

## SCIENCE POPULARIZATION IN THE CLASSROOM: A STUDENT EXPERIENCE

*A divulgação científica na sala de aula:  
uma experiência discente*

**Leandro da Conceição Borges**

PhD in Knowledge Management and Organization.  
Federal University of Minas Gerais (UFMG), Faculty of  
Pharmacy, Belo Horizonte, Minas Gerais, Brazil. E-  
mail: [leandrocb@ufmg.br](mailto:leandrocb@ufmg.br)

OrcidID: <https://orcid.org/0000-0003-0222-3040>

**Felipe Emmanuel da Cruz Moura**

Undergraduate student in Librarianship. Federal  
University of Minas Gerais (UFMG), School of  
Information Science, Belo Horizonte, Minas Gerais,  
Brazil. E-mail: [felemma@ufmg.br](mailto:felemma@ufmg.br)

OrcidID: <https://orcid.org/0009-0000-2819-2321>

**Fernanda Madeira Diniz Couto**

Undergraduate student in Librarianship. Federal  
University of Minas Gerais (UFMG), School of  
Information Science, Belo Horizonte, Minas Gerais,  
Brazil. E-mail: [fernandamdc@ufmg.br](mailto:fernandamdc@ufmg.br)

OrcidID: <https://orcid.org/0009-0003-8999-4506>

**Ana Carolina de Almeida Borba**

Undergraduate student in Librarianship. Federal  
University of Minas Gerais (UFMG), School of  
Information Science, Belo Horizonte, Minas Gerais,  
Brazil. E-mail: [cacau30@ufmg.br](mailto:cacau30@ufmg.br)

OrcidID: <https://orcid.org/0009-0002-9414-1121>

### ABSTRACT

**Introduction:** This experience report describes a project developed by a Librarianship class, in which students created a newspaper titled *Biblio Notícias*, with the goal of presenting topics related to programming languages in an accessible and simplified manner. **Aim:** The main objective was to challenge students to craft concise and attention-grabbing headlines, taking into consideration the limitations and interests of a lay audience. **Methodology:** To achieve the desired outcomes, action research was adopted as the methodological approach. Students were presented with a real-world problem, fostering the articulation of theory and practice in the pursuit of new knowledge. **Results:** The *Biblio Notícias* project provided students with an opportunity to develop strategies for presenting and discussing topics from the Information Retrieval Systems course in a clear and engaging way. The initiative promoted collaboration among students, encouraging the planning, presentation, discussion, and execution of classroom activities. Overall, students engaged with the content in a strategic and positive manner. **Conclusion:** It is hoped that this initiative will inspire researchers and educators in the field to transform classroom activities into publishable materials, thus strengthening and enriching Librarianship education in Brazil.

**Keywords:** Scientific dissemination. Scientific communication. Librarianship teaching. Students.

### RESUMO

**Introdução:** Neste relato de experiência, uma turma de Biblioteconomia criou um jornal chamado *Biblio Notícias*, com a perspectiva de apresentar assuntos relacionados a linguagens de programação de forma simples. **Objetivo:** Buscou-se desafiar os alunos a criarem manchetes que chamassem a atenção e fossem concisas, considerando as limitações e os interesses do público leigo. **Metodologia:** Para se alcançar os resultados esperados, traçou-se como estratégia o uso da pesquisa-ação, uma vez que os alunos foram confrontados com uma problemática e, com isso, promoveu-se a articulação da teoria

com a prática para a produção de novos saberes. **Resultados:** O Biblio Notícias serviu como uma oportunidade para os alunos desenvolverem estratégias de apresentação e discussão do assunto abordado na disciplina de Sistemas de Recuperação da Informação de maneira simples e bem elaborada. A colaboração entre os alunos foi incentivada, promovendo o planejamento, a exposição, a discussão e a execução das atividades em sala de aula. No geral, os discentes abordaram o assunto de forma positiva e estratégica. **Conclusão:** Por fim, espera-se que a ideia proposta incentive pesquisadores da área a transformarem as atividades desenvolvidas em sala de aula em materiais publicáveis, fortalecendo e enriquecendo o ensino de Biblioteconomia no Brasil.

**Palavras-chave:** Divulgação científica. Comunicação científica. Ensino de Biblioteconomia. Discentes.

## 1 INTRODUCTION

Collaborative practice in teaching is a reality that occurs through what is known as *bidocencia*, or collaboration between two or more teachers (Buss; Giacomazzo, 2019, p. 4), through which "[...] the second teacher and the head teacher - work together, aiming for the same goal, the learning of the students", or through the appreciation that takes place between the students themselves. In short, the aim of this study is to describe an experience carried out at the Federal University of Minas Gerais, with the subject of Information Retrieval Systems (IRS), for students in the fourth period of their undergraduate degree in Librarianship. The classes were taught using a co-teaching approach, with which the students gained introductory theoretical and practical knowledge of programming languages.

In addition, as part of the teaching internship course in the Postgraduate Programme in Knowledge Management and Organization at the same institution, the aim was to challenge IRS students to create eye-catching headlines in order to stimulate their ability to synthesize, plan and carry out activities in an accessible, understandable and collaborative way, targeting the lay public. Based on this strategy, the students were presented with the proposal to create a scientific journal in which the main issues permeating the programming languages covered in the subject could be clearly presented.

Reflections on the Resource Description Framework (RDF) and SPARQL languages were then shown through sheets prepared by 21 students (the class consisted of 24 students in all). Three of these students compiled the notes and transmuted the ideas into headlines for a fictitious newspaper designed on the Canva platform. A seminar was presented in this vehicle with the headlines, in which the students were able to explain various points based on the perception of the other students.

The research in question is extremely important for strengthening Librarianship education, an area in which there is an emphasis on collaboration and the exchange of ideas. These notes can serve as inspiration for the creation and adaptation of new classroom experiences by other professionals, contributing to the strengthening of Librarianship education as a whole.

The text is organized as follows: the first section, called "Scientific communication", discusses the emergence of the concept in Athens, Greece, and its institutionalization in scientific journals. The second section presents the scope of science popularization, the central proposal of which is to reflect a brief theoretical framework on the benefits of this practice for lay people, i.e. people who have no mastery of a particular subject, but who wish to delve deeper into relevant topics. The "Methodology" section details the procedures used in the research, presenting a step-by-step description of how the methodological path was developed. The "Results" section presents the headlines produced by the students, accompanied by a discussion. Consequently, the "Final considerations" include the concluding remarks of the research and, finally, the references adopted in the study.

## 2 SCIENTIFIC COMMUNICATION

The practice of communication in science, according to Meadows (1999), was already recorded in Ancient Greece and was carried out orally and in writing. The thoughts of the natural philosophers took place on the outskirts of Athens, and the dissemination of their explanations for the phenomena of nature took place in isolation, that is, the development of their investigations took place informally and there were no institutional incentives (Le Coadic, 2004).

According to Mueller (2000), until the 14th century, the investigation of natural phenomena in Ancient Greece was led by philosophers, who based the methods of their studies on argumentation and deduction. According to Meadows (1999), during the medieval period, the transmission of knowledge was carried out by copyist monks, who reproduced and transferred information into books in monastic libraries.

Access to libraries was restricted to the general public and was only open to religious people (Morigi; Souto, 2005). As Mueller (2000) points out, in addition to books, letters were a support and a means of communication between natural philosophers and scientists, making it possible to share their discoveries. However, the dissemination of science underwent significant changes from the 15th century onwards, with the invention of the movable press by Gutenberg, which allowed large-scale reproduction of copies that had previously been made manually by copyists, making works exclusive to libraries more accessible (Borges, 2018).

As Burkett (1990) argues, in the 16th century, the first scientists began to meet in scientific societies to exchange information with their peers about new discoveries. According to Mueller (2000), these societies began their organizational process in the 17th century in Europe, initially with the aim of compiling letters sent by members who were travelling to other countries. The compilation of these letters gave rise to what is now known as a scientific journal (Mueller, 2000).

Periodicals, also known as journals, emerged in Europe in the 17th century, a period of substantial social and collective change. In 1660, the monarchy was strengthened and 20 years of civil war in England came to an end (Meadows, 1999). In 1662, the Royal Society of London was founded (Meadows, 1999). According to Burkett (1990), Henry Oldenburg, secretary of the Royal Society, is recognized as the inventor of scientific journalism in 1665, when he became one of the founders of the printed journal *Philosophical Transactions of the Royal Society of London*. According to Meadows (1999), this periodical came from the most important letters sent to the scientific society.

However, it is important to note that the *Philosophical Transactions* was not the first scientific journal to be created. According to Spinak and Packer (2015), the *Journal des Sçavans* was founded by Denis de Sallo on January 5, 1665, three months before the *Philosophical Transactions*, and is widely recognized as the first

scientific journal, whose main objective was to provide its readers with information about new works published on the European continent. It also offered summaries of its content, published obituaries and biographies of notorious people, discussed physical and chemical discoveries, observations on astronomy, machines and descriptions of animal anatomy, as well as publishing religious decisions and censorship decrees (Spinak; Packer, 2015).

The content of the Philosophical Transactions encompassed topics considered scientific, while the Journal dês Sçavans focused on literature reviews, news concerning books and people linked to the Republic of Letters, as well as discussions on Cartesian philosophy (Spinak; Packer, 2015). The Republic of Letters was an association made up mostly of individuals belonging to the French elite. Cartesian philosophy was the discipline that preceded mathematics and scholasticism. In general, journals had the initial aim of disseminating knowledge, which had previously been transmitted through letters, books and orally at meetings of academies and scientific communities (Meadows, 1999).

According to Meadows (1999), the practice of submitting manuscripts to a board of scientists for review and approval was common to both journals. The aim of this peer review process was to guarantee the credibility and validity of the work, providing legitimate recognition of the research, or even an endorsement of the scientificity of the subject matter.

Scientific journals were printed on paper and had a defined internal structure, including title, authorship, introduction, development, conclusions and references. The publications played a fundamental role as a source of information, since they expanded the frontiers of knowledge by disseminating scientific discoveries on a global scale. As well as scientific articles, the journals also published brief news items about scientific societies and academies. Today, the structural model of scientific journals remains in use, but the peer review process can vary in its implementation (Meadows, 1999).

In the 17th century, specialized publications in various areas of knowledge appeared, marking the beginning of scientific specialization (Stumpf, 1996). According to Bedin (1997), the growth in the dissemination of science in the 19th century made it possible to observe a positive bias based on progress, since the flow

of scientific discoveries occurred through less complex mechanisms, the consequences of which were more noticeable in daily life. In this context, the challenge for science was to convey confidence rather than fear, in order to be coherent and optimistic.

With the popularization of science in the 19th century, there was a growth in the production of scientific journals due to the increase in researchers, research and technical improvements in printing (Stumpf, 1996). Mattos and Dias (2010) point out that this led to problems such as delays in publishing articles, in this case due to the evaluation process, high costs and difficulties in acquiring and maintaining collections in libraries.

As noted by Kornalewski; Borges; Belinato (2017), the maintenance of collections was one of the components that drove the strengthening of the movement for open access to scientific information in the 20th century. These aspects help in the discussion of how the dissemination of information and knowledge takes place today. Oliveira (2025, p. 2) believes that, while it is easy to disseminate information today, there is also the risk and sharing of misinformation<sup>1</sup>, something which, unfortunately, "[...] is a reality in many areas and also in the field of scientific dissemination and communication".

Finally, on the modus operandi of current scientific communication, Meneses (2025) draws attention to the use of generative artificial intelligence in the process of doing science. In the author's view, the ethical process of using these resources in the practice of creating manuscript content worries the scientific community, as discussions are being raised about the importance of the integrity of the scientific process. Therefore, ethics, integrity and transparency are fundamental factors, as they emphasize the importance of training scientific reviewers and editors in technology and critical evaluation.

When presenting the process of scientific communication, another bias is identified: the dissociation between scientific knowledge and popular knowledge, contributing to the emergence of what we now know as science popularization, as will be discussed in section 3.

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<sup>1</sup> False information.



### 3 SCIENTIFIC DISSEMINATION

According to Rojo (2008), the origins of science popularization go back to encyclopedism, since it was through encyclopedias that the process of literacy in society began. Despite its elitist nature in its early days, the process in question experienced a gradual popularization, consequently reaching a wider audience.

Science popularization has played an important role in the United States since the 19th century, as pointed out by Lewenstein (1997). The main objective was to win over the general public, to educate the underprivileged classes and, at the same time, to inform and entertain. To this end, the most popular publications of the time were produced with the intention of disseminating scientific knowledge from different perspectives.

Popular interest in science increased significantly with the Industrial Revolution, resulting in a greater demand for education. In the 20th century, periodicals began to include scientific news, while the growth of university courses contributed to the training of journalists and media graduates. This movement significantly boosted the development of science popularization (Valerio; Pinheiro, 2008).

However, Bueno (2010) draws attention to a recurring conceptual confusion between the terms scientific communication and science popularization in Brazil. According to the author, scientific communication refers to the exchange of information between specialists in certain areas of knowledge. Science popularization, on the other hand, encompasses the transmission of scientific, technological or innovative information to the lay public.

Generally speaking, scientific communication aims to disseminate advances and theories among researchers, while science popularization aims to democratize access to knowledge and promote scientific literacy. Bueno (2010) highlights the importance of including citizens in debates on specialized topics, especially those with a direct impact on their lives.

While science popularization encourages debate between experts as part of the process of validating knowledge, science popularization aims to enable the lay public to understand the world around them and keep up with scientific advances.

Although both address the dissemination of science, technology and innovation, they differ in terms of the target audience, the language used, the channels used and the intentions of each (Bueno, 2010).

According to Albagli (1996), science popularization is also known as science popularization. Valerio and Pinheiro (2008) include the term scientific vulgarization in this scope. Caribé (2015, p. 92) explains that the term arose in France in the 19th century from the Latin word *vulgus*, which originally meant "common" or "popular", without any pejorative connotation. From the French adjective *vulgaire* came the terms *vulgarité* and *vulgariser*, which later acquired a negative meaning.

Caribé (2015) notes that the term "vulgarization of science" emerged as an alternative to "popular science". Authors such as Auguste Comte, François Arago and Camille Flammarion preferred the term "popular science" because they considered it to be more positive, accessible and useful. In addition, they emphasized its distinction from formal, abstract and mathematized science. The term "vulgarization of science" is not common in English-speaking countries, but is more present in Latin languages such as French, Spanish and Portuguese. An example of this is the term "dissemination" itself (Caribé, 2015).

It is therefore understood that science popularization consists of translating technical and specialized content into accessible language, with the aim of reaching the general public (Albagli, 1996). For this process to take place effectively, Valerio and Pinheiro (2008) highlight the importance of interaction between scientists and communicators.

Given that the public for science popularization is mostly made up of lay people, it is common for there to be a distorted perception of science. Many believe that scientific knowledge is produced by isolated geniuses, without understanding its collective and institutional nature. Bueno (2010) points out that this view is reinforced by formal education, which values the main names in science, but does not address the processes and structures involved in the production of knowledge. In addition to misrepresenting reality, romanticization makes it difficult to recognize the resources and efforts needed for scientific progress.

Science popularization, therefore, performs multiple functions, including education, by expanding scientific knowledge; civic engagement, by fostering an

informed public opinion, and mobilization, by encouraging society's participation in political and technological decisions (Albagli, 1996). The activities of this group are aimed at different audiences, such as students, policymakers and scientists, and are motivated by political, economic or social reasons.

In this context, Bueno (2010) points out that the use of technical terminology can be perceived as noise by the lay public, making it difficult to understand. In this way, science popularization requires the recoding of discourse, using resources such as metaphors, analogies and illustrations to make information more accessible.

With the advance of communication technologies, science popularization has undergone significant changes. The growth of specialized websites and increased access to information have broadened the reach of science and created ways of appropriating knowledge (Valerio; Pinheiro, 2008).

The popularization of science, therefore, is increasingly intertwined with digital media, reaching audiences outside the scientific community and, in some cases, even promoting a reorganization of the audience profile. In general terms, science popularization aims to inform ordinary citizens about discoveries and innovations, contributing to the democratization of knowledge and stimulating society's interest in science (Valerio; Pinheiro, 2008).

Farias (2022) complements this view by pointing out that science popularization involves hybrid discursive practices, combining elements of academic language with characteristics of journalism. There are thus two distinct levels: one more objective and neutral, typical of science, and the other more subjective, aimed at public communication.

Finally, Matos (2021) argues that science popularization is a communicative act that seeks to consolidate the democratization of knowledge and encompasses a range of vehicles, such as magazines, newspapers, scientific events and visits to science centers, among other initiatives.

It is therefore believed that the use of tools such as Canva can make it easier for the general public to get closer to scientific content. The next section details the methodological approach adopted in this research.

## 4 METHODOLOGY

Ludke and Cruz (2010) understand that an experience report is not necessarily an explanation of scientific research, even though it reproduces records of experiences. This study deals with an experience that took place in a fourth-year Librarianship class at the Federal University of Minas Gerais. The activities took place in May 2024. The aspects are close to the action-research method, as the students were able to influence the results of the proposal for the *Biblio Notícias* periodical.

For Thiollent (2011), action research proposes interventions through which the production of knowledge is interrelated. It is therefore recommended that there be a balance between practical and knowledge objectives. Practical objectives seek solutions, while knowledge objectives aim to identify representations and skills to clarify adversities and guide transformative actions. Therefore, it is inferred that it is possible to define instrumental objectives for solving problems, as well as educational objectives for raising awareness and producing relevant knowledge (Thiollent, 2011). In order to prepare the subject seminars, students were asked to work with collaborative tools, with the aim of enhancing the apprehension of knowledge and enabling the exchange of experiences between students.

Canva was the tool chosen to create the journal, as it is a graphic design application designed in 2012 and offers a wide range of features for both ordinary users and professionals. The software in question offers resources such as fonts, graphics, vectors and templates, as well as access to free photos. The platform also offers photo filters, a vast collection of images, icons and shapes, as well as hundreds of fonts and templates for social media and marketing, such as memes, geofilters, templates for Instagram stories, flyers and business cards. The designs can be downloaded in various formats, such as JPEG, PNG and PDF (Gehred, 2020).

Yundayani, Susilawati and Chairunnisa (2019) state that Canva is simple to use and also allows students to acquire experience through the process of meaningful learning, helping in the acquisition of knowledge. In this way, the tool

gives students the opportunity to participate in the creative process and therefore reproduce information through retrospective knowledge.

The IRS course has a basic bibliography, the purpose of which was to transform these texts into summaries and then into headlines for scientific dissemination. The texts in question deal with programming languages, a subject that may sound complex to the lay public.

The class was made up of 24 students in all, and the room had 35 computers, all with internet access, which were essential for creating the headlines. For the design of the headlines, a standard header template was drawn up that best approximated the simple to modern look of current websites, with a reddish rust color. In addition, there is a collapsed sidebar represented by three stripes, a search bar in the top right-hand corner and, just below, an image of the silhouette of a city. The title of the fictitious science journal was *Biblio Notícias*. Adjacent to these elements, other non-interactive components were developed exclusively for aesthetic and playful purposes.

The headlines that appear in this report were drawn up jointly by three students enrolled in the course, who are present in this report. Each group member was responsible for a section of the text. After reading, the most relevant parts were identified and used to construct the headlines.

All the elements used to standardize the headlines are available in Canva, where they can be manipulated and replaced without altering the others, such as the presentation or layout as a whole. This makes it easy to experiment with styles, illustrations for the designs and different types of fonts.

For the headlines, each of the members established the strategies for presenting the information from the texts in the basic bibliography, following a pattern with a title and a brief explanatory text. The design of the Biblio Notícias project was drawn up by the members of the group, with Librarianship students or anyone else interested in related subjects as the target audience. Within the fictitious periodical, different "notebooks" were developed, which referred to various subjects in the course. The notebook in question refers to IRS.

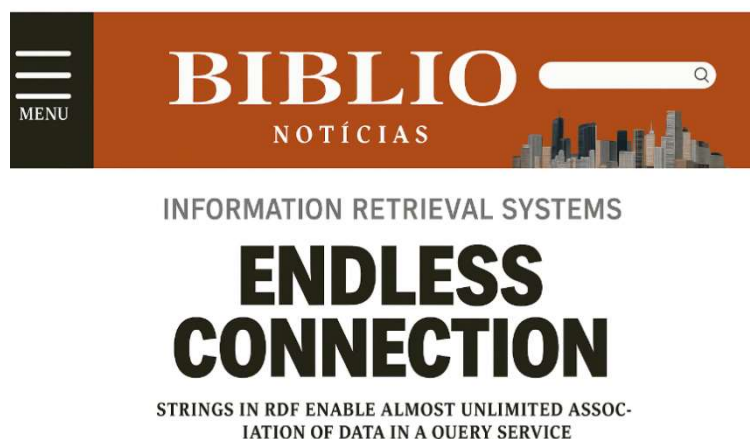
## 5 RESULTS

The first challenge faced by the group was to establish the criteria needed to characterize a headline. After the questioning stage, the tasks were distributed according to the skills known by each team member.

The activities were correlated by reading the text indicated in the basic bibliography, abstracting the main subjects, discussing the degree of importance of each topic within the text and the relevance of the topic within a possible headline. After defining the topics that would be presented as headlines, research was carried out on various news portals in order to understand and replicate the graphic structure often used by these communication channels. Finally, the knowledge gained from the text was combined with the graphic identity created, resulting in the headlines requested by the teacher during the exercise.

The first headline published on *Biblio Notícias* is shown in Image 1. This illustration corresponds to the text of the basic bibliography on programming languages. At the event in question, the seminar was discussing RDF and the SPARQL language. As can be seen, the headline using the term "endless connection" seeks to describe the languages to a lay audience in a "popular" way. It can therefore be said that this is an attraction mechanism that allows the established proposal to be understood, producing relevant information.

Image 1: *Biblio Notícias* headline



Source: prepared by the authors (2024).

It can be said that RDF plays a central role in the semantic web, since it enables the description and interconnection of resources made available on the web through a standardized structure. The SPARQL language, in turn, makes it possible to formulate queries that reflect the reality expressed in multiple data sources linked to RDF, thus consolidating the integration and interoperability between this information in the context of the semantic web, creating this "endless connection".

The basic premise of the seminar presented was as follows: "through the headlines, the students should demonstrate to their peers the fluidity with which they use the two languages". In short, the programming languages presented are used as introductory tools, since the aim of the SRI subject and also of the Librarianship course is not to train programmers, but rather librarians who understand and are aware of the existence of these languages in their work.

As shown in Image 2, the search process and the complex results are based on the SPARQL language. To this end, other content taught in the subject was consulted, as well as reading the fiches prepared by the other students. It should be noted that the class was divided into three groups which, based on the basic bibliography, prepared fiches that served as a starting point for the construction of the headlines.

Image 2: Headline in *Biblio Notícias* about complex searches and results



Source: prepared by the authors (2024).

Based on the notes made, a brief informative summary was drawn up on the main issues addressed, in order to condense the content and clarify any doubts. After completing the previous stage, a sentence was drafted which, in addition to summarizing the text, informed about its content in order to capture the reader's attention.

The information was then edited in Canva software so that it resembled the headlines of an electronic scientific journal as closely as possible. Considering the short time allotted to the creation and presentation of *Biblio Notícias* (two days), this did not compromise the presentation by the students, who demonstrated educational practices in a playful and assertive way, confirming that it is feasible to show topics that may sound complex to an audience that does not fully understand certain aspects.

Finally, it should be noted that all the students' questions from reading the content were duly answered by the teacher, if the team responsible for the seminar didn't know the answer. These cases were minimal.

## 6 FINAL CONSIDERATIONS

The general purpose of this experience report was to demonstrate the feasibility of presenting issues that might seem complex or excessively technical to a lay audience. To this end, an activity was carried out to create a scientific journal called *Biblio Notícias*, whose purpose was to present, in a simplified way, topics concerning the programming languages covered in the IRS course. The activity was implemented in a Librarianship class.

The justification for the report was to present a positive experience in the Librarianship course, with the aim of encouraging more researchers in the field to address and transform the activities developed in the classroom into publishable materials, so that they can be reproduced by other researchers and, as a result, Librarianship education in Brazil can be strengthened and enriched.

Furthermore, even in the face of major attacks, budget cuts and other issues that impact public education, the Federal University of Minas Gerais is privileged to

offer its students computers in good condition and with internet access for their educational activities.

The students were given a challenge, since they needed to create and display the headlines in a timeframe that was considered short. They drew up a strategic plan for reading the headlines and promoting discussion in class with the other students. In short, the initial premise outlined by the research subjects consisted of creating simple, eye-catching and synthetic headlines.

However, it is important to note that in order to carry out the task, it was necessary to understand the limitations and interests of those who would potentially read the news, i.e. the reading public. Likewise, it was essential to obtain a basic knowledge of the subject in order to identify which parts were relevant to highlight in the headlines. Allusively, the three students who presented the seminar could be considered the "experts" while the others were considered the lay public, who brought the issues to be debated.

In general, there was a certain ease in presenting information in a condensed form, as well as in translating and interpreting content. Transposing and sharing information is an essential part of Librarianship, since many people nowadays don't have enough time to read a document in its entirety. In other words, the introduction of a topic for discussion requires a robust knowledge base. It is therefore essential to draw up simple propositions, using the playful method, in order to make it easier for readers to familiarize themselves with the topic.

Future prospects include the replicability of the method created by the students in other Librarianship courses in Brazil highlighted in this research and that different teachers and researchers can improve their teaching strategies in the classroom. The experience provided a different perspective on the complex universe of programming languages, showing how the learning process can be facilitated through technological, playful and allusive approaches.

In this way, *Biblio Notícias* became a temporary scientific journal that allowed students to develop their own strategies for approaching the subject in a simplified way for general discussion among peers. It is important to note that one of the fundamental pillars of the IRS course is to encourage collaboration between individuals (students). This procedure was carried out through drafting summaries,

planning, execution and discussion between the participants who conducted the seminar with the other students. In summary, the students demonstrated a positive, purposeful and strategic approach to the topic in question.

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