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The Journal Club: Seeding scientific understanding at the Universidade Federal do Triângulo Mineiro, Brazil

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ABSTRACT

Traditionally, in many universities, student groups that promote critical and informative discussion are organized, aiming to debate themes from scientific articles and recent advances. Such groups are usually called *Journal Clubs*. Their aim is to provide the tools for both successful presentations and for comprehension/critical analysis of scientific publications, in order to use them in their own research and/or in the classrooms. The present communication details such a project involving engineering students from the Universidade Federal do Triângulo Mineiro (UFTM), located in south-east Brazil. The novelty in this case is two-fold: (1) the Engineering course at the UFTM has only recently been inaugurated and research activities are still tentative, and (2) reported examples of *Journal Clubs* are rare among engineering courses. This creates a gap between undergraduate studies and research activities, which we try to bridge here. Weekly, 1 h meetings were organized in which the participating students developed the skills necessary to understand and interpret scientific articles and present their findings. The principal result of the project was the enriching of the participants' training and confidence in discussing scientific data and in verbal communication of complex concepts. The project also taught the value of interaction between professionals during the discussion of scientific data. The project also helped to reduce the English language barrier and currently finds itself in its 4th year of activity.

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1. Introduction

1.1. Preamble

The present communication began with the idea that scientific knowledge is only really created and useful when it is shared, disseminated and understood. The seeds of the *Journal Club* are numerous, but the program began to take shape after the then MSc student (T.M. Florêncio) attended the *Summer School on Green Chemistry and Sustainable Energy*¹ hosted by the American Chemical Society (ACS) in 2012. The interchange joined students from different nations with different experiences in reading, discussing and sharing scientific information with their undergraduate study groups. The idea was brought to her MSc supervisor, who already had had similar experiences while attending his own undergraduate and postgraduate courses at the University of Wales, UK. It had already been noted that undergraduate students at their institution (Universidade Federal do Triângulo Mineiro—UFTM) had difficulties in both relating their undergraduate studies with research activities and critically analyzing the research articles provided by their supervisor. Bearing in mind the important role that research can have in the academic training of undergraduate students, the *Journal Club* was planned and executed, aiming to help provide undergraduate research students with scientific fluency and familiarity with journals and databases. Thus, the *Journal Club* “Seminars of Journals of Excellence in the Universidade Federal do Triângulo Mineiro—UFTM” was born.

1.2. The university

The *Universidade Federal do Triângulo Mineiro* (UFTM) was founded in 1953 as a medical faculty with the only course at the time being Medicine. It was not until 2005 that the medical faculty was awarded university status and by 2010 the number of courses had expanded to the current 25 on offer. Of these 25 courses, 7 are engineering courses, including Chemical Engineering. This rapid expansion creates a number of institutional and teaching challenges that are not unique to the UFTM. Not least amongst them is the duty to form individuals who are able to search for information and know how to apply it.

During the period of 2003–2012, there was an expansion in the Brazilian federal university system. This involved the founding of new universities and also the expansion of already existing higher education institutions. Special emphasis was given to regions where a higher education deficit existed, which in many cases meant the creation of new campuses in areas of the interior of the country. In this period there was an expansion of 31% in the number of places offered by the federal system and as a result 14 new universities were inaugurated and an 85% increase in existing institutions occurred. Simultaneously, there was a 183% increase in the number of scholarships for Masters, Doctorate and Post-Doctorate programs (CAPES, 2012).

Many of the contracted lecturers at the UFTM have a background in research, having completed their doctorates at established universities in different parts of the country, and would ideally like to continue their activities. However,

the initial research infrastructure was inadequate, creating an imbalance between teaching and research activities at all levels. It was felt that the students were being deprived of opportunities to extend understanding of their chosen career beyond the classroom—or even having the option to compare and contrast an academic career to an industrial one. Some students attempted to remediate this situation by developing undergraduate research projects with individual lecturers. In these cases, the students lacked basic skills required to search for information and subsequently understand it—frequently relying overmuch on the supervisor. In order to encourage the participation and discussion of scientific issues by students with different backgrounds there is a need to make them interact, with a common starting point—in this case, science itself.

For the students inserted in undergraduate research programs, the day-to-day contact with scientific articles is usual. However, there is frequently little attempt to search for articles in higher-impact English language journals. This is due to two factors:

- The language barrier, as most students have only a basic knowledge of the English language, which has long been recognized as a bottleneck for Brazilian science (Vasconcelos et al., 2008).
- Lack of familiarity with available databases.

1.3. Journal Clubs

Traditionally, in many departments of various universities and laboratories, a number of groups of critical and informative discussion are organized, with the aim of debating themes from scientific articles and recent advances in a given area. Such groups are usually called *Journal Clubs*.

During *Journal Club* meetings, the students involved are familiarized with an article, have time to study it and present and discuss it afterwards. The pre-selected articles might be numerous, recent and not related to each other or less numerous and included in the same topic. According to Barker (2002), the participation in *Journal Clubs* collaborates significantly in the construction of knowledge, not to mention that it demonstrates, indirectly, how informed, prepared and dedicated the participant is with their research. *Journal Clubs* have been observed to help develop the necessary skills to be able to review the literature and stay up to date with the state of the art in the field (Bakrania, 2010).

In the case of undergraduate research students the *Journal Club* promotes greater interaction not only between supervisor and the student, but also between students themselves. *Journal Clubs* also reinforce the scientific knowledge of the participants, enable training in the explanation of figures, tables and in the grounding of their own potential articles.

Thus, the *Journal Club* fulfills three functions: (1) updates the participant about the development of R&D inside their field in a critical manner; (2) promotes scientific communication from the student and (3) trains the participant in their self-confidence while presenting scientific work and clarifying possible doubts.

Studies suggest that the *Journal Club* is an effective learning tool. Bakrania (2010) discusses the integration of a *Journal Club* ideology embedded in a course entitled *Introduction to Nanotechnology* for undergraduate students and high-level graduates. According to Bakrania (2010), this approach for traditionally-based lecture courses offers a powerful alternative that focuses simultaneously on fundamentals and

¹ Held at the Colorado School of Mines in Golden, Colorado, June 25–July 2, 2012.

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