

Use and Awareness of Arxiv Open Access Preprint Repository among Physics Researchers of Bangalore City: A Study

Nagaraj M. N.^a and M. K. Bhandi^b

Raman Research Institute, C V Raman Avenue, Sadashivanagar, Bangalore.^a

Retired University Librarian, Mangalore University, Mangalore.^b

email: nagaraj@rri.res.in

Abstract

ArXiv is an Open access (OA) preprint repository of physics and related subjects. This paper reports awareness and usage of arXiv preprint repository among physics researchers. A structured questionnaire was distributed to 480 physics researchers and we were able to get 352 responses from researchers working in five research institutions in Bangalore city. The first part of questionnaire consists of demographic information; second part consists of awareness and usage of arXiv preprint repository. The last part consists of satisfaction level of users. The analysis revealed that out of 352 physics researchers 331(94%) use arXiv. Further, this study showed that users cite arXiv as reference and they are satisfied with its usage. We believe that this study proves successful usage and impact of preprint OA repository which sets an example for implement in other subject domain.

Keywords: arXiv, Physics researchers Preprint repository, User survey, Usage satisfaction.

1. Introduction

The preprint repository arXiv supports OA to scholarly communications. It was established by physicist Paul Ginsparg in 1991 and has more than 13,22,297 e-prints available for free reading and download

Ginsparg is a physicist widely known for his development of arXiv.org, a e-print archive. In a talk in 2001 he said that "arXiv is an example of a service created by a group of specialists for their own use: when researchers or professionals create such services, the results often differ markedly from the services provided by publishers and libraries". Further, Ginsparg 2001 states that "the original objective of the e-print arXiv was to provide functionality that was not otherwise available and to provide a level playing field for

researchers at different academic levels and different geographic locations". ArXiv has become a major forum for dissemination of scholarly publications in physics and mathematics. This resource has been entirely scientist driven, and is flexible enough either to co-exist with the pre-existing publication system, or to help it evolve to something better optimized for researcher needs.

In a slightly distinctive work, Henneken et al., (2007) in their study shows that the most important papers in astronomy and physics appear as e-prints on the arXiv. The myADS-arXiv service is unique in the world of electronic libraries and publishing. No other electronic newsletter or alerting service produces a view on the scholarly physics and astronomy literature as comprehensive as this service. The myADS-arXiv service provides the scientific community with updated information in researcher's field of interest. It also provides a complete view with the most relevant papers available in the subscribed field of interest. Schwarz & Kennicutt (2004) studying about demographic and citation trends of Astrophysical Journal papers and preprints states that there is no obligation for any author to make papers available, but the majority of physics and astronomers post their papers on the e-print archive.

2. Objectives of the Study

- To determine awareness of arXiv
- To study usage of arXiv
- To show that there exist relationship between field of research and use of arXiv preprint repository
- To study usage impact of arXiv.
- To study the satisfaction level of users

3. Methodology

A structured questionnaire was designed using Likert's five-point scale with close-ended questions. Total 480 questionnaires were distributed to physics researchers and were able to get 352 responses.

To determine physics researchers use and awareness of arXiv survey method was used. Keeping in view the objectives of the study, required data were collected through distribution of a structured questionnaire to physics researchers of five research Institutions in Bangalore. The physics researchers covered under the study included faculty members, postdoc and research scholars who may or may not be using open access resources. The scope of this study was confined to five research institutions located in Bangalore, Karnataka. These Institutions are Centre for Nano and Soft Matter Sciences (CeNS), Indian Institute of Astrophysics (IIA), Indian Institute of science (IISc), Jawaharlal Nehru Centre for

Advanced Scientific Research (JNCASR) and Raman Research Institute (RRI).

4. Data Analysis

The data collected from the questionnaire were analyzed through Statistical Package for Social Sciences (SPSS). The results are presented in the form of tables and figures.

4.1 Population study

Table 1. Distribution of questionnaire and response receive

S. No.	Institute	Questionnaire Distributed	Response Received	Percentage
1.	RRI	120	102	85
2.	IISc	140	98	70
3.	IIA	110	69	62.72
4.	JNCASR	80	60	75
5.	CNES	30	23	73
		480	352	73.33

From the table one it is clear that maximum response 102(85%) was received from RRI and minimum response of 62% is from IIA. All the above five research institutions taken for study are major physics research institute in Bangalore. Further, from the table two we can make out that respondents are from different branches of physics.

Table 2. Responses received as per research field of physics

S. No.	Research Field	Frequency	Percentage
1.	Astronomy & Astrophysics	112	31.8
2.	High Energy Physics	22	6.3
3.	Optics	20	5.7
4.	Condensed Matter Physics	124	35.2
5.	Theoretical Physics	51	14.5
6.	Biophysics	23	6.5
	Total	352	100.0

Based on the responses received six sub branch of physics are taken for analysis as presented in above Table 2. It is also clear from the table that maximum response is from Condensed matter physics with 124 (35.2%), followed by Astronomy & Astrophysics with 112(31.8%). The least response is from optics with 20(5.7%) slightly better than this is High Energy Physics 22(6.3%). The percentage of condensed Matter physics respondents is more because it is carried out in four research institutions namely RRI, IISc, CnEs and JNCASR.

4.2 Awareness about Open access Publishing

One of the objectives of the study was to understand user awareness of modes of OA publishing. It is evident from above figure one that majority of respondents are unaware of green OA (91.5%) and gold (92%) routes of open access. An interesting outcome of the analysis is that (around 86.4%) are aware of self-archiving of their publications on their personal WebPages. Delayed and paid OA modes are known by 32.4% and 48% respectively. ArXiv preprint repository is driven by authors by self-archiving and table also shows 86.4% awareness of self-archiving.

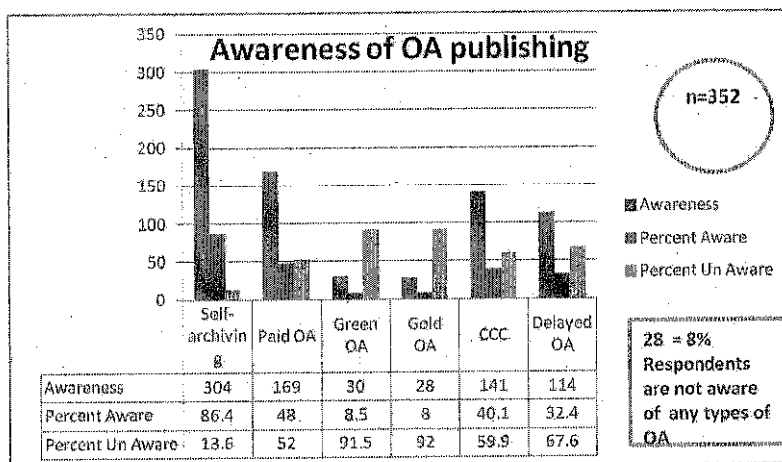


Figure .1 Awareness of Open access publishing

Researchers use different search engines and databases for retrieving scholarly output.

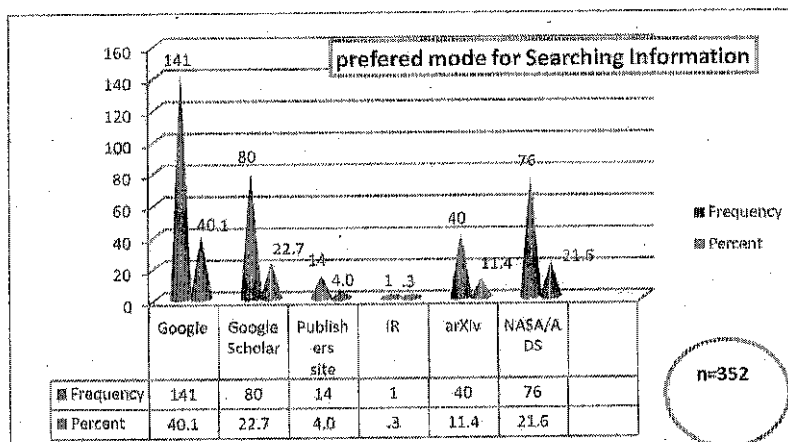


Figure 2. Preferred mode for searching information

In response to query to users for most preferred mode for searching information It is evident from the figure 2. that Google is most preferred with (40.1%) followed by Google Scholar with (22.7%) and least preferred are publishers site with (4%) and IR with (0.3%). Google is preferred because through it all types of documents and database are searchable. ArXiv is preferred by 11.4% as it is confined to only preprints.

4.3 Usage of arXiv

To find relationship between use of arXiv and field of research of physics researchers below hypothesis was tested.

“Use of arXiv preprint repository depends on the field of research of physics researchers”

Table 3. Crosstable showign use of ArXiv preprint repository versus field of research

ArXiv Preprint Repository usage	Research Field of Researchers						Total	
	Astronomy & Astro-physics	High Energy Physics	Optics	Condensed Matter Physics	Theoretical Physics	Biophysics		Percentage (%)
Never used	0	0	3 (15%)	12 (9.68%)	0	0	15	4.3%
Aware but not used	0	0	1 (5%)	2 (1.61%)	0	3 (13.04%)	6	1.7%
Rarely	8 (7.15%)	2 (9.10%)	2 (10%)	7 (5.65%)	0	1 (4.35%)	20	5.7%
Sometime	15 (13.39%)	5 (22.82%)	4 (20%)	28 (22.58%)	7 (13.73%)	6 (26.09%)	65	18.5%
Frequently	89 (79.46%)	15 (68.10%)	10 (50%)	75 (60.48%)	44 (86.27%)	13 (56.52%)	246	69.8%
	112 (100%)	22 (100%)	20 (100%)	124 (100%)	51 (100%)	23 (100%)	352	100%
% of Total	31.8%	6.3%	5.7%	35.2%	14.5%	6.5%	100.0%	

Table 3. shows, that majority 246(69.8%) of respondents use arXiv frequently, 18.5% use some time and 5.7% use rarely of total population only six percent of users are not using arxiv.

$$X^2(20) = 60.102, P=0.000 \text{ HS arXiv}$$

Chi-square test was used test hypothesis its value was 60.102 with $P=0.00$ showing high significance with 20 degree of freedom. This test proves that there is significant relationship between field of research and use of arXiv preprint repository. Further, this study shows usage of arXiv preprint repository depends on researchers working in different

fields of physics. As per above table 100% usage is seen among astrophysics and theoretical physics researchers. While among other groups it shows usage of above 80%. Reason for its significance is that arXiv comprises of all most all branches of physics.

4.4 Citation of arXiv

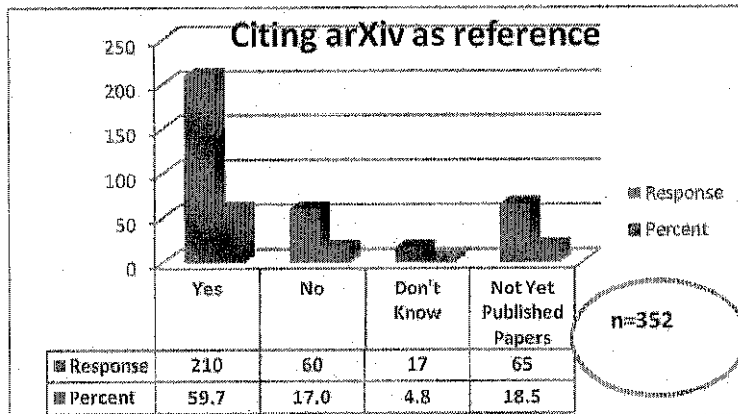


Figure 3. showing citing arXiv as reference

Citing arXiv as reference by users was studied to understand usage impact of arXiv. In response to this as shown in figure three out of 352 respondents 210(59.7%) replied that they are citing, 17% are not citing, 4.8% don't know and 18.5% not yet publish papers. From the figure three it is clear than around 60% are citing OA resource, which is a positive impact of OA resources.

4.5 Usage Satisfaction of ArXiv.

It is observed from figure four that majority of researchers (93.5%) are satisfied with the usage of arXiv at different levels. Out of 352 (13.1%) feel excellent, 50.6% feel good and 29.8% are average satisfied. Totally 6.5% are not at all satisfied with arXiv grading it as poor and very poor.

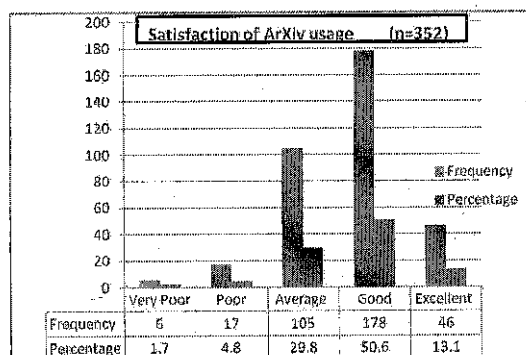


Figure 4. Satisfaction level of Users

In a similar study conducted by (Vlachaki & Urquhart, 2010) on use of OA journals of biomedicine in Greece found that knowledge of Open access publishing was closely related to the researchers experience of using open access publication.

5. Major findings of the study

- ArXiv preprint repository is driven by authors through self-archiving. This study also shows that 86.4% are aware of self-archiving their publications and remaining 13.6% are not aware of self- archiving .
- Out of 352 respondents 313(94%) are using arXiv preprint repository and 1.7% are aware but not using it 4.3% are neither aware nor using it.
- This study shows that around 60% are citing arXiv, which is a positive impact of usage of OA resource.
- This study also shows that 63.7% are satisfied with ariXiv and grade it as excellent and good. It is evident from this study around (29.8%) are partially satisfied with arXiv they have graded as average and 6.5% are not at all satisfied grading as poor and very poor.

6. Conclusion

So far, many studies have been conducted on use and awareness of OA journals. This paper is a unique attempt to study use and awareness of OA resource like arXiv preprint repository among physics researchers consisting of not only faculty but also junior and senior research fellows. The result may benefit to publishers and information specialists to improve use and awareness of OA resources. It is also found that physics researchers have high level of awareness and use of arXiv. The use of this OA resource has no relation with different group of researchers like faculty and research scholars. The study found no association between uses of arXiv among physics researchers working in different research institutions in Bangalore. It is observed from the study arXiv is not only extensively used but it is also cited thus indicating that physics researchers have a positive perception about arXiv. Lot of authors manuscripts are contributed to ariXiv further study can be carried out on impact of contribution and purpose of usage. Similar study can be carried out in other field like medicine and biology.

References

1. Ginsparg, P. (2001). Creating a global knowledge network. Paper presented at the second International Conference on *Electronic Publishing in Science*. Paris.
2. Henneken, E. [et al]. (2007). myADS-arXiv — a Tailor-made, Open Access, Virtual Journal. *Library and Information Services in Astronomy V: Common Challenges, Uncommon Solutions*, 377. Retrieved from http://www.asprebooks.org/a/volumes/table_of_contents/?book_id=86
3. Schwarz, G.J. & Kennicutt, R.C. (2004). Demographic and citation trends in astrophysical journal

papers and preprints. *The Astrophysical Journal*. Retrieved from <http://arxiv.org/abs/astro-ph/0411275> (Accessed on 20/10/2017).

4. Vlachaki, A., & Urquhart, C. (2010). Use of open access journals in biomedicine in Greece. *Library Management*, 31(1/2), 19-26.