DIGITAL JOURNALISM: multifaceted research in the development of didactics and production processes

JORNALISMO DIGITAL: Pesquisa multifacetada no desenvolvimento de didáticas e processos de produção

PERIODISMO DIGITAL: Investigación polifacética en el desarrollo de didácticas y procesos productivos

Zanei Ramos Barcellos
PhD in Urban Management, Master in Administration, Bachelor in Social Communication - Journalism. Assistant Professor of Digital Journalism and researcher at the School of Journalism of the Faculty of Communication, University of Brasilia (FAC/UnB). E-mail: zaneibarcellos@unb.br;

0000-0001-8619-6056

Mail: Universidade Federal do Tocantins, Quadra 109 Norte Avenida NS 15, Plano Diretor Norte, 77001090 - Palmas, TO – Brasil.

ABSTRACT:
The internet is the main source of news for Brazilians, the smartphone is the preferred device to reach them and social media have overtaken television as the hegemonic journalistic medium. Fragmented journalism in cyberspace demands new narratives, new media formats, production and distribution processes. Algorithms and artificial intelligence (AI) systems already perform many tasks, the profession reshapes itself and the teaching of digital journalism needs to keep up with the transformations. This article proposes multifaceted applied research as a way to develop narratives, apparatuses, production management systems and didactics capable of keeping up with technological evolutions and train journalists capable of researching and working in mutant environments.

KEYWORDS: digital journalism; applied research; multiplatform; artificial intelligence.

Foreword

The Digital News Report 2020 (REUTERS INSTITUTE FOR THE STUDY OF JOURNALISM, 2020) showed that 87% of Brazilians have the internet as their main source of information and that social media (67%) have overtaken television (66%) as the preferred means of accessing news.

The same survey showed the smartphone steady (76%) as the favourite device to access digitalized news, while the notebook (43%) continued in decline and the tablet (10%) remained constant. This significant data for journalism becomes even more relevant when considering the circulation of 234 million mobile phone chips in the country in July 2020, according to the 31st Annual Survey on the Use of IT in Companies (FGV-EAESP, 2020).

In the same effort to relate the consumption of journalism to communicational technologies, the TIC Domiciles 2019 survey (CETIC.BR, 2020) showed the preference of 98% of Brazilians connected by smartphone to access the internet, and that among the

main motivations are using social networks (65%) and searching for information (68%), activities that may include the consumption of news. The same Cetic survey also revealed that 56% of respondents read newspapers and magazines online, while the Digital 2020 April Global Statshotl (WE ARE SOCIAL, 2020) found that 76% of internet users in the 17 countries surveyed, including Brazil, began using their smartphones more to access the web due to the pandemic.

Meanwhile, app usage by mobiles has grown exponentially in recent years. The Global Benchmarks Report (ADJUST GLOBAL APP TRENDS, 2019) placed Brazil as the second country where app usage increased the most (9.39%) in 2018, a year in which news and social media app usage on the planet grew by 2.11 and 2.29% respectively.

This organisational environment leads news outlets and communication conglomerates to develop their own mobile enterprise application software (apps) aimed primarily at facilitating access to news, triggering alerts, reinforcing brands, and building reader loyalty. The adaptation of news apps to the needs of the receiver differentiates communication companies among themselves and may lead to a preference for one or another in a market of intense competition.

The insertion of emerging technologies in the various processes of journalistic production and dissemination is uninterrupted and intrinsic to the activity. One of the most relevant technological aspects for journalism today is the search for mastery and application of algorithms and artificial intelligence (AI) in its activities. Even journals without large sums to develop or buy AI systems and algorithms can avail themselves of the communicational flows generated by the algorithms and AI systems inherent to the web to autonomously forward to the receiver the news expected by him, at the ideal time and in the appropriate format to the available device, a process called 'Journalism of Things' by Barcellos et al (2017). This process can go beyond the mere use of communication flows when optimised by algorithms developed by press media in harmony with their own organisational strategies.

However, the use of the flows generated by others' algorithms and AI and even the performance of the systems developed by the press media themselves on the web are subject to restrictions and conflicts in cyberspace. When any informational system enters the web, it can harmonize with some aspects of the dominant algorithms and AI systems, but also conflict with them, with the interests and goals of those who produced them. The dominant algorithms are hegemonically produced by large digital corporations, such as Google, Apple, Facebook and Amazon, which strategically do not fully disclose their functioning or intentions (PARISER, 2012; GALLOWAY, 2017). Some

of these large corporations restrict the flow of certain information on the network, appropriate journalistic content with production paid for by the press media and even make money through advertising charged on access to news. This makes the relationship between media outlets and the big players on the internet tense worldwide and the reason for regionalised confrontations. In several countries and economic blocks these conflicts of interests have generated specific norms and legislations to preserve citizenship and free competition. This scenario of conflict in cyberspace was foreseen by Gibson (1984) to a certain extent in his fictional work Neromancer.

Thus, the university needs to train researchers and journalists able to work in an uncertain and volatile environment due to the fast evolutions of communication technologies. In view of this, this article aims to describe a multifaceted applied research in progress that aims to develop didactics, narratives, production processes and computerized systems for digital journalism. The article begins with the interweaving of some theoretical references with aspects of digital journalism practice. The description of the activities of the newspaper connected to the theoretical framework comes next, while the digital newspaper Campus Multiplataforma is presented together with the configuration of its platforms and production processes. This digital journal is the object and the destination of the research in focus. In the sequence are listed researches related to the main, finished and in development, followed by some considerations about their results and future directions. The article ends with considerations on applied research focused on the production and teaching of digital journalism.

Theoretical-prudential reference

The action of press media, journalists and common actors on the internet can potentiate or minimize the reach of news according to the programming of algorithms and reach of artificial intelligence (AI) systems that permeate the web in general and specifically in socio-technical networks. The more they learn about how algorithms work, the more journalists can schedule publications at certain times and places in cyberspace and use other search engine optimization (SEO) techniques to boost news visibility and segment audiences. The algorithms and AI systems inherent in the network, therefore, assume roles as gatekeepers and segmenters of audiences by determining who and what news reaches them, and also the media, formats and times of delivery. The common actors, in turn, when commenting and sharing the news also

play the role of gatekeepers, or gatewatchers, as Bruns (2009) typifies. When they act in this way, ordinary actors transmidiatize the news in the position of prosumers (TOFFLER, 1980), even awarding them new meanings (BARCELLOS ET AL, 2017; BRUNS, 2009; CASTELLS, 1999; DIAKOUPOULUS, 2019a; DIAKOUPOULUS, 2019b; HANSEN ET AL, 2017; JENKINS, GREEN, FORD, 2014; JENKINS, 2008).

The unfreezing of reception presupposes a complexification in the production of news. The old physical newsrooms, which centralised the processing of news, are heading for the virtualisation of work spread out in cyberspace. In this reality, the journalist loses some functions to automation and gains new ones related to programming and technologies. Other professions enter the newsrooms and gain the status of journalists. News is now processed differently in each communication conglomerate. The need for concurrent multimedia production destined for various platforms demands fast and complex, yet flexible and impermanent production and distribution processes. These processes occur more efficiently in convergent newsrooms (JENKINS, 2008), automated and virtualized. Barcellos, Gonzatto and Bozza (2014) conceive virtual newsroom as:

> A place in cyberspace where journalists work in a sufficient and synergistic way without the need of a shared physical space. So, paradoxically, it can be said that journalistic production happens in a dispersed way, without gathering professionals in the same physical space, but centralized and/or coordinated, most of the times concurrently, in a cyberspace, "place" that also becomes the production destination environment, where it is processed and from where it is distributed for consumption[1]. (BARCELLOS, GONZATTO, BOZZA, 2014, P. 85 - in author's translation)

The diffusion of the smartphone and the culture of mobility also implied new business models for journalism. The intelligent mobile phone started to instrumentalize several facets of convergent and multiplatform journalism (WESTLUND, 2013) until vanquishing the protagonism in the distribution of news. The smartphone as the main form of access to the news also means new forms of interaction between the receiver and the information. The screen scrolling and the computer click were replaced by the touch screen and the news became ubiquitous.

> We have crossed a psychological barrier.... On desktop and tablet, one can stay in a facsimile comfort zone where the fundamental experience is surprisingly similar to reading a newspaper. But the

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[1] Local do ciberespaço onde os jornalistas trabalham de forma suficiente e sinérgica sem necessitar de espaço físico compartilhado. Assim, paradoxalmente, pode-se dizer que a produção jornalística se dá de forma dispersa, sem reunir os profissionais no mesmo espaço físico, mas centralizada e/ou coordenada, no mais das vezes concomitante, em um "lugar" do ciberespaço que se torna também ambiente de destino da produção, onde é processada e de onde é distribuída para o consumo.

desktop is dropping like a stone. Now it's the turn of smartphones. Everything must work on the smartphone. (KUENG, 2017, p. 27).

As a result, research on the effects of social media, smartphone and AI on the practice of journalism has spread rapidly in recent years and found, among other things, more interaction between journalists and audiences (HOLTON, LEWIS and CODDINGTON, 2016); the de-ritualisation of consumption and the fragmentation of news (LIVINGSTON, 2004); the association between traditional and digital platforms, the emergence of nato-digital journals (BIVENS, 2008); the use of algorithms and artificial intelligence in news production and distribution (BUCHER, 2012; LATZER ET AL, 2016; DIAKOPOULOS, 2019a; DIAKOPOULOS, 2019b); the emergence of new production routines and newsroom configurations (ROBINSON, 2011); emerging values for news selection and ethical reflections on the profession (DEUZE and WITSCHGE, 2018; DEUZE and YESHUA, 2001; MICROSOFT, 2018).

The macro object and the organic nature of the research

The macro object of this research is the Campus Multiplataforma lab journal. It is also where the results are first applied. The Campus Multiplataforma was created in March 2017 in the Campus Multimidia subject, a mandatory curricular course in the Journalism course at the Communication School of the University of Brasilia (FAC/UnB). The average of students enrolled every semester is 25 and the workload adds up to 12 hours per week. This macro applied research started together with the newspaper and continues indefinitely. The digital newspaper includes seven platforms: an in-house developed web app, AppCampus; a website, also in-house developed; a news distribution group on WhatsApp, a Facebook page, an Instagram profile, a Twitter profile and a YouTube channel. All Campus platforms narrate facts for the UnB community, a public institution of higher education founded in 1962, with four campuses in the Federal District and around 57,000 students, teachers, and employees - one of the largest in Brazil.

The research related to the Campus permeates the discipline and intersects with other research conducted by teachers and students (course completion papers, scientific initiation and research groups) at the Faculty of Communication and other units of the UnB.

The editorial line of Campus Multiplataforma is based on Traquina's (2003, 2005) civic journalism and Castells' (2012) precepts. Thus, the newspaper positions itself next to the citizen and intends to be a virtual environment of democratic deliberation.

The management is also participatory as a way of inclusion, to minimize the possibilities of individual errors, to foster creativity, to provide synergistic processes of collective intelligence and to establish permanent internal discussions to foster learning (BARBOSA, MOURA, 2013; FREIRE, 1974, 1985, 1993; LEVY, 1999). The performance of students as researchers and creators follows the Research-Creation methodology, which does not separate the researcher from the object and values the experimentation of new elements, among which the media narratives (CHAPMAN and SAWCHUK, 2012).

The Campus has developed an organisational structure in which the functions of all its members have been defined (Figure 1). The organizational chart varies according to the definition of each group. A horizontal organizational format was sought, with few hierarchical steps and no isolated chiefs. An Editorial Board takes collective command of production every six months rather than assigning it to a single editor-in-chief. The project mediator (and teacher) was included in the Editorial Board at the same hierarchical level as the others, with as little interference in the process as possible, but at the disposal of the students to stimulate discussions about ethics or editorial approach. The structure with reporters not tied to any editorial department favours the coverage of the same news simultaneously for various platforms and in the appropriate media.

Likewise, the structure facilitates the formatting of news in different multimedia narratives, media convergence and the transmediatization of news. On Campus, the pure narratives that characterised traditional media are hybridised and published in different formats and digital medium, from where they can link to each other. They thus form a permissive narrative web to the interference of prosumers, receivers now with the gift of transmedia, who actively interfere in the production and transmission of news (CASTELLS, 1999; JERKINS, 2008; JERKINS, GREEN and FORD, 2014; SCOLARI, 2011; TOFFLER, 1980). Another aspect of convergence present in the Campus is the production of news for preferential reception by smartphone. This editorial decision assumed the mobile as a convergent device. On the smartphone the AppCampus aggregates all the news and works as an entry environment to the seven platforms, accessible with just one touch.

Figure 1 Campus Multiplataforma Organisational Structure.
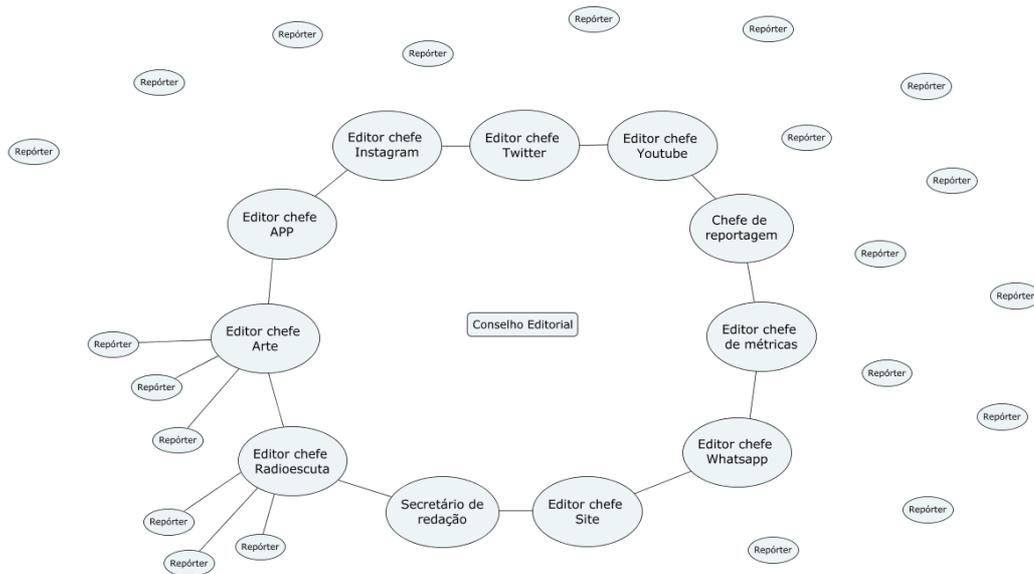
Source: Copy of Barcellos e Silva (2020, p. 8)

The adopted didactical procedure encourages all activities inherent to the production and distribution of Campus news to be carried out with the smartphone. Conducting interviews; producing and editing videos, photos, audios and texts; internal and external communication; sending and receiving files; online postings and interactivity. As these processes take place in a virtual newsroom regime, the smartphone also takes the lead.

The virtual newsroom adopted by Campus Multiplataforma is characterized as convergent because in this environment news is produced for different platforms. Campus, in turn, is characterised as multiplatform because, according to Salaverría (2005), multiplatform journalism strategically involves the performance of several media articulately to carry out news coverage.

The option for smartphone-based news production and diffusion was taken by the founding group of the Campus Multiplataforma during the realization of Freirean dynamics and active methodologies (FREIRE, 1974, 1985, 1993; BARBOSA and MOURA, 2013). The decision coincided with the adoption of the slogan "smartphone first" by The New York Times, which marked the newspaper's priority for mobile as a news distribution platform.

The brief discussion concerning the didactics, production and distribution approaches adopted in relation to the practice of the Campus Multiplataforma digital newspaper somewhat reflects the permanent organic process of applied macro research, its theoretical foundations, practical aspects, application of findings, formulation of didactics, research feedback and cross-fertilization. The thoughts

expressed are expanded below with the description of dynamics and results of sub-research.

Aggregated researches

The various applied researches aggregated to the main one are well outlined and independent, with their own methodologies and schedules, but they cross, interpenetrate, complement and feed off each other. They are tested in practice and applied in the didactic and laboratorial activities of the Multimedia Campus. The results are periodically presented and published in events, examination committees, books and magazines.

The procedures described follow Trujillo Ferrari's (1982) precepts, for whom applied scientific research goes beyond its practical purpose and "may theoretically contribute towards the planning of new research or even towards the theoretical understanding of certain sectors of knowledge with new facts"[2] (p. 171 – In author's translation). The use of different methodologies is in agreement with other researchers who concur that applied research can make use of different methodological procedures and simultaneously serve multiple interest groups (FLEURY and WERLANG, 2017).

Table 1 summarises some of the aggregated research in development, under implementation or already closed with results in application. Only research in progress and under implementation are commented on in this chapter since the others have already been disclosed in other publications.

Table 1 Applied research correlated to the Campus Multiplataforma macro-research.

Breakdown of research and stage of development	Brief description and theoretical support	Main methodological procedures
Development of didactics for the instruction and practice of Digital Journalism - Developed. Outcomes in application	Freirian didactic and based on active, open and flexible methodologies capable of quickly assimilating technological developments and glimpse their applications to journalism (FREIRE, 1974, 1985, 1993; BARBOSA and MOURA, 2013)	Research-Creation Modality that does not separate researcher from object, values the experimentation of new elements, including media narratives. (CHAPMAN and SAWCHUK, 2012)
Creation of a multiplatform press	A news medium distributed on several digital platforms dedicated to	Research-Creation

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[2] (…) pode contribuir teoricamente com novos fatos para o planejamento de novas pesquisas ou mesmo para a compreensão teórica de certos setores do conhecimento.

media tool - Developped. Outcomes in application	publishing differentiated news appropriate to the peculiarities of each one (social-technical networks, messaging and journalistic apps and websites) (SALAVERRÍA, 2005)	(CHAPMAN and SAWCHUK, 2012)
Development of journalistic narratives - Developed. Results in application being constantly updated	Creation of own narratives for different socio-technical networks, websites, messaging and journalistic apps, considering the peculiarities of each one and also of their differentiated publishing spaces.	Research-Creation (CHAPMAN and SAWCHUK, 2012)
Production of journalism for and by smartphone - Developed. Results in application	Use of the smartphone as a journalistic platform and for the appropriate formatting of news for mobile delivery. Work of journalistic production and distribution of news via smartphone	Research-Creation (CHAPMAN and SAWCHUK, 2012)
Implementation of a Virtual Newsroom - Developed. Results in application	Performing all journalistic tasks remotely (planning, data gathering and interviews, internal communication, internal content traffic, publication and interaction with receivers) (BARCELLOS, GONZATTO and BOZZA, 2014)	Research-Creation (CHAPMAN and SAWCHUK, 2012)
Development of production process networked (workflow) - Developed. Results in application	Mapping and designing the flowchart of the whole decision-making, content production and news distribution process of the Campus Multiplataforma (AALST and HEE, 2000).	Case study (GEORGE and BENNETT, 2005; STAKE, 2005), participant observation (MALINOWSKI,1978), semi-structured interviews and bibliographic research (MARCONI and LAKATOS,1996),
Harnessing the communicational flows of algorithms and AI inherent to the web - Partially developed, results in application, and part of that in progress.	Unravel the workings of the algorithms and AI processes of socio-technical networks and search engines and use the knowledge gained to buoy editorial decisions, create narratives and for news distribution. (BUCHER, 2012; LATZER ET AL, 2016; DIAKOPOULOS, 2019a; DIAKOPOULOS, 2019b; PARISER, 2012)	Participant observation and statistical data collection (MALINOWSKI,1978)
Development of an aggregator app - Partially developed,	Development and implementation of an app as one of the platforms of the Campus and as an aggregator of the contents of the other platforms (LINS,	Structured and semi-structured interviews (MARCONI and LAKATOS,1996). Participant

results in application, and part of that in progress.	2016; WESTLUND, 2013)	observation (MALINOWSKI,1978).
Development of a chatbot - Partially developed, and part of that in progress.	Chatbot that can be paired with AppCampus to answer readers in phases when the newspaper is out of production. (BRUNS, 2009)	Structured and semi-structured interviews (MARCONI and LAKATOS,1996). Participant observation (MALINOWSKI,1978).
Enhancing the use of AppCampus in harnessing the communicational flows generated by the algorithms and AI of socio-technical networks and search engines - Ongoing	Leveraging the connection between journalistic apps, algorithms, and AI systems inherent to the internet to optimise automated news distribution, buoy editorial decision-making and develop intelligent apps. (BUCHER, 2012; LATZER ET AL, 2016; DIAKOPOULOS, 2019a; DIAKOPOULOS, 2019b)	Creation research (CHAPMAN and SAWCHUK, 2012), participant observation and data survey (MALINOWSKI,1978)
Development of journalistic algorithms and AI systems linked to the Campus App - Under planning	Develop AppCampus-bound algorithms harmonious with the inherent AI algorithms and systems of the web to optimise news distribution and editorial decision-making. Produce news automatically. (HANSEN ET AL, 2017; DIAKOPOULOS, 2019a; DIAKOPOULOS, 2019b)	Methodology to be defined

Source: Prepared by the author.

The current focus of research in development is the application of communicational technologies in journalism and the teaching of digital journalism. They are at different stages of development but are simultaneous and complement each other.

The phenomenon of communication flows generated by algorithms and AI and the use of certain knowledge in this sense for editorial decision-making processes have been part of the Campus' activities since its creation, but now research in this sense takes on a leading role. Didactically, the studies on the characteristics of each platform are part of the programme for the first classes of the semester. The type of audience, the busiest times of day, the publication metrics and the narrative possibilities of each socio-technical network are considered later in the Editorial Board meetings for the planning of the coverage, the definition of agendas, the choice of narratives, the times and platforms for publication.

The aim now is to create our own automation processes. The mapping of the Campus workflow (see Table 1) paved the way for the design of a broad automation of production processes as it made explicit all the complexity of workflows and decision-making procedures. The workflows resulting from the research and the steps for their conception can be found in Barcellos and Silva (2020).

The work calls for intense participation of other classes' partners because it transcends the usual skills of journalists. But, according to Diakopoulus (2019a), the participation of journalists in the programming of algorithms and AI systems dedicated to journalistic tasks is paramount and has become a journalistic task. A first step in this regard has been materialised in the development of a chatbot that can be coupled to the Facebook platform and answers a few basic questions from readers. The idea is to improve it and install it in AppCampus.

Another current focus of research is related precisely to AppCampus. The fragmentation of the Campus news in seven platforms and its dispersion throughout cyberspace leads to the public not perceiving it as a single newspaper. Logos, colours and the mascot Campusito, a stylised seal, added to the content have not been enough to characterise the uniqueness of the newspaper. So, for two years now, the Campus has been developing its own web application, tested and approved in beta version, to work as an aggregating platform for the others and to reinforce the newspaper's uniqueness. The app publishes multimedia news summarising the main news published on the other platforms with links to them. The app is being improved in two Journalism disciplines, and involves students and teachers of Journalism and Computer Science at UnB.

The current version of the app enables direct access to metrics provided by Google Analytics (2020). The novelty allowed the beginning of another research to try to unveil some of the secrets of the algorithms and processes of AIs hidden by developers (GALLOWAY, 2017; PARISER, 2012). This research also aims to verify the impact on the audience of the stories published on AppCampus' linked platforms, and also to get to know the receivers better.

Considerations

The interconnection of theoretical and laboratorial activities of the Campus Multiplataforma digital newspaper in the course Campus Multimidia proved to be a favourable environment for applied research in two aspects. The first of these is the development of didactics for the teaching of digital journalism capable of following

and even anticipating trends of the fast evolution of communication technologies, and thus adequately train researchers and journalists. The second one is the swift development of new narratives, innovative means of communication, news production and distribution systems and production management processes.

The applied research also facilitates interdisciplinarity with disciplines of Journalism itself, of Communication in general, of Computer Science and others that have interfaces with digital journalism. For students of disciplines and research groups in the computing area, the joint experiences have been a way to see their work applied in practices in other areas, and for Journalism students the interdisciplinary work with Computing is an opportunity to develop computerized devices and systems, skills not fully covered in the disciplines of their course. Another aspect worthy of note is the opening of various research projects which are intertwined and whose results are complementary and/or feed back into each other.

Applied research is the ideal environment for the scientific initiation of undergraduate students, for the creation of specific study groups within the Multimedia Campus programme, for the development of end-of-course projects, MA projects and job market proposals.

Finally, the question remains unanswered as to whether the training of journalists should include courses in the area of information technology, since the research described above highlights the need for programming skills, although these have been resolved to a certain extent thanks to partnerships outside the School of Journalism and the Faculty of Communication.

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RESUMO:
A internet é a principal fonte de notícias dos brasileiros, o *smartphone* o aparelho preferido de acesso a elas e as redes sociais superaram a televisão como meio jornalístico hegemônico. O jornalismo fragmentado no ciberespaço demanda novas narrativas, formatos de veículos, processos de produção e distribuição. Os algoritmos e sistemas da inteligência artificial (IA) já desempenham muitas tarefas, a profissão se reconfigura e o ensino do jornalismo digital precisa acompanhar as transformações. Este artigo propõe a pesquisa aplicada multifacetada como forma de desenvolver narrativas, aparatos, sistemas de gerenciamento de produção e didáticas capazes acompanhar as evoluções tecnológicas e formar jornalistas aptos à pesquisa e ao trabalho em ambientes mutantes.

PALAVRAS-CHAVES: Jornalismo digital; pesquisa aplicada; multiplataforma; inteligência

RESUMEN:
Internet es la principal fuente de noticias para los brasileños, el teléfono inteligente es el dispositivo preferido de acceso y las redes sociales han desplazado a la televisión como medio hegemónico. El periodismo fragmentado demanda nuevas narrativas, formatos de vehículos, procesos de producción y distribución. Los algoritmos y sistemas de inteligencia artificial (IA) ya realizan muchas tareas, la profesión se reconfigura y la enseñanza del periodismo digital necesita mantenerse al día con los cambios. Este artículo propone la investigación aplicada polifacética para desarrollar narrativas, dispositivos, sistemas de gestión de la producción y didácticas capaces formar periodistas capaces de investigar y trabajar en entornos cambiantes.

PALABRAS CLAVE: Periodismo digital; investigación aplicada; multiplataforma; inteligencia artificial.