including students, practitioners, and policy makers.

Consider these questions when choosing to turn your thesis into a book or publishing a book chapter:

- Where will the book be published, online or print only?
- For a print book, what is the distribution plan?
- Will the book or chapters be indexed in Scopus or Web of Science or another index?
- If a book chapter, who are the other authors and editors?
- Will the university be able to purchase institutional copies of an ebook?

Conference papers

Presenting your paper at a conference in your discipline can be a great way to share your work and meet other researchers in your field. Conferences provide opportunities for researchers to get involved with discipline specific networks. Good quality conferences publish their proceedings giving authors an opportunity to publish easily and quickly. These proceedings may be published as a book or a special issue of a journal. Conference papers are a common publishing method in computer science and engineering where new technologies and methodologies emerge very quickly in computer science and engineering. Much of the scholarly publishing in these disciplines is via conference papers.

Consider these questions when planning to submit a paper to a conference:

- Are the papers peer-reviewed?
- Will papers be allocated a DOI to identify, locate, and track the output?
- Are the papers or proceedings indexed by Scopus or Web of Science or, if in a niche field, indexed in discipline specific databases?
- Has the conference been running for a long time?
- Who are the organisers and who is on the editorial board/committee?
- Are previous papers or proceedings being cited?

Preprints

Preprints are research papers that have not been subject to peer review and are added to online public databases called preprint repositories. Often, they are published to get an idea or theory out into the public view and have a crowd sourced review process. The author can receive feedback from other researchers about their paper and make any changes which they think will improve the research. In some cases, preprints are picked up by journals and published in the traditional way. Please check journal policies regarding preprints as some journals may not accept preprints for peer review.

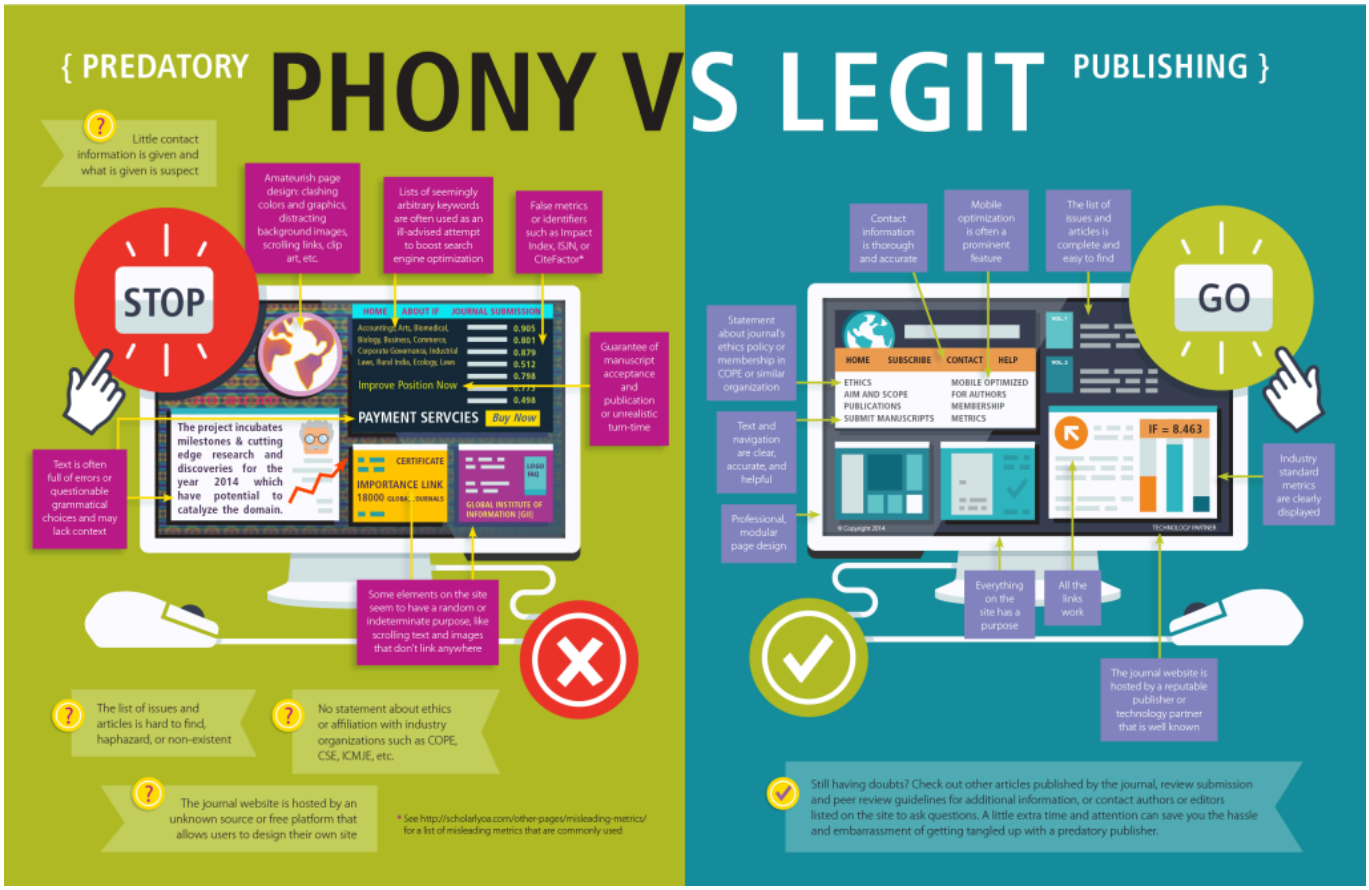
There are a variety of preprint repositories you can consider, many of which are discipline specific.

9.5 Identifying deceptive publishers, journals and conferences

Deceptive (predatory) publishers and journals use misleading or even deceitful practices to encourage you to submit to your manuscript. This includes making fraudulent statements about their editorial board, their peer review process, impact factors, and/or indexing. As the peer review process is either poor or non-existent, the articles published by these journals are often very low-quality and not indexed by major databases. As a result, the articles can be difficult to find, receive very few readers, and are rarely cited.

Be mindful of behaviours and activities that may indicate predatory practices. The following factors can help you identify a deceptive journal:

- Time frame between submission and publication is too short to allow for genuine peer review.
- Journal contact details do not include a named Editor.
- Journal is not indexed by reputable sources (e.g. Scopus or Web of Science).
- Impact factor claims are not backed up by evidence.
- Invitation to submit includes bizarre flattery.
- Journal name or journal scope is very broad.
- Top scholars in the discipline do not publish in it.



Increasingly, early career researchers are being targeted by deceptive book publishers offering to turn their thesis into a book. They are also known vanity publishers because they appeal to researchers who have recently finished their PhD and might have limited experience in publishing, or are eager to get published. These publishers are mostly print-on-demand services, only printing books as they are ordered.

Indicators of a deceptive publisher include:

- unsolicited email telling you how great your research is
- email requesting any payment at all for publishing your book
- publisher is not a scholarly publishing company and doesn't offer usual scholarly publishing services such as editing and peer review
- publisher does not provide information about print runs or where the books will be sold
- no marketing or promotion plan for your work.

Think. Check. Submit. is a resource that helps researchers identify trusted journals and book publishers for their research.

"Think Check Submit" by Think.Check.Submit. CC BY 4.0.

Researchers are often targeted by predatory conferences. These conferences may look legitimate based on a professional website, but you should be prepared to dig quite deep to determine whether they are credible. These conferences are hosted purely for profit, and it is likely you will be delivering your paper to a group of other unsuspecting researchers in unrelated fields.

Ask questions and actively seek information, such as:

- Can you contact the conference review committee directly?
- Are there any familiar names on the conference editorial committee? If so, email them via their institutional email address to check they are still on the committee.
- Are the conference proceedings peer reviewed & published?
- Are the conference proceedings indexed with a reputable source?
- Most legitimate conferences provide presenters with free attendance – if you are solicited to present, always check this.
- Check how long the conference has been running.
- See if you can find conference proceedings & citation data in Scopus or Web of Science.

Think.Check.Attend. is an initiative that aims to guide and assist researchers and scholars to judge the

legitimacy and academic credentials of conferences in order to help you decide whether to or not attend the same.

"Think Check Attend" by Think.Check.Attend. CC BY 4.0.

Read

Obtain a comprehensive overview of this topic through the fact sheet from the UNESCO Open Science Toolkit.

9.6 Tools for selecting journals

Using tools to help select a journal for publishing your research can help streamline the decision-making process by matching your manuscript to journals that align with your research topic and scope. This can save you significant time and effort. Many of these tools also provide information about specific journals, such as readership, citation impact, acceptance rates, and publication timelines. Incorporating these tools into your selection process might also help you avoid predatory journals by highlighting potentially concerns that need further investigation.

Select the arrows in the accordion below to explore examples of tools that are available to guide your publishing choices to enhance the visibility and impact of your research.

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Other manuscript matching tools

- Elsevier Journal Finder manuscript match tool for journals published by Elsevier.
- Taylor & Francis Journal Suggester manuscript match tool for journals published by Taylor & Francis.
- Wiley Journal Finder manuscript match tool for journals published by Wiley.
- Web of Science Manuscript Matcher

Activity

Finding and comparing journals

Option 1: Go to Scimago and use the Scimago Journal & Country Rank search to find a Q1 journal in your subject area.

Option 2: Go to DOAJ and use the Search tab and filters to find an open access journal in your subject area that has no Article Processing Charge (APC).

9.7 The publication process and peer review

In this section, we will explain the stages involved in the peer review and publication process, so you know what to expect. You will learn some more publishing tips as well as how to promote your article to a broad audience.

Preparing to submit

Before submitting your manuscript to the selected journal, refer to the 'guidelines for authors' to review the specific formatting requirements, including word count and citation style. These requirements can differ between publishers, so authors are advised to carefully follow the guidelines to ensure their work meets publication standards. You will need to make sure your research aligns with the journal's mission statement, editorial perspective, and audience. Check the open access arrangements of the journal as many publishers now have **Read and Publish Agreements** that enable immediate open access without a fee.

Professionally communicate with publishers about your work

After focusing on your academic work for so long, you now need to adapt your writing skills to professionally communicate your research to publishers. This correspondence will primarily be in the form of cover letters to individual journals where you are seeking publication or writing abstracts for conference proceedings.

Cover letters

A cover letter is more than just a request for your research to be included in a journal; it is the first opportunity you have to have impact on the editorial decision. A concise and well written cover letter should highlight the importance and significance of your research.

Before you start writing your cover letter, it is vital to look at the journal website and review the scope, aims, and audience of the journal. If your research doesn't fit these parameters, your paper will likely be rejected immediately. These submissions not only waste your time, but they also waste the time of very busy editors and journal managers.

It is important to follow the journal guidelines for authors – these have been written precisely to ensure your content can fit the criteria of the journal and include things such as word count and citation format. These can vary significantly across publishers and authors are recommended to comply with the sometimes very specific requirements in order to meet publication requirements.

Your cover letter should always include:

- editors name – check & double check
- journal name
- your article title
- type of article, for example, review, case study, original research
- date of submission
- brief background of article
- brief overview of methodology
- brief description of your findings
- brief explanation of why the paper is important and why it will be of interest to the journal's readers. Think about its significance to academia and the broader community
- if your article is based on your thesis, you must mention it!

Things to avoid:

- don't use jargon
- don't embellish your findings
- don't inflate the significance of your findings.

Abstracts

In addition to your cover letter, you will need to provide the abstract for your manuscript with your cover letter. Your abstract should include the objectives of the research, the methodology used, and a summary of the findings and conclusions. Some tips for preparing your abstract include:

- Make your abstract compelling, it should entice readers to want to know more.
- Follow the requirements of the journal or conference proceedings regarding length or style.
- It should include these five elements:
    - your research problem and why it matters
    - research objectives – use terms such as investigate, test, analyse, and evaluate to describe what you set out to do
    - methods used to do this and what you did
    - summary of key results highlighting most important findings
    - your answer to the problem and your conclusions.
- The readers should finish with a clear understanding of the central point that your research has proved or argued. In essence, what your research set out to do, how you did it, and the conclusions you reached. This should be written independently from your research with fresh language and should be well structured and concise with a logical flow.
- Don't include too much detail.

Submitting

When you are ready to submit, upload your manuscript via the instructions on the journal's webpage. You will navigate through a workflow that includes confirming that your manuscript has only been submitted to that journal and ethical clearance has been granted for your research (if required). You must never submit a manuscript to more than one journal at the same time.

Waiting for a response

Once submitted, you will need to be patient as the approval process takes time. Editors read manuscripts to screen out unsuitable submissions and share submissions with peer reviewers, usually researchers or practitioners in a similar field of research. Quality journals may go through a "double blind" peer review, which means that the author's name or names does not appear on the paper going to the reviewers and the names of the reviewers are not made known to the authors.

Reviewers are generally given between three weeks to three months to review a manuscript. Once all reviews have been returned, editors make a final decision, consolidate the reviewers' feedback, and respond to authors. If you have not heard from the editor after six months, it is reasonable to contact the journal to enquire about the progress of your submission.

Responding to peer review and resubmitting

The peer review process is a valuable form of quality control. The process can be confronting and uncomfortable when you first view the feedback but be assured that, while the process may identify weaknesses in your writing, methodology, or argument, the aim is to improve your research output. Many journals will respond with a "revise and resubmit" letter to their manuscript submissions.

Peer review is a great opportunity and, if you use the reviewers' comments to methodically and productively revise your manuscript to incorporate suggested changes, there is a strong chance that your updated manuscript will be accepted for publication.

It is recommended that you respond quickly and respectfully to the recommendations of editors and reviewers. Where you disagree with comments or the advice of different reviewers appears to conflict, indicate that you have considered each suggestion carefully and respectfully.

When resubmitting, include an extensive cover letter and ensure that you:

- thank the editor and reviewers
- identify the main points of revision
- demonstrate how you have revised the manuscript to address concerns
- explain areas not revised with substantial evidence to defend the original submission.

Watch

See the video below to hear from QUT academics and recently graduated students about some of the common experiences associated with the publication process to offer some insights on positive steps to help you through it.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=1683#oembed-1

Dealing with rejection and responding to peer review. (QUT YouTube video, 4m04s).

QUT only

Practical tips for submitting:

- Cite your QUT affiliation as 'Queensland University of Technology (QUT)'.
- Include your ORCiD (this will travel with the article metadata into the citation databases).
- State why the paper will be of interest to the readers of the journal if there is an opportunity to do so.

Read through QUT's information about authorship and publication to better understand your rights and responsibilities.

Want to know more about open access publishing and Read & Publish Agreements? Your Liaison Librarian can assist you to identify journals that meet your requirements and are included in QUT's Read & Publish Agreements.

Publishing tips

See below for some recommendations to help make the process of getting published as smooth as possible for you:

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And last, but not least...**Don't take rejection personally. Feedback is a valuable gift as it helps you to improve.**

9.8 Social media and promoting your research to a broader audience

If you want your research to be noticed, read, and cited, there are other approaches you can employ. One of the most effective ways to engage an audience is storytelling. Consider writing a plain language summary of your article covering what your research is about, what you did, what you found, and why your research is important. You can then upload it to a site, such as KUDOS, or The Conversation, or you can use it as a blogpost.

Social media

Social media is another valuable way to promote your research. You could mention your latest publication on a social media channel that is popular in your field to raise the profile of your work and your own academic profile.

Use the social media channels that are popular within your discipline to tell people about your research. Include a link to the article (a DOI is best as the attention you generate can be tracked by Altmetrics). If you haven't used social media for professional communication before, make sure you follow the rules or guidelines of the site channels, chat groups, or applications you follow. Most will include a request for respectful and constructive communication and will not tolerate unprofessional or critical posts. Be an observer on the group and see how it runs, the kind of content it shares, and the tone of the communications before posting.

As a researcher it is almost as important to stay in touch with the latest discipline related social media as it is with the latest research. Research blogs and apps, such as LinkedIn and Bluesky, can keep you updated with what other researchers in your discipline are doing.

QUT only

QUT runs regular workshops for researchers wanting to build their communication skills including:

- How to pitch and write for *The Conversation*
- Media strategy for researchers
- How to build and enhance my social media presence

9.9 Reflecting on your learning

In this module we have looked at the steps involved in selecting a journal or other publication in which to publish. To confirm your learning, take a moment to complete the knowledge check, reflect on the questions provided, and identify whether you understand the content or have any questions for your research support team.

Knowledge check

Confirm what you have learned in Module 9 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1689#h5p-46

Reflect

Consider:

1. What are the three main types of publication discussed in the source material?
2. What is the primary benefit of open access publishing for readers?
3. What is a “Read and Publish” agreement?
4. Why is it important to develop a publishing plan?
5. List three things to consider when choosing a journal for your research.
6. What are predatory or deceptive journals, and what is one sign of such a journal?
7. How should authors respond to feedback from peer reviewers?

9.10 Module summary

You have completed Module 9.

You are now ready to move onto *Module 10 Finding and using indicators of research impact*.

Additional resources

The following resources provide further practical guidance, tools, and theory to support your understanding and development of skills for planning to publish.

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MODULE 10 FINDING AND USING INDICATORS OF RESEARCH IMPACT

TANYA HARDEN, DR BRENDAN SINNAMON

Module learning objectives

By the end of this module, you should be able to:

1. Understand the value of measuring and explaining research impact.
2. Identify and access quantitative and qualitative indicators of impact as appropriate.
3. Find metrics at journal, author, and document level.
4. Identify and use other indicators of impact.
5. Use indicators appropriately in evaluations of information.

Learning plan

In this module, we will:

- Introduce research impact.
- Explore the main types of metrics.
- Introduce metrics tools.
- Discuss the responsible use of metrics.
- Explore other indicators of use, value or engagement.
- Demonstrate how to include metrics in academic writing.

10.1 What is research impact?

This section introduces the concept of research impact – what it really means, why it matters, and how it can be measured. Many people are familiar with the concept of impact within academia, which can involve the use of indicators like publication metrics (citations, publication counts etc.) in addition to qualitative indicators, such as peer review. It is important to distinguish publication metrics, and other measures of impact within academia, from the concept of research impact. Understanding impact goes beyond counting citations. It's about recognising the broader influence of research on knowledge, policy, and practice. Research impact is sometimes called societal impact, in that it considers the impact of academic research in the "real world", outside of academia.

Research impact

In its Research Impact Principles and Framework, the Australian Research Council defines impact as:

> "*the contribution that research makes to the economy, society, environment or culture, beyond the contribution to academic research*"
>
> ARC (n.d.), para. 7.

Measuring and showing evidence of the impact of academic research is becoming an everyday event in institutions across Australia and the world.

Types of research impact include:

- health impact – improvements in health outcomes and health systems
- economic and societal impact – evidence that the research has been taken up and used by policymakers, and practitioners, or has led to improvements in services or business.

Examples of research impact include:

- policy decisions or changes to legislation, regulations or guidelines which have been informed by research evidence
- costs of treatment of health care have changed as a result of research-led changes in practice
- growth of small businesses in creative industries through the development of new products and services.

As a researcher, knowing how to find and interpret these indicators not only helps you showcase your own work but also strengthens your ability to choose high quality, influential information sources for your research.

Quantitative indicators

Publication metrics are quantitative measures, based on publication and citation data that are often used within academia to assess the influence of research outputs. They can be used to analyse the

published output of authors, institutions, and regions, as well as an indicator of journal quality. Publication metrics are often considered as part of research assessment exercises and university rankings, and are often used by researchers in grant and promotion applications. Publication metrics can be calculated at the individual article level, author level, and journal level and some metrics are used to assess multiple entities. For example, citations can be calculated at an article, author, and journal level.

Some examples include:

- Article-level metrics, such as citations, provide an indication of the influence of an individual publication.
- Author-level metrics provide an indication of the influence of a researcher's output. They include the h-index, average citations per publication, field-weighted citation impact, and published output.
- Journal-level metrics are an indicator of a journal's quality and include metrics, such as the Journal Impact Factor and Scimago Journal Rank.

Bibliometrics are based on a researcher's published output; a researcher must have published several publications to be able to measure the possible influence of that research.

Qualitative indicators

Qualitative indicators can provide valuable evidence of impact, both in academia and in the "real world". They can provide greater context than numbers, explaining how and why academic research has made a contribution outside of academia and what was the significance of this contribution. For some non-traditional research outputs, such as creative works, expert assessments, such as reviews, are the most appropriate method of assessment, while invitations to speak at conferences can demonstrate a researchers esteem and standing within their field. Qualitative indicators can include:

- peer review
- letters of recommendation
- invitations to speak
- successfully acquitted research grants
- book reviews
- feedback from stakeholders and participants
- evidence of implementation into practice.

Qualitative and quantitative indicators can be used together to provide a richer more holistic view of the influence of academic research. The evidence you use, whether it is metrics or feedback from stakeholders will depend upon your purpose and any associated guidelines, for example, assessment criteria. You can find more examples of both quantitative and qualitative indicators of impact on the London School of Economics and Political Science's How to measure impact page.

Read

Read through the chapter Beyond metrics – research impact and engagement in QUT Library's 23 Scholarly Communication Things and complete the activities to check your understanding.

Indicators of research impact serve two key purposes:

- to demonstrate the impact and reach of your own research
- to assess the impact and reach of the research of others.

The latter is particularly useful when selecting credible sources for inclusion in your literature review or research project. For strategies on evaluating the quality and relevance of information sources for your research, see *Module 6 Evaluating information for research*.

10.2 Different kinds of metrics

There are a variety of publication and citation metrics available. Some are proprietary, meaning they can only be found in specific databases, such as the Journal Impact Factor, while others are found across a variety of sources, such as citation counts. Some metrics have relatively simple calculations, such as publication counts, while other metrics have more complex calculations, such as Field-Weighted Citation Impact (FWCI).

This section will focus on a few of the more commonly used metrics, including publication and citation counts, the *h*-index, journal metrics, and other field-normalised metrics.

A few simple guidelines and considerations for using metrics appropriately include:

- Metric values will differ depending on the source. This can be due to a number of factors, including the size of the database and the depth of coverage in different disciplines.
- Consider what is the appropriate metric or metrics for what you are assessing. Resources such as the Metrics Toolkit and the help functionality in the databases can assist you.
- Where possible, use multiple metrics to provide more context. For example, when using FWCI to assess a publication, it can be useful to include the citation count as well.
- Many metrics should not be compared across disciplines, or used to compare researchers at different career stages.
- Be aware there will be situations where publication metrics are not the best method of assessment and other indicators are more appropriate.

Examples of questions that can be answered by these types of metrics are:

- What are the higher ranked journals in the field of engineering?
- Who is citing my articles?
- How many times have I been cited?
- Which journal should I publish in?

Types of metrics

Publication counts

The publication count is the number of publications produced by an author.

A basic metric to measure author productivity is the publication count. The number will vary depending on the source database. It should be noted that a greater volume of output does not necessarily correlate with greater influence, reach, or research quality. This metric should not be used to compare authors across disciplines as publishing and citation behaviour vary across disciplines. It should also not be used to compare authors at different career stages.

Citation counts

Citation counts indicate the usage and engagement with the cited work by other authors.

A citation means that a scholarly work has been cited in the text and reference list of a publication. The 'count' of citations differs according to the citation tool used because different databases have different content coverage, including the number of publications and the years indexed. The citation count has been used as a proxy for quality – with quality indicated by a high level of citations. However, this is not always the case and citation counts alone as an indicator of influence/quality of an output are unable to determine:

- if the citations were viewed positively or negatively
- the expertise of researchers from different disciplines.

In all disciplines, citations take time to accrue. However, some disciplines (e.g. chemistry and biomedical science) have faster peer-review and publication processes and, consequently, higher citation rates than others (e.g. education, creative industries). Publishing norms and citation patterns can differ between disciplines. Therefore, this metric should not be used to compare authors across disciplines or at different career stages.

Read

The Lancet retracts Andrew Wakefield's article

In his article, Steven Novella discusses an **example of a highly cited paper** that was determined to be scientifically flawed. The original paper incorrectly claimed that the combined measles, mumps and rubella vaccine caused autism in children. The article was later retracted and the lead researcher was investigated for unethical research practices.

The message here is not to use citations in isolation – it is just one part of the story.

Consider citation analysis when you want to find:

- how often an output has been cited (times cited)
- the total citations and average citation per article for an author
- the average cited count for articles published in a specific journal
- additional resources on your topic also called tracking citations; in addition to checking the reference lists of papers you find useful, you can also check who has cited the paper.

h-index

The h-index is a simple, cumulative indicator of research performance and can be calculated using citation tools, such as Web of Science, Scopus and Google Scholar Profile.

The *h*-index is a variation on the concept of times cited and attempts to measure both the productivity (number of papers) and the citation impact of a researcher's publications. It provides a mechanism for the work of individual researchers to be compared with others in the *same discipline* and at the *same career stage*.

Example: If a researcher has an *h*-index of 4, this means that the researcher has four papers that have each been cited four times or more.

Uses:

- It is most appropriate for researchers who are established and have published extensively.
- It measures "durable" performance, not only single peaks, and avoids skewing by one highly cited paper.
- It is not limited to journal document types and can include conference papers and book chapters.

Limitations:

- It is not a good indicator for early career researchers or researchers who have taken career breaks, as both their publication output and citation rates will be relatively low.
- It is highly dependent on the length of a researcher's career, meaning only researchers with similar years of service can be compared fairly.
- It provides no indication of peaks and dips in publication performance.
- It is a less appropriate measure of academic achievement for researchers in the humanities and social sciences.
- It can be inflated by self-citations.

Read

The *h*-index has come under increased scrutiny in recent years.

Halt the h-index, a blogpost by Sarah de Rijcke, Ludo Waltman and Thed van Leeuwen from Leiden University's Centre for Science and Technology Studies (CWTS), outlines the limitations of the *h*-index.

Field normalised citation metrics

Many publication metrics, such as the h-index, do not account for differences in citation and publication practises across fields. Field normalised citation metrics are designed to mitigate these differences.

Metrics, such as Field-Weighted Citation Impact (FWCI) and Category Normalized Citation Impact (CNCI) compare the number of citations received by a publication to the expected number of citations for similar publications. Similar publications are usually the same age, publication type (article, review, conference paper, book etc.), and subject category, but this can differ depending on the field-normalised metric. The world average for these metrics is 1.00 – a number more than 1.00 indicates output has been cited more than expected, according to the global average for similar publications, less than 1.00 indicates it has been cited less.

While these metrics all have a world average of 1.00, they use different publication data and calculations to reach this number, so cannot be used interchangeably. The FWCI or CNCI of an author, institution, or group of authors is based on the mean average of the FWCI or CNCI of their publications. This means the that for entities with a small number of publications, the metric can be skewed by a few highly cited publications. These metrics can also vary significantly for newer publications.

Field-normalised metrics can be useful when comparing publications or authors from different fields.

10.3 Journal ranking and tools

Journal ranking and metrics attempt to rank and estimate the importance and performance of a journal in a particular field.

There are a range of tools designed to rank, compare, and measure scholarly journals in a specific discipline. Journals are allocated to quartiles (Q1, Q2 etc.) based on where they rank by a journal-based metric. For example, Scimago Journal Rank ranks journals by the metric Scimago Journal Rank and Journal Citation Reports rank journals by the Journal Impact Factor and the Journal Citation Indicator.

Journal metrics

See below for links to and descriptions of some of these tools.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://qut.pressbooks.pub/airs/?p=4105#h5p-90

Limitations of journal metrics:

- Journal metrics are designed to assess the journal and are calculated using all (or a subset of) its publications for that period. They cannot assess the quality or account for the impact of individual articles in a journal.
- Journal metrics are not designed to assess the contribution of an individual author.
- In research areas, such as computer science and engineering, where the main form of scholarly communication is conference papers rather than journal articles, the journal measures may be less relevant.
- The coverage of a database providing journal metrics may be unevenly distributed across subject areas, or not provide measures for some journals at all.
- Journal metrics are available for only a small number of journals that publish in languages other than English.
- Some journal metrics can be manipulated by self-citations, citation stacking (coordinated exchange of citations between authors or journals), and coerced citations, where editors pressure authors to cite certain publications.

Journal ranking lists

There are several journal ranking lists available, including the Australian Business Deans Council's (ABDC) Journal Quality List, the Association for Information Systems MIS Journal Rankings in the area

of management information systems, and The Journal Quality List, compiled by Dr. Anne-Wil Harzing, covering the areas of economics, finance, accounting, management, marketing, tourism, psychology, and sociology.

Read

Read the Overview of journal metrics

This article will give you a better understanding of how common journal metrics are calculated, and the some of their limitations to their use in evaluating journals.

10.4 Where can you find metrics?

There are a variety of tools, both free and subscription-based, to use for analyses or article, author, and journal metrics. Citation indexes, such as Web of Science, Scopus, and Google Scholar, track citations to academic works, showing how often and where they are cited. It helps researchers assess the influence and relevance of research, discover related studies, and identify influential works and trends within a field.

Citation indexes facilitate literature reviews, impact assessments, and the discovery of related research. By analysing citation patterns, scholars can gauge the significance of a research output, identify key contributors, and explore trends within disciplines.

Commonly used citation indices are:

- Scopus – an Elsevier product, requires a subscription
- Web of Science – Clarivate product, requires a subscription
- Google Scholar – freely available

Databases vary in:

- the sources indexed (journals, publishers, conferences etc.)
- the range in years of these sources (depth of coverage)
- the citation analysis features available.

Research analytics tools, such as SciVal (based on Scopus data) and InCites (based on Web of Science data), use the citation data collated in citation indexes to provide more in-depth analyses of published research, generating a greater variety of more sophisticated metrics and insights than what is available in a citation index. These products can analyse the output of researchers, groups of researchers, and institutions and can assist in benchmarking activities. This section will not be focusing on these more advanced tools, but if you would like to learn more, you can access the InCites training website or the SciVal LibGuide.

In the next sections, you can explore in more detail how to use Scopus, Web of Science, and Google Scholar as examples of citation indexes available to you to evaluate quality of publications.

Read

Read this blog post Google Scholar, Web of Science, and Scopus: Which is best for me?

10.4.1 Choosing a tool - Scopus

Scopus is a subscription database of peer-reviewed literature, including journals, books, and conference proceedings. In Scopus you can search for documents, authors, institutions, and journals and find their associated metrics. Scopus features tools to track, analyse, and visualise research. Access to Scopus will depend upon your institution's subscription.

As Scopus is a subscription product, you will need a login to access the database. The Scopus LibGuide is a useful resource to get a better understanding of how to search Scopus.

Key facts about Scopus:

- Coverage in life science, social science, physical sciences, and health sciences. Learn more about coverage on the Scopus Content page.
- Interdisciplinary coverage. Generally better coverage than Web of Science for the disciplines of Arts and Humanities, Business, Education, Engineering, Health, IT (conferences), Social Sciences, and Law.
- Updated daily.
- It provides many metrics, including article citation counts, an author's *h*-index, and journal metrics, such as CiteScore or Scimago Journal Rank.

To learn how to use Scopus, the Scopus tutorials are short videos or transcripts on the basics of using this platform. Their Scopus Support Center has frequently asked questions, which go into more detail on each area. For clarification of the metrics in Scopus, read their page on How are Article Metrics used in Scopus?

Author profiles in Scopus are automatically generated using an algorithm, but can be managed by an author, using the Author Feedback Wizard. Each author profile has a unique Scopus Author ID associated with it. You may have seen Scopus Author IDs listed on researchers' ORCiD profiles, or their staff profile pages.

Activity

Use Scopus to find the following metrics.

1. **Article citation counts:** do a title search using the article title, and to the right of the result, note the *'Cited by'* count.
2. **Author *h*-index**: search for the author in the 'Authors' tab. Click on the author name to view the *h*-index and more. If the author has multiple profiles, select all relevant results, and select *'View Citation Overview'*.
3. **Journal measure**: in the list of results, click on the title of the journal. Note the Scimago Journal Rank (SJR) alternatively and search on the Journal title.

Need help?

- See citation analysis instruction in the Quick Reference Guide (PDF, 3.04MB).
- Scopus tutorials show how to use Scopus to search and analyse researcher output.

QUT only

Additional resources:

- Register for and attend an Introduction to Publication Metrics workshop.
- Watch the Introduction to Publication Metrics workshop video.

10.4.2 Choosing a tool - Web of Science

Web of Science (WoS) is a subscription database that indexes a variety of peer-reviewed content, including journal articles, books, and conference proceedings. The Web of Science Core collection consists of several indexes, including the Science Citation Index Expanded (SCIE), the Social Sciences Citation Index (SSCI), the Arts and Humanities Citation Index (AH&CI), and the Emerging Sources Citation Index (ESCI). It also includes conference and book citation indexes. Access to these indexes will depend upon your institution's subscription.

This Quick Reference Guide (PDF, 1.24MB) is a useful introduction to Web of Science. The Web of Science Help Center provides user guides, video tutorials and on-demand courses to assist you in developing your skills in using Web of Science. Like Scopus, metrics are available for researchers, affiliations, documents or searches you construct.

Key facts about Web of Science:

- Coverage of literature in sciences, social sciences, arts, and humanities. Learn more about coverage in the Web of Science coverage details guide.
- Updated daily.
- Metrics available in Web of Science find article citation counts, the author *h*-index, and journal quartile rankings.

You can search for documents and researchers in Web of Science and find their associated metrics. You will need to login to Web of Science to access the full functionality, particularly if you are accessing the database from off campus.

Web of Science Researcher Profiles are automatically generated using an algorithm. They can be claimed and managed by the author, including linking to other systems, such as ORCiD. Each author profile has a unique ResearcherID associated with it. You may have seen ResearcherIDs listed on researchers' ORCiD profiles, or their staff profile pages.

Activity

Use Web of Science to find the following metrics.

1. **Article citation counts**: do a title search using the article title, and to the right of the result, note the '*Times Cited*'.
2. **Author *h*-index**: do an author search in the 'Researchers' tab, Click on the author name to view the *h*-index and other metrics. If the author has multiple profiles, select the relevant profiles and then click on 'View as combined record'.
3. **Journal quartile ranking**: to find out the ranking for a journal listed in your results, click on the jour-

nal title to find the quartile information.

Visit the Web of Science Platform for training resources to assist you in using Web of Science effectively.

QUT only

Additional resources:

- Register for and attend an Introduction to Publication Metrics workshop.
- Watch the Introduction to Publication Metrics workshop video.

10.4.3 Choosing a tool - Google Scholar

Google Scholar is free to access. Due to its breadth of coverage, citation numbers are generally higher than in Scopus or Web of Science, however, results should be checked as they may pick up unrelated citations. Google Scholar Metrics provides information on how to get started, the coverage of publications, and the inclusions and corrections (or how to make them). To get started with Google Scholar as an author to track your citations, you can start with Google Scholar Profiles and use the other tabs for citation related frequently asked questions.

Key facts about Google Scholar:

- Google Scholar can help you find article citation counts.
- You can use Google Scholar to track citations over time.
- Minimal data curation, which means that non-scholarly works can be included.
- Broad coverage, which can be useful for disciplines not well represented in subscription databases.

Read

- Short section on the limitations and criticism of Google Scholar citations.
- Can librarians trust resources found on Google Scholar? Yes... and no. – A nuanced discussion on reliability.
- Some things you need to know about Google Scholar – Primarily focused on profiles, but an engaging read.
- For a historical perspective, see Prof. Anne-Wil Harzing's 2008 article, Google Scholar as a new data source for citation analysis, published by the author of *Publish or Perish,* a software program that retrieves and analyses academic citations.

Google Scholar Citations

A Google Scholar Citations profile allows you to keep track of citations to your outputs, increases the visibility of your work through making your profile public on Google Scholar, and provides others with a mechanism to create alerts to follow your new articles and new citations to your work.

Searching for others in your field who may have a profile allows you to find potential collaborators and research that may be of interest.

See an example Google Scholar Citations profile. Note that metrics are usually higher in Google Scholar, as it indexes a broader range of content. There can also be issues with data quality in Google

Scholar, including duplicate publications. It is the profile owner's responsibility to maintain their profile and remove errors.

Activity

Use Google Scholar to find the following metrics.

1. **Article citation counts:** do a search using the article title, and below the relevant result, note the *'Cited by'* count.
2. Set up an alert to follow the author, list of metrics and collaborators.
3. Search for other authors who have created a profile.

For more help, see To get started with Google Scholar Citations.

QUT only

Additional resources:

1. Register for and attend an Introduction to Publication Metrics workshop.
2. Watch the Introduction to Publication Metrics workshop video.

10.5 Other indicators of use, value, or engagement

For many disciplines, traditional citation-based metrics alone will not capture the influence or reach of their research. This includes authors in disciplines that mainly publish books and book chapters, who may find that their outputs are not always included in citation indexes, and researchers in fields that primarily produce what are known as non-traditional research outputs (NTROs).

NTROs can include (but are not limited to):

- research reports
- code
- software
- datasets
- creative works (e.g. exhibitions, performances, compositions)
- architectural designs.

There will also be occasions where traditional citation metrics will not be the best form of evidence, for example, when demonstrating research impact, such as changes to clinical practice or other impacts outside of academia.

This section will introduce you to alternative metrics (altmetrics), explaining what they are, what they indicate, and the databases you can use to find them. It will also cover finding other evidence, such as library holdings.

Alternative metrics

Alternative metrics, commonly referred to as 'altmetrics,' are article-level metrics that were developed to complement traditional citation-based metrics by capturing the broader and more immediate impact of research. They include attention in social and traditional media, usage in reference tools, and citations in patents, policy, and other grey literature. Unlike citations, which take years to accrue and reflect only academic influence, altmetrics track online engagement, such as social media mentions, news coverage, policy documents, and blog posts. They can provides an indicator of how the public, practitioners, and policymakers are engaging with academic research..

Altmetrics can also be a useful indicator for non-traditional research outputs, such as datasets and software, and tracking downloads and other forms of engagement that can't be capture by traditional metrics. These non-traditional metrics provide an additional or alternative way to measure attention to, usage of, and engagement with a published work. It is important to remember that altmetrics complement, rather than replace, traditional metrics.

Altmetrics may include:

- number of article views
- number of downloads in an institutional/preprint repository

- number of times an article has been added to an online reference manager (e.g. Mendeley)
- number of Facebook posts
- number of mentions in news sources
- number of patents and patent citations
- number of data citations
- number of blog posts from individuals and organisations
- number of mentions in policy documents.

Benefits of altmetrics include:

- immediate response to output
- evidence of interest and engagement with the public, broader society
- interest outside of formal publishing
- contextual information about attention via altmetric aggregators
- improved visibility of your work and your research profile
- evidence of engagement with your research outside of academia, particularly in the policy space
- helpful to researchers with non-traditional research outputs, such as those in disciplines, such as Creative Industries
- supports impact and engagement narratives, which is particularly helpful when applying for research grants.

Limitations of altmetrics include:

- measures attention not quality
- value of metrics generated varies and is dependent on the user groups, measures, and fields of research.

Read

Read this report from Mike Thelwall on The pros and cons of the use of altmetrics in research assessment for more detail on altmetrics.

Activity

Before moving on to the next section, make a list of as many places as possible on the web that might feed into altmetrics. Try to be as specific as possible about the website or platform.

10.5.1 Choosing a tool - Altmetric Explorer

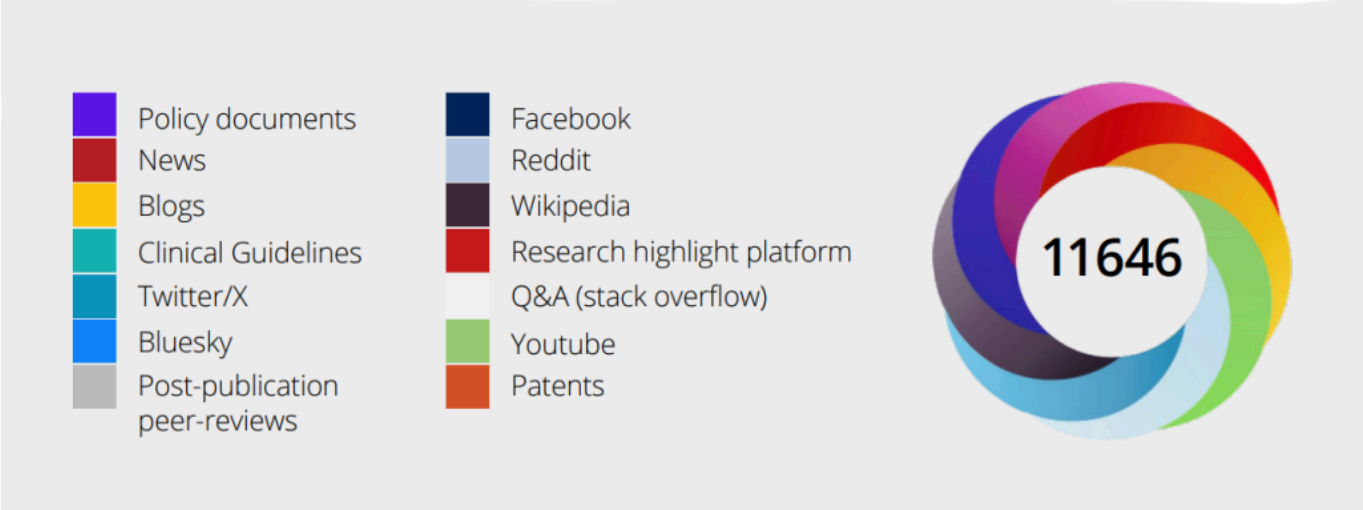
While altmetrics can be gathered from many sources, there are specialist tools, such as Altmetric Explorer, that aggregate this data from a variety of sources. Altmetric Explorer tracks attention to research outputs from social media and traditional media, government and policy documents, post-publication peer review, Wikipedia, clinical guidelines, and podcasts.

Key facts about Altmetric Explorer:

- Only research outputs that have an identifier, such as a digital object identifier (DOI), PubMed ID (PMID), or ISSN, are tracked.
- Altmetric Explorer pulls data from a wide variety of sources, including social media, traditional media, policy, and government organisation, patent offices, and reference managers.
- Altmetric Explorer data for an article can be accessed for free via the Altmetric badge on a publishers website, but a subscription is required for further analysis.

Altmetric Explorer cleans up and normalises the data from these sources then makes it available for analysis. A key difference between Altmetric Explorer and other social media monitoring services is that Altmetric Explorer will disambiguate links to outputs. It recognises that even though some social media posts might link to a PubMed abstract, newspapers to the publisher's site, and blog posts to a dx.doi.org link, they are all talking about the same paper.

You may have seen the Altmetric Explorer donut on article pages in QUT ePrints and publisher websites. Each colour denotes attention from a different source.



"Colours of the donut" by Altmetric, part of the Digital Science portfolio © Altmetric.

The number in the middle of the donut is the Altmetric Attention Score, which is automatically calculated, and is a weighted count of the amount of attention tracked for a research output. It is based

on three main factors: volume, sources and authors. For example, a mention in a newspaper article is more heavily weighted than a mention in a blog post. You can learn more about the Altmetric donut and Altmetric Attention Score. When looking at the Altmetric Attention Score of an output, the information provided in the "Attention Score in Context" tab can help you to understand how this output and its Score in comparison to other outputs in Altmetric Explorer.

While the Altmetric Attention Score may provide an indicator of the attention an output has received, digging deeper into the sources of attention can be more useful, particularly when looking for evidence of impact on policy, citations in clinical guidelines, or evidence of engagement with end-users.

Watch

Watch the video below on getting started using Altmetric Explorer to find alternative metrics and mentions of research outputs.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=3197#oembed-1

Finding Metrics: Altmetrics (QUT YouTube video, 4m16s).

10.5.2 Other sources of non-traditional metrics

While tools like Altmetric Explorer offer valuable insights into research impact, a broader scope of non-traditional metrics exists beyond these platform, providing additional sources of evidence and indicators of reach and influence. The following examples are not exhaustive but offer additional sources you may wish to explore.

Book holdings

The number of libraries that hold a book is a general indicator of value, proving there is a wide audience for the publication.

WorldCat

Use WorldCat to find the number of international libraries that hold a book:

1. In the '*Advanced Search*', perform an Author and Title search.
2. In the results, click on the title of the book to open the entry.
3. Scroll down, and under *Find a copy in the Library*'. Enter your location as 'Australia' and click: '*Find Libraries*'.

The total count of the libraries displayed will now be found directly underneath the location entry box.

Trove

Use Trove to find the number of Australian libraries that hold a book:

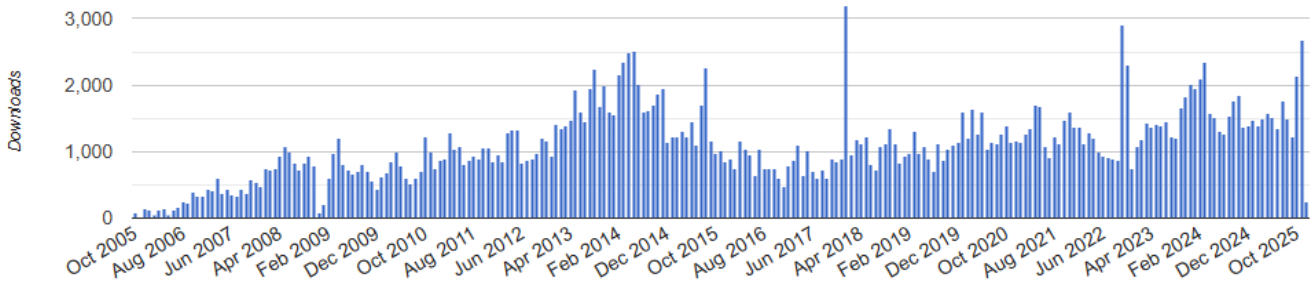
1. Select the 'Books & Libraries' option from the 'Advanced search' dropdown menu, enter the book title and the first author family name, and click *'Search'*.
2. Click on the title of the book in the results.
3. Find the number of libraries by clicking on 'Borrow'.

Downloads and pageviews

The number of article views or downloads of a PDF version of an article can indicate interest or popularity. Tools that provide download information might be databases, repositories, or a journal's website, and include QUT ePrints and PLOS Journals.

Within QUT ePrints, the statistics dashboard gives a graphical overview, key figures, and most popular works. From the bottom of the page there are full reports.

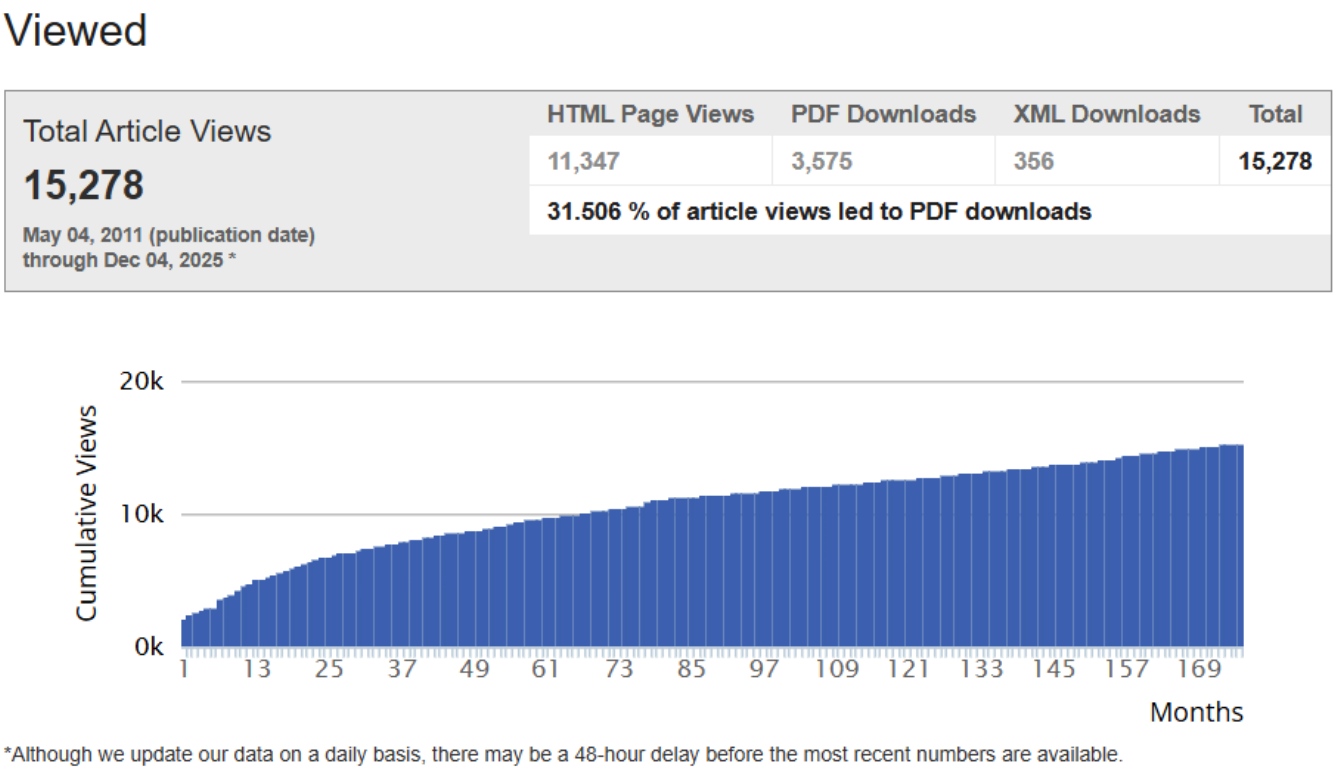
This is a screen capture of downloads of publications by QUT researcher, Professor Marcus Foth, from QUT ePrints, as of 4 December 2025.



"Statistics Overview: Marcus Foth" by QUT, CC BY-NC 4.0

Further information is available for downloads by country or downloads from QUT versus from elsewhere.

As another example, this is a screen capture image from 4 December 2025, of key statistics for this article in PLOS one.



Activity

Use **QUT ePrints to find downloads, article, and researcher statistics.**

To find the number of article or paper downloads:

1. Type the journal article title in quotation marks and click '*Search*'.
2. In the results, find the number of downloads next to the green arrow under the reference.

To find other article levels statistics, including altmetrics:

1. Type the journal article title in quotation marks and click '*Search*'.
2. In the results, click on the article title to open the article description.
3. Under the abstract, from bottom left of the *'Impact and interest*' bar, click *'More statistics'*.

For a download statistics overview of specific researchers:

1. From the menu on the left, click on '*Person*', browse alphabetically, and click the entry.
2. At the top right of the resulting publications list, click: 'Statistics dashboard'

Citations in patent literature

Patents are acknowledged as key indicators of innovation and technological progress. Citations to your research within patent literature can provide evidence of impact. Tools such as The Lens offer patent citation metrics, with additional sources including Web of Science, Google Patents, Altmetric Explorer, and SciVal.

The Lens is a free, open-access platform that combines scholarly literature, patents, and biological sequence data in one space. It is also a citation index, so you can also find citation counts, etc. for articles and authors. The Lens' strength lies in how it links patent literature to the cited publications, assisting researchers to discover the links between academic research and innovation.

Watch

This video provides a brief introduction to The Lens.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=4153#oembed-1

The Lens – Explainer Video (Vimeo video, 2m53s)

Citations in policy documents

Citations in policy documents and other grey literature are indicators of the influence of academic research on the policies and decision making of government, non-government, and intergovernmental organisations. Databases, such as Altmetric Explorer and Overton, track and collate citations to publications in these documents.

Overton is a global database that tracks how research influences public policy. It collects policy documents from governments, international organisations, non-government organisations (NGOs), think tanks, research institutes, and parliamentary bodies worldwide, focusing on materials like reports, guidelines, and briefs that influence or inform public policy. It then links them to the academic work they cite.

Watch

Watch this video for an introduction to Overton.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=4153#oembed-2

Introduction to Overton (YouTube video, 4m15s)

Citations in clinical guidelines

Citations in clinical guidelines can be an indicator that academic research is influencing clinical practice. Altmetric Explorer and Overton both index clinical guidelines and can assist in finding citations to publications. Read more about how Altmetric tracks clinical guidelines.

10.6 Including metrics in your writing

Metrics can be used to support the statements you make in your writing, be that for publication or for a grant application or a job application. Choose metrics that are appropriate and best support your statements. When using metrics it is important to include the date they were accessed and the source.

It is a simple format that requires you to name the source and the date when the information was published. This can be in the form of the year or the date with dd/mm/yyyy included.

When you include any kind of metrics in your writing, it is essential that you provide the sources of those metrics.

Examples of including sources for identified metrics

For an author's h-index or number of citations for a journal article:

For example, the citation count for an article could be included as one of the following:

1. "...the article by Naeem and Bhatti (2020) has been cited 214 times (Scopus, 17/07/2024). This indicates..."
2. "Scopus (17/07/2024) shows that Naeem and Bhatti's (2020) article has been cited 214 times, demonstrating that..."
3. "Brown has an *h*-index of 22, which compares favourably to other authors in her field (Scopus, 16/11/2025)."

For a journal ranking:

Journal rankings are released annually, usually mid-year. Due to the way the Journal Citation Reports and Scimago Journal Rankings are calculated, the edition year will always be the year prior to when they are released, e.g. Scimago Journal Rankings released in 2026 will be the 2025 Scimago Journal Ranking.

The ranking of a journal in an edition of a journal ranking will not change, for example, if Journal A is ranked Q1 in its subject category in Journal Citation Reports in 2023, that is its ranking in that edition. Its ranking may change in subsequent editions, but its 2023 ranking will not change, regardless of when you access it. The exception to this rule is if you are accessing journal metrics via a database, such as SciVal, for journal publications in the current year. As the journal ranking for the current year is not available, the closest available year will be used. When the relevant journal ranking is released in the following year, the journals ranking may change. In most cases, you will be using the current edition of

the journal ranking to source metrics for a journal, but, in some instances, you may use earlier editions. Always indicate the edition of the journal ranking you have used.

For example, the ranking for a journal could be included as one of the following:

1. "The *Health Information and Libraries Journal* is a highly ranked journal in the Library and Information Sciences subject category, being ranked in the 1st quartile (2024 Scimago Journal Rank)."
2. "The *Health Information and Libraries Journal* had a ranking Q1 for the Library and Information Sciences subject category at the time the article was published in 2020 (Scimago Journal Rank)."

You can use the principles in the examples above for including other kinds of metrics in your writing.

10.7 Responsible use of metrics in research assessment

Bibliometrics are widely used in research assessment. This includes national research assessment exercises, university rankings, and evaluations of individual researchers. Their use has prompted several initiatives that offer guidance on when metrics should be applied and how to use them appropriately. These initiatives also suggest alternative ways to assess research.

These include:

- The San Francisco Declaration on Research Assessment (DORA), (2013)
- The Leiden Manifesto, (2015)
- The Metric Tide, (2015), and the follow up review Harnessing the Metric Tide, (2022)
- The Hong Kong Principles, (2019).

The principles vary between the different statements, but there are common themes regarding transparency around the use of metrics, an acknowledgement of the limitations of publication metrics, and the importance of expert assessment. In 2024, DORA released further guidance about the use of quantitative metrics in research assessment, outlining five principles:

1. Be clear.
2. Be transparent.
3. Be specific.
4. Be contextual.
5. Be fair.

While these initiatives are primarily aimed at entities undertaking research assessment activities, it is useful for all researchers to have an understanding of these frameworks, as they are leading to changes in research assessment practices. For example, in Australia, the National Health and Medical Research Council is a signatory of DORA and refers to its guidance on the use of journal metrics in grant guidelines, while in 2023, QUT signed DORA and released the QUT Public Statement on Research Assessment (PDF, 86.1KB).

Watch

View the video below to learn more about the San Francisco Declaration on Research Assessment (DORA).

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://qut.pressbooks.pub/airs/?p=3147#oembed-1

Introduction to the San Francisco Declaration on Research Assessment (DORA) by Stephen Curry. (YouTube video, 11m26s). Licensed under CC BY.

10.8 Reflecting on your learning

In this section, you will have an opportunity to stop and consider the information provided in Module 10. You can do the knowledge check and identify whether you understand the content or have any questions.

Knowledge check

Confirm what you have learned in Module 10 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=1664#h5p-44

Reflect

Consider:

1. What is the primary distinction between research impact and publication metrics?
2. What are citation-based metrics, and at what three levels can they be calculated?
3. Why is it essential to provide the sources when including metrics in your writing?
4. What are the main differences in the coverage offered by Scopus and Web of Science?
5. What are altmetrics, and what types of activities do they measure?
6. Besides citation metrics, name two alternative indicators of research impact.

10.9 Module summary

You have reached the end of Module 10.

You are now ready to move onto *Module 11 Before you leave AIRS*

Additional resources

The following resources provide further practical guidance, tools, and theory to support your understanding and development of skills for finding and using indicators of research impact.

Australian Research Council. (n.d.). *Research impact principles and framework*. Australian Government. https://www.arc.gov.au/about-arc/strategies/research-impact-principles-and-framework

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Metrics Toolkit. (2010, August 20). *Field weighted citation impact*. https://metrics-toolkit.org/metrics/field_weighted_citation_impact/

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Jacobs, S., & Radbourne, C. (2021). Altmetrics. In C. Radbourne, A. Steiner, & S. Jacobs (Eds.), *23 Scholarly Communication Things*. Queensland University of Technology. https://qut.pressbooks.pub/23scholarlycommunicationthings/chapter/altmetrics/

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MODULE 11 BEFORE YOU LEAVE AIRS

LYNDELLE GUNTON

Module learning objectives

By the end of this module, you should be able to:

1. Reflect on what you have learned in AIRS.
2. Identify what further research skills training options you require and how to access them.
3. Understand the importance of developing your research support community.

Learning plan

In this module, we will:

- Consider the ways in which advanced information skills will help you as a researcher.
- Explore further training options to assist you in developing your research skills.
- Point you to research services and communities that can support you through the next stages of your research journey.

11.1 Where to go for more research skills training

Completing the AIRS program can provide a strong foundation for progressing to the next stage of your research training. Through AIRS, you can develop essential information skills that will support you throughout the early phases of your candidature.

As you move forward, you'll find a wide range of training opportunities available. The next step is to create a customised training plan that aligns with the unique needs of your research project and your individual needs as a researcher.

There is a wealth of information, support services, and staff ready to help you with this process. To ensure you choose the most suitable options, it's valuable to take some time to assess your current research strengths and potential gaps you can address with further training.

QUT only

QUT has a suite of specifically designed workshops, online modules, optional units and self-guided learning options that researchers and HDR students can access in order to design a training plan to meet your specific research needs. Simply type 'Training and Workshops' into the search bar on the HiQ page to explore the different services available to you.

Resources to help you identify your skill gaps

It's important to reflect on the skills required to complete your project tasks effectively. Consider your existing skill set and identify gaps that may impact your progress. If you've worked through AIRS, you may already have a sense of areas where your information research skills could be strengthened. Discussing these with your research supervisor or support staff, such as a Librarian, Academic Skills Advisor, or Careers Counsellor, can provide valuable guidance. Additionally, a range of online self-assessment tools are available to help you evaluate and develop your research capabilities.

QUT only

You can also assess your skills using the QUT HDR Skills Assessment Tool. This tool is designed specifically

for you to assess your competency in skills that are related to both your research development and your professional development so that you can identify skills gaps.

The HDR Skills Assessment Tool is open to all HDR students. You are encouraged to utilise it now, towards the start of your studies, and to continue to use it and update it to help you track your skills development throughout your candidature.

HDR Skills Assessment Tool by Graduate Research Education and Development Team, QUT, CC BY-NC-SA 4.0.

Resources to help you build your research skills training plan

Throughout this program, you have been introduced to the foundational information skills required to complete your higher degree research. However, every research project is different as are the specific tasks that will be completed and, therefore, the skills required to competently fulfil those tasks.

While you now know about the basics, you may have need to develop and apply more advanced skills. Depending on where you are conducting your research, there may be a range of available training to further support your skills' development. If this is not the case or some of your required training needs cannot be met in-house, take the opportunity to look at other available training, open access or fee-for-service. You can start by exploring the following options:

- QCIF training program for staff and students at member institutions, including programming, statistics, data management, and bioinformatics.
- Digital Research Skills Australasia (DrESA), an ARDC catalogue of digital research events and training resources, collected from Australasian providers.
- Relevant professional associations, research centres, and industry groups, for example, Australian

BioCommons, ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S).
- QUT e-Grad School offers virtual professional skills training to research students and early career researchers to support their research journey.
- Your own university library or higher institution's researcher skills training opportunities.

QUT only

QUT Library offers specialist training and support to assist you in the areas of:

- Authorship, peer review and publishing
- Copyright and intellectual property
- EndNote
- Publication metrics
- Research data management
- Systematic reviews and other systematic approaches as to reviews of literature.

To find the right opportunities for you, check out HDR HiQ: Training and workshops, keep returning to your personalised HDR Skills Assessment, and keep an eye out for the regular HDR email alerts.

If you have a specific question, you may prefer to send an email enquiry or book a consultation with your Liaison Librarian who is available to support you in the areas of literature searching, copyright, research data management, and publishing.

For help with coding, data analytics, digital tools, data management, or open research, talk to experts at QUT's regular online Hacky Hour sessions.

To find out about other research help and academic support for HDR students, go to the HiQ Research Students community.

Activity

You've built a foundation on which to develop a tailored research skills training plan for yourself.

1. Pick two skills to focus on developing this month (e.g., advanced database features, annotated bibliographies).
2. Add a recurring 30 minute slot into your calendar to work on investigating current research skill training options. Share your plan with your supervisor.

11.2 Building your research support community

Building your research support community and meeting others who understand your research experience is an important part of your HDR student journey.

As you continue with research project or studies, you will benefit from identifying who is part of your research support network and considering the roles each person plays. Ensure you are intentional about connecting and continue to develop relationships with those key supporters, be they formal and structured relationships, such as that with your research supervisor, or informal, such as those with your peers. Define those relationships that are peer-based and those that are mentoring in nature and give some thought to who you might seek out for different kinds of support. Be sure you understand how they can support you and be proactive in identifying expectations around communications. Be aware of the role you can take in supporting others in your research community as well.

Your research support community will continue to evolve during and after your studies. As you develop skills and gain experience, your support needs may change. Take time to reflect on the makeup of your community periodically and determine whether changes need to be made.

QUT only

There are a number of QUT HDR events, peer support services and groups available to you.

And don't forget to look after yourself!

The research experience can sometimes feel daunting or isolating. Don't hesitate to reach out to others if you are feeling overwhelmed or just need to talk to someone. There are a number of support services for HDR students to help you maintain your health and wellbeing or to manage any struggles you are experiencing relating to your research or personal circumstances.

"Video chat" by Vitaly Gariev via Unsplash, Unsplash licence

QUT only

QUT provides a broad range of services to support the health and wellbeing of all students, including:

- QUT Medical Centres, which provide health and medical services
- Counselling and Mental Health Services, which provides free and confidential counselling
- International Student Support and Accommodation and Settlement Support for arriving and settling in Brisbane
- Welfare and Financial Services to provide advocacy on a range of academic, personal and financial matters
- Chaplaincy, providing support on matters of a spiritual, ethical or personal nature
- Disability and Accessibility Services to support students with a disability, injury or health condition
- Harassment and Discrimination Advice, which provides confidential advice and support for how to report an incident and the support available
- Student Programs and Initiatives to support social engagement.

Further information about these support services, including contact details are available at the following website – Health and wellbeing – Student – QUT Portal.

11.3 Reflecting on your learning

This module has helped you assess your further research skills training needs and explore available options. To confirm your learning, take a moment to complete the knowledge check, reflect on the questions provided, and identify whether you understand the content or have any questions for your research support team.

Knowledge check

Confirm what you have learned in Module 11 with the quiz below. Submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://qut.pressbooks.pub/airs/?p=3285#h5p-95

Reflect

Consider:

1. What is the first step suggested in the module for creating a research skills training plan?
2. Name three specific areas of specialist training you might need to explore to complete tasks associated with your project.
3. How can a Librarian potentially assist HDR students?
4. What are two opportunities you can consider to connect with fellow HDR students?
5. Why does the module stress the importance of students reaching out for support?

11.4 Module summary

Congratulations

You've worked through all the researcher training modules in AIRS.

Additional resources

The following resources provide further practical guidance, tools, and theory to support your next steps in assessing your skills gaps and identifying potential training and opportunities for preparing for your research career.

Australian Research Data Commons, Wong, A., & Greenhill, K. (2025). *Online self-service data skills training resource sites for researchers: a preliminary scan*. Zenodo. https://doi.org/10.5281/zenodo.16809420

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MODULE 12 AIRS FOR SUPERVISORS

ROSIE GLYNN, LYNDELLE GUNTON, NATASHA KITANO

Module learning objectives

By the end of this module, you should be able to:

1. Recognise the role of AIRS in developing essential research skills for postgraduate students.
2. Identify the core knowledge areas and skills addressed by AIRS.
3. Explore the diverse ways research students can engage with AIRS throughout their candidature.
4. Understand strategies supervisors can use to prepare and support students engaging with AIRS.
5. Discover practical approaches to mentoring students through their AIRS journey.
6. Access and apply AIRS to maintain and enhance your own information research skills.

Learning plan

In this module, we will:

- Explore the purpose and structure of the AIRS program.
- Explain how AIRS supports HDR students in developing foundational and advanced research skills.
- Suggest strategies to integrate AIRS into your supervisory practice.
- Consider how AIRS can foster a culture of research integrity, inclusivity, and scholarly excellence.

12.1 What is AIRS?

Advanced Information Research Skills (AIRS), is a research skills training program, primarily aimed at higher degree research (HDR) students, that is, Doctorate and Master of Philosophy students in higher education institutions. This module will cover everything you need to know about AIRS as a research supervisor.

Marking its 36th year in 2025, AIRS is an accredited and mandatory coursework unit for all HDR students at QUT. You can read more about the history of AIRS at the beginning of this resource. However, it is also openly available here to anyone who seeks to develop and expand their information skills for research – current HDR students, early career researchers, highly experienced research supervisors, library and information professionals, or library studies students.

AIRS seeks to set the standard in information literacy training for HDR students by providing current, relevant, and credible learning outcomes, and enables active engagement through quality, innovative learning and teaching strategies. There is a focus on ensuring AIRS meets the transdisciplinary and transferable skill needs of contemporary researchers, while continuing to meet organisational priorities, as well as industry and Australian higher education standards.

Some higher degree researchers commence their studies with an advanced understanding of these important skills. They benefit from being adept at using systems and tools to make effective use of the information environment. However, many are neither equipped nor aware of the gaps in their knowledge and skills, or the impact that may have on their progress. To best meet higher degree researcher needs, the AIRS program focuses on knowledge and skills development that is important for the early stages of candidature, namely finding, organising, and using information, and embeds the skills required to effectively scope the initial literature review for the research topic.

Offering AIRS at the commencement of the research degree builds researcher confidence as they approach the first program milestone. This is evidenced by extensive data showing that most higher degree researchers achieve strong outcomes in the unit. Research also indicates that information literacy training attendees are more likely to seek support in later stages of their research degree from library staff, having developed those connections already. This can clearly have a flow on effect beyond any training in which higher degree researchers participate (Zhao et al., 2023).

12.2 What does AIRS content cover?

AIRS comprises of online modules, video recordings, learning activities, and knowledge checks that step learners through information literacy development in a logical way. This aligns with the research lifecycle and the journey that higher degree researchers are likely to take during their program. More specifically, attention is focused on the development of essential skills for finding, evaluating, managing, and using information relevant to a research topic. This is supplemented by enhancing capabilities in research integrity, research data management, scholarly publishing, publication metrics, and research impact.

AIRS consists of 11 modules covering the following:

Module 1: Getting started with AIRS

Module 2: Preparing to search for information

Module 3 Finding information for research

Module 4: Maintaining current awareness

Module 5: Managing information for research

Module 6: Evaluating information for research

Module 7: Using information responsibly and ethically

Module 8: Managing research data

Module 9: Planning to publish

Module 10: Finding and using indicators of research impact

Module 11: Before you leave AIRS

Each module dives into depth to cover all the knowledge and skills that researchers need to successfully navigate their research project.

12.3 Why should higher degree research students use AIRS?

HDR students enter their research journey at different levels of readiness, knowledge, and skills. AIRS introduces them to crucial research skills in the critical first months of candidature, ensuring all students develop foundational skills to set them up for success. The supportive learning environment nurtures a community of scholars and helps students develop their researcher identity. AIRS provides training in advanced search techniques and information and data management. It fosters an environment that encourages academic honesty and ensures students understand research metrics and the publication process.

By leveraging these tools and strategies, supervisors can successfully guide their higher degree researchers to:

- develop foundational skills for independent and effective information use
- prepare for their first higher degree research milestone
- understand and operate in the scholarly publishing environment
- ensure they have the skills and capabilities to conduct research now and into the future, regardless of the academic, professional, or industry context in which they find themselves
- explore emerging digital tools, including AI technologies, through a responsible and ethical research lens to consider how such tools can support, but not replace, critical thinking and scholarly rigour.
- develop a robust support network by connecting with library staff, other research support experts, and peers where available.

How can students engage with AIRS?

- Encourage your student to work through the modules with you.
- Establish a collaborative group of students who support one another with assessments and learning, and develop a community of practice.
- Use the resources for refreshing your own information skills for research.
- Connect with your library staff to explore further ways to support you and your students with AIRS.
- Use the knowledge checks in each module to confirm learning.

12.4 What can you do to prepare your student for AIRS?

AIRS is designed to meet the needs of students at all levels of research experience and higher education backgrounds. However, not all students will recognise or understand the value of developing these skills. As a research supervisor, encourage your student to understand how advanced information research skills can support their research studies and career pathways.

AIRS has shown us that higher degree researchers can develop a stronger skills foundation when partnering with supervisors who actively engage in their progress and encourage them to cultivate relationships with key research support staff. That support network will be different depending on individual higher degree researchers, the supervisors, and the institution. Further, the development of a community of learners engaging with information literacy training at the same time is of added benefit, providing peer learning and support, transdisciplinary networking, and opportunities for collaboration.

As such, developing and maintaining professional relationships with research support and library staff is a way that you can model good networking and collaborative practices. Partnering with colleagues and library staff can help you to introduce research skills training for higher degree researchers. You will see longer term benefits from making time to introduce higher degree researchers to key stakeholders and help them to build their personal learning networks.

As a supervisor, you are ideally positioned to explain the value of setting up systems, and using appropriate tools, for managing information to your higher degree researcher. By sharing personal stories of successes and failures, you can demonstrate the importance of planning and preparing to find, retrieve, evaluate, store, and use information. You can step your higher degree researcher through the approaches you have developed and used for managing literature and other information. This may include a range of analogue and/or digital systems and tools that enable you to effectively record and access your information throughout a research project. There is no one right way in which to do this. What works for one may not work for others. Higher degree researchers will find approaches that work for them, but you can prompt consideration by providing examples of approaches that have worked for you.

QUT only

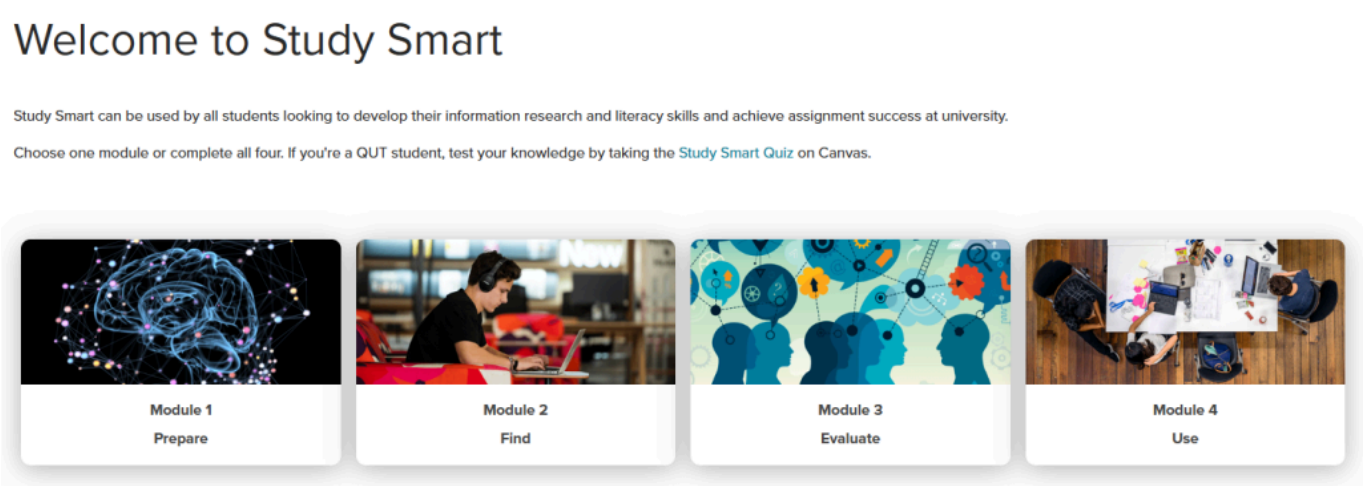
Information about IFN006 is available for research supervisors on the QUT Digital Workplace.

For some HDR students, the gap between being admitted to their research program and when they begin IFN006 AIRS may be some weeks. Ask your student which teaching period they are enrolled in and when they expect to commence. If there is a gap, point them to this AIRS program as a way to support them in getting started on developing the skills required to complete their early project tasks.

HDR students can find out more about the requirements to complete IFN006 and other coursework in

their QUT offer and welcome letters, on the HiQ website, in the IFN006 unit outline, in their welcome email from the IFN006 Unit Coordinator, and on the IFN006 Canvas site.

If students are new to research or have had a significant break from research, they can prepare for AIRS by doing the QUT Study Smart modules. These are openly accessible, self-paced online modules that step through the basics of developing information research and literacy skills for success at university.



"Study Smart" by QUT Library, CC BY-NC-SA 4.0

12.5 Why is AIRS beneficial to you as a supervisor?

As a research supervisor, you play a pivotal role in ensuring your HDR students gain the full benefits of the AIRS program.

By understanding the content throughout the modules, you can guide your students to apply the skills they develop into their specific research projects and key steps, such as literature reviews or data management. You can support your students' information literacy, research integrity, and critical thinking skills, all of which are crucial for long-term academic success.

A key benefit of supervising is what you can also learn from your higher degree researcher. As they progress through their research journey, they will be exposed to the latest tools, practices, and services that leverage emerging technologies. As a supervisor, you can access the AIRS units for your own professional development. Working through the AIRS modules on an annual basis may be a useful practice.

An inclusive approach can ensure you gain access to the wealth of knowledge and experience available from fellow supervisors and other research support experts. Knowledge-sharing between supervisors and higher degree researchers can create pathways to further training options and support services that can enhance the effective use of information for research. By using and adapting existing resources and tools, you can positively contribute to shaping the information literacy of your higher degree researchers, resulting in improved research outcomes.

Activity

In the next meeting with your HDR student, ask them:

1. Which module most improved your search approach?
2. Show me one documented search and tell me how you refined it.
3. Which evaluation framework did you use last week?

12.5 Reflecting on your learning

This module has explored how research supervisors can engage with the AIRS program and support their students to use it to develop their advanced information skills. To confirm your learning, take a moment to reflect on the questions provided. Contact your Liaison Librarian if you have any questions about AIRS.

Reflect

Consider:

1. How can I, as a supervisor, proactively integrate AIRS into my ongoing supervisory practices to ensure my HDR students build strong foundational research skills early in their candidature? Consider how AIRS aligns with your existing support strategies and how it might supplement or enhance them.
2. In what ways might my own assumptions about HDR students' readiness or information literacy influence how I encourage (or overlook) AIRS as a developmental tool? Reflect on your experiences with past students and whether you adjust expectations based on individual backgrounds.
3. How confident am I in the areas covered by AIRS (e.g., research data management, scholarly publishing, metrics), and how might I use AIRS resources to refresh and expand my own skills as a researcher and mentor? Think about your own continuous professional development in relation to these evolving topics.
4. What practical steps can I take to create a culture of research integrity and information literacy within my research group or school, using AIRS as a foundation? This might include collaborative activities, peer-learning groups, or embedding AIRS milestones into research plans.

12.6 Module summary

You have completed Module 12.

Thank you for exploring the AIRS program.

Additional resources

The following resources provide further practical guidance, tools, and theory to support your understanding and development of information research skills for researchers and HDR students.

Anderson, P., Blue, L. Pham. T., & Saward, M. (2022). *Higher degree by research: Factors for indigenous student success.* Springer Singapore. https://doi.org/10.1007/978-981-19-5178-7

Bundy, A. (Ed.). (2004). *Australian and New Zealand information literacy framework: Principles, standards and practice* (2nd ed.). Australian and New Zealand Institute for Information Literacy. https://www.library.qut.edu.au/about/policies/information-literacy-framework/documents/anz-info-lit-policy.pdf

Chen, L., Mewburn, I., & Suominen, H. (2023). Australian doctoral employability: A systematic review of challenges and opportunities. *Higher Education Research & Development*. https://doi.org/10.1080/07294360.2023.2240715

Harrington, M. R. (2009). Information literacy and research-intensive graduate students: Enhancing the role of research librarians. *Behavioral & Social Sciences Librarian*, *28*(4), 179–201. https://core.ac.uk/download/pdf/61656845.pdf

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United Kingdom Research Information Network. (2011). *The role of research supervisors in information literacy*. https://dfdf.dk/wp-content/uploads/2017/02/Research_supervisors_report_for_screen.pdf

United Nations Educational, Scientific and Cultural Organization. (2023). *Information literacy.* UNESCO Information for All Programme. https://www.unesco.org/en/ifap/information-literacy

Zhao, S. (2019). *A study of graduate students' information literacy needs in the electronic resource environment* [Doctoral thesis, University of Windsor]. Scholarship at UWindsor. https://hdl.handle.net/20.500.14776/8079

Module 12 References

Gunton, L., Kleine, S., & Bradbury, S., (2023). Developing information literacy in higher degree researchers. In S. Gasson, J. Blacker, I. Stoodley, A. Winter, & C. Bruce (Eds.), *Confident supervisors: Creating independent researchers*. James Cook University. https://doi.org/10.25120/wx68-6tm8

Zhao, S., Luo, R., Sabina, C., & Pillon, K. (2023). The effect of information literacy training on graduate stu-

dents' ability to use library resources. *College and Research Libraries*, *84*(1), 7-29. https://crl.acrl.org/index.php/crl/article/view/25747

Glossary

Academic integrity

Academic integrity refers to the ways in which you conduct your academic activities honestly, respectfully, fairly and responsibly.

AIRS

Advanced Information Research Skills. The program that is delivered as a mandatory coursework unit that all QUT higher degree research students must complete upon commencement of their studies (IFN006).The AIRS learning resources are open and accessible to all through this AIRS open education resource (OER).

Altmetrics

Altmetrics are article-level metrics based on metrics from the social web for analysing and informing scholarship. For example, online mentions/attention, mentions in policy or government documents, or citations in patents.

Annotated bibliography

An annotated bibliography is a collection of records of an information source, that includes a citation with notes. There are two parts to each annotated bibliography entry, the bibliographic information (the reference) and the explanatory paragraphs (the annotation). The explanatory parts can include descriptive and evaluative components.

Annotating

This is where you underline, highlight, or mark important passages, key phrases, and unfamiliar words in a resource, or add notes to a text to summarise or questions specific sections. Annotating can be done on physical resources, such as a printed copy of a journal article, or on digital resources, such as marking up a digital copy of a journal article using tools such as PDF tools.

Artificial intelligence

Artificial intelligence refers to technology that has been designed to perform tasks or simulate functions that traditionally only humans could do, such as decision-making, problem solving and learning,

Author alert

A notification that is created and issued in a search engine, database or repository when a specific author or content creator publishes new work.

Bibliographic information

Bibliographic information refers to the information you need to collect to create accurate references, such as author, date of publication, journal title, article title, book title, digital object identifier (doi), URL, web page name, report number and more. The information required will depend

on the resource type. The format or way in which the information is presented will depend on the referencing style used.

Bibliographic management software

Also known as referencing management software,or referencing tools.

Software tools that help you track and recall references to relevant literature. Examples include EndNote, Mendeley, Paperpile and Zotero.

Boolean operators

Boolean operators are simple words (AND, OR, NOT) used as conjunctions to include or exclude keywords in a search.

Chunking

A reading technique where you break the text into smaller sections and focus on understanding one section at a time.

Citation alert

A notification that is created and issued when a specific journal article is cited in another publication.

Cited reference searching

The process of tracking research backwards and forwards in time. When viewing an article in a citation database, the full citation will list references used by the author to write that paper. From this list you can link to any articles indexed in that database. If an article is not indexed in that database, it will not be linked.

Also known as citation searching or snowballing

cite|write

cite|write is QUT's guide to citing and referencing.

CNCI

Category Normalized Citation Impact (CNCI) compares the number of citations for a publication with similar publications within a specific subject area over time.

Coding the literature

Coding the literature involves categorising, organising, and extracting key information from the literature to identify patterns, themes, and relationships.

Comprehensive searching

A method of searching the literature systematically and comprehensively by formulating effective search statements using appropriate databases and advanced search techniques.

Concept map

Also known as mind map.

A visual tool that puts the main topic in the centre of the map and graphically represents the major concepts that relate to the main topic. It can be useful for the activity of concept mapping when identifying key terms and synonyms in a research question. This activity can be done by hand or by using digital tools.

Controlled vocabulary

A list or index that categorises and defines terms and phrases.

Copyright

Copyright refers to the laws that define and protect the rights of a creator of a piece of written or recorded literary or artistic work, such as sound recording, film, art works or written text.

Critical thinking

Critical thinking is a questioning process central to writing, reading and learning at university. Critical thinking is a skill used to develop new knowledge or understanding about a subject.

Database

A database is a regularly updated collection of online resources and may contain journal articles, ebooks, conference papers, maps, videos and other electronic resources. Databases can be related to specific subject areas or cover multiple subjects.For example, Scopus is a multidisciplinary abstract and citation database of scholarly literature.

Descriptor (see Subject heading)

Document delivery

Document delivery is a service provided by academic libraries that sources articles, conference papers, book chapters, books, theses and other formats of documents that may not be available in full-text through existing digital platforms to library members. The name of this service may differ between libraries. At QUT Library, the service is Request From Other Institutions. More information for QUT students and staff is available on the QUT Library website.

Evaluating information

Applying a defined criteria to review the information sources gathered based on quality, reliability and relevance to your research. For more information refer to Module 6.

Evaluating your search

The process of reviewing the results of your searches to determine relevance and, where necessary, refining or revising your search to improve the results returned. For more information refer to Module 3.

Field searching

Some databases allow searching in specific fields such as the title, author, abstract, or subject. This

type of searching is quite specific and will retrieve fewer results than a keyword search. By using field searching, you can increase the precision of the search thereby retrieving fewer results. For more information refer to Module 3.

Filters (see Limiters)

GenAI (See Generative Artificial Intelligence)

Generative artifical intelligence

A subsection of artificial intelligence where systems using machine learning have been trained using large amounts of data to perform, mimic or imitate tasks and create text, images, videos and other forms of content. Users can use inputs called prompts to generate content, the nature of which is determined by the data on which a particular GenAI tool is trained.

Also known as GenAI.

More information about generative AI can be found in the QUT Library guides Using generative AI and Generative AI in Research and Teaching.

https://architecture.digital.gov.au/generative-artificial-intelligence

https://en.wikipedia.org/wiki/Generative_artificial_intelligence

Google Scholar

Google Scholar is a web tool by Google that indexes scholarly materials, theses and some types of grey literature. Google Scholar is best used in conjunction with discipline-specific databases and by adding the links to full-text access where provided by your library via the Google Scholar settings. See Module 2 for further information.

Grey literature

Grey literature is an umbrella term that describes materials produced on all levels of government, business and industry that is not distributed via commercial publishing methods. Grey literature may be useful for exploring areas where there is little published evidence, and for finding recent and local resources.

h-index

The h-index is an indicator of research performance. It can be calculated using citation tools such as Web of Science, Scopus and Google Scholar profile, which track the number of papers published and the associated number of citations, to generate the author's h-index.

H5P

Technology that enables users to share interactive HTML content.

Index term (See Subject heading)

Intellectual property

Intellectual property generated during your studies, research or work at QUT could be a creation, idea or a name you give to something. Examples include (but are not limited to) patents, trade-

marks, and designs, copyright for original material, inventions and confidential specialised information. For more information refer to Module 6.5.

iThenticate

iThenticate is QUT's plagiarism detection software for higher degree research (HDR) candidates. All HDRs will automatically be provided with access to iThenticate after commencement of your research program. You will be require to submit your thesis through this software.

See also *Plagiarism*.

Journal quartile rankings (see Quartiles)

Journal ranking and impact factor

Journal ranking and journal impact factors are quantitative measures that attempt to rank and estimate the importance and performance of a journal in a particular field. For more information refer to Module 7.2.1 (Journal ranking and tools).

Keyword searching

Most databases search keywords or terms anywhere by default unless you choose another type of search.The database looks for a match for your keyword in any field in the record. You can combine keyword searches with other techniques as part of a comprehensive search strategy.

Keywords

In AIRS, these are key terms from your research question or questions. Identifying keywords informs your searching as these words (or synonyms and/or related terms) will appear somewhere (e.g. title, abstract, or author keywords) within the resources you find.

Large language model

A deep learning or machine learning model that works with big data sets to interrogate, summarise and generate content in natural language or human-like text.

Also known as LLM.

https://en.wikipedia.org/wiki/Large_language_model

Liaison Librarian

A term used for a librarian who works in an academic or university library and who partners and works closely with a specific discipline, Faculty or School in that institution. They support academics, researchers and students within those domains and develop discipline-specific expertise about collections, search tools, research and publishing.

For QUT staff and HDR students, your QUT Liaison Librarian can connect you with the information and resources you need. To find the Liaison Librarian for your Faculty or School, search the QUT Library Liaison Librarians webpage.

Limiters

Limiters are used in searching to narrow your search. They can also be called filters. This is often

best done in the results screen of a database or other search tool to increase the relevancy of results after a comprehensive search. Examples include limiting by subject, date, format, full text, peer-review.

Literature review

A literature review is an evaluative report of information found in the literature related to your selected area of study or research. The review should describe, summarise, evaluate, and clarify this literature. It should present a theoretical base for the research and help you (the author) determine the nature of your research.

LLM (See Large Language Model)

Medical subject headings

A controlled vocabulary of medical terms, which functions as a thesaurus organised alphabetically by subject, with related sub-categories listed beneath the top-level heading.

Also known as MeSH.

MeSH (See Medical subject headings)

Mind map (see Concept map)

Nesting

Nesting is used in comprehensive searching to group synonyms together with the OR Boolean Operator. Synonyms are grouped within brackets/parentheses as a set, and this part of the search will be performed by the database first.

For example, *("respiratory tract infection" OR bronchiolitis) and management* finds articles about the management of either respiratory tract infections or bronchiolitis.

See also *Boolean operators*.

Open access

Open access is the free, immediate, online availability of peer reviewed research publications coupled with associated licensing rights that specify the use and reuse of these articles. Authors usually retain the copyright of open access articles.

Open access journals

Open access journals provide immediate open access to the full content of each issue. Most open access journals publish articles under a Creative Commons licence. Some open access journals charge fees (article processing charges) that must be paid by the author or the author's institution.

Organising the literature

For AIRS, organising the literature refers to how you will organise and manage your source material (e.g., literature or other resources) and notes. Organising information might include the notetaking software you use or a particular reference management tool to store your references and literature.

The strategies you employ to organise the literature will be individual to you. For more information refer to Module 5.

Paywall

A paywall restricts access to specific content without a paid subscription or direct purchase.

Peer review

Peer review is the strict approval process applied to scholarly journals with one or more experts reviewing the articles before they are accepted for publication. There are various forms of this process. If a research publication is given the status of peer reviewed, it has been through a form of this process before being published.

Phrase searching

Phrase searching is a form of searching that requires a database or other search tool to look for two or more words in the exact order they are entered. Quotation marks "xyz" are usually used to identify and enclose a phrase. Some databases assume that a string of words will be searched as a phrase whereas others will search on each individual word.

Plagiarism

Plagiarism is the presentation of another person's ideas or work as your own. It may also include the resubmitting your own work for another assessment item.

See also *iThenticate*.

Popular information

Popular information is typically written by authors who are not necessarily experts in the field and are targeting a more general audience.

For example, this could be in the form of a blog post or newspaper article. For more information refer to Module 2.3.2.

Preliminary searching

Initial or preliminary searching helps to establish a basis for later specific or more comprehensive searching. Preliminary searching can help clarify the topic and supply basic knowledge upon which to develop an improved searching focus. For more information refer to Module 2.2.2.

Preprint

A preprint is an early version of a research paper (known as the author accepted manuscript) made available via a preprint server or repository but not yet formally published in an academic journal.

Preview reading

Preview reading is where you read headings, subheadings, and captions to get an overview of the content. You might also skim introductory and concluding paragraphs to understand the main ideas.

Proximity operator

Proximity or adjacency operators allow you to locate one word within a determined distance from another.

For example 'kitten W3 cat' would find the word 'kitten' within three words of 'cat' in the order that you search for them. These operators often differ between databases. For more information refer to Module 3.2.1.

Publication metrics

Publication or citation-based metrics are often described in terms of what can be counted. They include quantitative methods such as journal impact factors, individual researchers rankings such as their h-index, and citation counts.

Quartiles

Quartile rankings are derived for each journal in each of its subject categories, according to which quartile of the Impact Factor (IF) distribution the journal occupies for that subject category. These can also be called Journal quartile rankings.

For example, Q1 comprises the quarter of the journals with the highest values (top 25%) whereas Q4 reflects the lowest values (bottom 25%).

Read and Publish Agreement

Read and Publish (R&P) agreements bundle together access to the publisher's journals (the read component) with open access publishing options for the university's researchers (the publish component) free of any article processing charges.

In Australia, R&P agreements generally involve multiple institutions and are negotiated nationally by CAUL. QUT has R&P agreements which cover specific journals from a number of major publishers.

Research impact

Research impact is different to publication metrics and refers to measuring the impact of research, academically and also economically and societally, through the influencing of policy decisions, research-led changes in, for example, health practices, and the development of new products and services.

Research question

A research question summarises the significant issue your research will investigate. It will guide the research process and will help you focus and conduct your literature review.

RSS feed

Updates using XML-based data files to provide a summary or the full text of a website's content.

Scanning

Identifying specific information by quickly searching for keywords or phrases.

Scholarly information

A scholarly resource is generally written by experts in the field for experts in the field and contributes to the body of knowledge in that discipline area. For more information refer to Module 2.3.2.

Search alert

A search alert can be created for a search you have run in a database or other search tool to let you know when new material matching your search terms is added. A search alert is an easy and effective way to get recent articles in your research area. For more information refer to Module 4.2.2.

Search concept

Search concepts are the most important words in a research question or questions.

Search statement

A search statement is used in a database or other search tool to find information. The statement is a combination of key words and phrases, from your research question, used in conjunction with known search techniques, including Boolean operators, phrase and proximity searching, truncation and wildcards. The construction of a search statement will vary depending on the research topic and the database or search tool in which you are searching.

Search strategy

A search strategy is a systematic plan for conducting a search. It gives consideration to the concepts from your research question, the keywords, synonyms and related terms in those concepts, the types of information you need to find, where you need to search, and the search techniques you will need to apply. For more information, refer to Module 2.2.

Skimming

Skimming is the reading technique of quickly looking over the text to identify main ideas, key points, and the general structure.

Snowballing (see Cited searching)

Subject heading

Subject headings are a set of terms and phrases, known as standardised terms, from a controlled vocabulary, that are used to describe the content of books and articles and are assigned by cataloguers and indexers.

Also known as a descriptor or index term.

Subject headings

Subject searching

Subject searching uses subject headings to search in databases. This type of searching can be more specific than a keyword search as you are using the subject field, based on controlled vocabulary, to limit and define your search. For more information refer to Module 3.2.2.

Synonyms

A synonym is a word, phrase or term that means the same thing or almost the same thing as another word. In AIRS, you will be identifying synonyms for your keywords and concepts. For example, synonyms for landscape might include topography, land, or terrain. For further information, refer to Module 2.3.

Table of contents (TOC) alert

A Table of Contents (TOC) alert is created to notify a reader when a new issue of a journal or serial publication is available and usually lists the table of contents. of that latest issue. You can set up a journal alert via many databases, or directly from journal home pages. For more information, refer to Module 4.2.2.

Thesaurus

A thesaurus is a resource such as a book or website, that lists words in groups of synonyms and related concepts.

Truncation

Truncation symbols are used in searching to look for the root or stem of a word. The most commonly used truncation symbol is the asterisk *. For example, in QUT Library Search, typing in *govern** will return results that include *government*, *governance*, *governing, governs*...

Ulrichsweb

Ulrichsweb is a online platform that can be used to identify and check for peer-reviewed or scholarly material.

Wildcard

A wildcard symbol is used in searching to substitute a letter either within a word or at the end of a word. This symbol is particularly useful for American or British spelling variations or when you're unsure about the spelling of the word. For example, in QUT Library Search, organi?e will find both *organise* and *organize*.

About contributors

Editors

Lyndelle Gunton
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Lyndelle coordinates training for researchers and higher degree research students about information research skills, including the IFN006 AIRS program at QUT. With extensive experience in academic libraries, she has published on topics including academic integrity, open knowledge, and information literacy in higher education.

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Sal is an academic librarian with expertise in information literacy, scholarly communication, and open educational resources. She supports the learning, teaching and research needs of the QUT Graduate School of Business, School of Accountancy, and School of Economics and Finance. Her work focuses on empowering researchers and students through advanced information research skills and digital literacy initiatives. Sal has an interest in open scholarship demonstrated through her work with the Council of Australasian University Librarians (CAUL) OER Collective Working Group.

Rani McLennan
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Rani McLennan provides expert copyright advice and training to QUT staff, ensuring compliance with legislation and supporting the creation of openly licensed educational resources. With over 15 years of experience across academic, public, and school libraries, Rani is passionate about transforming how organisations manage and communicate information. She has significant expertise in the development and publishing of open texts through her work with the Council of Australasian University Librarians (CAUL) OER Collective, advancing open education practices nationally.

Contributors

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In her role as Scholarly Communications Librarian at QUT, Paula has played a leading role in advancing open access and innovations in scholarly publishing at institutional, national, and international levels. Since 2003, Paula has championed open access initiatives, including leading the implementation of QUT's pioneering open access repository, QUT ePrints—the first in the world to be backed by an institution-wide open access mandate. She continues to oversee QUT ePrints and supports a range of open access publishing services, including eJournal hosting. Paula's work has contributed to national policy

development and the creation of resources such as OAKList, supporting academic authors and repository managers across Australia.

Zachariah Dominello

QUT LIBRARY

Zach supports students and researchers as a Library Adviser in the Library's Faculty of Engineering Liaison Team. He brings extensive experience from previous roles across QUT Library, including Liaison Librarian and Resource Assistant, as well as his background as an educator at QUT College.

Philippa Frame

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Philippa leads QUT Library's research data management service, supporting staff and HDR students across the research lifecycle. She provides expert advice and training on data management planning, access to research datasets, and appropriate data storage solutions. Philippa also assists researchers in publishing and sharing data through QUT's Research Data Finder repository. With qualifications in communication and information management, she is committed to promoting good data practices that enhance the usability and impact of research.

Sandra Fry

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Sandra Fry is a Liaison Librarian at QUT, supporting the School of Social Justice and the School Education in the Faculty of Creative Industries, Education and Social Justice. With a background in journalism and information technology, Sandra brings a unique perspective to her work in academic libraries. She has a strong interest in open access publishing and scholarly communication, and has contributed to researcher development initiatives including Research Boot Camps and profile-building workshops.

Rosie Glynn

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As the Liaison Librarian for the School of Nursing at QUT, Rosie provides specialist support for the library and information needs of nursing students and staff. With experience in both academic libraries and curriculum design, Rosie is dedicated to enhancing digital capabilities and information literacy in health education.

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Lyndelle coordinates training for researchers and higher degree research students about information research skills, including the IFN006 AIRS program at QUT. With extensive experience in academic libraries, she has published on topics including academic integrity, open knowledge, and information literacy in higher education.

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Tanya Harden

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As manager of QUT Library's Publication Metrics Service, Tanya supports the university's research community with expert advice, training, and data reporting. Her role involves guiding researchers and HDR students in the use of publication metrics tools such as Scopus, SciVal, Web of Science, and Altmetric Explorer. Tanya also liaises with vendors to improve data quality and develops resources to help staff make informed decisions around research impact and grant applications.

Michael Hawks

QUT LIBRARY

Michael supports the School of Chemistry and Physics and the School of Computer Science in QUT's Faculty of Science. As an academic librarian, he has a keen interest in digital engagement and has contributed to innovative outreach initiatives, including virtual campus tours and student-focused events.

Gabrielle Hayes

QUT LIBRARY

Gabrielle provides specialist library support as Liaison Librarian for the School of Biology and Environmental Science and the School of Mathematical Sciences in QUT's Faculty of Science. She has extensive experience in developing engaging online learning resources to enhance information literacy and promote independent learning. Gabrielle is passionate about creating accessible, student-centred materials that help learners navigate information with confidence and curiosity.

Stef Jacobs

QUT LIBRARY

Stef provides researching and referencing support for coursework students in their role as a Library Adviser in the Faculty of Science Liaison Team. With a background in Teacher-Librarianship, Stef is passionate about fostering open knowledge and empowering students to become confident with their information literacy skills through high-quality teaching materials.

Natasha Kitano

QUT

Natasha Kitano is a Language and Learning Educator in QUT's Graduate Research Education and Development (GRE+D) team. She supports Higher Degree Research (HDR) students in developing academic writing and research communication skills, with a strong focus on wellbeing and resilience. Natasha coordinates initiatives such as the HDR Writer's Wellbeing Lounge and contributes to the

design of eGrad School modules that promote mental health, reflective practice, and scholarly engagement. Her background in applied linguistics and extensive experience in academic support inform her commitment to fostering inclusive and supportive research environments

Dr Sal Kleine
QUT LIBRARY

Sal is an academic librarian with expertise in information literacy, scholarly communication, and open educational resources. She supports the learning, teaching and research needs of the QUT Graduate School of Business, School of Accountancy, and School of Economics and Finance. Her work focuses on empowering researchers and students through advanced information research skills and digital literacy initiatives. Sal has an interest in open scholarship demonstrated through her work with the Council of Australasian University Librarians (CAUL) OER Collective Working Group.

Meeka Moessner
QUT LIBRARY

Meeka provides support for the Faculty of Health Library team in her role as Library Adviser. She has held various roles at QUT, including in research support and student services. She brings a creative background and a strong focus on student engagement and academic support, particularly in the health disciplines.

Thomas Mullins
QUT LIBRARY

Tom has worked in academic libraries for over ten years. During that time he has enjoyed focusing on equipping students with excellent research skills, and promoting increased awareness of diversity, equity, and inclusion within the academic library setting.

Emma Nelms
QUT LIBRARY

Emma is a Liaison Librarian and currently Manager of Library Services at QUT Kelvin Grove campus. She coordinates the web and digital engagement service, supporting learning, teaching, and research. Emma contributes to strategic planning and governance across QUT Library, and currently leads the development and implementation of the Library's GenAI Roadmap.

Cameron Rutter
QUT LIBRARY

Cameron provides expert advice and guidance on copyright matters to the QUT community in his role as University Copyright Officer. With qualifications in visual arts and information studies, Cameron supports staff and students in navigating copyright compliance, licensing, and intellectual property issues. He plays a key role in maintaining the university's copyright resources and contributes to policy development and education around responsible use of content.

Dr Brendan Sinnamon
QUT LIBRARY

Brendan is a Liaison Librarian for the Faculty of Engineering at QUT, supporting the School of Civil and Environmental Engineering and the School of Mechanical, Medical and Process Engineering. He holds a PhD in Chemistry from the University of Queensland, as well as qualifications in library and information studies and higher education from QUT. Brendan has published research in both chemistry and library science, and regularly presents on topics such as eBook usage and information resources. He is dedicated to enhancing research and learning outcomes for students and staff in engineering disciplines.

Peter Sondergeld
QUT LIBRARY

As an experienced academic librarian, Peter supports the School of Biomedical Sciences and the School of Exercise and Nutrition Sciences in QUT's Faculty of Health. A Fellow of the Higher Education Academy, he has contributed to research on flipped learning and digital capabilities in health education.

Alice Steiner
QUT LIBRARY

Alice is a Liaison Librarian at QUT, supporting the library and information needs of the School of Communication, School of Creative Arts, and School of Design in the Faculty of Creative Industries, Education and Social Justice. With qualifications in visual arts, library and information studies, and higher education, Alice brings a multidisciplinary perspective to her work. She is dedicated to enhancing student and researcher engagement through tailored information literacy and resource support.

Ellen Thompson
QUT LIBRARY

Ellen is an academic librarian with over 20 years of experience. Her background in visual arts informs her work supporting creative disciplines in the Faculty of Creative Industries, Education and Social Justice, including the School of Communication, School of Creative Arts and the School of Design. She is particularly interested in emerging technologies in teaching and research.

Marvin van Prooijen
QUT LIBRARY

Marvin is an academic librarian with expertise in information research skills and scholarly communication. He supports the learning, teaching and research needs of the School of Public Health and Social work and the Faculty of Health. He has worked in multiple roles with the Office for Scholarly Communication providing high-quality research support services for HDRs and staff at QUT.

Stephanie Villis
QUT LIBRARY

Stephanie supports the Advanced Information Research Skills (AIRS) program as a Library Adviser at QUT Library. As an academic librarian with a background in teaching, she helps postgraduate students develop essential research capabilities. Stephanie has also worked as a Liaison Librarian, delivering targeted instruction in information research strategies, library resources, and scholarly communication.