THE PERFORMANCE IMPACT OF THE BRAZILIAN INFORMATION SCIENCE JOURNALS ON FACEBOOK: AN ALTMETRIC STUDY*

A REPERCUSSÃO DE ARTIGOS DE PERIÓDICOS BRASILEIROS DE CIÊNCIA DA INFORMAÇÃO NO FACEBOOK: UM ESTUDO ALTMÉTRICO

LA REPERCUSIÓN DE ARTÍCULOS DE PERIÓDICOS BRASILEÑOS DE LA CIENCIA DE LA INFORMACIÓN EN FACEBOOK: UN ESTUDIO ALTMÉTRICO

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RESUMO: Reflete sobre as interações do Facebook enquanto elementos de atenção online e fonte de dados altmétricos, e dialoga as reflexões com uma análise empírica que considerou a repercussão de artigos de periódicos da Ciência da Informação indexados no Repertório da Produção Periódica Brasileira de Ciência da Informação (RPPBCI). A coleta de dados altmétricos foi realizada por meio da utilização de *Application Program Interface* do Facebook parametrizada pela URL principal e secundária de artigos de 31 periódicos. A repercussão dos artigos indica uma atenção online com 13.633 interações, sendo 8.840 de "curtidas", 2.992 de "compartilhamentos" e 1.801 de "comentários". A revista Perspectivas em Ciência da informação possui o maior destaque com 13,4% da atenção recebida e artigos recentes obtiveram pontuação mais elevada. Conclui-se que interações com conteúdo de artigos científicos no Facebook são ricas fontes de dados altmétricos e merecem maior atenção por parte de estudiosos desse campo, elas podem ser benéficas como uma métrica agregada porque fornece uma visão adicional sobre o desempenho científico dos artigos quando curtidos, compartilhados ou comentados.

PALAVRAS-CHAVE: Altmetria. Atenção Online. Facebook.

ABSTRACT: This article reflects on the Facebook's interactions as elements of online attention and altmetric data. The empirical analysis of the reflections considers the repercussion of Information Science journal articles, indexed in the Periodical Brazilian Information Science Production Repertory (RPPBCI). The collection of the altmetric data was performed through the Facebook Application Program Interface parameterized by the main and secondary URL of articles from 31 journals. The articles' repercussion indicates an online attention with 13.633 interactions, of which 8.840 are "likes", 2.992 are "shares" and 1.801 are "comments". The Perspectivas em Ciência da Informação Journal has the greatest visibility with 13.4% of the attention received and recent articles achieved high score. In conclusion, interactions with the content of scientific articles on Facebook are rich sources of altmetric data and deserve more attention from scholars in this field. They can be helpful as an aggregate metric for providing an additional view of the articles' scientific performance when liked, shared or commented.

KEYWORDS: Altmetrics. Online attention. Facebook.

RESUMEN: Refleja sobre las interaciones del Facebook mientra elementos de atención en línea y fuente de datos altmétricos, y dialoga las reflexiones con un análisis empírico que consideró la repercusión de artículos de periódicos de la Ciencia de la Información indexados en el Repertorio de la Producción Periódica Brasileña de Ciencia de la Información (RPPBCI). La recolección de datos altmétricos fue realizada por medio de la utilización de Application Program Interface del Facebook parametrizada por la URL principal y secundaria de artículos de 31 periódicos. La repercusión de los artículos indica una atención en línea con 13.633 interacciones, siendo 8.840 "me gusta", 2.992 veces se ha compartido y 1.801 comentarios. La revista Perspectivas em Ciência da Informação posee el mayor destaque con el 13,4% de la atención recibida y artículos recientes obtuvieron puntuación más elevada. Se concluye que las interaciones con contenido de artículos científicos en Facebook son ricas fuentes de datos altmétricos y merecen mayor atención por parte de estudiosos de ese campo, ellas pueden ser benéficas como una métrica agregada porque proporciona una visión adicional sobre el desempeño científico de los artículos cuando son curtidos, compartidos o comentados.

PALABRAS CLAVE: Altimetría. Atención en línea. Facebook.

1 INTRODUCTION

The assessment and evaluation of the impact of research results' publications are fundamental processes to the science and, also, to support the society advancement of knowledge. For a long time, these processes have been sustained by traditional metric studies in which performance evaluations are based on specific quantitative indicators. For example, scientific productivity, number of citations and impact factors. These indicators are the subject of many criticisms, mainly due to neglecting of the qualitative aspects of scientific performance.

The increase in the volume of scientific production is highlighted in the quantity of theses, dissertations, papers published in events, articles of periodicals and new magazines. This enhancement as well as the change movement in the frequency of periodical publications (BLATTMANN; SANTOS, 2014) demand a different approach. The approach should have faster processing and a clearer nomination of relevant articles.

The citations that journal articles receive are good indicators of impact. However, since citations tend to accumulate slowly, their function is retrospective. Thus, they are not suitable for the identification of subjects of "the moment", relevant to read and work with or most popular research themes. (PRIEM; GROTH; TARABORELLI, 2012; BOON; FOON, 2014).

Analyzes of the scientific work impact need to go beyond formal scientific discourse (SHEMA; BAR-ILAN; THELWALL, 2014). In order to reach an audience inside and outside the scientific community (ARAUJO, 2015a; VANTI; SANZ-CASADO, 2016). Thus, blogs and social media, such as Facebook and Twitter, perform an important role in the altmetric study and alternative metrics (GOUVEIA, 2013; BARROS, 2015).

The altmetric indicators can be generated by several social media sources with distinct purposes. Despite this, there is a preference of the scientific community to use Twitter in studies that analyze the social impact of social web researches (THELWALL et al., 2013; HAUSTEIN et al., 2014; HOLMBERG et al., 2014; WINTER, 2015; SCHNITZLER et al., 2016), leaving a gap for studies that reflect on this same impact on other social media. Especially when considering the contributions of these media and their usage particularities for scientific communication.

For this task of reflecting and deepening the knowledge about the field of alternative metrics, Gouveia (2016, p. 644) reinforces that we must consider them. However, we should not lose sight of "the particularities that each data source contains, and with its influences on the attention production and interaction of its agents".

Thus, this study aims to reflect on the interactions of Facebook as elements of online attention and source of altmetric data. It also approaches the reflections with an empirical

analysis, which considered 31 periodicals of Information Science. These articles are indexed in the Periodical Brazilian Information Science Production Repertory (RPPB CI): <http://www.labimetrics.inf.br/rppbci/>. The research is elaborated on the Laboratório de Estudos Métricos da Informação na Web (Lab.iMetrics): <http://dgp.cnpq.br/dgp/espelho grupo/5207019450670905> on the research line "Science 2.0 and the altmetric inputs".

2 FACEBOOK AS AN ALTMETRIC DATA SOURCE

The increasing number of users on social media websites and amount of time connected to these environments have made scholars reflect on the use of these media as a source and channel of information. In addition, they reflect on the need to include them as a scientific information filter (BARROS, 2015). With approximately 1.19 billion users (PINHEIRO et. al, 2015), Facebook is the world's largest social network and has the potential to be a great information filter.

Beyond an information filter, Facebook also can be used by scientific journals as a divulgation mechanism of its published articles and knowledge's popularization (SOUZA et al., 2015), as well as to retain and attract readers, authors and referees, what consistently, expands relationship network (COSTA et al., 2016).

For Allen (2016), the increase achievement of certain surveys on Facebook demonstrates the public interest and their engagement on the network. The author believes that measuring the achievement of the work on this social media allows the researchers to better understand their work repercussion.

In the conversational sphere, the interactions or actions of liking, sharing and commenting on Facebook are symbolic appropriations and may state different intentions. For Recuero (2014), "like" would be an action of: a) diffusion of the information, once the users make public to their social network the "liked" message; and b) support diffusion and agreement, functioning as a form of legitimation of the "liked" content.

Sharing has another role and the values associated to its main function seem to be to "give visibility to the conversation or the message, broadening its range". The act of "share" is "based on the [user's] perception of something as 'interesting' to their social network". It also legitimates and "values the information that was originally published" (RECUERO, 2014, p.120). The comments are perceived as more evident practices of the dialogue. They are not only an indication of participation, but they make an effective contribution to the conversation. Comments are a "more effective participation, demanding a greater effort and happening when the users have something to say about it" (RECUERO, 2014, p.120).

Therefore, it is considered the incremental increase of the users' commitment to the content that they interact with. Since the action of liking, to sharing, and finally to

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commenting. The first seems a smaller investment, a signage. The second has a greater involvement and the last one indicates a greater expression of engagement. For each one, it is possible to think about the online attention that the scientific information has acquired and the type of indicator that has been measured by the altmetric studies. The online attention is understood here as aspects of audience (range) and interactions that the content receives on social media (ARAUJO, 2015b).

For Ringelhan, Wollersheim and Welpe (2015) state that, because scientists and researchers are highly qualified individuals, when they "like" something, they give visibility and audience to relevant contents. This can be considered a valuable indicator of the impact of academic works.

The authors highlight the lack of research that analyzes Facebook interactions as a contemporary indicator of the social impact of scientific manuscripts. According to them, the altmetric literature has revealed a preference for analysis on Twitter. Unlike tweets and other sources for previously analyzed altmetric data, the act of "like" seems to be promising. This happens because it indicates a positive action for a content, transmitting it to the network (RINGELHAN; WOLLERSHEIM; WELPE, 2015). Which can be extended to the actions of share and comment.

"Sharing" can be considered a good information filter, acting as recommendation actions. "Comment", in turn, may be indicative of receptivity, expressing evaluations and debates around new published articles. Thus, "widely shared articles soon after their publication are those of great appeal to an area" (IAMARINO, 2013) and the most "commented" ones emphasize that the appeal has mobilized the discussion (BORNMANN, 2014).

Thus, the information actions expressed in likes, shares and comments on Facebook can help to measure the visibility of the real and daily interactions of these social media users with the scientific research.

3 MATERIALS AND METHOD

Exploratory research having as an empirical universe periodical articles indexed on the Periodical Brazilian Information Science Production Repertory (RPPBCI). In order to circumvent the absence of a common identification pattern, what is the situation of most journals in the CI area, such as Digital Object Indentifier (DOI), a collection of altmetric data from Facebook followed the guidelines of Araújo and others (2015) in using an *Application Program Interface* (API): < https://developers.facebook.com/tools/explorer/ >.

A great advantage of this type of query is that the URL search, parameterized via API, provides the total volume of interactions that this URL receive (ALLEN, 2016). This method differs from alternative metrics tracking services, such as Altmetric.com, which considers

Facebook's altmetric punctuation only on public pages and groups - disregarding individual likes and posts (ALTMETRIC, 2017) a parameterized URL search via API provides the total volume of all interactions that this URL receives (ALLEN, 2016).

The indexed journal metadata was collected using the OAI-PMH protocol *(Open Archives Initiative - Protocol for Metadata Harvesting).* OJS provides more than a URL for each article, where the most common structure being a URL for displaying the article's metadata and another page with an incorporated PDF reader. However, there are cases with more than two URLs, for example a bilingual journal.

The URLs are collected from the metadata *dc:identifier* and *dc:relation* in OAI-PMH. A query is made to the Facebook's API (version 2.9) at the time the software search result is displayed and is done on each of the collected URLs. We have identified that Facebook API differentiates results from URLs using the prefix http and https, and because of this feature, for each URL, we realized two API queries, one with each prefix. The system sums the results of all URLs and stores in the non-relational database *Elasticsearch*[1] the results obtained. The source codes used are avaible at https://github.com/trmurakami/rppbci and the Figure 1 exemplifies the result in JSON from API query at URL http://www.revistas.usp.br/incid/article/view/69327.

```
{
    "engagement": {
        "reaction_count": 100,
        "comment_count": 21,
        "share_count": 10,
        "comment_plugin_count": 0
    },
    "id": "http://www.revistas.usp.br/incid/article/view/69327"
}
```

Figure 1. Query Facebook API result by URL
Source: Research data (2016).

The queries were made in the first week of April 2016. They were parameterized by the main and secondary URL of all the articles of the 31 journals present in the RPPBCI, with their quantitative representation in terms of "likes", "shares" and "comments". The data is presented according to the quantitative volume by journals. Then, the articles with greater attention online are discussed.

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[1] *Elasticsearch* is an engine of search discovery service and distributed analysis, capable of resolving an increasing number of use cases. Avaible at: https://www.elastic.co/products/elasticsearch

4 RESULTS AND DISCUSSIONS

Data from 10,024 articles published by the 31 journals were analyzed, of which 18 (58.06%) presented altmetric data that together indicate 13,633 online interactions, totaling 8,840 "liked" (L), 2,992 "shares" (S) and 1,801 "comments" (C). Table 1 presents this distribution by the position (#) of the journals.

Table 1 –Distribution of journals by interaction on Facebook

#	Title of the Journal	L	%	S	%	C	%	Total	%
1	Perspect. Ci. Inf.	1152	13,0	422	14,1	255	14,2	**1829**	13,4
2	Rev. Bras. Bibliotec. Doc.	803	9,1	208	7,0	210	11,7	**1221**	9,0
3	Encontros Bibli	767	8,7	281	9,4	134	7,4	**1182**	8,7
4	Rev. Ib. Americ. Ci. Inf.	805	9,1	167	5,6	107	5,9	**1079**	7,9
5	Biblionline	719	8,1	144	4,8	167	9,3	**1030**	7,6
6	RECIIS	562	6,4	350	11,7	80	4,4	**992**	7,3
7	Revista ACB	504	5,7	232	7,8	138	7,7	**874**	6,4
8	Inf. & Soc.: Estudos	395	4,5	214	7,2	76	4,2	**685**	5,0
9	Inf. & Inf.	336	3,8	177	5,9	77	4,3	**590**	4,3
10	Perspect. Gest. Conhec.	212	2,4	105	3,5	76	4,2	**393**	2,9
11	PontodeAcesso	199	2,3	142	4,7	50	2,8	**391**	2,9
12	Biblos	225	2,5	67	2,2	80	4,4	**372**	2,7
13	Ci. Inf. Rev.	271	3,1	50	1,7	51	2,8	**372**	2,7
14	Rev. Ci. Inf.	222	2,5	87	2,9	27	1,5	**336**	2,5
15	Rev. Bras. Educ. Ci. Inf.	223	2,5	42	1,4	35	1,9	**300**	2,2
16	Liinc em Rev.	213	2,4	35	1,2	40	2,2	**288**	2,1
17	Rev. Dig. Bibliotec. Ci. Inf.	177	2,0	40	1,3	57	3,2	**274**	2,0
18	Transinformacao	212	2,4	16	0,5	45	2,5	**273**	2,0
19	InCID	188	2,1	40	1,3	35	1,9	**263**	1,9
20	Tend. Pesq. Bras. Ci. Inf.	178	2,0	59	2,0	4	0,2	**241**	1,8
21	Inf. & Tecn.: ITEC	161	1,8	55	1,8	17	0,9	**233**	1,7
22	Folha de Rosto	150	1,7	10	0,3	20	1,1	**180**	1,3
23	AtoZ: Nov. Prat. Inf. Conhec.	77	0,9	13	0,4	4	0,2	**94**	0,7
24	Braz. Journ. Inf. Sci.	33	0,4	4	0,1	13	0,7	**50**	0,4
25	Informacao@Profissoes	29	0,3	6	0,2	1	0,1	**36**	0,3
26	Pesq. Bras. Ci. Inf. Bibliotec.	17	0,2	8	0,3	2	0,1	**27**	0,2
27	Cad. Inf. Jur.	8	0,1	12	0,4	0	0,0	**20**	0,1
28	EmQuestao	2	0,0	4	0,1	0	0,0	**6**	0,0
29	Bibliot. Univ.: pesq. exp. e persp.	0	0,0	2	0,1	0	0,0	**2**	0,0
30	Biblioteca Escolar em Revista	0	0,0	0	0,0	0	0,0	**0**	0,0
31	IRIS	0	0,0	0	0,0	0	0,0	**0**	0,0
	Total:	**8840**	**100**	**2992**	**100**	**1801**	**100**	**13633**	**100**
	(%)	**64,8**	**-**	**21,9**	**-**	**13,2**	**-**		

Source: Research data (2016).

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Social media like Facebook allow more fluid and interactive communication of ideas and have the potential to increase the number of access and reading to scientific journals, in addition to enabling more interaction between authors who can post comments about what they have published and respond to readers (AMIR et al., 2014).

The magazine 'Perspect. Ci. Inf. ' reached the highest audience in online attention. With a total of 1,829 interaction data (13.4%) and the only one to maintain the highest values in the three types of interaction observed. The second magazine with the highest total value of interaction is the 'Rev. Bras. Bibliotec. Doc.' with 1221 (9.0%), followed by 'Encontros Bibli' with 1,182 (8.7%), 'Rev. Ib. Americ. Ci. Inf.' with 1,079 (7.9%) and 'Biblionline' with 1,030 (7.6%).

Overall, the performance of scientific journals seems not accompanying or still not to justify by the fact of them have or no an online presence keeping profiles in Facebook pages. The adhesion of Library and Information Science journals to social media has been shy in accordance with studies of Souza et al. (2015) and Costa et al. (2016) and based on the results of these, the 10 journals with the best ranking in Table 1, only RECIIS and Revista ACB have a Facebook page. What does us infer that altmetric data are generated by the authors of articles, their network and community reader that is interested in the subjects that articles treat.

Although in most cases the values of the "comments" are smaller than the "liked" and "shares", some magazines, even well punctuated in one of them, descend in the positioning in function of the others. The 'RECIIS', for example, it is the sixth of the general ranking, with 992 (7.3%) interactions, and presents the second largest value of sharing interactions.

The "like" actions represent the most evident type of interaction in the analyzed field, corresponding to 64.8% of the interactions. The second one is "share" with 21.9%. According to Recuero (2014, p. 211), "the purpose of using tools such as like and share is, precisely, to legitimize what is being said, agreeing or asserting" and is usually associated with a positive action relating to the content.

The act of "comment" is the less expressive, with 13.2% of the interactions. Because it demands greater commitment in the possible conversation, it is less frequent (RECUERO, 2014). So, it is equivalent to say that the possible discussions generated around the articles are relatively low.

While traditional scientific journals reputation measures, such as impact factor, are still (and will continue to be) widely used, it is impossible to ignore the role of social media such as Facebook as altmetric data source and its "social impact" online interaction with likes, comments and sharing that journals receive. Researchers like Karimkhani, Gamble and Dellavalle (2014) even say that in this new direction that seeks academic and social impact, authors who routinely evaluate the impact factors of the journal in order to determine which

to send their manuscripts can also consider the impact of social media of these journals.

In order to obtain an approximation of the analyzed universe, considering the volume of articles, a cut was made with the ten most expressive ones, that is, a ranking with the articles that obtained the highest altmetric indexes.

These journals are evidenced on Table 2, with their corresponding title, the authors, the journal title, the publication year and the number of likes (L), shares (S), comments (C) and the total sum of them.

Table 2 – Ten journals with the most online attention

Título	Autores	Periódico	Ano	L	S	C	Total
O bibliotecário na gestão de pessoas: um estudo baseado na gestão do banco de dados do jornal o povo	Pires Santos, F. E.; Silva, A. K. P. da; Ayres, M. T. L.	Biblionline	2014	145	2	38	**185**
A digitalização de documentos arquivísticos no contexto brasileiro	Schäfer, M. B.; Flores, D.	Tend. da Pesq. Bras. em Ci.Inf.	2013	146	1	34	**184**
A brief history of academic libraries automation in Brazil and some future perspectives	Viana, M.; Mazzardo, M.	Rev. Ib. Americ. Ci. Inf.	2015	125	29	24	**178**
Usuário, não! Interagente. Proposta de um novo termo para um novo tempo	Corrêa, E. C. D.	Encontros Bibli	2014	100	31	28	**159**
History of paper: evolutionary panorama of production techniques and the implications for its preservation	Fritoli, C. L.; Krüger, E. L.; Carvalho, S. K. de P.	Rev. Ib. Americ. Ci. Inf.	2016	93	18	46	**157**
Políticas de preservação digital para documentos arquivísticos	Santos, H. M. dos; Flores, D.	Perspect. Ci. Inf.	2015	114	15	22	**151**
Use of social network to support visually impaired people: A Facebook case study	Caran, G. M.; Santini, R. M.; Biolchini, J. C. de A.	Transinf.	2016	109	37	2	**148**
The role of archives of the federal institutions of higher education and the experience of the Central Archive of the University of Brasilia	Roncaglio, C.	Rev. Ib. Americ. Ci. Inf.	2015	104	9	24	**137**
Memórias em rede: as fotografias em ambientes virtuais	Morigi, V. J.; Massoni, L. F. H.	Liinc em Revista	2015	107	23	6	**136**
The evolution of the topic of Information literacy in Brazil: a bibliographic study from 2006 to 2013	Trein, J. M.; Vitorino, E. V.	Rev. Bras. Bibliotec. Doc.	2016	99	24	10	**133**

Source: Research data (2016).

As expected from altmetric indicators, more recent articles tend to get more online attention and, consequently, a higher score (ARAUJO, 2015a; BARROS, 2015). The articles presented in the table were published in the years of 2013 (1), 2014 (2), 2015 (4) and 2016 (3). The article 'O bibliotecário na gestão de pessoas: um estudo baseado na gestão do banco de dados do jornal o povo' by Pires Santos, Silva and Ayres (2014) is the one with the most online attention, with a total of 185 interactions.

As in the ranking of journals, the values of the interactions of "likes" surpass those of "sharing" and "comments". However, even the articles that are well punctuated in one type of interaction have descended in the rank positioning in function of others. The article 'A digitalização de documentos arquivísticos no contexto brasileiro' by Schäfer e Flores (2013), for example, is on the second place if we consider general interactions, but is the first in terms of 'likes', with 146. The article 'Use of social network to support visually impaired people: A Facebook case study' by Caran, Santini and Biolchini (2016), is on the seventh position in the total of interactions and it is the most widespread, with 37 shares. Finally, Fritoli, Krüger and Carvalho (2016), that even occupying the fifth overall position, it is the one that most engages users in conversations, with 46 comments.

5 CONCLUSIONS

Interactions with content of scientific articles on Facebook are rich sources of altmetric data and deserve more attention from scholars in this field. They can be beneficial as an aggregate metric because they provide additional insight into the scientific performance of articles when liked, shared or commented.

The study provides theoretical and methodological support for other searches interested in the potential of the online attention that scientific articles receive on Facebook. Especially the reflections on the specificities of this social media for scientific communication, and the practical gain in the of data collection method via API. This collection not only circumvents the DOI's absence problem, but also covers a wider spectrum of online attention as it considers the data from private conversations.

On this last question, it is worth remembering that Facebook's public interaction data represents a small part of the engagement that scientific research generates in this social media. Commonly provided on some platforms like Altmetric.com, these are just a fraction of Facebook's total involvement, not being a sufficient and reliable metric to understand the scope of engagement.

According to Allen (2016), real conversations happens on private interactions. Because individuals talk about what matters to them in these conversations, measuring them can provide a worthy indication of online promotion and attention that the surveys receive. For ethical research purposes, it is important to note that this API collection feature complies with Facebook's Privacy Terms of Service and does not disclose the identity of comment

providers, thereby preserving their privacy.

Only two of the total of analyzed journals did not present altmetric data when consulted by both the main and secondary URLs, they are: 'Biblioteca Escolar em Revista' e 'IRIS - Revista de Informação, Memória e Tecnologia'.

In order to continue the research and better understand the data and what they represent, they will be analyzed as a group. This aims to check for any behavioral pattern on general and specific interaction values and whether a thematic categorization can state more or less degree of online attention to articles on Facebook.

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