

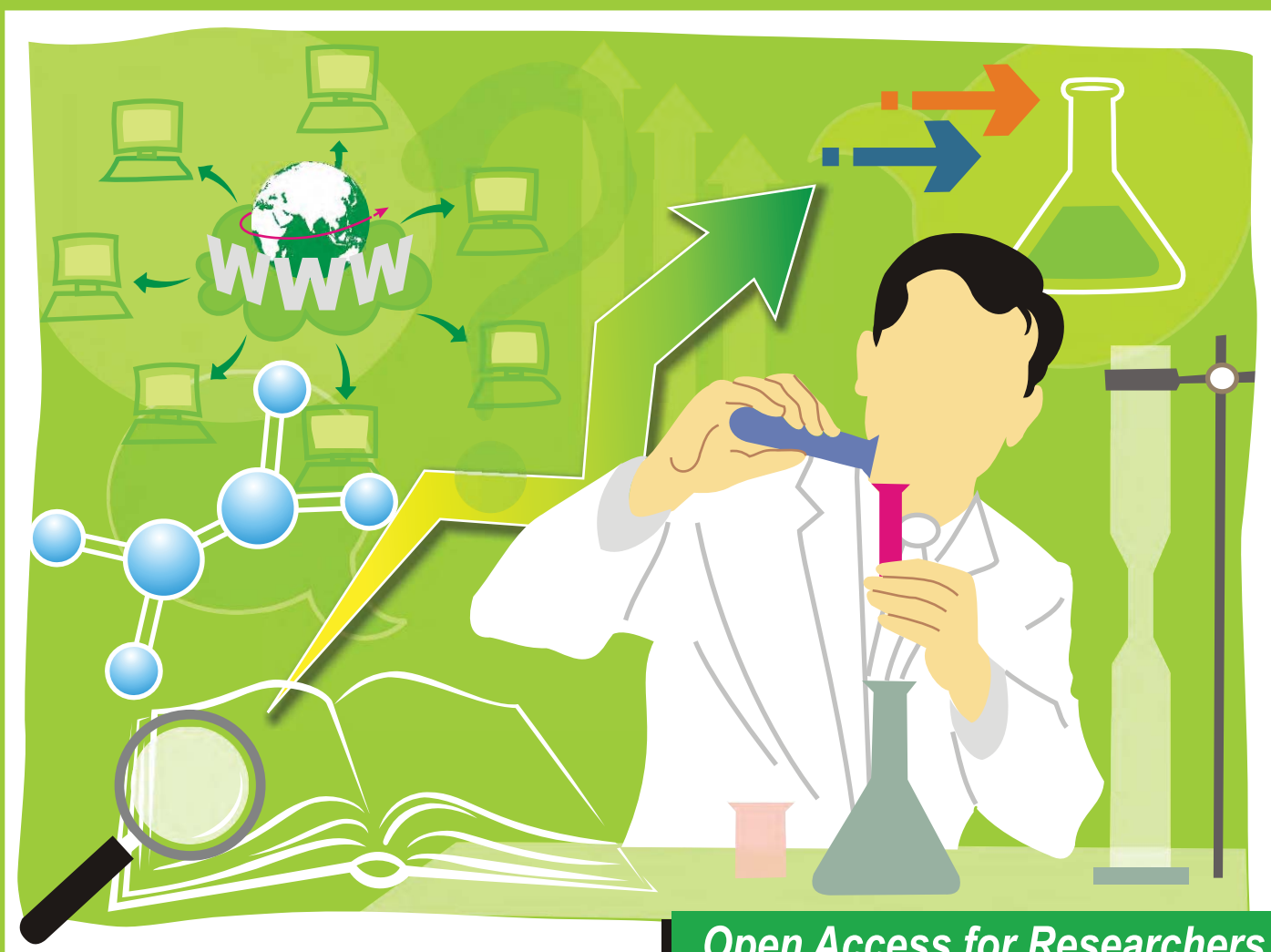


United Nations
Educational, Scientific and
Cultural Organization



1

Scholarly Communications



Open Access for Researchers



United Nations
Educational, Scientific and
Cultural Organization

Scholarly Communication

Module

1

Scholarly Communication

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MODULE INTRODUCTION

Researchers, scholars and scientists main business is scholarly communication. We communicate about our work to others, as we push the boundaries of what we know and the society knows. We question established notions and truths about science. We share our findings with others, and in a way that is popularly known as scholarly communication which emerged with the publication of first journal in 1665. However, the term gained popularity only in the 1970s, as access to peer reviewed and scholarly communication became difficult. This module has four units covering introduction to scholarly communication, peer reviewed journals, electronic journals and databases and the Serials Crisis. At the end of this module, the learner is expected to be able to:

- Explain philosophy, mission, and objectives of scholarly communication
- Describe the process of scholarly communication
- Identify different channels of scholarly communication
- Discuss the dysfunctioning of the scholarly communication

In **Unit 1**, *Introduction to scholarly communication*, we have discussed different aspects of scholarly communication – particularly its genesis, importance and ethics of academic publishing, and different communication channels available in academic publishing. Some of these channels are commonly described as primary sources as they provide first-hand testimony or direct evidence concerning a topic under investigation. Historically, scientific journals were initiated by learned societies and other scholarly communities for reporting results of concluded research works or scientific discoveries. Now many for-profit publishers have started publishing research journals.

Unit 2, *Communicating with Peer Review Journals*, covers two important academic publishing channels, namely peer reviewed journals, conferences and their proceedings. This Unit also highlights different methods and procedures of peer reviewing for publishing primary literature emanated from research studies. The peer reviewing is essential for validating quality of research findings conveyed by researchers, which are subject to fulfilment of ethical standards and appropriate research design, sampling and other methodological issues.

In **Unit 3**, *Electronic journals and databases*, we have discussed the emergence of electronic journals in academic and research environment due to wide proliferation of information and communication technologies (ICT) in research communications and academic publishing. Scientific communities and scientific communications from the global South are getting substantive attentions through adaptation of electronic journals and electronic academic databases in the process of research communications.

In **Unit 4**, the *Serials Crisis*, we discuss the cost of peer reviewed publications and the problems faced by researchers in developing countries. The focus of this unit is on highlighting the problems and discusses possible solutions including the emergence of open access as one of the solutions. Open access journal publishing helps in mitigating some of the problems associated with serials crisis.

UNIT 1 INTRODUCTION TO SCHOLARLY COMMUNICATION

Structure

- 1.0 Introduction
- 1.1 Learning Outcomes
- 1.2 Objectives of Scholarly Communication
- 1.3 Historical Perspectives of Scholarly Communications
- 1.4 Foundations of Science and Scholarship
- 1.5 The Process of Scholarly Communication
 - 1.5.1 Different Channels of Scholarly Communication
- 1.6 Principles and Paradigms of Scientific Culture / Scholarship
- 1.7 Let Us Sum Up
- 1.8 Check Your Progress

1.0 INTRODUCTION

In an academic research environment, scholarly communications become central part of the process of deliberations. Scholarly communications are carried out using certain channels of communications by scholars and academicians. Most important ones are scholarly journals, conference proceedings, research monographs, dissertations, research reports and personal memoirs. Internet now provides much easier and instant means of connection. Social media is a boon for any type of communication.

The learned societies – the formal institutions representing scientific and think tank communities – are primarily responsible for initiating scholarly journals in their respective subject areas, where members can communicate their results of scientific research and get valuable feedbacks from readers of these journals or fellow members of these learned societies. Since the mid-twentieth century and later, learned societies have started collaborating with for-profit publishers – for achieving global outreach, global readership and global authorship. ICT-enabled environment helps in global outreach of scholarly literature, more rapidly than earlier print-only era. Scholarly communications got enormous impetus when scholarly literature becomes globally and instantly accessible through online mode in the globalized societies.

This unit is part the Module titled “Scholarly Communications”. In this unit, the genesis of scholarly communications is briefly discussed, followed by overviews and paradigms of scientific revolutions, scientific culture and scientific scholarship.

1.1 LEARNING OUTCOMES

After reading this unit, you are expected to be able to:

- Describe genesis of scholarly communications;
- Discuss the roles of learned societies to initiate information dissemination and academic publishing;

- Identify different kinds of primary sources as medium of scholarly communication;
- Explain the process of scholarly communications in academic research; and
- Critique scientific revolutions and scientific culture in academic research.

1.2 OBJECTIVES OF SCHOLARLY COMMUNICATIONS

The scholarly communication is the process of sharing, disseminating and publishing research findings of academics and researchers so that the generated academic contents are made available to the global academic communities. A research paper is a standard way of presenting one's research findings against certain research questions, based on scientific methods of experimentations, observations and data analysis. So, an author, or a group of authors, prepares a manuscript for submitting to a scholarly journal, where s/he articulately narrates his scientific experiments, research methodologies, key findings and conclusions to communicate how some significant contribution has been made in the body of knowledge. Submitted paper in a scholarly journal usually goes through rigorous peer review process before it gets accepted. The paper reviewers are drawn from the subject experts and practitioners in a specialized area matching a submitted paper. Peer reviewing is seen as a key quality control mechanism for a reputed journal to keep it amongst the best in its subject field. Thus, many reputed journals have very high rates of rejection in order to accommodate many good papers with brilliant ideas and novelty.

The journal *Science* published by the American Association for the Advancement of Science (AAAS) informs "Because of the stiff competition for space in the journal, *Science* now accepts less than 7% of the original research papers submitted. Most submissions are evaluated by the staff editors and our Board of Reviewing Editors for potential significance, quality, and interest. ... About 80% of submitted manuscripts are rejected during this initial screening stage, usually within one week to 10 days."

1.3 HISTORICAL PERSPECTIVES OF SCHOLARLY COMMUNICATIONS

Scholarly communications historically had been driven by the learned societies and their member communities around the world to publish findings of their research inquiries and scientific discoveries. The learned societies were the main promoters and publishers of scholarly journals. The first sets of learned societies were established in different European countries in the seventeenth and eighteenth centuries around the periods of European renaissance. These were predominately named as the Royal Societies, as they received patronage from the monarchies and their respective governments. Each learned society launched a periodical for disseminating the results of research of their society members and other scholars. Scholarly periodicals of the learned societies,

often called as ‘Transactions’ or ‘Proceedings’, were published at regular intervals to incorporate scholarly works or academic inquiries by their respective member scholars. Many of these members were actively engaged in academic discourses. Their interactions through academic meetings helped in deep understanding and shaping up of contemporary subject fields. These ‘Transactions’ were multi-disciplinary in nature, encouraged scholars in different disciplines to understand each other’s scholarly research outcomes. The presented papers in Society’s academic meetings sometimes incorporated in these ‘Transactions’ for wider circulation amongst the members of a learned society. Text Box 1 depicts the scope of learned societies in India, which is similar to scientific societies in other countries.

Some of the oldest scholarly journals around the world are identified below:

- *The Journal des Sçavans* was the earliest academic journal published in Europe. Its first issue was released on 5th January 1665. It was founded by Denis de Sallo, adviser to the Parliament of Paris in France. It is presently published as the *Journal des Savants* (ISSN: 0021-8103).
- *The Philosophical Transactions of the Royal Society* (Phil. Trans.) was the second earliest academic journal published in Europe by the Royal Society of London. Its first issue of the first volume was released on 6th March 1665. It is presently published in two separate parts, namely, the *Philosophical Transactions of the Royal Society A: Mathematical, Physical, and Engineering Sciences* (ISSN: 1364-503X), and the *Philosophical Transactions of the Royal Society B: Biological Sciences* (ISSN: 0962-8436).
- *The American Journal of Science* (AJS) (ISSN: 0002-9599), founded in 1818, was the earliest scientific journal published in the United States. It has been published continuously since 1818.
- *The Asiatick Researches, or Transactions of the Society Instituted in Bengal, for Inquiring into the History and Antiquities, the Arts, Sciences, and Literature of Asia*, was the earliest scholarly journal published in Asia published by the Asiatic Society, India. Its first volume was released in 1788. It is one of the oldest scholarly journals published from the global South. It is presently published as the *Journal of the Asiatic Society* (ISSN: 0368-3303).

Text Box 1: Scope of Learned Societies in India

“Starting from 17th century the societies played significant role in the launching and nurturing periodicals. In the beginning the scope of the societies was general. For example Royal Society of London (1662), Accademia dei Lincei, Rome (1603) etc. were devoted to the promotion of learning in general. The same situation is observed in India as well. The scope of the Asiatick Society was very broad and not restricted to any particular subject. The societies that sprang up during the three to four decades following the foundation of the Asiatick Society (1784) were also general in scope.”

Source: Sen, B.K. (2002). Growth of Scientific Periodicals in India (1788-1900). *Indian Journal of History of Science*, 37(1), S1-46.

1.4 FOUNDATIONS OF SCIENCE AND SCHOLARSHIP

Since the nineteenth century, the scholarly communications have been transacted through conferences, books and the scientific periodicals launched by the scientific societies, national science academies and other learned communities. These scientific societies were membership-based and principally supported by the individual contributions of the scientific members. Century old scientific societies are largely non-profit institutions, engaged in creation and dissemination of scientific research. Of late, most of these societies have transferred their journal publishing ventures to the for-profit publishers or business enterprises. Whereas, many other scientific societies still retain their journal publishing activity to primarily engage with qualitative science dissemination and to provide cross-subsidy into their research and training activities. Many of the world's distinguished scientific journals are surviving for more than a century. So are the scientific societies. They have made deep impact on scientific inquiries, advancement of knowledge, and growth of subject areas. Many of them have facilitated the formation of new scientific disciplines. In the era of online publishing, many of them command higher attention of scientific communities than the newer journals. Table 1 shows a list of some distinguished scientific journals around the world. Some of these journals, although started as non-profit publishing venture, have transformed them into marketable and profitable products of profit-making corporate publishers. On the other hand, some other scientific journals in the list have remained with the non-profit societies. Their market visibility has been raised remarkably due to publishing high quality research papers, global authorship and global readership. These academic journals also have increased online and social media presence for outreaching to worldwide audiences.

These academic journals essentially capture frontiers of science and scholarship. They provide wider avenues of interactions, academic discourses, knowledge creation and knowledge enrichment. Many of these journals led to development of subject specific journals with narrower focus. Some of these journals were bifurcated or trifurcated into different parts or sections to disseminate research findings in more specific subject areas. Delivery mechanism of journal contents was also changed in the late twentieth century. In addition to print edition of academic journals, online editions of these journals were introduced during this time (i.e., late 20th century) to make electronic or online delivery of journal issues and journal articles through electronic journal gateways and journals' own websites. With this introduction of online delivery, the scholarship became more reachable and instantly accessible to the worldwide audience than earlier times.

Table 1: Publisher's Status of Distinguished Scientific Journals around the World

Name of the Journal	Publishing Since	Society/ Publisher	ISSN	Publisher's Status
Aeronautical Journal	1897	Royal Aeronautical Society	0001-9240	Non-Profit
American Journal of Science	1818	American Journal of Science	0002-9599	Non-Profit
Analyst	1876	Royal Society of Chemistry	0003-2654	Non-Profit
Belgian Journal of Botany	1862	Royal Botanical Society of Belgium	0778-4031	Non-Profit
Journal of the American Chemical Society	1879	American Chemical Society	0002-7863	Non-Profit
Journal of the Royal Society of Medicine	1907	Royal Society of Medicine	0141-0768	Non-Profit
Nature	1869	Macmillan	0028-0836	For Profit
Physical Review	1893	American Physical Society	1050-2947	Non-Profit
Proceedings of the National Academy of Sciences (PNAS)	1915	National Academy of Sciences of the United States of America	0027-8424	Non-Profit
Science	1880	American Association for the Advancement of Science (AAAS)	0036-8075	Non-Profit
Scientific American	1845	Scientific American Inc.; Macmillan	0036-8733	For Profit

1.5 THE PROCESS OF SCHOLARLY COMMUNICATIONS

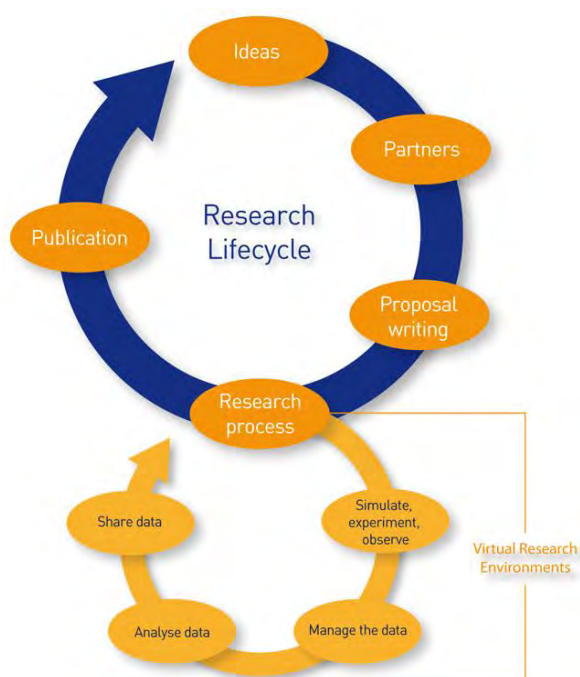


Figure 1: Research Lifecycle diagram, proposed by JISC, United Kingdom

Source: www.jisc.ac.uk/whatwedo/campaigns/res3/jischelp.aspx

The scholarly communication is only a small component of a larger Research Lifecycle. The researchers engaged in advancement of knowledge through participating in collaborative scientific research projects, more specifically plan their research in consultation with their research partners, funders and institutional research team. Initially, a group of researchers nurtures research ideas, which are fine-tuned by their research partners and other team members. Then they write a well-structured research proposal and submit to a research funding agency. The funder selects a research proposal for funding, subject to fulfilment of the funder's broader criteria and scope. Funder may insist modifying certain aspects of a research proposal to suit their funding objectives, obligations and budgetary limitations. After acceptance of a research proposal, then the research process starts in virtual research environments – in active participation with the collaborative institutions and other research partners. Each partner institution may initiate a specific and well-defined component of the research work. Coordination of all research components is done by the research director or principal investigator in active participation with all project leaders of different components. A typical research process involves certain activities for research data generation, namely, Simulate, Experiment and Observe. In social science research, field work is usually undertaken for research data generation through observation or simulation. Then the research process intrinsically involves in management of generated data, data analysis and data sharing. Here, the research director and team leaders are involved in report writing, and communicating findings of the collaborative research work. This research team may choose any of the scholarly communication channels – such as journals, conference proceedings and research monographs – to disseminate results of research to a larger audience. The research team is also responsible to produce high quality report for communicating to the funding agency and other stakeholders responsible for initiation of any follow-up research activities. The generated or collected research data also requires preserving for future reuse or reutilization in follow-up research projects. Then the Research Lifecycle reiterates for solving some of the related research problems and advancing frontiers of knowledge. Figure 1 shows a Research Lifecycle diagram, universally applicable to scientific research paradigms.

1.5.1 Different Channels of Scholarly Communications

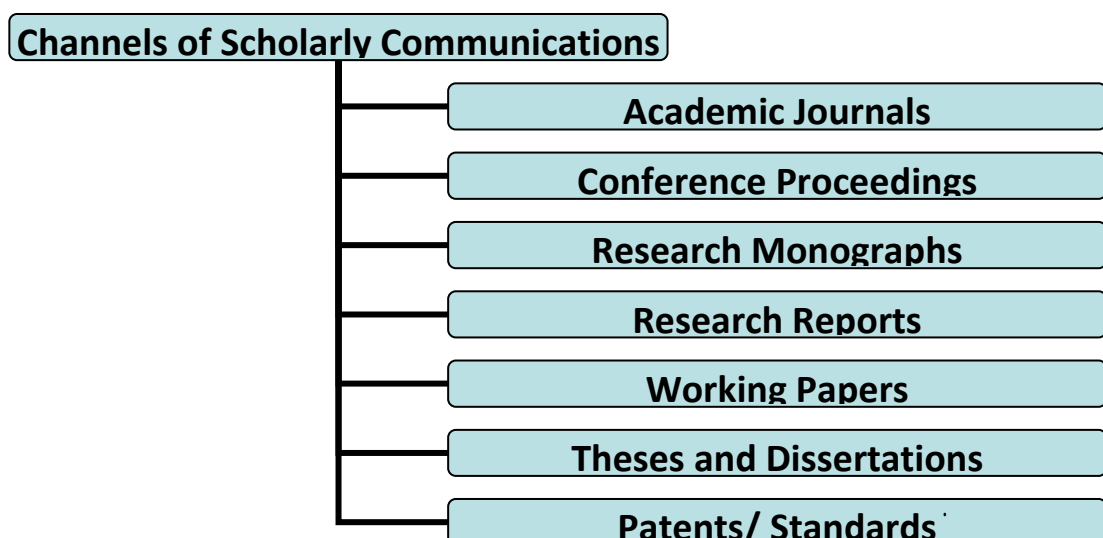


Figure 2: Scholarly Communication Channels

There are many avenues of scholarly communication available to researchers. The most popular channel of scholarly communication is scholarly periodicals. This periodical publication channel is well respected within scientific communities for their high level of academic impact, credentials, quality assurance, accessibility, and outreach potentials.

The scientific conferences are considered as a good avenue for reaching out to expert communities in an interactive mode to get feedbacks on presented research papers. Conference papers may be published before or after the conference. Nowadays, many conferences are co-publishing presented conference papers in online proceedings, available with commercial publishers' knowledge gateways. Some conference organizers are even collaborating with academic journals to publish special issues, selecting certain number of high quality papers presented in the respective conference. In social sciences and humanities disciplines, a research monograph is considered as an effective publishing channel for a research project. Books or monographs are considered as non-ephemeral items having long-standing impact within a community of researchers.

Research monograph is also a good option for publishing results of research. In some books, collections of chapters written by different authors are considered, where each chapter is a kind of research paper depicting certain amount of results of a research work.

Research reports and project reports are formal mode of research communication to record and disseminate research results to funding agencies and other stakeholders involved in the research process. In some countries, public-funded project reports are made available in public domain through online open access.

Theses and dissertations are formal mode of academic research communication to record and disseminate research results of doctoral and master's level research studies, undertaken by enrolled students in higher educational institutions and universities. In some countries, public-funded doctoral dissertations are made available through institutional or national repositories of electronic theses and dissertations (ETD). In India Shodhganga¹ project of the INFLIBNET Centre is one such national system.

Working papers are a type of scholarly papers to communicate findings of research in progress. Working papers help the researchers in getting qualitative and timely feedbacks for making certain changes in research design or analysis of generated data.

The patents are vehicle of protection of intellectual property rights emanated from scientific projects or scientific discoveries. A new product or process or technique derived from a scientific research work, which has certain applications for the betterment of human life, is patentable and inventors can claim it as their intellectual property by registering it with patenting authorities by following certain legal procedures.

All these channels of scholarly communication are popularly known as primary sources or original sources or primary literature. Figure 2 gives an indicative list of primary sources of information. Primary sources are indexed in global or national indexing and abstracting (A&I) databases, which are also popularly known as alerting service. Science Citation Index² (SCI), produced by Thomson Reuters, is an example of secondary source of information connecting to recently published primary literature.

Figure 3 gives a list of types of papers published in academic journals. Most predominant types are research papers, review papers, research communications or short communications. Some academic journals include feature articles based on theme of a special issue. Other regular types of articles are book reviews, opinion or commentary papers, perspectives or insight papers, news or views, and conference reports. In many journals, editorial is regularly published to express editorial points of view on certain aspects related to journal specific issues or research environment or some current issues in general.

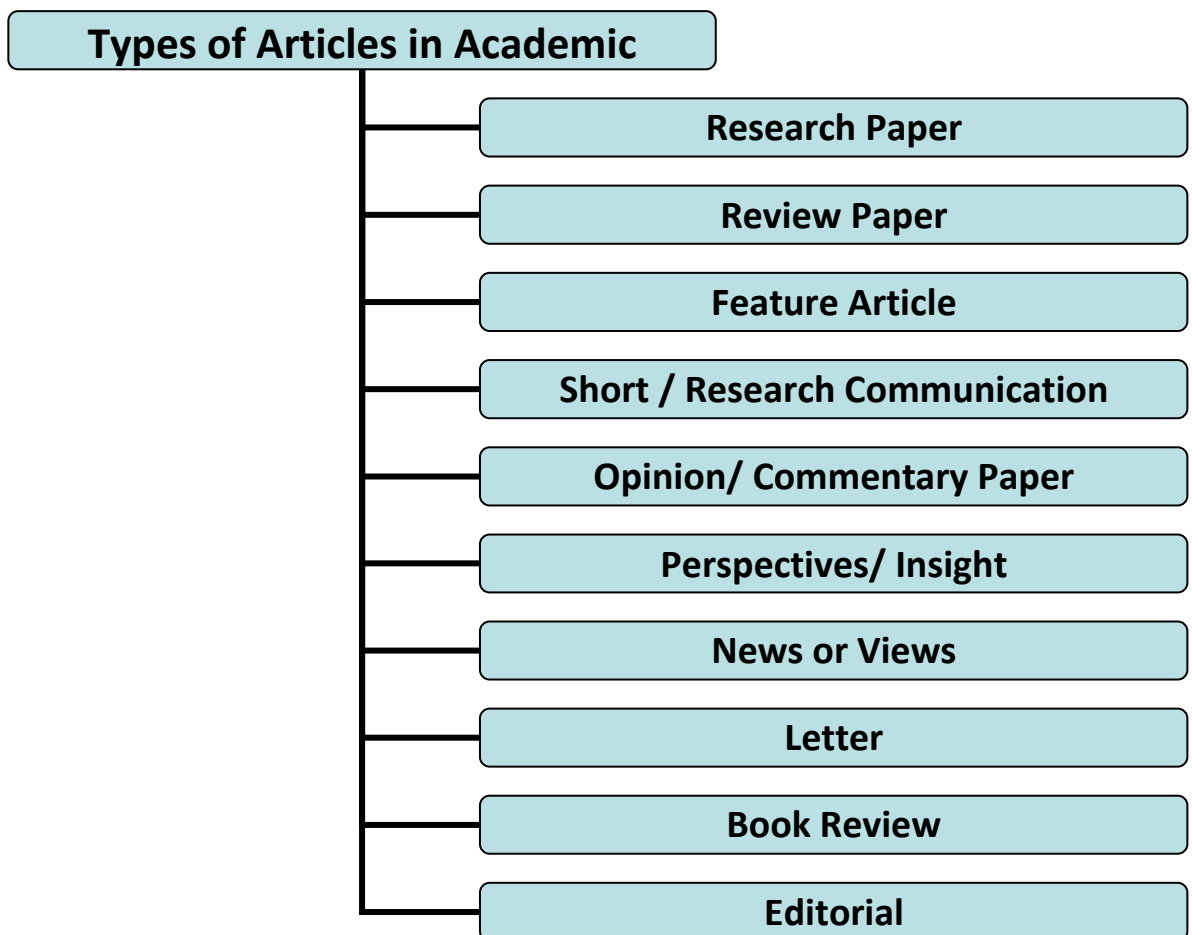


Figure 3: Types of Papers Published in Academic Journals

1.6 PRINCIPLES AND PARADIGMS OF SCIENTIFIC CULTURE AND SCHOLARSHIPS

During the European Renaissance period, spanning the 14th to 17th centuries, the western science met the modernity and a new dawn of scientific inquiries was established, based on principle of logical reasoning, evidence and generalization. During the post-Renaissance period, we saw the emergence of modern science, which is popularly known as the scientific revolution. The scientific revolution was marked by the developments in scientific disciplines, such as mathematics, physics, astronomy, biology, human anatomy and chemistry. The scientific revolution was also marked with formation of modern scientific laws and principles, such as Kepler's laws of planetary motion, Newton's laws of motion, and Newton's law of universal gravitation. The scientific revolution brought transformed views and interactions between nature and society, as well as, science and society. The scientific culture brought a new set of values for understanding the world, new philosophical insights, and redefined the goals of enquiry.

The scientific scholarships in modern times helped in formation of the scientific temperament, culture and scientific establishments in western countries and their colonies. Scientific establishments, in participation with scientific communities and the state, initiate much focused innovative scientific research programmes to stimulate scientific progress in the world. The scientific communities nurture a common platform for professional developments of scientific researchers. They are also very instrumental in bringing out different ethical principles, professional standards and best practices of scholarly research.

There are many international standards and guidelines available for good governance of scientific research around the world. Scholarly communication, being essential part of the scholarly research process, has certain international standards and principles. Examples of few international standards are namely,

- i) Standards and Operational Guidance for Ethics Review of Health-Related Research with Human Participants, prepared by World Health Organization (WHO), 2011;
- ii) Universal Declaration on Bioethics and Human Rights, adopted by UNESCO, 2005;
- iii) International Ethical Guidelines for Biomedical Research Involving Human Subjects, prepared by Council for International Organizations of Medical Sciences (CIOMS) and WHO, 1993;
- iv) International Standards of Responsible Publication for Authors and Editors, prepared by the Committee on Publication Ethics (COPE), 2010.

Text Box 2 provides international standards of responsible publication for authors and editors, as prepared by the Committee on Publication Ethics (COPE) – an international scientific community for promoting integrity in research publications.

Text Box 2: International Standards for Authors and Editors

For Authors (*Responsible Research Publication: International Standards for Authors*)

The research being reported should have been conducted in an ethical and responsible manner and should comply with all relevant legislation.

Researchers should present their results clearly, honestly, and without fabrication, falsification or inappropriate data manipulation.

Researchers should strive to describe their methods clearly and unambiguously so that their findings can be confirmed by others.

Researchers should adhere to publication requirements that submitted work is original, is not plagiarised, and has not been published elsewhere.

Authors should take collective responsibility for submitted and published work.

The authorship of research publications should accurately reflect individuals' contributions to the work and its reporting.

Funding sources and relevant conflicts of interest should be disclosed.

For Editors (*Responsible Research Publication: International Standards for Editors*)

Editors are accountable and should take responsibility for everything they publish.

Editors should make fair and unbiased decisions independent from commercial consideration and ensure a fair and appropriate peer review process.

Editors should adopt editorial policies that encourage maximum transparency and complete, honest reporting.

Editors should guard the integrity of the published record by issuing corrections and retractions when needed and pursuing suspected or alleged research and publication misconduct.

Editors should pursue reviewer and editorial misconduct.

Editors should critically assess the ethical conduct of studies in humans and animals.

Peer reviewers and authors should be told what is expected of them.

Editors should have appropriate policies in place for handling editorial conflicts of interest.

Source: <http://publicationethics.org/resources/international-standards/>

1.7 LET US SUM UP

In this Unit, you have learnt about different aspects of scholarly communication – particularly its genesis, importance and ethics of academic publishing, and different communication channels available in academic publishing. Some of these channels are commonly described as primary sources as they provide first-hand testimony or direct evidence concerning a topic under investigation. There is also existence of secondary sources. Indexing and abstracting services are usually a kind of secondary sources helping the academic researchers in literature search and discovering primary literature available in academic journals and other worthwhile research literature. Historically, scientific journals were initiated by learned societies and other scholarly communities for reporting results of concluded research works or scientific discoveries. Now many for-profit publishers have started publishing research journals. The emergence of interactive online databases and online gateways of primary literature marks arrival of personalized web-based services for disseminating scholarly literature to global researchers, institutions and prospective authors.

1.8 CHECK YOUR PROGRESS

- 1) Who is the publisher of the journal 'Science'?
 - a) American Association for the Advancement of Science
 - b) National Academy of Sciences of the USA
 - c) Scientific American Inc.
 - d) Macmillan
- 2) Who is the publisher of journal 'Nature'?
 - a) American Association for the Advancement of Science
 - b) National Academy of Sciences of the USA
 - c) Scientific American Inc.
 - d) Macmillan
- 3) Which is NOT a not-for-profit publisher?
 - a) Macmillan
 - b) American Association for the Advancement of Science
 - c) National Academy of Sciences of the USA
 - d) Royal Society of Chemistry
- 4) Which is NOT the for-profit publisher?
 - a) Macmillan
 - b) Springer
 - c) Wiley
 - d) Royal Society of London

- 5) What is the rejection rate against submitted manuscripts in 'Science' journal?
- a) About 7%
 - b) About 93%
 - c) About 80%
 - d) About 20%

ONLINE VIDEOS TUTORIALS

There are a number of video tutorials available on topics discussed in this Unit. Some of the tutorials were developed by the reputed institutions, libraries and scientists. Now, you can learn more about how to become an active researcher contributing primary research literature and how you would be involved in communicating research as an author to your fellow scientists, researchers and scholars.

- *Advice to Young Scientists: Do Important Science!*(MARTIN RAFF) **Video**³
- *Communicating Science* (EUGENE GARFIELD) **Video**⁴
- *Defining Scholarly Communication* **Video**⁵
- *Do's and Don'ts in Research Communications* **Video**⁶
- *Good Practice In Communicating Research* **Video**⁷

UNIT 2 COMMUNICATING THROUGH PEER REVIEWED JOURNALS

Structure

- 2.0 Introduction
- 2.1 Learning Outcomes
- 2.2 Academic Journals, Their Functions, Working and Procedures
- 2.3 The Peer Review Process
- 2.4 World of Journal Publishing
- 2.5 The Importance of Scientific and Professional Societies in Journal Publishing
- 2.6 Publishing in Conferences
- 2.7 Let Us Sum Up
- 2.8 Check Your Progress

2.0 INTRODUCTION

In an academic research environment, scholarly communication requires peer reviewing to ensure quality assurance, adherence to presentation and ethical standards, and novelty in reported research results. Peer reviewers are drawn from the qualified as well as members of the profession within the relevant field. This evaluation by the experts ensures conformity to prevailing norms and adheres to effective self-regulation of scientific contents.

Similar to open access publishing platforms, some senior researchers have now established open peer review platforms to help the prospective authors with transparent method of selecting papers in scholarly journals and academic conferences.

The researchers in different countries also need to identify appropriate journals for submitting their manuscripts. As high ranking journals have higher rate of rejection and also sometimes are prejudiced or biased in editorial decision-making on submitted manuscripts. Therefore, authors from developing countries should identify their publishing venues very judiciously. The author guidelines, available in journals' websites or print issues, should be consulted thoroughly to avoid any rejection due to mismatched or out-of-focus submissions.

In this Unit, discovery processes in journal publishing and academic conferences are briefly discussed to help the researchers in guiding their efforts in enhancing their scientific productivity and higher rate of paper acceptance.

2.1 LEARNING OUTCOMES

At the end of this unit, you are expected to be able to

- Explain about the peer review processes and methods in scholarly communications;
- Critique the prospects and benefits of peer review in a nut-shell;
- Understand the world of journal publishing; and
- Discuss the processes and benefits of publishing in conferences.

2.2 ACADEMIC JOURNALS, THEIR FUNCTIONS, WORKING AND PROCEDURES

As indicated in the previous Unit, the academic journals are the most preferred channel of scholarly communication for publishing primary research results. After the World War II, the world saw a sharp rise of scholarly research – mostly funded by the public funded research councils around the world, more specifically in developed nations. Many developing countries as well as emerging countries within the group of developing nations have also undertaken capability enhancement drive in the last three decades to establish research and development (R&D) centres in those countries in collaboration with research institutions in advanced countries. There is also sharp rise in North-South scientific cooperation for technical and intellectual capability development in countries in the global South. All these efforts have resulted in higher production of scholarly literature and publishing them in scientific journals and other media for worldwide dissemination. Most of academic journals are published by non-profit publishers such as learned societies, research councils, research institutions, university presses, research and literary academies. On the other hand, in the twentieth century we see that for-profit publishers such as publishing companies and multinational enterprises are taking great interests in publishing academic journals, usually in collaboration with learned societies. In a recent study, it has been revealed that for-profit publishers Elsevier, Springer and Wiley now have a large market share – about 42% of journal articles in STM (Science, Technology and Medicine) disciplines. They also have made high profit margins in recent years – between 30% to 40% – by charging high subscription fees as well as open access publishing fees. Thus, STM journal publishing has gone into the hands of monopolistic corporations. However, non-profit academic publishing ventures are also flourishing due to easy availability of electronic publishing (or e-publishing) avenues and more particularly open access channels for achieving universal and free dissemination of scholarly literature, global authorship and global readership of journal contents.

Academic journals also have continued practices of peer reviewing of submitted manuscripts before publishing. For inclusion in renowned citation

databases such as Web of Science⁸ (WoS) and Scopus, or in subject-specific indexing & abstracting (I&A) services, an academic journal should meet the following main eligibility criteria:

- i) have a ISSN number,
- ii) should consist of peer-reviewed contents;
- iii) should be published on a regular basis;
- iv) the contents should be relevant and readable for an international audience, and
- v) should have a publication ethics and publication malpractice statement.

These eligibility criteria are drawn from *Scopus' Content Policy and Selection Criteria*⁹. This is more or less similar in other international I&A services and citation databases.

A scholarly paper, also known as an article, is an independent academic piece of writing where an original study has been presented with scientific evidences and analytical reasoning. Figure 4 depicts persons involved in publishing process of an article. A published article is a collaborative piece of academic writing, where many persons – both visible and invisible – have significant contributions in pre-publishing and post-publishing processes. An author is solely, legally and morally responsible for creation and submission of a scholarly paper. The paper can also have multiple co-authors, who are involved in the research study and deriving research results. There is also possibility of having informal contributions of some professional colleagues or peers of authors – who have helped in developing a particular manuscript in draft stage with their valuable comments or critical feedbacks. After submission of a manuscript to an academic journal, a paper usually goes to a journal editor or an editorial board member. If editor agrees with suitability of the submitted manuscript to journal's scope and subject coverage, the paper is sent to one or two peer reviewers along with guidelines for the reviewers. Peer reviewers are subject experts and senior researchers with considerable publishing experiences. They advise the editor on acceptance, rejection or revision of the submitted manuscript. In the publishing process publisher, printer, online publisher and few other people are involved for making the article available in print or online format. A funder or funding agency has supported the research study – a research paper is an outcome of that research study. Sometimes funder supports a publishing fee or article processing charge (APC), if required, for publishing an open access article in hybrid or open access journal. A hybrid journal publishes both open access articles and restricted access articles meant for subscribers of that journal, whereas an open access journal publishes open access articles only.

In post-publishing process, the indexers, bibliographers and librarians are involved in making a research paper known and accessible to research communities through various information, alerting and reference services.

Then a paper is accessed by a reader who is a current researcher – actively involved in academic study, teaching or research. The person could be a reviewer of the published paper and can cite this paper in forthcoming review article or research paper. Sometimes, an academic paper gets immediate media attention due to revealing some interesting facts, or conveying important social messages. Science bloggers and science writers in mass media highlight interesting findings in a research paper. Newspapers and magazines portray many such stories to keep abreast their readers on latest innovations and scientific development around the world. Thus, a research article has many collaborators – active or passive – to facilitate knowledge transmission from one to many, from lab to industry, field to fork.

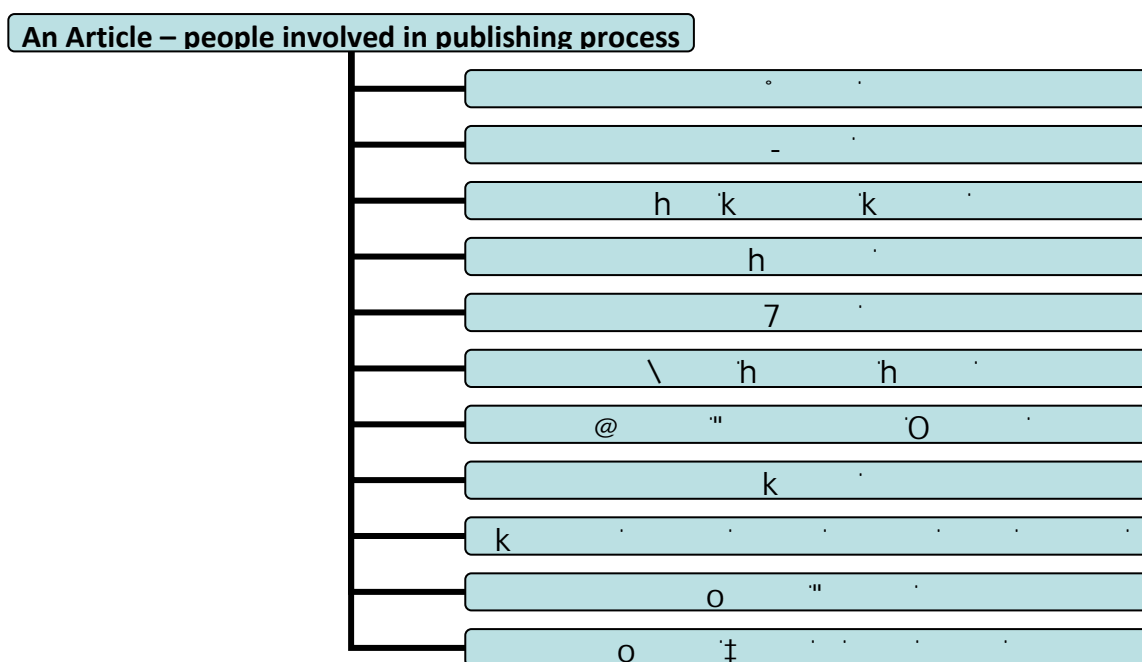


Figure 4: Types of People Involved in Publishing Process of an Article

2.3 THE PEER REVIEW PROCESS

The peer reviewing, being the core of screening process for a submitted manuscript before acceptance in an academic journal is a more exhaustive process of article being considered for publishing. Text Box 3 shows you major aims and different benefits of peer reviewing. Figure 5, (Source: Sense About Science, 2012) elaborates the peer review process as followed in peer-reviewed journal. The journal editor or any other member of editorial board usually screens a submitted paper to see if the submitted manuscript is relevant to journal's scopes and subject coverage; whether suitable for the journal's targeted audiences; finally, whether it meets journal's selection criteria. Here journal editor can out-rightly reject a submitted manuscript, where authors do not meet any of the above-mentioned points. If editor is satisfied with the contents of a submitted manuscript, then the manuscript is sent to two or more reviewers. The reviewers are subject experts and they have long publishing or

research experiences in the field. They thoroughly review the submitted manuscript on the guidelines given by the editor and give critical comments on different aspects of the paper, viz., relevance of the paper to the scope of the journal, importance of the topic in the current scenario, literature review, research design, and scientific evidences provided, relevance of conclusion, etc. They may also identify flaws in research design, sampling, analysis, conclusion and other shortcomings of the submitted manuscript. Then based on reviewers' comments, editor rejects or accepts or asks the author to revise the paper as suggested by the reviewers for a paper for publishing in the journal. Editor makes assessment of reviews received from different reviewers. Based on his own judgement and agreement along with any other member of editorial board, editor takes decision on acceptance of a submitted manuscript. If the manuscript is accepted, authors also require providing additional information or clarify points as sought by the reviewers or editor. Authors also need to justify shortcomings as pointed by the reviewers or editor. In most of the cases authors make revisions before final acceptance of a paper. Peer review is an iterative process that requires intellectual inputs from both authors and reviewers. Majority of scientific journals follow any of the four editorial decisions on acceptance of submitted paper after completion of its peer review process. *Nature* journal elaborates it more clearly:

- **Accept**, with or without editorial revisions.
- Invite the authors to **revise their manuscript** to address specific concerns before a final decision is reached.
- Reject, but indicate to the authors that **further work might justify a resubmission**.
- **Reject outright**, typically on grounds of specialist interest, lack of novelty, insufficient conceptual advance or major technical and/or interpretational problems.

As indicated in Figure 6, scientific journals follow any of the four different methods of peer reviewing. There are two broad methods, namely, **Blind Review** and **Open Review**. Blind review methods usually follow pre-publication peer reviewing, i.e., peer reviewing before acceptance of a paper in a journal. On the other hand, Open Review methods follow both pre-publication and post publication peer reviewing. Pre-publication peer review follows two broad methods, namely: (i) **Single-Blind Review** where reviewers know the authors but the reviewer's name is not disclosed to the author; (ii) **Double-Blind Review** where the identity of the reviewers and the authors are not disclosed to either party. In Open Review methods, no identities are concealed; both author and reviewer names are disclosed. In **Pre-Publication Open Review**, any comment related to a submitted manuscript of a paper, which is normally mediated by the editor, can be posted by reviewers before the journal publishing an article. It only can be posted by the reviewers pre-assigned by the editors. In **Post-Publication Open Review**, any reviewer comments related to a submitted manuscript of a paper, which is normally mediated by the editor, can be posted by readers and reviewers after the article has been published.

The *eLife* journal¹⁰ (ISSN 2050-084X) follows more transparent peer reviewing method with some innovative ways to keep editorial decision accessible to its scientific audiences and prospective authors. In *eLife* journal articles, readers can track reviewers' comments and get tips on the manuscript enrichment or revision process. An *eLife* journal article makes online availability of full-text contents, figures and data. It also gives access to:

- *Decision letter*, highlighting comments of the reviewers;
- *Author response*, clarifying reviewers' comments and how that has enriched the submitted version;
- *Leave a comment*, anybody can post critical comments on the article and comments are filtered by the editor before posting online.

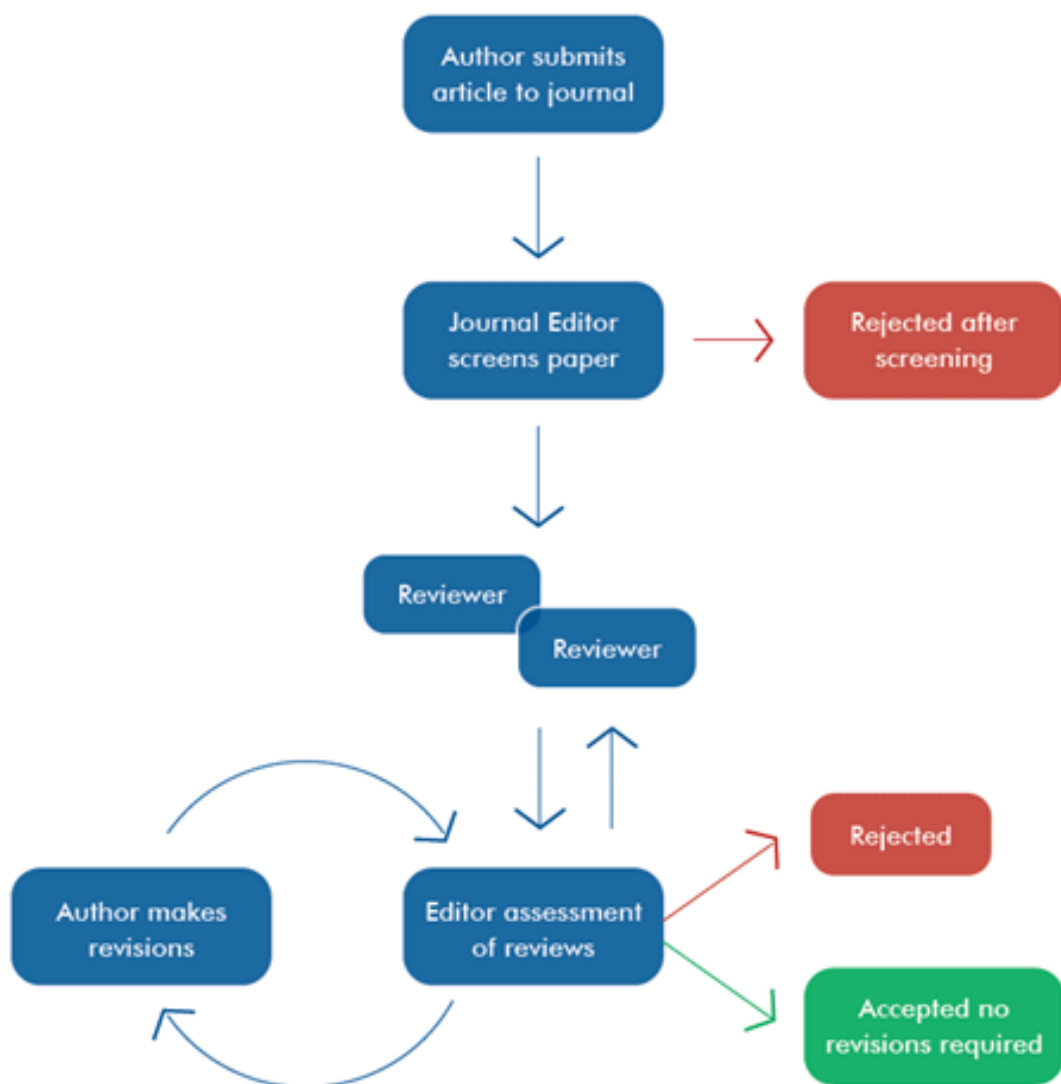


Figure 5: Peer Review Process

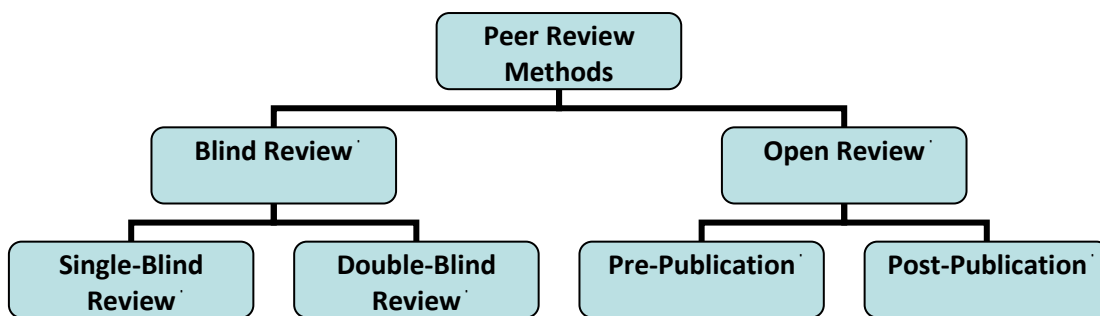


Figure 6: Peer Review Methods

Text Box 3: Peer Review Benefits and Value Addition

Why peer review? What are the benefits?

The author receives detailed and constructive feedback from experts in the field.

The process can alert authors to errors or gaps in literature they may have overlooked.

It can assist with making the paper more useful to the journal readership.

It may enable a discussion (between the author, reviewers, and editor) around a research field or topic.

Readers can be assured that the research they are reading has been verified and validated by subject experts.

What value should peer review aim to add?

Peer review should aim to establish that:

A submitted article is original work which has not been previously published nor is under consideration by another journal, in part or whole;

The article meets all applicable standards of ethics;

The paper is relevant to the journal's aims, scope, and readership;

A submitted article presents original research findings;

A submitted review article (or similar) offers a comprehensive critical review and evaluation of key literature sources for a given topic; and

The article is methodologically and technically sound, and adds to the knowledge base of the field.

Source: <http://journalauthors.tandf.co.uk/review/peer.asp>

2.4 WORLD OF JOURNAL PUBLISHING

Worldwide more than 100,000 scholarly journals are published on a regular basis by more than 5,000 academic publishers located in different countries. There are many directories of scholarly journals available in print as well as online format. One of the most authoritative directories is the *Ulrich's Periodicals Directory*¹¹, produced by ProQuest LLC. The *Ulrich's Periodicals Directory* (ISSN: 0000-0175) is available in print format, which is an annual publication. Its online edition, known as *UlrichsWeb* is a searchable database covering about 336,000+ periodicals – providing information about popular and academic magazines, scientific journals, newspapers and other serial publications. It also includes information on open access scholarly journals. On the other hand, *Directory of Open Access Journals* (DOAJ¹²) is the online database of open access journals, which is freely accessible and searchable. UlrichsWeb is a subscription-based product, unlike DOAJ. DOAJ lists about 9800+ scholarly open access journals published from 124 countries. A few other searchable online databases of scholarly journals include: Genamics¹³, Academic Journals Database¹⁴, Open Access Journals Search Engine¹⁵, JURN Directory for the arts & humanities¹⁶, British Library's Zetoc¹⁷, RoMEO Journals database¹⁸, etc. The RoMEO database also indicates each individual journal's copyright and self-archiving policies to help the researchers and authors in taking self-archiving decision.

Google Scholar Metrics¹⁹ provides ranked list of different scholarly journals, ordered by their five-year h-index and h-median metrics. A user can browse the top 100 publications in several languages – presently covering nine source languages viz. English, German, French, Portuguese, Spanish, Italian, Dutch, Chinese and Japanese. For English language journals, users can further browse the top 20 publications in several broad categories and in several subcategories. Google Scholar Metrics presently maintains eight broad categories and about 200+ subcategories.

These online and print directories help the researchers and prospective authors in identifying appropriate academic journals as their publishing venues, based on a paper's research focus, subject coverage and target audience. A research paper should also have relevance matching journal's aims, scope, and readership. Majority of scholarly journals provide author guidelines online. Author guidelines are also published in journals' regular issues. Author guidelines should always be consulted before submitting a paper in an academic journal.

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2.4.1 Importance of Author Guidelines

Every scholarly journal publishes author guidelines for helping and guiding the authors in submitting their manuscripts. These guidelines help in understanding a journal's scope, thematic areas, geographical focus, target audiences, and types of papers considered. It also explicitly mentions the manuscript requirements. These are specific requirements for preparing an abstract, main texts, figures, tables, in-text citations, footnotes or endnotes, and references. A scholarly journal usually follows a specific reference style. In order to get manuscripts accepted, prospective authors should thoroughly follow all the manuscript-related requirements – as clearly specified in the Author Guidelines of a journal.

In addition to publicizing the author guidelines, many academic publishers also maintain dedicated online channels for prospective authors. These publishers encourage authors to get registered with them to know publishers' side announcements, such as call for papers in special issues, call for papers in conferences, call for proposals for research awards, special services for authors' in developing countries, language enrichment tips, language editing services, etc. These publishers also maintain relevant FAQs (frequently asked questions) pages in their websites for guiding and awareness of prospective authors.

2.5 THE IMPORTANCE OF SCIENTIFIC AND PROFESSIONAL SOCIETIES IN JOURNAL PUBLISHING

In the previous Unit, you learned about roles of learned societies in academic publishing. The learned societies around the world as well as a number of international associations of in different subject fields have been associated with journal publishing in their respective subject areas since their origin the 17th century. These scientific and professional societies initially started academic publishing to disseminate scientific discoveries, innovations and major research findings to their respective members' communities. However, institutional subscription model of their scholarly journals gave them much impetus in continuing journal publishing rather professionally ensuring a steady revenue stream to finance societies' other developmental activities. These learned societies later got engaged with for-profit publishers for publishing scholarly journals with motives to run these journals professionally on profit sharing basis.

Some scholarly societies, such as American Library Association, also have strengthened their publications division and run this division in a professional manner in order to generate surplus revenues or profit margins for the societies. The professional approaches also have made several positive changes in journal publishing. The editorial office ensures timely peer-reviewing of submitted manuscripts, timely conveying decisions on manuscripts to the authors, quality assurance and coherence in scientific contents, and finally

timely publishing journal issues without any delay. While ensuring quality contents and timely production of journal issues – the researchers take a journal seriously. The editorial advisory board of an international journal also ensures diversity in publishing contents, bridging the scientific communities through publishing research findings relevant for the society in the global North as well as in the global South.

2.6 PUBLISHING IN CONFERENCES

In the previous unit you learned that the academic conference is one of the major channels for scientific discourses. The publications out of the academic conferences, seminars, symposiums, workshops, congresses and similar academic events are commonly known as conference proceedings. In such meets authors usually submit papers out of their ongoing (not finished) research. The authors in scientific conferences submit full-text papers to the conference organizers for considering inclusion in the academic programme of the conference. The organizers usually arrange peer-reviewing of all submitted papers. However, sometimes presented papers don't get peer-reviewed as these are submitted by invited speakers – who have considerable professional or academic experience. After reviewing and necessary revisions presented papers are published after the conference, which is popularly known as conference proceedings. Some conference organizers publish conference proceedings before starting of the conference, which is known as pre-conference proceedings. Some other organizers prefer to publish conference proceedings after completion of the conference, which is known as post-conference papers. In pre-conference proceedings, authors only get chance to improve their manuscripts based on feedbacks received from the paper reviewers. In post-conference proceedings, authors get chance to improve their manuscripts based on feedbacks received from the conference participants, discussants, observers and session chairs.

Nowadays, conference proceedings are published in combination of three modes: (i) Printed Volume, (ii) CD-ROM or USB Flash Drive, and (iii) Online on the website. Sometimes, conference organizers tie up with publishing companies for publishing printed or online conference proceedings in a form of an edited book. Publishers distribute this edited book widely and add an ISBN or ISSN number for unique identification of book title. In online platform, conference organizers develop a dedicated website, where every conference paper may have separate abstract or full-text contents. Web-based conference proceedings are either accessible through open access mode or toll-access to only subscribers.

Some of the popular conference proceedings series are listed below, which are available to their respective subscribers as well as paper contributors in conferences:

- Proceedings.com providing extensive catalogue of international conference proceedings available through books trade channels²⁰.
- ACM International Conference Proceeding Series²¹ published by Association for Computing Machinery (ACM).
- IEEE Conference Proceedings²² published by Institute of Electrical and Electronics Engineers (IEEE).
- American Chemical Society (ACS) Conference Series²³.
- Procedia²⁴ (Elsevierpublishingsolutions.com/procedia.asp), published by Elsevier B.V., is an electronic product which quickly publishes high quality conference proceedings in over 20 subject categories, e.g., *Agriculture and Agricultural Sciences Procedia* (ISSN: 2210-7843), *Procedia Engineering* (ISSN: 1877-7058), *Procedia Social and Behavioural Sciences* (ISSN: 1877-0428), etc. Every title of Procedia has a unique ISSN number and is available through SciVerse ScienceDirect portal. Each online issue of a Procedia publishes accepted peer-reviewed papers of a specific conference, and dedicated on a specific subject area.

There are a few open source and commercial solutions available to conference organizers for efficient management of scholarly publishing activities, such as electronically acceptance of papers and abstracts, peer review of submitted papers, participants' registration, post conference proceedings and posting papers in a searchable format, and other tasks of conference management. All these solutions are availed by thousands of academic event organizers every year in over 100 countries. Most popular ones are:

- **Open Conference Systems**²⁵ – an open source software produced by multi-university initiative Public Knowledge Project (PKP) – is a free web publishing tool that helps in creating a complete web presence for scholarly conferences. OCS an integrated tool for creating a conference website, sending call for papers, electronically accepting paper and abstract submissions, posting conference proceedings and papers in a searchable format, editing papers after peer review, and registering conference participants and allowing post-conference online discussions, besides many other functions helpful to conference organizers.
- **EasyChair.org** offers similar functionalities to conference organizers in a centralized server, where conference presenters can register and submit their full-text papers. Its online solution helps in performing key conference management functions such as accepting paper and abstract submissions, peer-review and web publishing of accepted papers.

- **OpenConf.com** offers similar functionalities to conference organizers in a centralized server as well as to localized institutional websites maintained by the conference organizers. Its online solution as well as downloadable software tool helps in performing key conference management functions such as accepting paper and abstract submissions, peer-review and web publishing of accepted papers.

2.7 LET US SUM UP

In this Unit, you have learned about two important academic publishing channels, namely peer reviewed journals, conferences and their proceedings. This Unit also highlights different methods and procedures of peer reviewing for publishing primary literature emanated from research studies. The peer reviewing is essential for validating quality of research findings conveyed by researchers, which are subject to fulfilment of ethical standards and appropriate research design, sampling and other methodological issues. Scientific communities give considerable values to peer-reviewed contents for engaging themselves in valid knowledge formation, knowledge transmission and proliferation of scientific research. Researchers in social sciences and humanities disciplines also have common practices of publishing monographs, and chapters in edited books. Research monographs and edited books, if peer-reviewed, are also considered as effective channels of scholarly communication.

Conference proceeding is another effective channel of scholarly communications, where scholars and practitioners in scientific disciplines widely participate to disseminate their research results. A conference is two way communications. Scientists come to talk of their work and listen to what others have to say on developments in their area. The authors of accepted papers present their findings in an audience with similar scientific backgrounds. In a Q&A session after author's presentation, session chair, discussants, and observers express their feedbacks and critical comments on different aspects of a presented paper, including its flaws. Thus, conference papers help the researchers in identifying their drawbacks in research design or research findings and help them in improving their research and knowledge. For the novice a conference teaches both writing and presentation skills.

2.8 CHECK YOUR PROGRESS

- 1) Identify ten categories of people involved in publishing process of an article in scientific journals.

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- 2) What are the major editorial decisions on acceptance of submitted manuscript of a paper after completion of its peer review process?

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- 3) Identify four peer review methods as practiced in scientific journals.

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- 4) Why does an author make revision of a submitted paper?

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- 5) What are the benefits of peer review?

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- 6) Choose the right answer

- (a) Which journal offers pre-publication open review?

- i) Science
- ii) Nature
- iii) eLife
- iv) Blood

- (b) Which is not a directory of scholarly journals?

- ii) Ulrich's Periodicals Directory
- iii) Directory of Open Access Journals (DOAJ)
- iv) Directory of Open Access Books (DOAB)
- v) Open Access Journals Search Engine (OAJSE)

- (c) Which is the open source software for conference management?

- i) EasyChair
- ii) Open Conference Systems
- iii) OpenConf
- iv) OpenJGate

- (d) Which online database hosts Procedia?
- SciVerse ScienceDirect
 - IEEE Xplore Digital Library
 - ACM Digital Library
 - Biomed Central

ONLINE VIDEOS TUTORIALS

There are a number of video tutorials available on topics discussed in this Unit. Some of the tutorials were developed by the reputed institutions, libraries and scientists. Now, you learn more about how you can become an active researcher contributing primary research literature, and how you would be involved in communicating research as an author to your fellow scientists.

- *Advice on Submitting to the Conference Proceedings Video*²⁶
- *Building Expertise in Journal Publishing*, by Susan Murray *Video*²⁷
- *Do's and Don'ts in Research Communications Video*²⁸
- *Ethics Video Series: Conference Papers and Presentations Video*²⁹
- *How to Get Published in a Peer-Reviewed Journal: Planning and Execution Video*³⁰
- *How to Publish in a Top Journal Video*³¹
- *Peer Review Video*³²

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UNIT 3 ELECTRONIC JOURNALS AND DATABASES

Structure

- 3.0 Introduction
- 3.1 Learning Outcomes
- 3.2 Emergence of e-Journals
- 3.3 Migration of Peer Reviewed Journals from Print to Online Platforms
- 3.4 Electronic Databases
 - 3.4.1 Bibliographic Databases
 - 3.4.2 Citation Databases
 - 3.4.3 Full-text Databases
 - 3.4.4 E-Journal Gateways
 - 3.4.5 Online Directories
- 3.5 Let Us Sum Up
- 3.6 Check Your Progress

3.0 INTRODUCTION

Academic and research publishing in recent times have experienced emergence of electronic platforms for effective research collaborations and research disseminations. Research communication and more particularly academic publishing processes require effective integration of information and communication technologies (ICT) for harnessing production of qualitative knowledge and dissemination to audiences globally. Peer-reviewed scholarly journals around the world are gradually migrating to electronic platforms, to make their contents globally visible, accessible, searchable and citable. Many peer-reviewed journals are now migrating from print edition to open access edition to make their knowledge resources freely accessible by the global researchers' communities.

On the other hand, exponential growth of scientific literature also has led to rapid disappearance of produced literature before it actually gets noticed by the scientific communities. Here, journal aggregators and online full-text databases help in long term digital preservation of journal contents in online environment, where multiple publishers make their contents available thorough third party service providers. Many publishers also collaborate up with more than one journal aggregators and full-text databases for making archived contents available from multiple service points.

In this Unit, characteristics and varieties of electronic journals and online research databases are discussed in details to help the learners in understanding availability of research literature as reliable proprietary electronic resources as well as open access resources in different platforms.

3.1 LEARNING OUTCOMES

At the end of this unit, you are expected to be able to

- Describe the basic characteristics of electronic journals and online academic databases;
- Explain the reasons for migration of peer reviewed journals from print to online platforms;
- Understand advantages of electronic version over print version of scholarly journal literature; and
- Identify different online platforms available for accessing and retrieving scholarly literature in academic and research environments.

3.2 EMERGENCE OF E-JOURNALS

Till the last quarters of the twentieth century, the scholarly journals were mostly distributed globally in print format through postal networks. Due to snail mail, many important research findings got delayed reaching to researchers located in distant countries. In print format, journal has limited readership as only one person can read a particular issue at a point of time. Other readers have to wait until their turn comes to have a glance at the latest issue of the journal. In the last quarter of the twentieth century, the publishers got interested in integrating information and communication technologies (ICT) in scholarly journal publishing for rapid global dissemination, expanding their markets to emerging nations and other developing nations. The for-profit as well as non-profit journal publishers then made extra efforts to reach the unreached through electronic journals or e-journals available through publishers' websites. An e-journal not only provides same contents as of a print journal, but can also provide material not possible in print journals.

E-journals can be distributed through journals' website, publishers' portal, e-journal gateway, and full-text databases of journal aggregators. Nowadays, many online bibliographic databases and online indexing & abstracting (I&A) services provide external full-text links to journal contents available on publishers' portal. Figure 7 indicates different channels of delivery of journal contents on electronic environment. Publishers provide unique document identifier to each published article, which is known as DOI or Digital Object Identifier³³. Every DOI is registered with Digital Object Identifier System at www.doi.org and www.crossref.org. Bibliographic databases and I&A services interlink every article recorded in their databases with the unique DOI, so that users can easily identify and obtain full-text of relevant articles.

Table of contents (TOC) alert service is one of the major useful services for researchers to know and identify relevant articles in their areas of interests. E-journals can disseminate TOC alerts through various modes such as emails, mailing lists, RSS feeds, and social media to outreach their global audience.

Some search engines, viz. Google Scholar, facilitate users to set an article alert on a specific search term or an author or an institution or a journal, so they get informed almost immediately when new contents become available on online platforms.

The beginning of the twenty first century is also marked by emergence of smart phones and mobile digital technologies such iPad, Tab, or similar devices. The researchers and academics are also increasingly using these mobile devices for information access and research collaborations. Many e-journals have started disseminating full-text journal contents through special Apps suitable for mobile devices. M-Science is growing now at much higher pace to supplement efforts in e-science mode of science and research communications.

Open access journals are necessarily electronic journals without any restriction of information access and content sharing and replication with due acknowledgement through researchers' personal or professional networks. Open access journals are also upgrading their platforms to make their full-text contents seamlessly accessible through M-Science platforms and mobile devices.

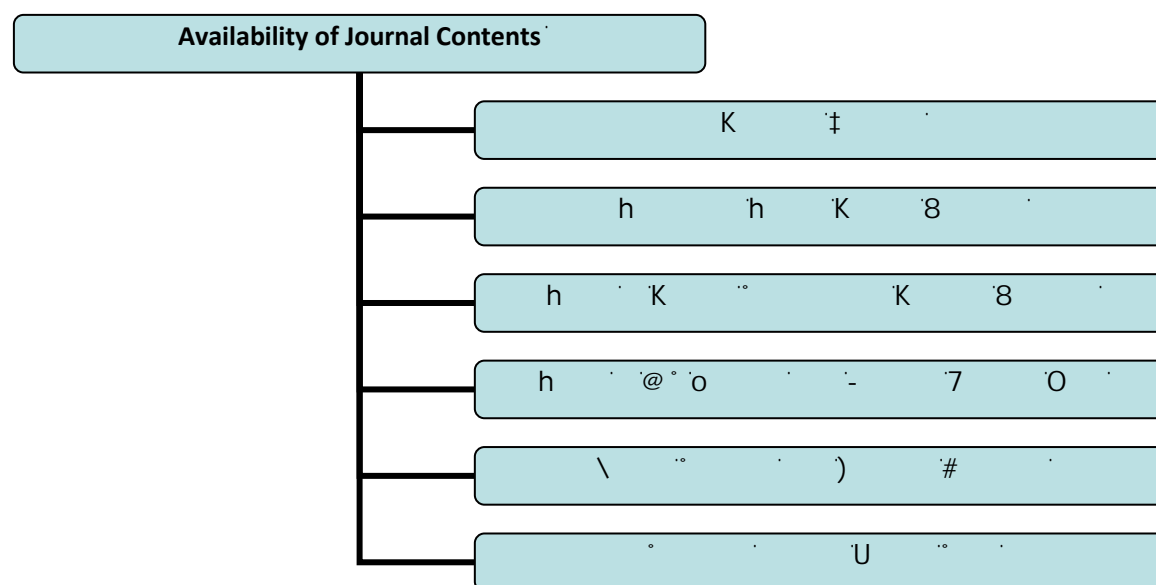


Figure 7: Delivery of Journal Contents in Electronic Environment

3.3 THE MIGRATION OF PEER REVIEWED JOURNALS FROM PRINT TO ONLINE PLATFORMS

The peer reviewed scholarly journals have been migrating to web-based platforms in recent years in addition to publishing their respective print edition. Most of the existing scholarly journals published from the advanced countries have already adopted dual modes of online and print formats. These journals now form a considerable mass of electronic publications. We also see emergence of new e-journals as online only edition, without publishing any print edition. Some of the existing scholarly journals have terminated their

print edition to publish online edition only. While a print edition has limited space to publish a few number of articles due to high cost of printing and distribution, online only edition has much more flexibility to accommodate more articles and features than its print counterpart. Electronic journals also have flexibility to publish ‘articles in press’ in advance – months before the articles being published with pagination and assigned issue number or volume number of a journal. E-journals also allow embedding of graphs, photos, video clippings, and hyperlink to other referred sources.

Migration of scholarly journals from print to web-based platforms essentially supports their global outreach strategy in order to achieve their global readership, global authorship and global marketing. The journal publishers also offer e-journals in bundles to their prospective institutional subscribers. The bundles can be formed on the basis of subject areas, viz., management sciences, engineering disciplines, applied sciences, biomedical sciences, etc. Generally, journals in STM (science, technology and medicine) disciplines are costlier than HSS (humanities and social sciences) disciplines. Also, journals in STM disciplines publish much higher number of articles, than journals in HSS disciplines. Journal frequency of STM journals and average number of articles in a STM journal volume are much higher than HSS journals.

Scientific disciplines have much higher growth potential. So new scientific journals target recently emerged or super-speciality subject areas, such as nanotechnology, nano materials, molecular biology, biotechnology, etc.

Frustrated with corporatized scholarly journals, which are in the clutches of profit-making multinational publishing companies or powerful lobbies, academic communities also sometimes seek alternative pathways in establishment of scientific journals of new kind with strong focus on unbiased and transparent peer-reviewing system. Thus, we see emergence of new kind of e-journals in recent time alternative to scientific cultural and scholarly communication practices. Participatory and transparent practices of new e-journals will help in developing new benchmarks in research communications.

Publishers of scholarly journals also seek new business model to explore new markets and continue their profitability. Toll-access model is a historically proven profiting model for journal publishers, but non-sustainable to subscribing institutions. Due to ‘serials crisis’ phenomena, libraries across the world are facing budget cuts, inflations and foreign currencies’ negative fluctuation. Academic libraries don’t have adequate financial strength to subscribe to all scholarly journals needed for their members. Thus, libraries go in selective subscription of journals based on available budgets and much relevance to academic curricula or research programmes in their respective universities or institutions. Many libraries also have discontinued or reduced their print subscription to accommodate new e-journals relevant to their library users. Lost ground of print journals is motivating new breed of e-journals to capture an ever-increasing market of scholarly databases.

Open access (OA) journals don’t have any burden on academic libraries’ budget. But research institutions have significant implications as many OA

journals accept manuscripts for publishing in their journals subject to paying an article processing charge (APC) or a publishing fee. Researchers in developing countries sometimes feel a pinch of APC as many of them don't have relevant budgetary provisions in their institutional budget or research project's budget.

Hybrid journals publish open access articles in their respective toll-access journals. Hybrid journals are subscription-based e-journals, which occasionally accept manuscripts for publishing as open access articles. All major for-profit publishers now accept open access articles in their conventional scholarly journals, subject to receiving an APC from contributing authors.

3.4 ELECTRONIC DATABASES OF JOURNALS

Electronic databases of scholarly journals are globally available to researcher communities through institutional subscription or open access mode. Any database essentially consists of several electronic records of related items. Each electronic record stores relevant metadata information. In the context of academic databases, an electronic record of an academic database contains information on article title, names of authors, their affiliation, institutional address, journal title, pagination, issue number, volume number, year of publication, abstract, DOI, and other relevant metadata. Five types of academic databases are usually available to researchers, namely:

- i) Bibliographic Databases
- ii) Citation Databases
- iii) Full-text Databases
- iv) E-Journal Gateways
- v) Online Directories of Journals

These databases are briefly discussed in the following sections.

3.4.1 Bibliographic Databases

Bibliographic databases contain bibliographic records of papers, published in different peer-reviewed scholarly journals. Many indexing & abstracting (I&A) periodicals covering contents of published literature in different disciplines are available in print format. These periodicals systematically obtain and disseminate bibliographic records of recently published literature in their respective academic disciplines. Later, many of these I&A periodicals have discontinued publishing in print format. Instead, they started offering online I&A services in machine readable format. Many of these indexing services are available in dual print and online formats. These online databases are searchable using metadata. As these databases contain abstracts of scholarly literature, free text search is also made possible. These databases also provide external full-text links to journal contents available in publishers' portal, so that users can easily obtain full-texts of relevant literature. Table 2 provides an illustrative list of bibliographic databases and online I&A services. Many of these databases are freely available to researchers, while some of

them are available to subscribing institutions. Many bibliographic databases are available at multiple platforms as well as online citation databases, e.g. Web of Knowledge.

Table 2: Bibliographic Databases/ Indexing & Abstracting (I&A) Services – Some Examples

Name of Database	Since	Free Access	Producer	Subject Areas
AGRICOLA (Agricultural Online Access)	1942	√	U.S. National Agricultural Library	Agricultural Sciences & Farm Technologies
Education Resources Information Center (ERIC)	1966	√	U.S. Department of Education	Education
INIS (International Nuclear Information System)	1970	√	International Atomic Energy Agency	Nuclear Science
LISTA (Library, Information Science & Technology Abstracts)	-	√	Ebsco	Library & Information Science
MEDLINE (Medical Literature Analysis and Retrieval System Online) or MEDLARS Online or PubMed	1971	√	U.S. National Library of Medicine	Biomedical Sciences
Indian Science Abstracts (ISA)	1965	√	NISCAIR, India	STM
Biological Abstracts	1926	X	Thomson Reuters	Biological Sciences
CAB Abstracts	1973	X	CAB International	Life & Agricultural Sciences
Chemical Abstracts Service (CAS)	1907	X	American Chemical Society (ACS)	Chemical Sciences & Technologies
Current Contents Connect	1958	X	Thomson Reuters	All Areas
INSPEC (Information Services for the Physics and Engineering Communities)	1967	X	Institution of Engineering & Technology, UK	Physics & Engineering Areas
International Bibliography of the Social Sciences (IBSS)	1951	X	ProQuest	Social Sciences
LISA (Library and Information Science Abstracts)	1969	X	ProQuest	Library & Information Science
Sociological Abstracts	1952	X	ProQuest	Sociology, Social Sciences

3.4.2 Citation Databases

In addition to providing access to bibliographic records of source documents, citation databases systematically record referred literature listed with every published document as its list of references. The first major citation index – the

Science Citation Index – was launched in 1964 by the US-based Institute for Scientific Information (ISI). Some important online citation databases of journal literature available these days are, namely:

- Scopus³⁴, produced by Elsevier B.V.
- Web of Science³⁵ (WoS), produced by Thomson Reuters. WoS consists of Science Citation Index Expanded (SCI-Expanded), Social Sciences Citation Index (SSCI) and Arts & Humanities Citation Index (A&HCI).
- Indian Citation Index³⁶ (ICI), produced jointly by the Knowledge Foundation and Diva Enterprises India Private Ltd.
- SciELO Citation Index³⁷, produced jointly by SciELO and Thomson Reuters.
- Chinese Science Citation Database³⁸, produced jointly by Chinese Academy of Sciences and Thomson Reuters.

These online citation databases are available to subscribing institutions only. There are a few citation search engines, namely:

- Google Scholar Citations³⁹, produced by Google, Inc.
- Microsoft Academic Search⁴⁰, produced by Microsoft, Inc.
- CiteSeerX⁴¹, hosted by Pennsylvania State University, USA.
- INSPIRE-HEP⁴² – the High Energy Physics Information System, hosted by CERN, Switzerland
- ChemxSeer⁴³, hosted by Pennsylvania State University, USA.

Citation databases cover many open access journals and open access articles published in hybrid journals. You will learn more about citation databases and citation-based tools for evaluation of scientific productivity in Unit 2 of Module 4.

3.4.3 Full-text Databases and Journal Aggregators

The e-journals are scattered on respective publishers' portals and individual journals' websites. Academic researchers sometimes don't get access to many of these contents as some journals are not subscribed by their respective institutions. Some journal aggregating databases aggregate full-text journal contents in common searchable databases for providing unified/ single interface online access to researchers. Aggregators usually provide access to relatively few months' older journal contents, as aggregators are third party service providers – not actually publishers of scholarly journals. These are not

designed initially as full-text resources but as secondary information resources. Earlier some of the aggregators also offered CD-ROM-based full-text databases, released at periodic intervals containing collections of journal content. With the passage of time they discontinued producing CD-ROM-based products, and have started online portals for disseminating full-texts of journals. Table 3 provides an illustrative list of journal aggregators. The EBSCOhost and ProQuest are leading aggregators' databases having considerable market share in both developed countries and developing countries. They earlier offered CD-ROM-based full-text journal contents to many libraries around the world. Table 4 provides illustrative list of full-text databases, which are mostly available in open access domain. Subject repositories and institutional repositories are also online full-text databases having varieties of scholarly contents. These searchable online databases store and retrieve journal literature and other forms of scholarly literature such as book chapters, conference papers, dissertations and monographs. Some repositories only store pre-print and post-print versions of journal contents due to copyright restrictions or embargo policies of for-profit publishers. Although, authors are allowed to self-archive publishers' version if these are made available through Creative Commons or copyleft or other unrestrictive licensing.

Table 3: Illustrative List of Journal Aggregators

Name	Access Mode	Website	Coverage
China Knowledge Resource Integrated Database (CKNI)	Subscription-based	Eng.oversea.cnki.net	Multidisciplinary research contents, sourced from peer-reviewed scholarly journals from China and other Chinese-speaking countries.
EBSCOhost Online Research Databases	Subscription-based	Ebscohost.com	Multidisciplinary research contents, sourced from scholarly publishers, university presses and professional associations.
IndianJournals.com	Subscription-based	IndianJournals.com	Multidisciplinary research contents, sourced from peer-reviewed scholarly journals from South Asian region.
Ingenta Connect	Subscription-based	IngentaConnect.com	A bibliographic database of multidisciplinary research contents with external full-text links.
JSTOR	Subscription-based	Jstor.org	A digital library of academic journals, books, and primary sources. Originally contained digitized back issues of academic journals, it now includes books and current issues of some journals.
MetaPress	Subscription-based	MetaPress.com	Multidisciplinary online hosting service for scholarly publishers, university presses and learned societies.
Project Muse	Subscription-based	Muse.jhu.edu	Social sciences and humanities from non-profit publishers.
ProQuest Research Library	Subscription-based	ProQuest.com	Multidisciplinary research contents, sourced from scholarly publishers, university presses and professional associations.

Table 4: Illustrative List of Full-text Databases

Name	Access Mode	Website	Coverage
arXiv	Open Access	arXiv.org	E-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance and Statistics.
bioRxiv	Open Access	bioRxiv.org	A preprint server for biology.
EconPapers	Open Access	EconPapers.Repec.org	A free bibliographic database of economics and finance papers with majority freely downloadable.
e-LIS	Open Access	Eprints.rclis.org	E-prints in library and information science (LIS) – an international OA repository for academic papers in LIS.
IDEAS	Open Access	Ideas.Repec.org	A central index of economics and finance research, including working papers, articles and software code with external full-text links.
PeerJ PrePrints	Open Access	Peerj.com/preprints/	A 'preprint server' for the biological sciences, medical sciences, and health sciences.
PubMed Central	Open Access	Ncbi.nlm.nih.gov/pmc /	A free full-text archive of biomedical and life sciences journal literature.

3.4.4 E-Journal Gateways

Electronic journal gateways host full-texts of different scholarly journals, published by various publishers. E-journal gateways are collaborative efforts of mainly non-profit publishers including research councils and learned societies for freely reaching out global audiences through single searchable portals. These gateways are often supported by the regional research councils or international research funding agencies. These gateways greatly increase the journals' accessibility to researchers and educators around the globe – particularly intra-region and also inter-region, thus making the research works useful to a wider audience. This aggregation also helps in crosscutting academic disciplines in a larger context to support discourses in multidisciplinary and trans-disciplinary subject areas within the region. Table 5 provides an illustrative list of e-journal gateways. Some the e-journal gateways, as mentioned, were launched with supports from the INASP's the Journals Online (JOL) project. International Network for the Availability of Scientific Publications (INASP) helps in capacity development of non-profit academic publishers in developing countries in launching e-journal gateways for their respective country or a region using the open source software PKP Open Journal Systems (OJS).

Table 5: Illustrative List of E-Journal Gateways

Name of Gateway	Access Mode	Regional Focus	Website
African Journals Online (AJOL)*	Open Access	Africa	Ajol.info
Bangladesh Journals Online (Bangla JOL)*	Open Access	Asia	Banglajol.info
Mongolia Journals Online (Mongolia JOL)*	Open Access	Asia	Mongoliajol.info
Nepal Journals Online (Nepal JOL)*	Open Access	Asia	Nepjol.info
Philippine E-Journals	Open Access	Asia	Ejournals.ph
Sri Lanka Journals Online (Sri Lanka JOL)*	Open Access	Asia	Sljol.info
Latin America Journals Online (LAM JOL)*	Open Access	Latin America	Lamjol.info
Redalyc	Open Access	Ibero-America	Redalyc.org
SciELO (Scientific Electronic Library Online)	Open Access	Latin America	SciELO.org
* Part of the INASP's the Journals Online (JOL) project			

3.4.5 Online Directories of Journals

In Unit 1 of Module 1 you have learned about various online directories available for identifying scholarly journals along with their additional details. Table 6 provides an illustrative list of Online Directories of scholarly Journals. The *Ulrich's Periodicals Directory* – owned by ProQuest LLC – is highly popular in academic and research circles. Its online edition, known as UlrichsWeb, is a searchable database covering about 336,000+ periodicals. It provides information about popular and academic magazines, scientific journals, trade journals, newspapers and other serial publications. Directory of Open Access Journals (DOAJ) is a searchable multidisciplinary directory of open access scholarly journals. In addition to providing detailed information on scholarly journals, DOAJ is also searchable at article level for about 5,700 journals. SHERPA/RoMEO on the other hand provides information about open access policies of the journals and publishers, to help researchers in self-archiving related decision making. In this database RoMEO offers four colour-codes depicting four different archiving policies of journals and publishers. For example, Green indicates that authors can archive pre-print and post-print or publisher's version/PDF; blue indicates that authors can archive post-print (i.e. final draft post-refereeing) or publisher's version/PDF; yellow indicates that authors can archive pre-print (i.e. pre-refereeing), while white indicates that archiving is not formally supported. You will know about many other useful online directories of academic periodicals in Unit 1 of Module 1.

Table 6: Indicative List of Online Directories of Journals

Directory Name	Website	Coverage
Directory of Open Access Journals (DOAJ)	DOAJ.org	9,800+ journals
SHERPA/RoMEO – Journals' and Publishers' Open Access Policies	Sherpa.ac.uk/romeo/	22,000+ journals
UlrichsWeb (Ulrich's Periodicals Directory)	UlrichsWeb.com	336,000+ periodicals

3.5 LET US SUM UP

In this Unit you have learned about emergence of electronic journals in academic and research environment due to wide proliferation of information and communication technologies (ICT) in research communications and academic publishing. Nowadays no scholarly journal can be imagined without having its online presence. Every journal publisher worth the name, irrespective of its standing as for-profit or non-profit, has embraced ICT-enabled publishing environment. Thus, electronic journals are a reality in the twenty first century. The researchers in the developing world, while publishing in regional or national-level academic journals, get ensured that their research contributions can reach across the globe through e-journal gateways, subject repositories, online bibliographic or full-text databases and e-resources. Scientific communities and scientific communications from the global South are getting substantive attentions through adaptation of electronic journals and electronic academic databases in the process of research communications. With the passage of time we see many electronic journals have adopted principles of open access (OA), and transformed themselves into OA journals. We now have globalized views of scientific discourses as free flow of scientific contents is ensured in ICT-enabled OA environment. Open access movement has created interactive spaces for OA channels, such as, OA journals, OA knowledge repositories and OA e-journal gateways.

You will learn more about OA movements and OA channels of research communications in Module 2 and Module 5 of this self-directed learning course.

3.6 CHECK YOUR PROGRESS

- 1) What are the advantages of electronic journals?

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- 2) What is the advantage of ToC alert service for scholarly journals?
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- 3) What are the channels of delivery of journal contents in electronic environment?
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- 4) Why do peer-reviewed journals migrate from print to online platforms?
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- 5) Where can you find a scholarly journal's ISSN?
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- 6) Which type of journal does publish OA articles, while publishing toll-access articles as well?
a) Open Access Journal
b) Subscription-based Journal
c) Hybrid Journal
d) E-Journal Gateway
- 7) Which company does own Ulrich's Web?
a) Thomson Reuters
b) ProQuest
c) Elsevier
d) Springer
- 8) Which is not an I&A service?
a) Chemical Abstracts Service
b) LISA
c) MetaPress
d) MEDLINE

- 9) Which is not a citation search engine?
- Google Scholar
 - Microsoft Academic Search
 - INSPEC
 - CiteSeerX

ONLINE VIDEOS TUTORIALS

There are a number of video tutorials available on topics discussed in this Unit. Some of the tutorials were developed by the reputed institutions, libraries and scientists. Now, you may learn more about how you can become an active researcher contributing primary research literature, and how you would be involved in communicating research as an author to your fellow scientists.

- *Bibliographic Databases Video*⁴⁴
- *Bound Journals and Electronic Databases Video*⁴⁵
- *Citation Indexing Video*⁴⁶
- *Finding Full Text from Article Databases Video*⁴⁷
- *How to Locate a Journal's ISSN Video*⁴⁸
- *How to Use a Database to Find Articles Video*⁴⁹

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UNIT 4: THE SERIALS CRISIS

Structure

- 4.0 Introduction
- 4.1 Learning Outcomes
- 4.2 Dysfunctioning of the Scholarly Communications
- 4.3 Serials Crisis Phenomena
- 4.4 Pricing and Economics of Journal Publishing
 - 4.4.1 Cost Effectiveness of Journals
 - 4.4.2 Problems with Predatory Open Access Journals
- 4.5 Accessibility, Delay and Other Issues of Journals
- 4.6 Let Us Sum Up
- 4.7 Check Your Progress

4.0 INTRODUCTION

The term serials crisis is commonly used to highlight the exponential increase in subscription cost of many scholarly journals, particularly, which are published by for-profit publishers. This crisis in academic publishing is "widely perceived", which is to do with the combined pressure of budget cuts at universities, increased costs of journals, unbearable economic recession and the global economic downturns in recent times. In many countries the funds available to the libraries for journals subscription have remained static or have declined in real terms. On the other hand, journals subscription prices for institutional access have been rising much faster than the Consumer Price Index for several decades. This causes the declining subscriptions to number of journal titles to accommodate price increase of the core essential journals to institutional research activities.

The serials crisis phenomenon led to initiation of global open access movement to help the researchers to come out of over-dependency on monopolistic corporate publishing companies. On the other hand, many open access journal publishers charge article processing fee or publishing fee from the submitting authors, as one of the major sources of revenue to self-sustain an open access journal publishing venture. No-fee open access journals are also in existence, which get cross-subsidy from the public exchequers or collective supports from scholarly societies' membership. Open access journals are nowadays getting attentions from predatory publishers as well. For every three 'recorded' open access journals, there is every possibility of having a 'predatory' open access journal. Usually, existence of open access journals is recorded in the Directory of Open Access Journals (DOAJ) which shows availability of about 9804 open access journals as on 15th January 2014.

In this Module, various reasons and solutions to mitigate serials crisis are discussed in details to help the researchers in understanding present day problems associated with the scholarly publishing, especially the journals.

4.1 LEARNING OUTCOMES

At end of this unit, you are expected to be able to

- Understand the impact of serials crisis on scholarly publishing;
- Explain the outcomes of serials crisis, most particularly the new methods of dissemination of contents of scholarly journals; and
- Describe the problems associated with the transition from print journal publishing to online journal publishing, and more particularly to open access journal publishing.

4.2 DYSFUNCTIONING OF THE SCHOLARLY COMMUNICATION

The nature of scholarly communication in the ICT-enabled era has changed significantly. In last twenty years period, many print journals have introduced their digital or online edition, popularly known as electronic journals. Many new scholarly journals were also launched purely in electronic format without any print edition. Electronic journals have many more functionalities than traditional print journals. These journals can be read 24X7 anywhere using desktop computers, laptops and now even hand-held mobile devices. An electronic copy can be downloaded, shared, archived or transmitted to anyone having internet accessibility. Problem of space for archiving back issues in libraries is over. Also there is no limitation of space to accommodate any number of articles in an issue. Print journals usually have regular International Standard Serial Number (ISSN), whereas electronic edition of scholarly journals have separate ISSN, known as e-ISSN. So, a scholarly journal usually has a regular ISSN for print edition and e-ISSN for electronic edition.

However the number is only a registry of the publication and not necessarily a reflection on the scholarliness of the publication.

An online journal gateway or a publisher's site also offers many personalized services to its registered users, such as, Table of Contents (ToC) alert service for current issues of journals, call for papers in special issues, list of highly cited papers, list of highly downloaded papers, and list of highly saved papers in social bookmarking websites. They also allow registered users in commenting in article page, which is subject to editorial acceptance. These journals also offer appropriate options in article page for sharing an article's bibliographic details in social media and save its bibliographic record in social bookmarking websites.

Proliferation of academic journals is consequence of knowledge explosion since the twentieth century. This growth is exponential. Research literature available in today's world is manifold in comparison to the last decade. Every journal gets considerable number of articles submitted by new as well as experienced authors. Filtering out these manuscripts to choose right, qualitative and focused articles require editorial acumen, rigorous peer-review process and quality control. However, getting qualified peer-reviewers and

editorial board members is becoming a major challenge to existing as well as to new journals.

New career promotional principle of “Publish or Perish” (PoP) for scientists and academics, more particularly in the developing countries, forces many journals receiving poor quality manuscripts with errors in methodological, language, structural and theoretical frameworks. Unexperienced editors and peer-reviewers when allow these poorly written manuscripts to be published, the quality of journals is then compromised. The journal declines in ranking within its subject fields with respect to its scientific impact and popularity. Then another journal with tight quality control ascends to take a higher rank. While quality check is compromised in a reputed journal, due to aging of editorial board members or peer reviewers or other reasons, a new breed of highly promising scientists must be induced to keep pace with new developments in the fields.

On the other hand, new journals with backing from scientific networks, special interests groups or scholarly societies are also being launched around the world with new methodological approaches. Many of these journals have differentiated their approaches through innovations in delivery mechanism or in peer-reviewing process. Some of the journals have started open review system, inviting authors and reviewers in a common interactive platform for well articulation of arguments and two-way flow of ideas. Journal editors many a times become facilitators in mediating peer-review sessions, before accepting or rejecting submitted manuscripts. An example of such journal following open review system is *eLife* journal.

ICT-enabled scholarly communications environment also helps publishing of journals from developing countries. These journals have been traditionally distributed mostly through print subscriptions within the country and its neighbouring countries. But, when these journals are published in electronic format and are made available through online platforms of regional journal gateways or open access channel, they get worldwide visibility, readership and attract global authors contributing from other countries. Their print or online subscription in other regions can also be increased due to their increased global visibility and accessibility. For assuring international visibility and accessibility of scholarly journals, many publishers have started digitizing contents of back volumes and archiving digitized contents in online platforms, either subscription-based or open access. For example, Project MUSE⁵⁰ has archived digitized contents of back volumes of journals from non-profit publishers and more particularly from university presses in the United States and Canada. Project MUSE is a subscription-based service covering social sciences and humanities.

The scholarly communications have experienced many levels of dysfunctions in the last three-four decades, starting from reducing affordability of subscribed contents to reducing affordability of open access publishing charges

as well as now encountering with predatory open access publishers. Following Sections highlight global concerns in serials crisis and issues related to scholarly journal publishing.

4.3 SERIALS CRISIS PHENOMENA

The prices of scholarly journals have climbed sharply over last few decades. On the other hand, libraries are facing problem of annual budget cuts due to global economic downturns and inflation. Figure 8 highlights different causes of serials crisis. Four major reasons of serials crisis are namely, exponential price hike of journals, particularly which are published by for-profit publishers; library budget shrinkage; inflation and global economic recession post 2008; and fluctuations in currency conversion. Libraries in developing countries also face sharp reductions of library budget due to fluctuations in currency conversion or volatile nature of values of national currencies in those countries. Scientists in many developing countries and least developed countries (LDCs) have been worstly affected by disparity in access to subscribed contents due to unaffordability as well as non-availability of high speed internet connections to access these contents.

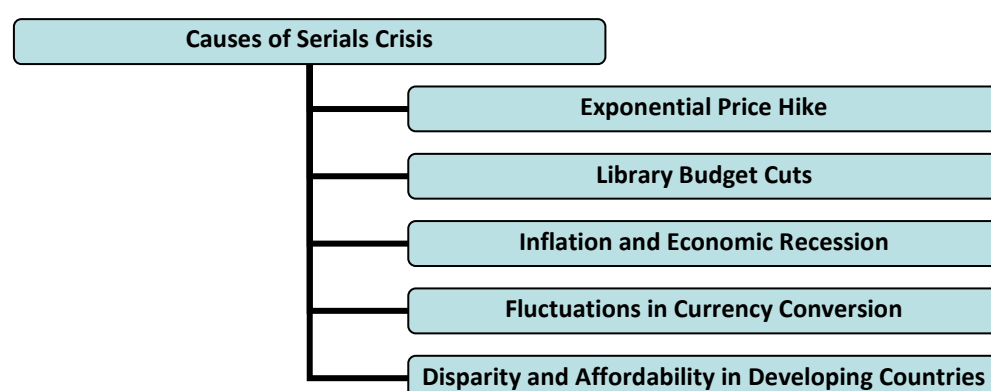


Figure 8: Dimensions of Serials Crisis

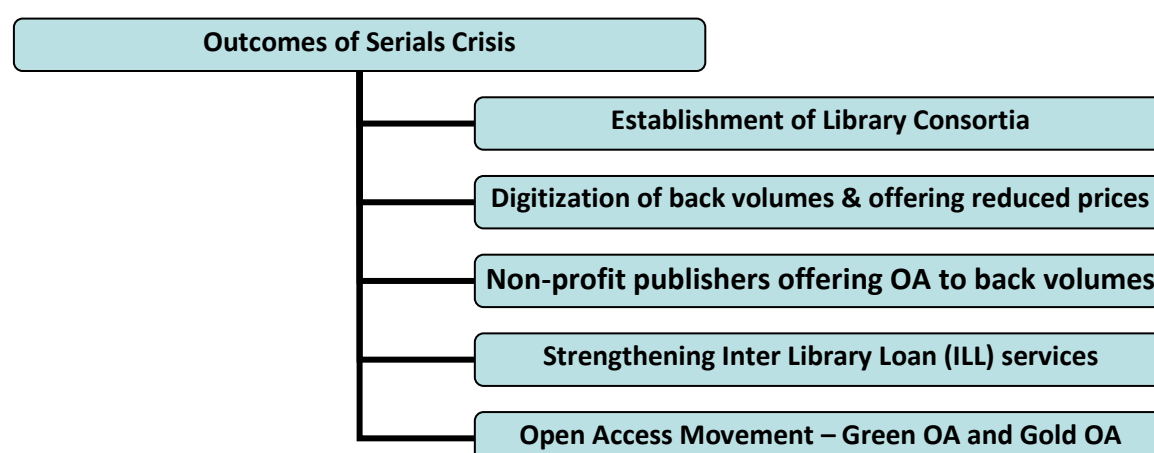


Figure 9: Outcomes of Serials Crisis

Available Solutions to Mitigate Serials Crisis

A number of solutions are made available around the world to mitigate problems of serials crisis. Some of the widely available solutions or outcomes of serials crisis are shown in Figure 9. Some of the mentioned solutions or approaches to mitigate problems of serials crisis are briefly described below:

- **Launching of Library Consortium at Country-level, Regional-level, State-level or City-level:** These consortia are involved in cooperative procurement of scholarly journals at competitive rates from commercial publishers for members of these library consortia. Each publisher offers discipline specific bundles of journals, such as social sciences, physical sciences, biomedical sciences, applied sciences, technologies, and business management to each library consortium with differentiated pricing policies based on number of users, number of nodal access points and number of member institutions. Some of the globally known library consortia are OhioLINK⁵¹, INDEST-AICTE⁵², UGC-Infonet⁵³, SANLiC⁵⁴, etc. Many of them have become role models in the global South. Table 7 provides a representative list of library consortia around the world depicting their mission, objectives and functions. This Table also indicates that OhioLINK is the oldest library consortium, whereas INDEST Consortium has largest number of member institutions. All these library consortia are members of a global network – the International Coalition of Library Consortia⁵⁵, which is an informal group established in 1996 currently comprising approximately 200 library consortia from around the world.
- **Providing special access to subscription-based research literature in least-developed countries (LDCs) and select developing countries:** The World Health Organization (WHO) launched the HINARI Access to Research in Health Programme⁵⁶ in 2002 to provide free or very low cost online access to the major journals in biomedical and related social sciences to local, not-for-profit institutions in developing countries. However, emerging developing countries, such as Brazil, Russia, India, China and South Africa (BRICS) are not eligible in this programme. Figure 10 shows a map of benefitted countries and institutions in HINARI Programme.

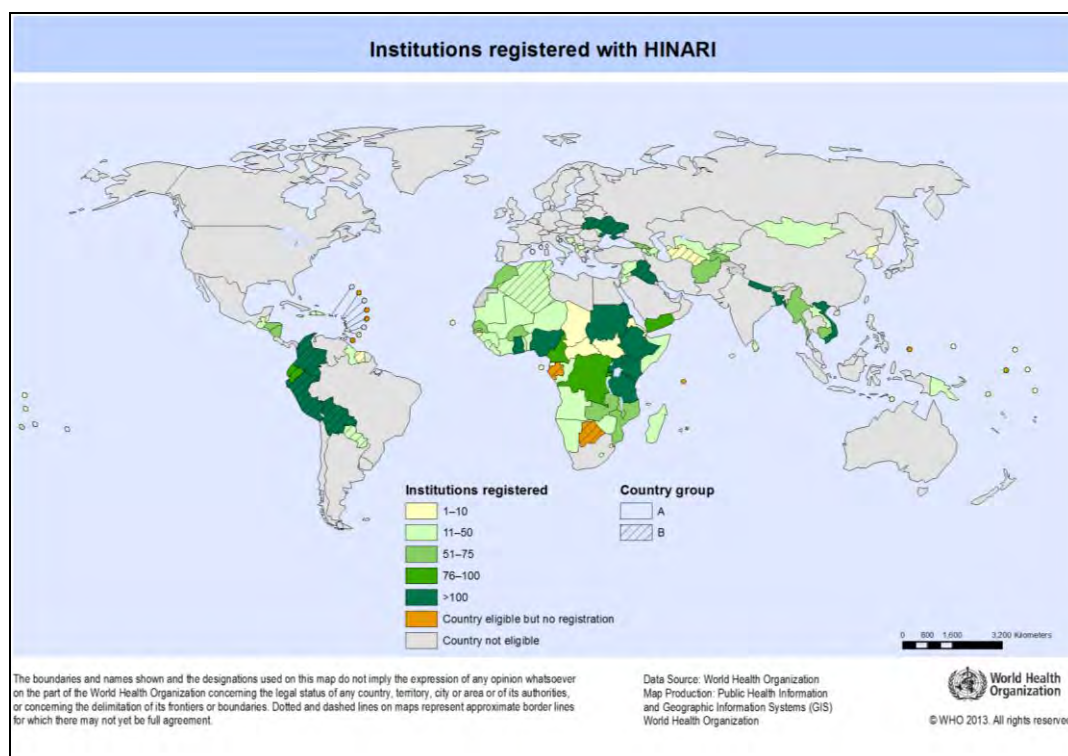


Figure 10: Beneficial Countries in HINARI Programme

(Source: http://www.who.int/hinari/Global_HINARI_registered_2013.png)

- **Digitization of back volumes of journals:** Many journals had undertaken digitization of back volumes of print journals and archived these contents in online platforms, such as, Project MUSE⁵⁷ and JSTOR⁵⁸, which are offering subscription-based access to digitized print journals at much cheaper rates.
- **Subscription-based service to online full-text research databases:** These databases are providing contents from multiple publishers in multidisciplinary subject areas, available at relatively cheaper rates than publisher's journal subscription. Popular service providers include ProQuest⁵⁹, EbscoHost⁶⁰, and IngentaConnect⁶¹. These databases have certain embargo period, up to twelve months, for restricting hosting of current contents of scholarly journals after their novelty period.
- **Strengthening Inter Library Loan (ILL) services:** ILL service is oldest method of library cooperation, which operates on principles of cooperation and resource sharing. ILL service helps in reducing duplication of resources within network members. ILL service provides full-text contents to its end users, which is demand based. The end users first identify literature from bibliographic or citations databases, and then seek full-text contents of required literature from ILL network members. However, some

copyrights provisions restrict ILL services, such as making multiple copies of a single article, or providing ILL service to a commercial entity.

- **Launching open access pre-prints, e-prints servers and institutional repositories:** Serials crisis led to encouraging authors in self-archiving their papers in pre-prints server. A number of institutions and academies have established different subject-based digital repositories and institutional repositories. ArXiv⁶² is the oldest global open e-print archives launched in 1991 covering many scientific areas, viz., physics, mathematics, and computer sciences. Later in 2013 bioRxiv.org was established as the biologists' version of arXiv, covering biomedical and life sciences subject areas. Many library consortia started capacity development of their member institutions for building institutional repositories using open source software. The International Network for the Availability of Scientific Publications⁶³ (INASP), established in 1992 by the International Council for Science (ICSU), is working on the same principle of improving access to information and knowledge through a commitment to capacity building in emerging and developing countries.
- **Launching Global Open Access Movement:** The perceived serials crisis led to a global movement for open access (OA) to scholarly literature to provide universal online access to research literature emanated from the public funded research. Many public funded institutions and universities around the world have established green OA channels such as OA institutional repositories, subject repositories for self-archiving of research literature. The researchers affiliated with public institutions and universities also have started publishing research papers in OA journals. There is proliferation of OA journals published by non-profit scholarly societies, professional associations, academies, universities and research institutions. Of late, for-profit publishers have taken interest in publishing OA journals and OA articles in hybrid journals. For-profit publishers have introduced hybrid journals to accommodate OA articles in their conventional subscription-based journals. As on 1st April 2014, the Directory of Open Access Journals (DOAJ) shows availability of about 9709 journals. This ever-growing list indicates exponential growth of OA literature. There are also directories of other OA resources such as Directory of Open Access Repositories (OpenDOAR⁶⁴) and Directory of Open Access Books⁶⁵. These ever-growing directories point to success stories of global open access movement. We will learn more about global open access movement and different open access channels in Module 2 of this course.

Table 7: Illustrative List of Library Consortia

Name of Consortium	Est. Year	Mission and Objectives
Ohio Library and Information Network (OhioLINK), U.S.A. (Ohiolink.edu) Total members: 89	1990	Vision: OhioLINK will lead in the provision of advanced strategic academic information resources and services that enable Ohio's scholars, students, and libraries to excel. Mission: OhioLINK creates a competitive advantage for Ohio's higher education community by cooperatively and cost-effectively acquiring, providing access to, and preserving an expanding array of print and digital scholarly resources; by efficiently sharing the collections of member libraries; and by centrally hosting digital content to advance teaching, learning, research, and the growth of Ohio's knowledge-based economy.
Indian National Digital Library in Engineering Sciences and Technology Consortium (INDEST), India (Paniit.iitd.ac.in/indest/) Total members: 1373	2003	The INDEST-AICTE Consortium has the following objectives: i) To subscribe electronic resources for the members of the Consortium at highly discounted rates of subscription and at the best terms and conditions; ii) To extend the benefit of consortia-based subscription beyond the core members to other engineering and technological institutions; iii) To impart training to the users and librarians in the member institutions on subscribed electronic resources with an aim to optimise the usage of subscribed electronic resources; iv) To find more avenues of cooperation and interaction amongst member libraries; v) To increase scientific productivity of member institutions in terms of quality and quantity of publications; vi) To help new engineering institutes and colleges to make the right choice of e- resources; and vii) To find more avenues of co-operation and interaction with other consortia.
UGC-Infonet Digital Library Consortium, India (Inflibnet.ac.in/econ/) Total members: 419	2003	The main objective is to provide access to qualitative electronic resources including full-text and bibliographic databases to academic institutions at a lower rates of subscription. The major aims and objectives are as follows: <ul style="list-style-type: none"> • to provide access to a high-quality and scholarly electronic resources to a large number of academic institutions including universities and colleges at substantially lower rates of subscription and at most favourable terms and conditions;

		<ul style="list-style-type: none"> • to promote rapid and efficient access to scholarly content to the users and to create and promote use of ICT in teaching and learning in universities in India; • to extend the benefit of Consortium to its associate members including private universities and colleges; • to impart training to the users, librarians, research scholars and faculty members of the institutions in use of electronic resources with an aim to optimize their usage; • to promote use of e-e-resources with gradual decrease in print subscription; • to promote interaction and inter-library cooperation amongst the participating universities; • to evaluate the usage of the subscribed resources and to identify new resources that are required to be subscribed under the programme; • to bring qualitative change in teaching, learning and research with an aim to meet the ever growing challenges of globalization of higher education; and • to increase the research productivity of the institutions both in terms of quality and quantity of publications.
South African National Library and Information Consortium (SANLiC) (Sanlic.org.za) Total members: 25	1999	<p>Vision: SANLiC is the leading facilitator of cost effective access to high-quality scholarly electronic information in support of research, teaching and learning in Public Higher Education and Research Institutions.</p> <p>Mission: SANLiC facilitates, on a non-profit basis, affordable access to scholarly electronic information in support of the learning, teaching and research activities of its members. This is achieved mainly through collective negotiations with publishers and aggregators. It also promotes the use of high-quality, open access electronic information resources.</p>
Portal de Periódicos da Capes, Brazil (Periodicos.capes.gov.br) Total members: 400+	2000	<p>This is the Brazilian National Electronic Library Consortium for Science And Technology that was created to make scientific knowledge more easily accessible in Brazil. It is a virtual library that aggregates high quality content, provided through publishers and international scientific associations.</p>

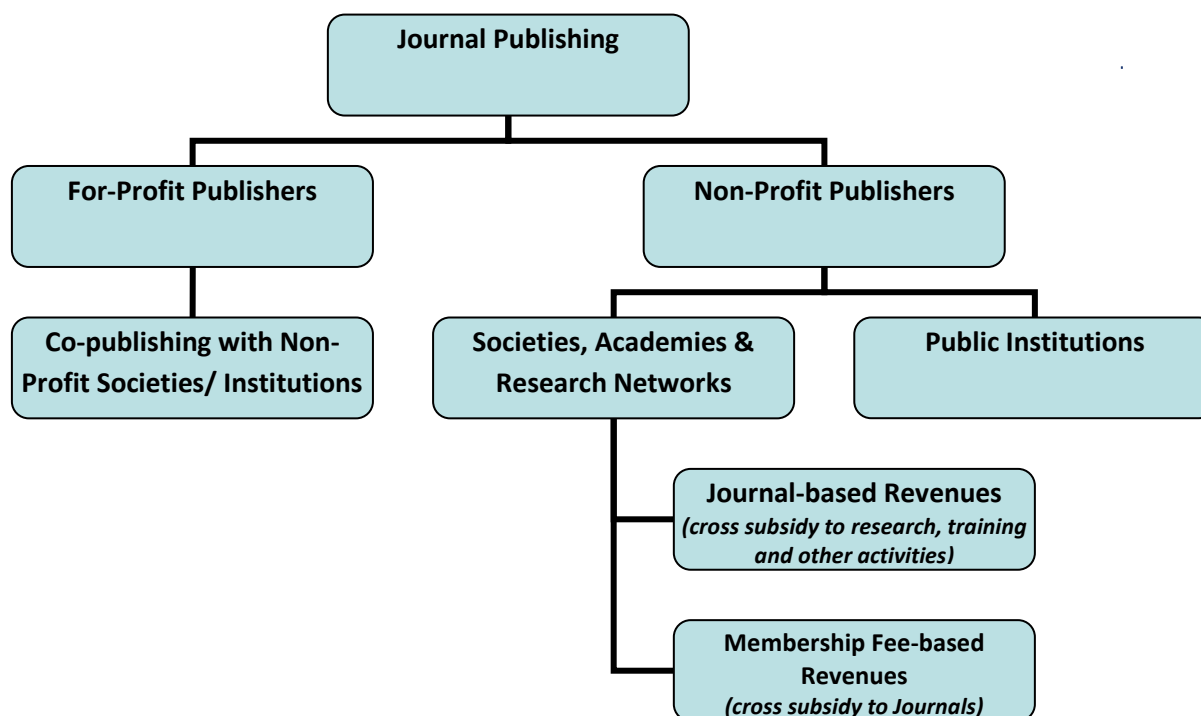


Figure 11: Schematic View of Academic Journal Publishing

4.4 PRICING AND ECONOMICS OF JOURNAL PUBLISHING

Publishing scholarly journals is a commercial affair of publishers that involves costs in pre- production, production and distribution processes. Some of the costs are recovered from the annual subscriptions, online subscription, sales of online articles, article processing charges (APC) or publishing fees, as well as from some advertisements in journal issues or journal websites. Since the beginning of academic publishing many non-profit societies are involved in journal publishing. They receive membership fee from the members. This membership fee usually includes annual subscription to the society's journal or proceedings. Since long for-profit publishers have stepped in publishing academic journals, either independently or jointly with non-profit societies or institutions. For-profit publishers obviously make profit by selling annual subscriptions to subscribers and sales of journal contents. They also have many other avenues of generation of revenues, such as selling rights of translation or republishing to online academic databases and reuse of contents, both current and retrospectively by other publishers. Their co-publishing venture with non-profit societies is a win-win situation for both the parties – publishers get ready to publish journal contents and societies receive a share from journals' sales revenue. Without getting into the hassles of printing, distributing and collecting subscription – all these are expensive and time taking processes. Figure 11 gives a schematic view of academic journal publishing. This Figure also indicates that non-profit publishers are sometimes fully dependent on journal-based revenues for providing cross subsidy to their research, training and other professional activities. On the other hand, a few non-profit publishers generate revenues from membership fees and other dues from their

members. They are ready to provide cross subsidy to journals, and even launching open access journals for the benefits of communities all over the world in their respective subject areas. Many public-funded research institutions and universities are also involved in journal publishing. They also have budgetary support to publish journals in their core areas of research. They also provide cross subsidy to journals from their research programmes and help in launching open access journals for the benefits of communities in their respective subject areas. The serials crisis started at the global level with unaffordable hike of subscription fee by some for-profit publishers and scholarly societies, who are fully dependent on journal-based revenues. Their whole motive is to generate high margins of profit from their journal publishing business.

4.4.1 Cost Effectiveness of Journals

The eigenFACTOR.org website provides a unique indicator for measuring pricing of scientific journals – the journals which are indexed in the Web of Science (WoS) and its by-product Journal Citation Reports (JCR) on Web. This indicator is named as Cost Effectiveness (CE) Index. This index indicates prestige of a journal vis-à-vis its affordability by the scientific community. Highly popular journals based on a journal's Article Influence® score having relatively low subscription fee or author's fee are considered as top-rated. This index has two tracks, namely CE based on subscription fee and CE based on fee paid by the authors. Here the subscription fee refers to cost of institutional subscription to print or online edition of a journal. The author's fee refers to average article processing charge for publishing an OA article in OA journals. Cost Effectiveness⁶⁶ for open access journals is searchable by subject field, name of publisher, and journal title. Cost Effectiveness⁶⁷ for subscription-based journals is searchable by Eigenfactor category, ISI category, name of publisher, and journal title. Figure 12 depicts schematic view of measuring cost effectiveness of a scholarly journal using eigenFACTOR.org website.

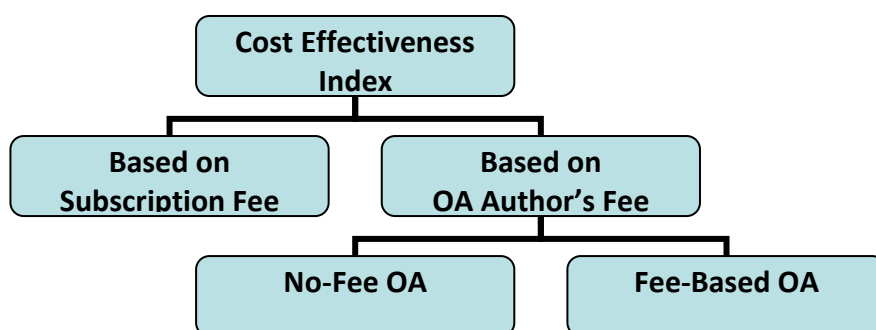


Figure 12: Measuring Cost Effectiveness of a Scholarly Journal

Similar to eigenFACTOR.org website, JournalPrices.com⁶⁸ is a very useful website for researchers and librarians. It provides a comprehensive detail of every journal indexed in the Web of Science (WoS) database. This online database can be searched by journal title, name of publisher, ISSN and subject areas. Its informative journal pricing details include journal's Profit Status, Price per Article, Price per Citation, Composite Price Index, and Relative Price Index. This website identifies three value categories of scholarly journals, viz., Good Value, Medium Value and Bad Value. A typical journal record looks like Table 8, searched by subject area Computer Science. Ted Bergstrom's Journal Pricing Page (Econ.ucsb.edu/~tedb/Journals/jpricing.html) provides additional inputs on economics of journal publishing.

Table 8: A Record in JournalPrices.com database

<p>Title: ACM COMPUTING SURVEYS Publisher: ASSOC COMPUTING MACHINERY ISSN: 0360-0300 Subject: Computer Science Profit Status: Non-Profit Year First Published: 1969 Price per article: 36.59 Price per citation: 6.28 Composite Price Index: 15.16 Relative Price Index 0.92</p>

4.4.2 Problems with Predatory Open Access Journals

The “Predatory Open Access” is a new concept and term conceived and coined by University of Colorado Denver librarian and researcher Jeffrey Beall. He maintains a regularly-updated online report named “Beall's List”⁶⁹ of potential, possible, or probable predatory scholarly open-access publishers. This is a list of questionable, scholarly open-access publishers, operating around the world and seeking manuscripts from prospective authors for publishing in their respective journals. These journals charge a publishing fee or article processing fee from authors and promise to publish the paper ‘instantly’. Text Box 4 shows Beall's criteria for determining predatory open access publishers. Most of these predatory journals are not indexed by abstracting and indexing services or covered by citation databases. Most of these journals are not even listed in the Directory of Open Access Journals (DOAJ.org).

John Bohannon (2013) in his paper titled “Who's Afraid of Peer Review?” reveals little or no scrutiny and peer reviewing in many open-access journals, which fraudulently claimed to be peer reviewed. This paper went viral in social media circles and got considerable attention of science writers, science

bloggers and science administrators. Later in December 2013, five scholarly organizations – the Committee on Publication Ethics (COPE), Directory of Open Access Journals (DOAJ), Open Access Scholarly Publishers Association (OASPA), and World Association of Medical Editors (WAME) – have published a joint statement “Principles of Transparency and Best Practice in Scholarly Publishing” to be followed by their member publishers and OA journals. They have also introduced more stringent criteria of granting membership of OA publishers in these organizations and inclusion of OA journals in DOAJ.

Text-Box 4: Beall's Criteria for Determining Predatory Open Access Publishers

A Predatory Publisher may ...

- Publish papers already published in other venues/outlets without providing appropriate credits.
- Use language claiming to be a “leading publisher” even though the publisher may only be a startup or a novice organization.
- Operate in a Western country chiefly for the purpose of functioning as a vanity press for scholars in a developing country.
- Do minimal or no copyediting.
- Publish papers that are not academic at all, e.g. essays by laypeople or obvious pseudo-science.
- Have a “contact us” page that only includes a web form, and the publisher hides or does not reveal its location.

Editor and Staff

- The publisher’s owner is identified as the editor of all the journals published by the organization.
- No single individual is identified as the journal’s editor.
- The journal does not identify a formal editorial / review board.
- No academic information is provided regarding the editor, editorial staff, and/or review board members (e.g., institutional affiliation).
- Evident data exist showing that the editor and/or review board members do not possess academic expertise to reasonably qualify them to be publication gatekeepers in the journal’s field.
- Two or more journals have duplicate editorial boards (i.e., same editorial board for more than one journal).
- The journals have an insufficient number of board members, have concocted editorial boards (made up names), include scholars on an editorial board without their knowledge or permission, have board members who are prominent researchers but exempt them from any contributions to the journal except the use of their names and/or photographs.

The Publisher

- Demonstrates a lack of transparency in publishing operations.
- Has no policies or practices for digital preservation.
- Depends on author fees as the sole and only means of operation with no alternative, long-term business plan for sustaining the journal through augmented income sources.
- Begins operations with a large fleet of journals, often using a template to quickly create each journal's home page.
- Provides insufficient information or hides information about author fees, offering to publish an author's paper and later sending a previously-undisclosed invoice.

Integrity

- The name of a journal is incongruent with the journal's mission.
- The name of a journal does not adequately reflect its origin (e.g., a journal with the word "Canadian" or "Swiss" in its name that has no meaningful relationship to Canada or Switzerland).
- The journal falsely claims to have an impact factor, or uses some made up measure (e.g. view factor), feigning international standing.
- The publisher sends spam requests for peer reviews to scholars unqualified to review submitted manuscripts.
- The publisher falsely claims to have its content indexed in legitimate abstracting and indexing services or claims that its content is indexed in resources that are not abstracting and indexing services.
- The publisher dedicates insufficient resources to prevent and eliminate author's misconduct, to the extent that the journal or journals suffer from repeated cases of plagiarism, self-plagiarism, image manipulation, and the like.
- The publisher asks the corresponding author for suggested reviewers and the publisher subsequently uses the suggested reviewers without sufficiently vetting their qualifications or authenticity. (This protocol also may allow authors to create fake online identities in order to review their own papers).

(Source: <http://scholarlyoa.files.wordpress.com/2012/11/criteria-2012-2.pdf>)

4.5 ACCESSIBILITY, DELAY AND OTHER ISSUES OF JOURNALS

There are many other concerns related to scholarly journal publishing. The business models of journal publishing have evolved over time, so are the diversity in publishing processes. ICT-enabled environment helps the journal publishers directly connecting to users' communities and other stakeholders. Now-a-days journal contents are accessible both in print format and electronic format. Online journal contents are accessible via desktop computers as well as mobile devices. This is a new development to make journal contents accessible

through mobile devices, which has not yet been adopted by non-profit publishers operating from developing countries.

The economically emerging nations, more particularly BRICS countries are now in focus as commercial publishing companies see their growth opportunities in terms of increased sales revenues in those countries.

While distribution of print journals is slow and costly to reach their subscribers, electronic journals offer much faster access or install access provisions. The electronic journals provide free ToC alerts through emails, RSS feeds and social media groups. ToC alerts help the prospective researchers to read and use relevant articles in their respective research areas.

Print subscribers often face the problem of missing issues, and after several reminders they may get some missing issues from the publishers or local distributors. If an old print issue of a journal is lost from the library, this becomes permanent loss for the researchers associated with that institution. In addition to let a library requires ample space to archive back issues of a periodical, it is a costly process.

On the other hand, online subscription also has several limitations. One such is that if a library does not continue subscription to a particular journal, the library may not have perpetual access to the old journal volumes for which the library had already paid subscription fee. The library also has no option to download all articles of a subscribed e-journal for lateral institutional use.

Some online journals allow authors in self-archiving of their published articles in their respective institutional repositories or in authors' personal webpages. Whereas, some publishers give certain embargo period for delayed self-archiving of their published articles. Many publishing companies have the journal-specific embargo periods to restrict authors in self-archiving, whereas some companies ask their authors to pay a gold open access fee for immediate self-archiving.

4.6 LET US SUM UP

In this Unit, you have learned about serials crisis and its different reasons and different solutions available to mitigate these problems. The library and researchers' communities have made many attempts to deal with problems associated with scholarly journal publishing, particularly of spiralling costs of journals subscription in the days of library budget cuts, global economic recession and unbearable economic inflation. Open access journal publishing apparently helps in mitigating some of the problems associated with serials crisis. But commercial interests of for-profit publishers sometimes spoil philosophy and spirit of open access to public funded research. They try to churn out higher profit margins from the authors by charging considerable amount of article processing fee. The informed choices are now made available to OA authors, through websites such as JournalPrices.com and eigenFACTOR.org. However, these websites don't cover wide spectrum of

available online or print journals. The researchers also need to know different publishing choices available to them while selecting qualitative and well-recognized journals as their publishing venue. The problems discussed in this Unit will help the researchers in taking informed decisions while publishing articles in journals.

4.7 CHECK YOUR PROGRESS

1) Identify five reasons of serials crisis.

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2) Identify five solutions to mitigate problems of serials crisis.

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3) Identify name of the person associated with a regularly-updated online report on predatory open access publishers.

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4) What is the name of online report on predatory open access publishers?

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5) Where can you find details of an open access journal?

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.....

.....

6) Where can you find Cost Effectiveness (CE) index of scholarly journals?

- i) JournalPrices.com
- ii) eigenFACTOR.org
- iii) JCR on Web
- iv) JournalMetrics.com

7) Where can you find details of an open access repository?

- i) Directory of Open Access Books (DOAB)
- ii) Directory of Open Access Journals (DOAJ)
- iii) Directory of Open Access Repositories (OpenDOAR)
- iv) Scopus

- 8) Where can you find details of an open access book series?
 - i) Directory of Open Access Books (DOAB)
 - ii) Directory of Open Access Journals (DOAJ)
 - iii) Directory of Open Access Repositories (OpenDOAR)
 - iv) Web of Science
- 9) Which library consortium is operated in Brazil?
 - i) OhioLINK
 - ii) INDEST Consortium
 - iii) UGC Infonet
 - iv) Portal de Periódicos da Capes
- 10) Which library consortium is operated in India?
 - i) OhioLINK
 - ii) Aicte-INDEST Consortium
 - iii) Portal de Periódicos da Capes
 - iv) SANLiC

ONLINE VIDEOS TUTORIALS

There are a number of video tutorials available on topics discussed in this Unit. Some of the tutorials were developed by the reputed institutions, libraries and scientists. These video tutorials will help you in understanding basic problems associated with academic journal publishing and more particularly on serials crisis.

- *Academic Publishing Crisis, Part 1* **Video**⁷⁰
- *Academic Publishing Crisis, Part 2* **Video**⁷¹
- *Impact of New Technologies on Scholarly Publishing: The Serials Crisis and Beyond*, by Jorge Contreras **Video**⁷²
- *Predatory Publishers*, by Jeffrey Beall **Video**⁷³

ANSWERS TO CHECK YOUR PROGRESS

Unit 1

(1) a, (2) d, (3) a, (4) d, (5) b

Unit 2

Q6. (a) iii, (b) iii, (c) ii, (d) i.

Unit 3

(6) c, (7) b, (8) c, (9) c.

Unit 4

Q.(6) ii, (7) iii, (8) i, (9) iv, (10) ii.

GLOSSARY OF TERMS

Term	Definition
Academic Conference	It is a meeting for academicians and researchers to present and discuss their work. Together with academic or scientific journals, conferences provide an important channel for exchange of information between researchers.
Academic Database	It is a database of bibliographic records, an organized digital collection of references to published literature, including journal and newspaper articles, conference proceedings, research reports, patents, books, etc.
Academic Journal	It is a peer-reviewed periodical in which scholarship relating to a particular academic discipline is published. Academic journals serve as fora for the introduction and presentation for scrutiny of new research, and the critique of existing research.
Article Processing Charges	A central mechanism for funding Open Access (OA) scholarly publishing, by charging a fee from authors willing to publish in an OA journal.
Bibliographic Database	It is a database of bibliographic records, an organized digital collection of references to published literature, including journal and newspaper articles.
BRICS Countries	A group of emerging countries belong to broad category of developing countries. Represented countries are Brazil, Russia, India, China and South Africa.
Citation	It is a reference to a text or part of a text identifying the document in which it may be found.
Citation Index	It is a bibliographic tool in print or electronic format that lists all referenced or cited source items published in a given time span.

Copyright	An arrangement whereby software or artistic work may be used, modified, and distributed freely on condition that anything derived from it is bound by the same conditions.
Creative Commons license	It is one of the several public copyright licenses that enable the free distribution of an otherwise copyrighted work. A CC license is used when an author wants to give people the right to share, use and build upon a work that they have created.
Database	It is an organized collection of data held in a computer, especially one that is accessible in various ways.
Gateway	It is a device used to connect two different networks, especially a connection to the Internet.
Gold Open Access	A term to describe when authors provide open access by publishing in an open access journal.
Green Open Access	A term to describe when authors provide open access by self-archiving their journal articles in an OA repository.
Hybrid Journal	It is a kind of journal which itself is not fully open access, but authors may pay a sum of money to make their articles open access. This type of open access articles is called "Gold OA". This is also known as hybrid open access journal.
Indexing & Abstracting Service	It is an alerting service that provides bibliographic data and abstracts of new and latest research.
Inter Library Loan	A service whereby a user of one library can borrow books or receive photocopies of documents that are owned by another library.
Least Developed Country	A country that, according to the United Nations, exhibits the lowest indicators of socioeconomic development, with the lowest Human Development Index ratings of all countries in the world.
Patent	It is a set of exclusive rights granted by a sovereign state to an inventor or their assignee for a limited period of time, in exchange for the public disclosure of the invention.
Peer Review	It is the evaluation of work by one or more people of competence to the producers of the work. It constitutes a form of self-regulation by qualified members of a profession within the relevant field.
Primary Sources	They provide first-hand testimony or direct evidence concerning a topic under investigation. They are created by witnesses or recorders who experienced the events or conditions being documented.
RSS Feed	It uses a family of standard web feed formats to publish

	frequently updated information: journal contents, blog entries, news headlines, audio, video, etc.
Scholarly Journal	It is the same as academic journal.
Scopus	It is the world's largest abstract and citation database of peer-reviewed literature.
Secondary Sources	In scholarship, a secondary source is a document or recording that relates to or discusses information originally presented elsewhere. An indexing & abstracting database is a kind of secondary sources, so are annual reviews in the field.
Serials Crisis	A term to describe the exponential increase in subscription cost of many scholarly journals.
Symposium	It is an academic meeting for researchers to present and discuss their work.
USB Flash Drive	A data storage device that includes flash memory with an integrated Universal Serial Bus (USB) interface.
Web of Science	It is the world's second largest abstract and citation database of peer-reviewed literature.

LIST OF ABBREVIATIONS

A&I	Indexing and Abstracting
AAAS	American Association for the Advancement of Science
ACM	Association for Computing Machinery
ACS	American Chemical Society
AICTE	All India Council for Technical Education
APC	Article Processing Charge
BRICS	Brazil, Russia, India, China and South Africa
CD-ROM	Compact Disc Read-Only Memory
CIOMS	Council for International Organizations of Medical Sciences
COPE	Committee on Publication Ethics
DOAB	Directory of Open Access Books
DOAJ	Directory of Open Access Journals
DOI	Digital Object Identifier
E-Science	Electronic Science
ETD	Electronic Theses and Dissertations
FAQ	Frequently Asked Questions
HINARI	Health Internetwork Access to Research Initiative
HSS	Humanities and Social Sciences

I&A	Indexing & Abstracting
ICSU	International Council for Science
ICT	Information and Communications Technology
IEEE	Institute of Electrical and Electronics Engineers
ILL	Inter Library Loan
INASP	International Network for the Availability of Scientific Publications
INDEST	Indian National Digital Library in Engineering Sciences and Technology Consortium
ISBN	International Standard Book Number
ISSN	International Standard Serial Number
JCR	Journal Citation Reports
JOL	Journals Online project
LDCs	Least Developed Countries
M-Science	Mobile Science
OA	Open Access
OAJSE	Open Access Journals Search Engine
OASPA	Open Access Scholarly Publishers Association
OCS	Open Conference Systems
OhioLINK	Ohio Library and Information Network
OJS	Open Journal Systems
OpenDOAR	Directory of Open Access Repositories
OSS	Open Source Software
PKP	Public Knowledge Project
Q&A	Questions and Answers
R&D	Research and Development
RSS	Rich Site Summary or Really Simple Syndication
SANLiC	South African National Library and Information Consortium
SCI	Science Citation Index
SciELO	Scientific Electronic Library Online
STM	Science, Technology and Medicine
TOC	Table of Contents
ToC	Table of Contents
UGC	University Grants Commission, India
UNESCO	United Nations Educational, Scientific and Cultural Organization
USB	Universal Serial Bus

WAME	World Association of Medical Editors
WHO	World Health Organization
WoK	Web of Knowledge
WoS	Web of Science

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