

**Review and Reflections on Establishing an  
Engineering and Physical Science Journal  
Club**

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**Abstract**

A journal club was established and integrated within a curriculum of study to provide students with opportunities to develop their academic speaking, writing and integrity skills, whilst also becoming more socialised to academia. Herein the author presents a comprehensive literature review into many of the common decisions taken in establishing a journal club, with a specific focus on the foundation year (pre-undergraduate) physical science context. A reflective diary is used to contextualise the decisions taken, the strengths and weaknesses of this journal club implementation in this context and provide practical advice for professionals who want to establish journal clubs of their own. This work additionally underpins a mixed-methods study of this journal club implementation to understand how confidence in academic skill development can be supported through the journal club, which is cited and discussed in detail elsewhere, beyond the immediate scope of this article.

**Keywords**

Journal Club; Academic Skills; Engineering and Physical Science; Reflection.

**Introduction**

*Academic skills and success in the physical sciences*

Whilst success in formal education is often measured in quantitative outcomes from summative assessments, for example, the award of a degree, there is an array of (meta)cognitive and noncognitive expectations placed on graduates by teachers, schools and universities, employers and the general public (Grehan, Flanagan and Malgady, 2011). Subject specificity set aside, this would typically include an embodiment of lifelong learning, communication (written and verbal) and critical thinking skills, ability to reflect, and displaying high levels of conscientiousness (Kim, Poropat and MacCann, 2016; Burns and Sinfield, 2022). Indeed, conscientiousness itself is the strongest noncognitive personality trait that positively correlates with academic success, thus, unsurprisingly, it has long been the focus of educators (Pashler *et al.*, 2007). These skills together are often referred to as *academic skills* (Felder and Brent, 2016). Difficulties can arise for students most notably at the transition stages of education, for example, from school to university, or from university to the graduate job market where there is a mismatch between the expectations of teachers or employers and students or graduates. Students who have developed these skills can be expected to make more rapid academic progress in, and socialisation to, new working environments. As such, universities *can* be key places for students to develop these skills for academic success as well as broader success in life. So, what do these academic skills look like for physical scientists?

*Communication and critical thinking skills of physical scientists*

As with learning any new skill, multiple and deliberate attempts are required to practise the skill, with appropriate feedback opportunities to elicit reflection and scaffold future actions to incrementally improve and develop (Baker, 2022). This is certainly true of verbal and written communication and critical thinking skills which justify integrating opportunities for developing such skills throughout university curricula (Wingate, 2006; Felder and Brent, 2016). A successful physical scientist will typically need to work with colleagues on collaborative projects (Lewis, Ross and Holden, 2012), increasingly true as multidisciplinary projects grow in complexity, as well as contribute to, and work within, the global scientific community (Leahey, 2016). Notwithstanding the knowledge or subject-

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specific skills that most closely align with a discipline (Nortvedt and Siqveland, 2019), this will involve verbal and writing mediums of communication which are often underdeveloped in undergraduate students (Lowe and Cook, 2003; Moore and Morton, 2017). However, the ability to speak and write persuasively is key to articulating one's thoughts and ideas (Graham, Gillespie and McKeown, 2013; Heron *et al.*, 2022), and the need for these skills is quickly exemplified in the activities scientists (among others) frequently find themselves: debating, discussing, critiquing and presenting in both verbal and written contexts. Furthermore, taking responsibility for the product of speaking and writing involves credibility, when one can articulate the links between theory and prediction and data to conclusions persuasively through the lens of critical analysis, and with *academic integrity*. After all, it is one thing to convince your audience of something, it is another thing for it to stand up to appropriate scrutiny within the relevant communities of practice.

Speaking and writing should come with a contextual responsibility rooted in ethics and morality (Macfarlane, Zhang and Pun, 2014). Consider the reported findings of a physical science experiment. If I conduct an experiment, I have the responsibility to report my findings transparently with appropriate context and detail so that the intended audience can scrutinise and use the findings appropriately. Broadly speaking, this involves reporting all relevant data with appropriate accuracy and precision (data transparency), acknowledging where the literature base has been drawn upon to support the work (referencing), often in collaboration with others (co-authorship) (Burns and Sinfield, 2022), which, taken together, gives a holistic overview of what it means to exhibit academic integrity in the context of the physical sciences. For students entering higher education, the concept of academic integrity is poorly understood (McGowan, 2005); students are unlikely to have practised academic integrity in their prior educational contexts (Bamford and Sergiou, 2005). Students will therefore need scaffolding and guidance to develop a sense of scholarship toward academic integrity as a tenet to their everyday practices; perhaps only truly achieved as part of a wider socialisation into academia. Together, with academic speaking and writing, these all represent compound skills where each component of the skill needs to be developed (e.g., writing an engaging presentation, presenting it coherently, answering questions, all with credibility) as well as competently carrying them out simultaneously.

#### *Life-long learning, reflection, conscientiousness and socialisation*

To be conscientious, one would expect a successful physical scientist to be a self-directed learner capable of identifying knowledge and skill gaps, articulating professional aspirations and maintaining a suitable work-life balance for a sustainable and fulfilling career (Burns and Sinfield, 2022). This will only be realised through the development of one's ability to authentically reflect on their current context, 'the now', and identify steps to what they are trying to accomplish, 'the future'. Encompassing many of the skills discussed up to this point is coming to understand what it means to be a 'scientist', or an 'academic', for instance, the journey to *becoming* (Kinchin and Thumser, 2021). This represents a material change in thinking and philosophy on the journey from novice to expert informed by experience gained by engaging in the profession (O'Sullivan *et al.*, 2009; Bartle and Thistlethwaite, 2014), and socially constructing a shared meaning and understanding of what makes an academic, an academic. Academia, thus, can be viewed as a social learning system where one must engage in the community of practice of academia to socialise to it (Wenger, 2000; Cox, 2005). This is usually achieved through interactions between novices and experts with discourse to help articulate the nuances of a profession (Woods-Townsend *et al.*, 2016), perhaps things which are not obvious in the popular media, or quite often, are misrepresented or misunderstood in the media from which many novices will consume unsuspectingly, and likely, consume uncritically (Nisbet *et al.*, 2002). Another example of this, particularly notable for physical scientists, is a transition in one's conceptualisation of what knowledge is, and how we come to know what we know (i.e., epistemology). This transition involves an evolution of knowledge conceptualisation, well-described by Perry's model of intellectual development (King, 1978). Novices typically encapsulate knowledge within a 'dualism' framework

where they see knowledge as 'right' or 'wrong' (absolute knowledge) and questions have clear, discrete solutions (Felder and Brent, 2016), where they can memorise question-solution sets to construct their knowledge base. As socialisation grows in response to education involving greater problem complexity with clearer (or more understood) transparency to the approximations employed in theoretical frameworks, and experience of the limits of what is (and can be) known, learners may transition to contextual evidence-based justifications for solution reasoning, ever increasingly moving towards a relativism framework. Here, solutions may instead be incomplete and highly contextualised. Such transitioning can be captured by changes in one's philosophical working paradigm that involve an evolving, incremental and reflective journey (Baker, 2021a).

Developing these compound academic skills requires practice within a learning space which provides discourse (Thornburg, 2004), feedback opportunities and, of course, exposure to the nature of being an academic. A literature search reveals the use of and membership within a *journal club*, particularly when designed with the community of practice model in mind (Price and Felix, 2008; Newswander and Borrego, 2009), can develop confidence in academic skills and embody socialisation in academia (Topf et al., 2017). The characteristics of the journal club model and its successful implementation are the subject of the remainder of this literature review.

### **Journal clubs**

#### *A concise history of the journal club*

The persistent characteristics of a journal club involve the regular gathering of members who discuss scholarly works with an open and critical decorum to further the collective understanding of the group as well as to elicit reflection from individual members (Topf et al., 2017). It aims to be a virtuous and democratic process to pursue knowledge, truth, and understanding, which has likely been a staple of scholarship for far longer than its humble recorded history (Linzer, 1987). The origins of the modern-day journal club are often traced back to the renowned pathologist and surgeon, Sir James Paget, who noted observations of a self-directed group of medical students that met to share and discuss journal articles during his pupillage at St. Bartholomew's Hospital in 1834-35:

Books were given out as from any subscription library: but there was no reading-room. In place of this, some self-elect of the pupils, making themselves into a kind of club, had a small room over a baker's shop near the Hospital-gate, where we could sit during intervals of work and read the journals...

(Paget, 1903, p. 42).

It is perhaps unsurprisingly then, that the evolution of the use of journal clubs continued to be observed within the medical communities. One of the first formal journal clubs is attributed to the Canadian physician, Sir William Osler. This club, established in 1875, had a more specific remit for members to disseminate journal articles which they otherwise would not have access to through individual subscriptions (Linzer, 1987). What followed was the rapid uptake of the journal club provisions across institutions as these members established clubs of their own as their careers progressed. At the same time, an increase in published scholarship regarding the use of journal clubs in medical fields as a means of professional development helped popularise the journal club model (Linzer, 1987).

#### *Where are journal clubs being used?*

Given their roots in medicine, many medical and healthcare settings appear to have flourishing journal clubs, with remits closely aligned with Osler's: to keep abreast of recent developments and continue professional development (Honey and Baker, 2011; Lachance, 2014; Ilic, Voogt and Oldroyd, 2020). Increasingly, several sectors have established journal clubs to develop evidence-informed practice and critical thinking skills, such as nursing (Seymour, Kinn and Sutherland, 2003; Woith, Jenkins and Kerber,

2013; Sortedahl, Wical and Benike, 2018), veterinary sciences (Llewelyn *et al.*, 2020), surgical fields (Asyied *et al.*, 2019), pharmacology (Jones *et al.*, 2022), psychiatry (Swift, 2004), biological sciences (Glazer, 2000; Brill, Falk and Yarden, 2003; Lonsdale *et al.*, 2016), teaching and learning (Barak and Dori, 2009; Tallman and Feldman, 2016; Turner *et al.*, 2020), and engineering and physical sciences (Newswander and Borrego, 2009; Minerick, 2011; Baker, 2025). However, whilst there are cases of journal clubs being used in an array of disciplines, medicine and healthcare contexts overwhelmingly dominate the reported literature; reports of engineering and physical sciences journal club implementation are extremely sparse. From my experience in postgraduate education, many research groups used journal clubs (formally and informally) to discuss recent developments in their fields which spanned the biological and physical sciences, yet the literature is lacking reports on such case studies. Similarly, whilst there are reports of undergraduate journal clubs, they are overwhelmingly implemented in the working context of a graduate, for example, within a hospital, a research group, or a postgraduate course. Of course, educational providers for students embarking on such careers are gradually integrating journal clubs into the curriculum of undergraduate studies, but what about pre-undergraduate courses, such as a Foundation Year (FY) provision (Dampier *et al.*, 2019), perhaps there is utility in establishing such practices earlier in education. Given this, it is reasonable to assert that journal clubs are commonplace in a diversity of disciplines, educational levels, and professional contexts, but their use is often underreported, notably, for this work, an engineering and physical science journal club at the pre-undergraduate level has not been reported on, making it a possibly missed opportunity for integrated curriculum design to develop an array of academic skills early in a student's university studies (Baker, 2025).

#### *Journal clubs to develop academic speaking and academic writing*

Perhaps first and foremost the utility of journal clubs aligns well with their origin; they help to keep abreast of advances in knowledge and understanding within a domain of research, particularly when systematic literature reviews might be the subject of discussion (Alper *et al.*, 2004). Journal clubs, however, often operate with other remits, notably when used in the development of specific academic skills. Consider *academic speaking* first. Confidence in academic speaking can be rapidly developed through guided journal club meetings (Szucs, Benson and Corturillo, 2016; Szucs, Benson and Haneman, 2017). Student presenters get hands-on experience of presenting in an academic context whilst the ensuing discussion is initiated by high-order questioning from the more experienced members (or instructors) and building upon each member's contribution. In some cases, further reflection on the experience can be elicited through peer feedback (Glazer, 2000), as well as multiple, frequent, opportunities to present and practice academic speaking (Tallman and Feldman, 2016), with guidance on the presenter's role and the structure of any presentation rapidly developing confidence in its members (Glazer, 2000). This is similarly true with the development of *academic writing* skills, after all, there is frequent overlap between speaking and writing domains (Hunt and Chalmers, 2013; Heron, 2019). Specifically, scaffolding the critical appraisal of journal articles helps students develop both criticality and the ability to better articulate their thoughts and opinions (Edwards *et al.*, 2001). This has been observed even with relatively short pieces of writing, so long as there has been suitable scaffolding and feedback between opportunities to write, the development of academic writing skills can be significant (Libarkin and Ording, 2012; Birol *et al.*, 2013), although not necessarily guaranteed (Rayner *et al.*, 2014). A journal club, then, can provide multiple, frequent, opportunities for participants to practice these skills and receive feedback to enhance skill development.

#### *Journal clubs to develop academic integrity and foster socialisation*

Selecting journal articles from the current literature provides an almost limitless pool of scholarly texts, within which display a continuum of the characteristics which one associates with academic integrity. For example, while there are journals and publishers for which the editorial and peer-review processes are robust, this can be undermined by poor editorial decisions, peer-review processes, or author conduct (McCook, 2006). Further, there are publishers which fall short of accepted academic

standards, for example, so-called predatory journals (Beall, 2017). The credibility of the literature base depends on the replication of results and broad academic scrutiny to detect substandard research which itself requires well-developed critical appraisal skills for this detection and the communication skills to report them effectively. Journal clubs can then, by their very nature, deliberately select articles for discussion of academic integrity. Furthermore, the process of preparing, writing, discussing, and critiquing (and reviewing) journal articles is commonplace for most academics and thus, active participation in a journal club proffers an important dimension of socialisation. Indeed, it would be remiss to not highlight the parallels between the operation of journal clubs with that of the perspective of developing communities of practice since they are fundamentally based on 'collective learning' within a 'shared domain' (Wenger, 2011). Further, given many journal clubs are found in the professional setting of its membership (i.e., 'situated learning' (Gobbi, 2010)), even those clubs with the explicit remit to stay up-to-date with subject-specific developments, will undoubtedly have the implicit remit to establish and foster a community of practice, socialising journal club members to the profession (Newswander and Borrego, 2009; Tallman and Feldman, 2016; Cruess, Cruess and Steinert, 2018).

The literature reporting on how journal clubs operate and what makes them successful is not always well-reported (Deenadayalan *et al.*, 2008). Indeed, both the operation and relative success are inexplicitly linked based on what success looks like for a particular journal club. However, there are some common themes of reported successful journal clubs surrounding their membership and attendance policies, the number of participants, the club's structure, the frequency of meetings and the venue chosen to promote the *modus operandi* of one's journal club (Forsen Jr, Hartman and Neely, 2003; Deenadayalan *et al.*, 2008; Honey and Baker, 2011).

#### *Mode of attendance and membership of journal club*

Recruitment will typically fall into a binary between compulsory and voluntary attendance. The former is often reserved for journal clubs which form part of an accredited or integrated curriculum for which participation (and member contribution) in the journal club needs to be assured (Deenadayalan *et al.*, 2008). On the other hand, voluntary membership is widely used in situations which aim to attract a self-selected group who *want* to be part of the club, rather than *have* to be there (Clauss, Cawkwell and Beach, 2019). This is particularly suitable for extra-curricular and professional development opportunities where membership is offered to those who find it aligns well with their development interests and who may be seeking membership for a variety of reasons, for example, social, academic, and experiential. The conditions of recruitment and attendance expectations contribute to the community feeling of the club, as well as determining the overall demographic of its membership (Lonsdale *et al.*, 2016).

#### *The size of the journal club*

A restriction on the total membership numbers of a club is usually enforced to achieve a suitable balance of creating useful discussion. For example, with too few participants, it can be difficult to maintain a fruitful discussion, and with too many, it is difficult to include all participants in a discussion, often with only dominant voices being heard, and others, reticent to speak in a larger forum. Ultimately, it will depend on the journal club's aims and its venue which will determine where this balance lies. For a prototypical journal club in an intimate setting, this number is usually around 10 participants (Forsen Jr, Hartman and Neely, 2003; Milinkovic, Field and Agustin, 2008; McLeod *et al.*, 2010; Agustini and Tegeh, 2019), although there are examples of large-scale journal clubs (Kuxhaus and Corbiere, 2016), particularly those which exploit online environments (Wray, Auerbach and Arora, 2018).

#### *Structure, frequency, and venue*

The structure of the journal club will depend on the underlying aim of the club. For example, a club

which involves a membership with little experience with journal articles will need to be structured differently from those used in professional settings whose members have been socialised to their disciplines. A common theme for most clubs is the use of a rotating 'presenter' role which ensures all members have the opportunity to present journal articles to the rest of the club, from which discussion follows between all participants. A persistent role of 'chair' or 'organiser', is noted as a common feature of well-functioning journal clubs (Swift, 2004; Deenadayalan et al., 2008), ensuring administrative tasks are completed, such as presenter roles being filled, suitable articles selected, a space to meet is retained, and the meeting itself keeps to the agreed schedule. It is worth noting that a flipped-learning approach to journal clubs can be useful (Bounds and Boone, 2018), although again, it will depend on both the club's aims and the competency of its membership. Typically, a club meeting is structured first with a short presentation led by a subset of the membership on the article(s) selected, establishing some common understanding of the article, followed by an encouraging opportunity to discuss thoughts and ideas surrounding the journal article. This requires participants to be comfortable in sharing their thoughts and ideas: this dynamic will make or break the success of a journal club (Lachance, 2014). This can, at least in part, be fostered through designing and articulating a suitable journal club decorum, essentially to establish a certain level of 'psychological safety' (Friesth and Dzara, 2020). The articles themselves are critical components of the journal club, after all, these are the subject of the discussions. Selecting the articles is often left to the presenter(s), although this assumes a certain level of competence in both searching for suitable literature, as well as understanding what is and isn't relevant to the club (Honey and Baker, 2011; Tallman and Feldman, 2016). For a novice group to begin exploring and discussing journal articles, it is likely most suitable for articles to be selected by the chair of the club to ensure the article is accessible to the group, provides opportunities for discussion, is relevant to the aims of the club, and will not take too much time to prepare for the meeting which could otherwise impact attendance of its members (Davis et al., 2014; Clauss, Cawkwell and Beach, 2019).

The frequency with which a journal club meets also has no definitive answer. For higher frequencies, such as once a week, there is a larger administrative burden on the organiser(s) and may discourage participants from attending due to time pressures. Conversely, if the gaps between the club meetings are too large, then the aims of the club might be slow to be realised. For example, if the club aims to help develop academic skills within a university setting, large gaps and timetabling conflicts with key assessment dates and term breaks may leave few opportunities for club meetings before its members move on to different academic departments or programmes, leading to slow or fragmented skill development opportunities. Reports in the literature suggest that a one-hour meeting every month is selected by a majority of journal clubs (Deenadayalan et al., 2008; McLeod *et al.*, 2010).

Finally, the venue in which the journal club takes place will weigh heavily on the design principles of the club. The traditional journal club, which is still widely used, takes place at or close to the context of its members for convenience, for example, a hospital, university, staff meeting room, coffee shop etc., and which allows members to sit in a circle/horseshoe to promote eye contact to all contributors. This, of course, requires participants to be in one place synchronously but has the benefit of a low barrier to entry, if members are likely to already be nearby, and it can be quite sociable. Online journal clubs have also been widely used (Topf et al., 2017), with a notably renewed interest as traditional journal clubs digitised their meetings online amidst the 2020 Coronavirus pandemic (Aweid *et al.*, 2021). Online clubs have the benefit of being more readily scaleable (although, possibly at the cost of depth of discussion) and do not require a shared space. However, it will require a suitable online decorum for democratised discussion and engagement, for example, the expectation of participants' cameras to be turned on to reduce passive engagement and use suitable tools to organise discussions (e.g. virtual hands-up) and a certain level of self-regulated learning (Wang, Shannon and Ross, 2013). Each format, therefore, has its own relative merits which need to be closely aligned with the aims of the club (Summey et al., 2020).

### **The Foundation Year provision**

FY programmes are found at the interface between further (tertiary) education and higher education, aligned to Level 3 of the Framework for Higher Education Qualifications (FHEQ), equivalent to the widespread A-level qualification. When a student completes the FY programme, they typically progress onto the corresponding first-year undergraduate programme at FHEQ Level 4, usually at the same institution. Whilst there has been a long-established presence of such courses for international students, prioritising developing English proficiency, there has been a recent expansion of such provisions across the United Kingdom to provide further access to higher education as well as a specific intervention for widening participation initiatives for some institutions (Dampier et al., 2019; Wint, 2022). This has led to a quadrupling in the number of students on FY courses in the last decade (HESA, 2019; OfS, 2019) and has broadened cohort demographics with increased uptake from several underrepresented groups including mature students, first-generation university students, students from low participation socio-economic and ethnic backgrounds, students with non-traditional qualifications, and of course, students who do not meet direct-entry academic requirements (Sanders, Daly and Fitzgerald, 2016; Clifford, 2018; Dampier et al., 2019). As such, FY provisions find themselves in a unique place to support the transition of students from compulsory education into higher education.

Given many of these programmes are being designed from the ground up, institutions and educators display lower inertia to change, for example, making use of integrated approaches rather than bolt-on approaches (Wingate, 2006, 2007; Dampier et al., 2019), make them particularly good opportunities for pedagogical research. In essence, an effective FY pedagogy is emerging and contributing case studies in high-quality teaching and learning (Baker, Spencely and Walsha, 2024).

### **Research questions**

The work here serves two distinct purposes. The first purpose, and the focus of this paper, is to provide a reflective narrative on the establishment of the journal club, its operations, and its successes and challenges from the unique insider-researcher position held in this work. The intention then, is to provide other practitioners who want to implement the journal club model into their context and some insights of establishing and operating a journal club. After all, it is reasonable to assume that many practitioners will find themselves in a similar situation, wanting to contribute to skill development within a curriculum they already teach and contribute to. The literature review and reflections provided may therefore help others implement a journal club within their specific context.

The second purpose, which is the subject of a separate report (Baker, 2025), is to evaluate how confidence across academic skills domains is influenced through implementing this journal club provision within this group of students and context (Foundation Year; Engineering and Physical Science). Briefly, recent research has uncovered mismatches between expectations and reality of specific academic speaking skills (Baker and Heron, 2023) and it would be reasonable to hypothesise that such mismatches exist across several skill domains. As such there is a need to better understand the place universities have in supporting academic skill development whilst socialising students to the academic community of practice. Further, I make the case that such development should begin as early as possible in a student's studies, given appropriate scaffolding. Given that the number of FY provisions is rising, and the journal club model is under-reported in this context and across the physical sciences, this intervention might provide a valuable and timely opportunity for academic skills development.

### **Reflective diaries as a narrative of Journal Club meetings**

A detailed evaluation of what confidence means to students, and how one can measure it and evaluate academic skill development is reported elsewhere for this Journal Club implementation (Baker, 2025). The focus of this work is to provide other practitioners with practical advice on implementing journal

clubs within their context, drawing on the reflections on establishing and running this Journal Club. To do this, a reflective diary was written shortly after attending each Journal Club meeting by the researcher (Wallin and Adawi, 2018). Herein, thoughts and feelings about how the meeting went, the unexpected challenges and any surprising conversations or comments were written down. The level of detail of these notes was such to help record events accurately but balanced with facilitating the meetings themselves. Some key themes are generated through reading across all three meetings and contextualised to express some of the successes and challenges of running the Journal Club. A rigorous thematic analysis is not conducted in analysing the reflections, instead, a holistic overview of the 'take-home' messages I would give to another practitioner in my position might find useful.

This research project received favourable ethical opinions from the institutions involved (FEPS 21-22 010 EGA) and research is carried out following institutional ethics codes of practice (UoS, 2017; UoC, 2018), based on the recommendations of the British Educational Research Association (BERA, 2018).

### **Establishing the Journal Club**

#### *Recruiting members to the Journal Club*

A questionnaire was sent out to all students enrolled on the Engineering and Physical Science foundation year, where they were invited by email to answer some questions about academic skills (cf. (Baker, 2025)), as well as the option to express their interest in joining the Journal Club, noting that in this research project, I would only be able to take 10 members. In total, 68 students responded (52% response rate) to the questionnaire and of these, 14 students indicated they would like to join the Journal Club. I then randomly selected 10 of these students to join the Journal Club to maintain a suitable membership size.

#### *The structure of the Journal Club meetings*

A familiar teaching room, centrally located on the university campus, timetabled after regular teaching sessions was selected to ensure all members had reasonable accessibility to the Journal Club meetings. Three sessions were timetabled (approximately 3 weeks apart) during the first semester of teaching, a balance between the logistical challenges of timetabling extracurricular activities within a busy timetable whilst trying to maintain a suitable frequency of meetings. A basic offering of refreshments: tea, coffee and biscuits within a roundhouse furniture layout was conducive to some additional sociability. It is worth noting that at this stage of the academic year, many students will still be unfamiliar with the majority of their course mates and unsurprisingly, sociability improved after subsequent Journal Club meetings. The structure of the Journal Club meetings was:

1. Meet at 3 pm, settle and get refreshments [5 minutes]
2. Initial presentation by 3 or 4 students about the article for discussion [5 minutes]
3. A general discussion about the article [20 minutes]
4. A focused guided discussion on the academic themes for the meeting [20 minutes]
5. Time for questions and introduction of the article for the next meeting [10 minutes]

#### *Selecting articles for discussion*

On reflection, this task was more complicated than anticipated. There were many articles which I considered based on being interesting for discussion, a representative sample of those considered include: (Einstein, 1905; Shannon, 1948; Watson and Crick, 1953; Gale and Shapley, 1962; Akerlof, 1970; Wakefield *et al.*, 1998; Ioannidis, 2005; Baker *et al.*, 2017; Awad *et al.*, 2018; Baker and Taylor, 2019; Zhong *et al.*, 2020; Elhacham *et al.*, 2020; Murphy *et al.*, 2022). The general considerations were:

1. *Controversial papers or topics*, the idea of course, that such papers may lend themselves naturally to discussion and debate.



2. *Recent scientific papers*, the idea being that these represent recent research which will likely have a narrower focus and incremental improvements on the current literature base.
3. *Historically and scientifically significant papers*, as these might spark interest as they often underpin the theories already studied by participants at this point. Such papers were ultimately disregarded as I felt they would not lend themselves to discussions since they are now firmly situated in the literature base.
4. *Papers from disciplines which are notably different from the physical sciences* which would expose participants to different research paradigms.
5. *Papers which I have written*, the idea is that it might open discussions about the writing process and nature of peer-review.

Across all the papers I considered, I focused on those that presented both familiar and unfamiliar topics, collected and analysed data (rather than mathematical proofs or theoretical considerations), and had limitations to the conclusions that could be discussed. Papers also needed to be appropriate for an academic theme focus (Table 1). Based on papers I had already read, rather than looking for new papers which meet these criteria, the three chosen for the Journal Club were:

1. 'The Moral Machine Experiment' by Awad et al. (2018).
2. 'Learning in double time: The effect of lecture video speed on immediate and delayed comprehension' by Murphy et al. (2022).
3. 'A simple and affordable experiment to determine Reynolds number' by Baker and Taylor (2019).

#### *The presentations*

The purpose of having the student presentations was two-fold, firstly, it allows students to develop their academic speaking skills with a small group of regular attendees. This was scaffolded through informal meetings with me to discuss the very broad scope of the paper they were going to present and to give some tips about how they might present it. All presentation groups took advantage of this and engaged in an informal meeting before their presentation. The presentation groups were selected by me, and presenters were informed before any meetings happened. The second reason for the presentations was that it gave any students who did not adequately prepare for the Journal Club meeting a chance to be familiar enough with the content so that they could still engage meaningfully in the subsequent discussions (Lachance, 2014).

#### *The academic themes*

Themes were primarily chosen to reflect the structure of report writing and writing with integrity. Each selected paper had an identifiable section for the academic theme focus of that session. Knowing where our students often struggle with academic writing, for example, the difference between an abstract and an introduction, and methods and methodology were specifically grouped to address these frequent misconceptions. For integrity skills, paraphrasing and referencing were the key skills to focus on since this is where students often make mistakes which lead to poor quality marks in report writing, or in more serious cases, accusations of academic misconduct. As such, this is a useful way to help develop specific skills tailored to membership of the club.

**Table 1.** The schedule and academic theme focus of each Journal Club meeting (Baker, 2025).

<b>Journal Club Meeting number</b>	<b>Presenters</b>	<b>Academic theme focus</b>
1. October	Members 1-4	Abstract, introduction, paraphrasing, referencing.
2. November	Members 5-7	Methods, methodology, results, referencing.
3. December	Members 8-10	Results and discussion, report structure, peer review.

## **Facilitating the Journal Club**

### *Club meeting 1*

#### Attendance and presentation

The meeting began swiftly after a regular teaching session several members had attended, 8 of the 10 members attended the Journal Club with two members informing me of absence due to illness. All Journal Club sessions were booked for two hours to give flexibility on the use of the teaching spaces, this was useful for this meeting as I took a few additional minutes to establish a decorum for the meetings – a reminder of the structure of meetings, a polite way to interject and build upon discussion and raise disagreements. The presenters performed well, and this was very likely the first time any of them had to present academically at university. They picked out some astute observations from the paper, including some of the main results (preferences for survivability) and the difficulty in defining morality. The presenters chose to discuss a section of the paper each in turn from notes made on a copy of the paper. This worked well and set the tone for a discussion, rather than a lecture-type presentation.

#### The general discussion on paper 1

It took a few contributions from myself as well as picking on specific people to share their thoughts to get discussions moving, but within 5 to 10 minutes and sharing an anecdote of getting young students (when I worked as a secondary school teacher) to try the online simulation/questionnaire this paper was reporting on as a class exercise, members quickly began politely interrupting one another to express their views or to build upon a particular point. One excellent example which I had not anticipated was a detailed discussion on the philosophy of taking no action, whether ‘just because we could programme morality, should we?’. This was further expanded on by several members about the use of personal characteristics (e.g. criminal records, ethnicity, etc.) and whether it would cause ‘racist algorithms’ and indeed, how such vehicles could access or detect such data. A third discussion point raised by another member was the cultural differences in preference for survivability domains displayed across the world. Finally, I pointed out that the group of authors represent a diverse group of academic voices hailing from several disciplines (Media and Communication, Evolutionary Biology, Psychology, Economics, Computing and Data Science) and that many will likely find themselves in such interdisciplinary groups to contribute to problems which span several subject domains.

#### Academic theme discussion (abstract, introduction, paraphrasing, referencing)

There were clear misconceptions of what an ‘introduction’ is meant to be, with students typically referring to it as a ‘summary of the paper’, but a discussion on what makes a good introduction proved useful and the article was a good model for how introductions help establish context and key knowledge and literature before the findings/discussions. For example, I drew attention to Page 60 where examples of laws which run, in line, ambiguously, and counter to public preferences on this subject matter. This also allowed for a transition to discuss the idea of the audience and as a group, we determined the intended audience of this article was likely policymakers and car manufacturers and the introduction is written as such. We discussed abstracts which the students appeared more confident with, likely because they would have read this first in the article (and of course, introductions being dismissed as the summary by this point). They shared ideas that it ‘draws readers’ in and gives a ‘summary of the work’. We discussed how referencing is used. The idea is that we, the reader, can go and find the reader being used to evidence or expand on something written in this paper.

### *Club meeting 2*

#### Attendance and presentation

Once again 8 of 10 members attended with two different students not attending due to reported illness. The presenters this time had individually read the paper and then took turns to give their overview building upon each other presenter’s contributions in turn. The presenters once again have

been able to ascertain important results from the paper. The first presenter mentioned they had looked up what 'metacognition' is and related it to some of the practices their schools had implemented before, although they did not know it by name at the time. They were quickly able to equate the context of this paper to watching lecture-captured content in their courses and reflected on whether they use different timings (Baker, 2021b). A quick round table suggests the group likes to use x1.25-x1.50 playback speed. They took away that a sensible strategy might be to attend the lecture and then nearer the examination time, re-watch at x2 speed. The second presenter pointed out that the control group, those who did not watch any videos, got 40% correct on the comprehension test. They suggested this may mean that the exclusion criteria based on previous knowledge may not be as useful since the control group performed relatively well. They also noted that some of the biggest results pointed out that the self-prediction of achievement vs. actual achievement was most different for those who studied at x2 suggesting the participants did not view it as a useful way to study. Finally, the presenter noted that 85% of the students watched content at greater than x1 speed, which our roundtable provides some ad hoc context for. The final presenter focused on the discussion, conclusions and limitations. They provided keen insights into how such study habits may be disadvantageous to students for whom English is an additional language. They noted it would have been an interesting result to measure the comprehension of this group based on these strategies. They also identified the limitations of the work to their context, such as the use of subtitles, course content and lecture length.

The general discussion on paper 2

The group were quick to agree that they failed to see how it might be immediately relevant to their subject disciplines, particularly, mentioning that complicated mathematical examples often need pausing and time to work through them. Another mentioned that this work may not have considered how students with learning disabilities might benefit or suffer from such a learning strategy. I was surprised that there was no mention of 'ethics' as the paper mentions 'UCLA ethics guidelines'. I pointed out that they were working with people and this required consideration of the ethics of the work. We discussed this in the context of the Journal Club. The Journal Club had to go through ethical approval and a participant information sheet was required to give the informed consent. Indeed, such discussion whilst extremely valuable and interesting to have, does indicate that participants are not always as informed as we like to think even when provided with relevant information. Coincidentally, I had withheld consent from a photography session at the university on the morning before this Journal Club meeting because the event could not explain how and where the photograph would be used, nor was there any time given to consider the requested consent form to sign. It shows how discussions might be swayed by the chairperson's views/biases and experiences. I drew out the discussion on what we mean by the word knowledge, particularly on the idea that the comprehension test was multiple choice and true/false questions, indicating, possibly, a surface-level knowledge that might be different if the subject matter was more complicated. Extending the mathematics example offered by one member, I asked if it would work well for the previous paper's subject matter, the moral machine one, whose questions and answers might not be so sharply defined. There was broad agreement that the nature of the social science/moral aspects is hard to answer with any certainty.

Academic theme discussion (methods, methodology, results, referencing.)

The academic focus of this session was on methods and methodology with some time dedicated to the results (notably, the use of statistics and data presentation). The methods were well articulated by the presenters and the rest of the group was able to pick out the key aspects of the methods, the participants, exclusion criteria, the characteristics of the videos used in the study, and the use of immediate and delayed testing to measure 'memory' and 'understanding'. The results were discussed, and I asked if they felt that bar charts were appropriate, broad consensus was that they were, but one noted that a scatter graph might have shown more for the variance. Another pointed out that the data statement provides a link to the data used in this work, so they could go and make their own graphs.

I capitalised on this observation to discuss open-access principles. One question asked by members was about the costs involved - I asked how much they think it costs to publish a paper in open-access (i.e. free to download and view for anyone). Guesses ranged from £200 to £5000 – I pointed to one journal I have published with which was USD 4000. This surprised many, particularly when they naturally asked, where does the money come from? I explained that research bodies/open-access grants are often underpinned by public money. We discussed the nature of the error bars (related to the plots they might encounter in their Excel, MATLAB and lab assignments this academic year). The use of p-values was new to the students, although some noted the use of 't-test' and mentioned 'normal distributions'. These are topics to be covered soon in the mathematics components of their course.

Overall, this paper presented a challenge for members, one I felt they overcame but their responses indicated that conceptionally this paper was more difficult to engage with. I noted with them this represented a different subject area to engineering and physical science. I also explained that this paper was something which was read by some groups at the university, particularly teaching-focused colleagues, and was met with both fanfare and scepticism. They seemed to be interested in this and enjoyed knowing that this was something their teachers had been reading. Members have also been very preoccupied with a significant piece of computing coursework, and I sensed this may have become a distraction, certainly in terms of attending the session. In anticipation of this, I had told students that the second hour (which I overbooked for these sessions), could be used for an ad hoc MATLAB workshop, which was well-utilised and may have helped maintain a relatively high attendance rate on this occasion.

### *Club meeting 3*

#### Attendance and presentation

This session was attended by 4 of the 10 members. Indeed, on the day of the meeting, several students reported illness whilst others did not signal their intention to miss the session. There was a coursework deadline at 4 pm on this day which could not be avoided, and if attendance in other teaching sessions with other lecturers was indicative, several of those who did not intend were likely also working to this deadline and thus deprioritising the Journal Club for another hour or so of coursework productivity. Those who did turn up were quite happy to continue, although I felt there was some general fatigue with the group (as noted by most of the staff at this time of the year) given this is the last week of teaching in the semester and students are naturally looking forward to going home for the Christmas break. This period will be the only official break the students have had by this point – if the staff are feeling it, the students will be doubly so. Two presenters (the third sent an illness message) who worked together to present, summarised the paper well. They noted the key measurements (time taken to collect 300 cm<sup>3</sup> of water) and a proceeding calculation to determine the Reynolds number of the system under study. I also mentioned to the members at the end of the last meeting (when introducing the next article) that this article should act as a scaffold or model for lab report writing in the next semester. Unsurprisingly, both speakers discussed its relevance in a 'lab reporting' context. They spoke about aspects such as the sectioning of the paper and the methodology. I had spoken to the presenters before the meeting (as I did with all presenters), and they had asked if there was anything extra to do since it was one of my papers. I explained that it might be useful to discuss the nature of peer review and/or share views on what it might mean to have a peer review process (since they have some aspects of this in another academic module of their course). Indeed, both speakers discussed this and one presented some examples of where the peer-review process has broken down, citing some examples of academic fraud (data manipulation) (Reich, 2009). There were some excellent observations regarding reproducibility. Whilst they had mentioned that the results were repeatable based on the histograms, they noted they couldn't comment on any reproducibility. They are quite right that only one experiment was performed, and accuracy was determined through comparison to existing data and calculation. Indeed, this led nicely to discussions

about the nature of sharing work through publication so others can try and reproduce the results and extend the experiment or findings further to new applications or other situations.

The general discussion on paper 3

Our general discussion was scaffolded by me more than I had anticipated. Perhaps because this paper was one of mine, or it was less thought-provoking than the other papers, or perhaps because the students were tired and along with less attendance (or some combination of these) it required much more effort on my part to encourage thoughts and opinions on this work. We went through each section and discussed the purpose of it and how it is structured. For example, we discussed 'purpose', 'methods', 'results', and 'outlook/conclusions' in an abstract. Students noticed referencing was different in this paper (using Vancouver style) - Harvard referencing was used for their coursework assignments this academic year. We discussed some of the pros/cons of each, notably in organising referencing. I asked what would happen if my first reference was in the methodology and then I wrote my introduction – they agreed tracking numeric would be tougher. This provided an opportunity to discuss reference management tools which none of the participants had heard of. I explained the general operations of the tools and that they are notably useful as documents grow in size; they have only had to deal with 4-5 references at this point in their studies, I pointed out my PhD thesis had 605 which provoked some interest in the use of these tools (Baker, 2017), and we discussed some of the tools they might use and try for their lab report in the following semester. Another student pointed out that there was no description of deburring the hole for the water to flow which could alter the stability of the flow. Whilst deburring had indeed taken place in the work, this was not explicitly mentioned and was a useful discussion on balancing the granularity of the methodology between a step-by-step recipe with the layering of details and taking a certain amount of 'assumed knowledge', though I agreed that not all readers may think about this. Similarly, one student pointed out that Figure 2 in the paper, which displayed water following from the bottle, has an incorrect perspective since the top of the cylinder (in black) would be in front of the water flow (blue). I agreed with this astute observation! I conceded that so long as the mistake does not impact the readability or integrity of the work, it should be ok!

Academic theme discussion (results and discussion, report structure, peer review)

We discussed the purposes of the 'acknowledgement' section 'any biographies/author images' as some journals require this (this was an example of one) and 'ORCID iDs'. The students had some ideas of the acknowledgement section as being 'to thank people who helped' and similar sentiments. I tried to help firm this idea up by asking about the difference between authorship and being mentioned in acknowledgements. To further strengthen the discussion about peer review, I shared the reviewer's comments I got for the article being discussed. Whilst such comments are often kept private within the peer review cycle (although there is increasingly the option for transparent peer review), it seemed like a good learning opportunity in this setting given it was one of my papers and lends credibility to it. They were surprised with some comments, particularly that one comment suggested a single word change in the title from 'measure' to 'determine'. I noted this seems insignificant but pointed out that it is very useful as we never measured the Reynolds number, we measured the time taken to measure the volume, which was used to calculate (or determine) the Reynolds number. I took the chance to offer a personal piece of advice in feedback cycles – 'assume the person is trying to help you, not undermine you' so you are more likely to improve your work. I likened this to their coursework and how one can become 'immune' to seeing mistakes when you have looked at the same things for a long time. I also suggested this can partially be mitigated by leaving time between drafting sessions of a piece of work. I also noted it is important who you get to give feedback on work, noting there are some colleagues I seek critical feedback from more than others. One of the students related this to the peer review of their coursework draft where some of their peers were more constructive and critical than others (Spencely, Baker and Harrison, 2023).

### **Sentiments expressed across these reflections**

The purpose of writing the reflective diary was to help articulate how the meetings themselves operated and to give some insights into the discussions that took place. In terms of facilitating the meetings themselves, two important themes repeat. The first is with *attendance and engagement*. As noted, the attendance was variable with illnesses and the current course workload contributing to attendance at each meeting. Similarly, engagement from members depended on the individual preparedness of the students and pressures such as the course workload. Indeed, how I scheduled the Journal Club tried to mitigate meetings around significant course deadlines, but the number of deadlines, in addition to the individual timelines members have set themselves to complete course work, made scheduling the Journal Club meetings away from all external course pressures difficult. The second theme is related to the *facilitation and guidance* the meetings required from the chairperson to keep discussions flowing and on topic. The reason I implemented the Journal Club with myself as its chairperson was that its membership would be composed of students new to the university and that they likely needed significant scaffolding to engage with the meetings. Of course, the downside to this is that it did require a significant time commitment to facilitate the meetings to select the articles, scaffold presentations, facilitate/initiate/mediate discussions, and select academic themes to focus on. In the context of providing the Journal Club to 10 students, it is not an immediately scalable intervention without modifying its implementation, along with any drawbacks it might bring.

Whilst a more formal evaluation of academic skill development (speaking, writing, integrity) and elements of socialisation to academia are discussed elsewhere (Baker, 2025), discussions and comments from Journal Club members recorded in the reflective diary provide some insights into *academic skill development* and *interdisciplinary insights*. Requiring a short (group) presentation and using the academic themes focus allowed direct experience and discussions around specific aspects of skill development. This was tailored to the common misconceptions our students exhibit throughout the academic year, providing the opportunity to address them in an authentic setting. Carefully selecting the articles for discussion exposed members to interdisciplinary topics which allowed them to demonstrate engagement in other fields such as psychology, ethics and social science. The drawback, of course, is that members found some of these articles conceptionally difficult given they were unfamiliar with the subject matter and how different research paradigms operate.

### **Concluding remarks**

When establishing a journal club, several decisions must be made to ensure that the club can operate logistically, as well as realise its aims. The membership size, the venue and the frequency of meetings need to be carefully considered as well as the structure and content of the meetings themselves. Reviewing the literature on journal clubs, a group of 10 members, meeting for an hour approximately once a month, in a regular teaching room was deemed suitable for a Foundation Year Engineering and Physical Science journal club. The content is also critical to the aims of the club. To help develop academic speaking, writing, and integrity skills and help socialise members to academia, the selection of articles, presentation opportunities, focused discussions on predetermined academic themes, and scaffolding members' participation were also important decisions to make. Selecting three articles which exposed members to different subject domains and epistemologies, scaffolding presentations in small groups (3's or 4's), and providing time to focus discussions on a specific academic theme were utilised to tailor the discussions to align with the aims of this journal club. Narrative reflections on running the Journal Club should help provide practitioners who are interested in establishing journal clubs some insights which often go unreported and note the challenges of additional workload in establishing and facilitating a journal club for a small number of students who require scaffolding to engage in the club.

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