

# Investigative Study on Preprint Journal Club as an Effective Method of Teaching Latest Knowledge in Astronomy

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# Outline

- Introduction, definitions
- Which are the factors that affect the success of preprint journal clubs (JC) in Astronomy (usually called Astro-ph/Astro-Coffee, hereafter AC)
- Authors performed a survey, respondents from 9 institutions, deriving 4 main factors.
- Benefits for the audience?
- Authors reflect about their own AC in accordance with the found factors

# Introduction

- Astronomical knowledge advances very fast thanks to use of the state-of-the-art facilities and telescopes. Discoveries are fast rewriting physics and astronomy textbooks.
- As always in the forefront of research, there is an increasing demand for digesting new information.
- One of the many ways of keeping updated of the latest knowledge is through journal clubs.
- A journal club is defined as an education forum of a group of individuals with the agenda of discussing articles to stay up-to-date with literature.
- Such forum started in medicine in 19<sup>th</sup> ct., but probably even earlier.

# Introduction

- some suggest that astrophysicists have replaced journal reading with regular visits to the Astrophysics subject (astro-ph) at arXiv [www.arxiv.org](http://www.arxiv.org).
- a preprint is an unpublished manuscript meant to be published in journals and/or serials. Preprints can be reviewed/accepted manuscripts, submitted manuscripts that are yet to be reviewed, and circulated manuscripts for peer-review before formally submitting them to a journal
- preprint servers are repositories of preprints. Most used arXiv, from 1991.
- advantage: free for all.
- by reading papers that are not yet peer-reviewed, participants may provide the authors of the papers direct criticisms before publication.
- It can help students develop critical evaluation skills in understanding manuscripts that are not yet peer-reviewed.

# Introduction

- Journal Clubs are an effective method of cultivating a community of practice (CoP=a site of individuals that share a common interest and regularly interact as a method of learning)
- A CoP must satisfy three components: the domain (the shared interest), the community (the people involved in a regular engagement or interaction), and practice (the shared resources and capabilities being learned throughout the interactions)
- can serve as bridges for students and faculties at various levels to meet and learn from one another.
- Some journal clubs have also utilized social media (virtual JC) as a way of extending engagement to a wider audience. This also provides a solution to workplaces and sites where face-to-face journal clubs/CoP are impossible.
- Various communication technologies may also be introduced, e.g. Twitter for organizing.
- online websites offer help in implementing JC: Astrobites and VoxCharta

# Introduction

Most of the published articles studying journal club implementation are in the field of medicine, and many of these articles have found certain points about journal clubs:

- goal of most JC is to do “critical appraisal”. This refers to “the process of carefully and systematically examining research to judge its trustworthiness, and its value and relevance in a particular context”.
- Without this, journal clubs just become a way to practice and improve presentation skills.
- a common goal for medical journal clubs is for participants to learn new information which they can apply in actual practice.
- didactic-like journal clubs (i.e. such which do not promote discussion) may cause participants to become passive learners.
- when senior clinicians organize medical journal clubs, they are more likely to dominate the discussion, by providing more experienced points of view. This may unintentionally cause pressure to other attendees who have less experience.

# Introduction

- Other factors which play a role in journal club success: maintaining attendance and engagement, having good and trustworthy resources for articles (e.g. websites, books, past presentations of other people, etc.), and choosing an organizer who can facilitate the discussion.
- Journal clubs become successful when clear and concise goals are prepared beforehand, establishing a common objective for the attendees. Different journal clubs may have different objectives.
- Effective journal club include mandatory attendance, regular meetings with suitable schedules for everyone, clear short- and long-term purposes, circulating papers to be discussed before sessions, having an organizer that can lead the discussion.
- Having a safe space where participants can ask “low-level questions”, everyone can share perspectives without stress or fear of being embarrassed, the balance between the needs of those who are still learning and those who are experts.

# Methodology of the study

The authors perform a study to identify the factors that should be considered to implement a successful JC. These factors are then assessed in their own JC, to check if the implementation is effective in teaching the latest knowledge in astronomy or not.

- A questionnaire was disseminated to obtain an initial understanding of how JC is implemented in other institutions and countries.
- An interview was implemented next for willing respondents to get more information on their answers in the initial questionnaire.
- In the second phase, the objective is to see how the factors contribute to the success of their own JC.



# Questionnaire

Three ways of contacting survey respondents (authors can not estimate how many people were invited to answer the survey):

- internet search for universities and institutions that have JC by entering on the search engine the keywords “astro-ph”, “astro-coffee”, and “astronomy journal club”, emailing the questionnaire during 4 months
- posted the questionnaire to a Facebook group of astronomers (9300 members)
- asking colloquium speakers in NTHU during Spring Semester 2020 to answer the

TABLE I. Elements of AC that we asked from the respondents in our initial survey

<b>General Information</b>	Name, title, and research field of respondent Number and demographics of institution Number and demographics of AC (if there is) Position of organizer (if the respondent is not the organizer)
<b>Design/Format of AC</b>	Schedule (time, day, frequency) Brief description of how discussion of papers is facilitated Presence of financial aid Food and Drinks Advantages/disadvantages of current AC format Goals of AC Perceived benefits of AC to attendees Websites/archives where participants look for papers Suggestions/comments about their AC format Is it a mandatory requirement for students?
<b>For those without AC</b>	Other activities aside from AC (e.g., colloquium, seminars, etc.) Reason(s) for not having AC

# Questionnaire

Two sets of questions depending on whether they have AC or not.

With AC:

- Who regularly attends AC • Who is invited to join AC?
- Astronomy fields discussed in AC • Websites where you check new papers • Parts of the paper you focus on (e.g., methodology, results, abstract...)
- Schedule, duration, and frequency of AC • Do you get any financial support for AC? For?
- What kinds of foods and drinks do you have during AC? • Do you think most participants will still come without foods or drinks? • Do you invite a speaker for your AC? • What is the title of the organizer? • How is AC announced? • Is AC a required subject for students? • How do you conduct AC? • What are the usual benefits of AC to participants? • What are the advantages and disadvantages of the way your AC is done? • Any suggestions/experiences about AC that you would like to share? • Are you willing to meet us via Skype, Zoom, or other video call platforms for a follow-up interview? How about email interview?

For respondents without AC: • Other events implemented in your institution (colloquium, seminars, symposium) • Why no JC? • Have you ever thought about making JC? • Why no success?

# Interviews

Follow-up questions for the video/email/personal interviews with the survey respondents who agreed to have them helped to further understand the results:

- Introduction and academic background of the participant
- Opinions about the current format of AC in their institution
- Motivations of organizing/attending AC
- Environment of AC and interaction of participants and organizers
- Improvements and recommendations for their own AC

# NTHU AC

- AC in NTHU was implemented as an elective class
- Each session is 3 times a week (from Tuesday - Thursday), 12:20 pm - 1:20 pm.
- At the beginning of the semester, the objectives of the AC were made clear to the participants:
  - To help attendees read efficiently (as many papers as they can):
    - a group of regular presenters for each day (5-6 people per group) was assigned. For each day, at least 3 presenters should present their chosen papers via a rotation system. Anyone is welcomed to present papers including the professor, when the 3-paper quota was not achieved or when the session has not yet ended. Question session follows, with a total of 10 minutes per person is allotted for presentation and queries.
  - To keep up with the latest discoveries in astronomy:
    - read papers from preprint servers (e.g., arXiv, VoxCharta, and/or Astrobites), journals, and the latest news in astronomy, even without presenting a paper, and voting in VoxCharta (monitored by the professor)
  - To learn from other fields in astronomy:
    - accommodating people studying different research fields

# Results of survey

- Too little numbers to really exercise all the statistics authors used.
- Autors obtained many particular suggestions, mostly concerning non-participation by more postdocs to boost the discussion, lunch break possibility for JC time (it was start of pandemics time).
- Authors encourage other institutions to evaluate their own AC in accordance with the found factors to assess the effectiveness of their AC/JC.

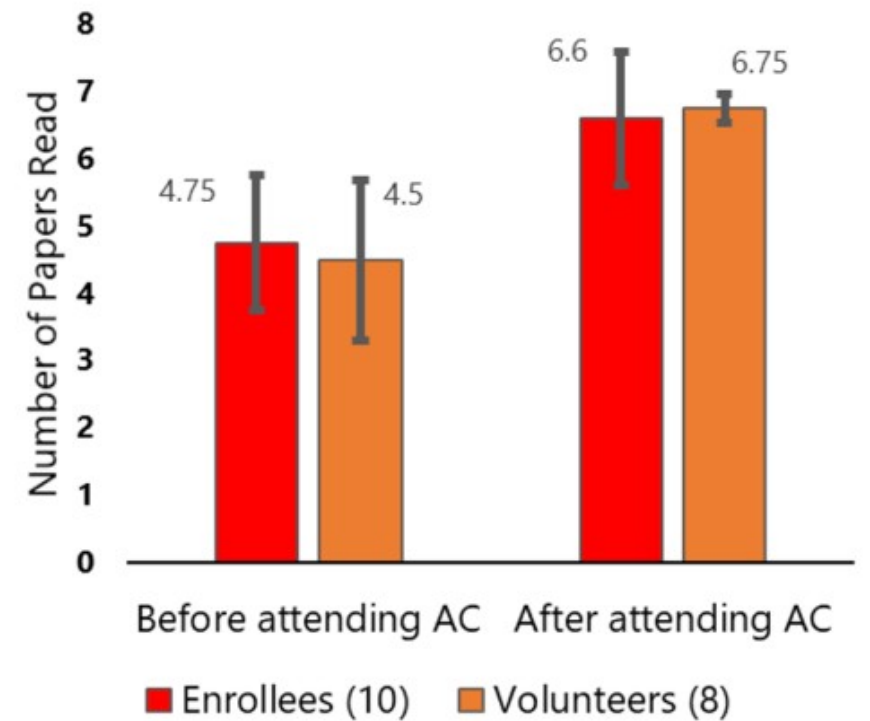


FIG. 2. Average number of papers read by enrollees (red) and volunteers (orange) before and after attending AC for the whole period of the Spring Semester 2020 (March 2020 - June 2020). Standard error bars are displayed.

# Conclusions

There are 4 important factors for a successful AC:

- commitment (dedication of organizer/s and participants in maintaining AC),
- environment (the overall organization of the AC as a forum for learning),
- content (topics and platforms for discussion),
- objective (goals of the AC)

Main recommendations:

- Specify what you would like to achieve in attending and implementing AC (objective)
- Have a core of people and an organizer, who are dedicated to attend AC every session and participate regularly (commitment)
- Achieve balance in having an in-depth discussion of the papers presented and casual communication among participants, avoiding pressure and stress (environment)
- For each paper discussed, introduce the basic concepts and show other visual aids (videos, pictures from the internet, etc.) if necessary.

**Thank you.**

**Stay safe.**

**Stay sane.**

**Do Science!**

