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Studygrams: characteristics and possibilities of use in science and biology education

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ABSTRACT

Studygrams are profiles on the social media platform Instagram that share different types of educational, informative, and instructional content, such as study routines and materials. The growth of this type of profile is an indicator of contemporary society's interest in learning, teaching, and getting informed in ways that differ from traditional methods. With the aim of exploring this new movement of social media usage in education, this study aimed to characterize Brazilian Studygrams that seek to disseminate and/or teach contents related to Biological Sciences and have the greatest public acceptance, as well as to understand possible applications of this interface in Science education. Ten Studygrams were observed for two months. Information about different aspects of the profiles was recorded in a hypertext field diary and in a spreadsheet, and later submitted to the technique of Discursive Textual Analysis. The occurrence of Commercial Studygrams, structured by companies that aim to sell courses or other educational services, and Independent Studygrams, managed by spontaneous individual or collective initiatives, whether they are students from primary, secondary or higher education, or teacher-researchers, in order to disseminate scientific knowledge and personal teaching-learning experiences were identified. The organization of the structural parts of the profiles, such as the biography, visual identity, and the way science and biology content are approached in the post's presentations, varies according to their purposes. It was also observed that there are possibilities for using Studygrams in the formal process of science and biology teaching and learning, as they can serve as a source of information as well as a space for activities. In this scenario, it is believed that Studygrams represent a new culture of both teaching and learning and the dissemination of science, as they present a diversification in the way of approaching scientific knowledge and concern with aesthetics, language, organization, and sources of information.

KEYWORDS: Digital Information and Communication Technologies. Cyberculture. Social Networks.

1 INTRODUCTION

With Web 2.0 and cyberculture, the online world began to offer space for new forms of expression and interaction. Smartphones have become one of the biggest addictions of the 21st century. In moments of celebration, work, and pain, they are there, assisting or distracting. Like a big trap, they capture attention for hours on end with countless psychological and neurological strategies through mechanisms of sociability and interactivity, linguistic, auditory, and aesthetic resources.

According to Moran (1995, p. 24), technology enchants with its power of seduction, and re-enchants "because we participate in a much more intense interaction between the real and the virtual." Smartphones are the fruits of this re-enchantment.

Real life has become more practical with smartphones. Mobile, customizable, and connected to the internet, they allow for various everyday tasks to be performed from anywhere and provide easy and quick access to entertainment resources, information, messaging, delivery services, learning, among many others. They have taken the place of computers and have become both a tool for work, communication, leisure, and other practical functionalities. They have gone from being a luxury item in the early 2000s to a necessity in modern times.

These technologies of intelligence and the culture of mobility have captured human attention due to the almost insatiable desire of the human mind to have access to solutions to problems, new and interesting information quickly and dynamically. For Pérez-Gómez (2015, p. 15), the digital management of information in the last four decades has acted as a "source of satisfaction for needs, development, survival, and power."

In this sense, education and teaching scenarios have begun to experiment and try to adapt to the exponential growth of positions and roles that the information age, culture of mobility, and social media are allowing. A relevant example of this is the effort of basic and higher education institutions to develop or implement software in their pedagogical actions and strategies, hoping to meet the demands and needs of contemporary man.

Through an interactive approach with clear and objective language, students seek refuge in media to overcome their difficulties in formal education processes. Thus, video lessons and other resources available on social networks have become increasingly popular among students, due to the process of cognition mediated by interaction, sharing of interests, and exchange of knowledge in a deterritorialized way, in which the only boundary for this channel of knowledge is personal interest in the content (SERRANO, 2009). Moran (2000, p.59) states that "we are rapidly moving towards fully audiovisual and interactive teaching and learning1 processes."

It is naive to ignore this scenario, even because interactive multimedia "favors an exploratory or even playful attitude towards the material to be assimilated. It is therefore a tool well adapted to active pedagogy" (LÉVY, 1993, p.40). In this sense, Moran (2007) argues that the relationship between Communication, Media, and Education can be thought of at three levels: the organizational level, more participatory and adapted to individuals; the content level, which deals with life problems and prepares for the future; and the communicational level,

knowledgeable and integrative of the languages and techniques of those who inhabit the virtual.

The educational possibilities arising from these levels of relationship motivate transformations, both in teaching practices and in the development of new competencies for the school (LINHARES; CHAGAS, 2017). The literature presents reports and analyses that point to various applications, contributions, and implications of pedagogical strategies based on the use of digital resources, such as gamification and flipped classrooms, as well as the usefulness of Virtual Learning Environments (VLEs). Another reflection of this is the high investment of large education companies in the training of Teacher Influencers, who produce and publish content of different natures on social media, with excellent resolution and graphic structure, and a focus on contextualization and interactivity.

It is understood, therefore, that technological versatility innovates in the ways of teaching, learning, and disseminating scientific information. On Instagram, independent profiles have begun to share their study routines and materials, publish video lessons, make live video calls (lives), individual or in groups, to discuss and explain topics of social interest, disseminate information from scientific studies, among other forms to stimulate learning and/or teach/inform. The success of these profiles is linked to the advice and tips for building study schedules and materials, the current and contextualized content of the posts, as well as the aesthetics and humorous tone, and also the personal opinions and experiences about school/academic routines.

Studygrams, as study profiles on Instagram are called, have multiplied at an absurd rate in recent years, indicating the undeniable interest of digital natives in learning, teaching, and getting informed through social media. The number of Studygrams is increasing, but not all profiles created for this purpose are active. Unfortunately, it is still not possible to determine how many Studygrams are active or inactive, or how many share topics related to Biological Sciences in Brazil because Instagram does not provide such data. The only available information is the number of posts that used the hashtag "#studygram" and its Brazilian variations: "#studygrambr" and "#estudogram".

To give an idea of the popularity of Studygrams, the following data is highlighted: at the beginning of 2020 (01/19/2020), there were 5.795.258 posts on the timeline with the hashtag #studygram. By May of the same year (05/24/2020), there were 7.441.069 posts. This indicates a relative growth of 28.39% in the number of posts in a four-month period, which is around 411.453 new posts per month or 13.715 per day. Undoubtedly, a lot of material is being produced, shared, and disseminated, indicating many hours of study, preparation, and interaction.

The presented numbers illustrate people's fascination with social media and point to a new culture of teaching- learning in the age of mobility. However, it is necessary to consider that digital technologies and media are only one of the variables that drive teaching- learning in Sciences and Biology. According to Kenski (2012), the mediations and nuances that are revealed in the process of interactions between teachers, students, knowledge, and technologies define the quality of education and are essential for the autonomy and development of critical thinking in individuals.

However, Silva and Serafim (2016) affirm that formal education is not "tuned in" to these movements. Schools and universities must increasingly consider that students and teachers have stopped being recipients and transmitters of knowledge, respectively, and, in contemporary times, have started to re-elaborate, share, and give meaning to information through their own unique processes of learning and seeking knowledge.

In light of the above, the objective of this study is to characterize Brazilian Studygrams that seek to promote and/or teach content related to Biological Sciences and have the greatest acceptance from the public, as well as to understand possible applications of this interface in Science education.

2 METHODOLOGICAL APPROACH

This study is based on the assumptions of netnographic research. According to Kozinets (2014, p. 61), "netnography is a participant observation-based fieldwork research [...] to achieve an ethnographic understanding and representation of a cultural or communal phenomenon." The stages of this type of research, as outlined by the author, were followed, including: (1) entry and immersion in the virtual community being studied; (2) data collection and analysis; (3) understanding of discourse and interaction among members for greater information reliability; and (4) research ethics.

Therefore, the data presented and discussed in this study are the result of participant observation that the researchers conducted during online fieldwork on the Instagram social network. It should be noted that the data collection methodology for the analyzed profiles and the temporal reference for monitoring were inspired by Bar-Ilan's (2005) study with WebBlogs.

According to Castro and Spinola (2015), internet research is challenging, as it involves difficulties in defining the sample and a diversity of representations on the network. For this reason, since Instagram does not provide a detailed listing of Studygrams, only general data, such as the number of publications that used the #studygram, a model was developed a priori to map and systematize the profiles that teach or promote Biology content, aiming to analyze successful cases, as explained below.

Thus, the study aimed to understand which elements define a Studygram with high visibility, in order to then carry out the immersion and other stages. It was concluded that the most common metric for popularity on Instagram is mainly the number of followers. According to Macêdo (2016, p. 46), "the more followers a profile has, the more prestige and recognition it will have within the social network environment." This phenomenon, called clustering by Recuero (2014), reveals a tendency for individuals to connect to more densely connected profiles. The largest profiles on Instagram, for example, are internationally known personalities and artists, such as Portuguese soccer player Cristiano Ronaldo (195 million followers), American singer Beyoncé (137 million followers), among others.

To verify the standout Studygrams in Brazil that somehow stimulate the teaching-learning of Biology, the "Search" interface of Instagram on the computer was accessed. The "Tags" function was selected, and in the search field, the hashtags "#studygram" and its Brazilian variations "#studygrambr" and

"#estudogram" were inserted. As Instagram is a network that has profiles with both public and restricted access, the search results selected only public profile posts.

This initial search was conducted to verify the structure of this type of profile, observing and recording in a field notebook the following aspects: number of followers and posts on the timeline; profile description structure; general aspects of posts on the timeline; Stories and Featured Stories; Science and Biology content explored in the posts; administrator's profile; followers' profiles; and profile focus, through explicit or implicit information in the posts.

After the initial navigation, it was found that, on average, the most recognized Studygrams are those with around 30 thousand followers. Thus, the researchers began searching for publications on topics related to Biological Sciences, in association or not with other areas, in Portuguese-language profiles with a quantitative of followers close to or greater than 30 thousand. The ten profiles that most frequently met these criteria were selected. The researchers followed and interacted with the posts and monitored the profiles for a period of two months, March and April 2020. Table 1 contains general information about these Studygrams.

The profiles were explored in depth, observing aspects related to the overall structure and organization of the profile and the posts themselves.

The information accessed, which constitutes the corpus of this study, is all of a public nature, that is, freely accessible to members and non-members of Instagram, spontaneously produced by followers and administrators of the accounts. However, although the Research Ethics Committee (2020, p. 11) of the Escola Nacional de Saúde Pública Sergio Sergio Arouca (ENSP/Fiocruz) (National School of Public Health) advises that "Research on public Internet pages that do not require registration or authorization from the administrator to access the content dispensing ethical evaluation and consent registration," the administrators of the profiles analyzed were informed of the objectives, justification, benefits, and anonymous participation in this study. Therefore, information that could identify the profile, its manager, or followers was hidden and/or replaced, as in the case of Table 1, where numbers correspond to the account name (@1 to @10).

Table 1. General information about the investigated profiles

Profiles	Number of followers	Number of posts
@1	223 thousand	1.354
@2	117 thousand	3.151
@3	159 thousand	6.518
@4	75,2 thousand	567
@5	91,8 thousand	444
@6	70 thousand	1.632
@7	97,2 thousand	173
@8	879 thousand	250
@9	69,2 thousand	581
@10	57,1 thousand	561

Source: instagram.com (2020)[2].

The collected information was recorded in a hypertext field diary in the EverNote® software and/or in spreadsheets created in Microsoft Excel®. The Textual Discursive Analysis - TDA technique (MORAES; GALIAZZI, 2011) was used to explore and analyze the corpus.

3 ANATOMY OF STUDYGRAMS

3.1 A new understanding of the terminology

While navigating the universe of Studygrams, it was noticed that the definitions proposed by previous studies on this tool seemed too restrictive. Fernandes (2018, p. 1964) defines them as "Instagram profiles whose objective is to present photos and stories about the study process of one or more disciplines." Castro and Biadeni (2020) consider them as serving both to share study materials and tips as well as spaces for exchanging experiences.

Here, a new understanding is registered for the term "Studygram". From the researchers' perspective, Studygrams are profiles that, although using the same resources as any other on the Instagram social network, have administrators dedicated to constructing posts with the intention of: sharing and/or (re)transmitting study materials/experiences, on one or several areas of knowledge (mind/concept maps, videos, animations, data); providing planning tips (study schedules for selection processes and material organization strategies); and disseminating and discussing socio-scientific issues (publication of articles and news, conducting collective/individual video conferences).

3.2 Types of Studygrams

Profiles seem to seek some common elements: interaction, closeness, dialogue, and new ways/materials to learn- teach, using Instagram's own resources (stories, comments, directs, lives, and others). However, it was observed that the way of elaborating posts and their contents, as well as the organization and structure of the profile and the vision of its creators, presented relevant

particularities. From this, it was admitted that there are different types of Studygrams:

1. **Commercial Studygrams:** aim to both inform/promote scientific content and promote the brand they are linked to. They are usually related to a public or private educational platform or institution. They have a graphic structure with attractive and highly persuasive elements to entice followers to some type of educational service, whether virtual or in-person, and not free. Normally, they are reflections of the success and expansion of the managers' own teaching platforms.
2. **Independent Studygrams:** structured by individual or collective spontaneous initiatives. They have a plan for building posts dedicated to sharing study materials and routines, as well as discussing and disseminating socio-scientific issues. Although they establish partnerships with Commercial Studygrams or sell their own materials, they do not initially focus on financial return. The reasons why people build and manage accounts of this nature are the need for personal and/or artistic expression, recognition, social contact, and the sharing of knowledge and academic information. They can be divided into two subtypes:
    a. *Student Studygrams:* created and managed by school or university students. They are the most frequent on the network. They disseminate study tips and materials with an aesthetic standard that uses standardized calligraphy techniques (letterings) and coherent, impeccable, and constant organization of postings.
    b. *Expert Studygrams:* developed by teachers, university or basic education professionals, or qualified professionals interested in popularizing and disseminating science or education. They are dedicated to the publication and discussion of scientific data or findings, technological news, and social issues, as well as assisting students with brief explanations on various subjects. They post screenshots of articles/data; critical, analytical, instructional, and/or explanatory videos; summaries; and curiosities. They conduct video conferences (live streams) with other specialists.

The above typologies were developed based on the understanding that the idea of Studygrams cannot be restricted to a media genre used only by students, creators, or followers of these profiles. It is considered, therefore, that there is a complex network of individuals dedicated to stimulating learning on Instagram, with or without profit, through the production or dissemination of materials that stand out for their aesthetics and informal, curious, synthetic, and informative language. As Kenski (2012, p. 38) affirms, it is necessary to consider that Digital Information and Communication Technologies - DICTs - "have their own logics, languages, and particular ways of communicating with people's perceptual, emotional, cognitive, intuitive, and communicative abilities."

In face of this, the abandonment of the false stereotype that these profiles are intended for young people and that their creators succeed through posts with elaborate calligraphy and little dedication to the learning needs of students is proposed, as seen in many memes circulating on Instagram itself. This type of criticism fails to recognize the role of this media genre in education, diminishing its real importance and influence in teaching and learning, as well as the form of expression and efforts of those who seek to consolidate virtual spaces for exchange of information, experiences, and knowledge.

3.3 The First Impression

On Instagram, the description or Bio is the first contact of the profile with any visitor. In addition to the profile picture and name, it offers 160 characters for the user to present personal information such as age, profession, city of residence, and hobbies, or institutional information such as field of activity, business description, and awards, as well as their interests and ideals.

This is also the only space where clickable links can be inserted on Instagram. Therefore, several users are using paid or free tools to gather multiple links on an external page, such as Linktree (https://linktr.ee/) and Linklist (https://linklist.bio/). Thus, the visitor accesses the profile, clicks on the bio link associated with a site with a list of links, and can view all the services and products that the manager offers outside of Instagram.

Although they follow these same assumptions, Studygram biographies are structured with unique characteristics. However, when the profile has a more specific focus/content/area, in many cases, the administrators warn in this section. The characteristics of the Bios observed in each type of account were:

1. **Commercial Studygram Bio** (Image 1): Brief description of the profile's objectives/focus/mission and/or the company behind the profile. It has directions (links) to teaching platforms, usually paid, or to the institution's website or other social networks. They present phone and email contacts for Customer Service.

Image 1: Commercial Studygram biography observed in this study3.

Source: Adapted from instagram.com (2020)3.

2. **Independent Studygram Bio:**

   a. *Student* (Image 2.a): Brief description of the administrator, usually with their age and which year of basic education they

are in and the course they plan to take in college entrance exams; or which course, semester and institution they are studying at. Sharing of Studygrammer's file storage cloud link, such as DropBox, iCloud, Google Drive, as well as partner sites/profiles and the administrator's personal account on Instagram or other social media.

b. *Expert* (Image 2.b): Brief description of the profile administrator(s)' education and professional work location. Focus of the account. Links to personal blogs, Lattes CV, YouTube channel, and/or other social media accounts. Directions to online discussion groups, free or paid, on specific topics, as well as preparatory courses for selection processes, especially ENEM. These moments are developed on the owner(s) of the profile's websites or teaching platforms and/or on free applications such as WhatsApp, Telegram, Skype, Zoom, Microsoft Teams, and others. They have a contact email for partnerships or interaction with followers.

Image 2: Studygram student and expert biographies observed in this study.

Source: Adapted from instagram.com (2020)3.

3.4 Audience and Publications

The audience that frequents these profiles is quite diverse, composed of children and adults, parents and teachers, other Studygrammers, curious people, and others. However, a singularity was noticed among the followers of Student Studygrams. A large portion of the followers are students preparing for college entrance exams, people studying for public exams, or students in the same course as the profile manager or related fields, which demonstrates the user's identification with the page and can reinforce interactivity, as they tend to share the same experiences and interests in scientific content and news.

The posts are shared with the public in the same way as in a personal account on the same network, that is, using the resources that are made available with updates from Instagram itself. They can be unidirectional or interactive, when they stimulate interaction between the administrator and the follower and between followers themselves. Furthermore, very specific approaches were observed in Studygram posts, which differentiates them from personal relationship accounts:

1. **Timeline or TL posts:** Materials produced by the profile (original) or shared (reposted), in most cases, are mind/concept maps or summaries, curiosities, videos, diagrams, data, or analyses of current socio-scientific issues. Announcements of services offered by the

company, professional, or student who manages the profile, such as courses, planners (study schedules), study materials, e-books, etc., or partner brands.

2. **Story posts:** Sharing of TL posts. Videos of material preparation and/or administrator's routine. Polls or questions to test knowledge about the subjects discussed by the profile or to consult the opinion and expectations of followers about the organization of the page, quality of materials, and discussed subjects. Not all posts are pinned in the "Highlights."
3. **Story posts pinned to Highlights:** Schedules, tips for organizing study materials. Critical analyses or dissemination of articles and teaching platforms, partnered or not. Videos with exercises resolutions, answers to polls, or more detailed explanations about specific topics of content. Instructions for giveaways conducted by the profile.

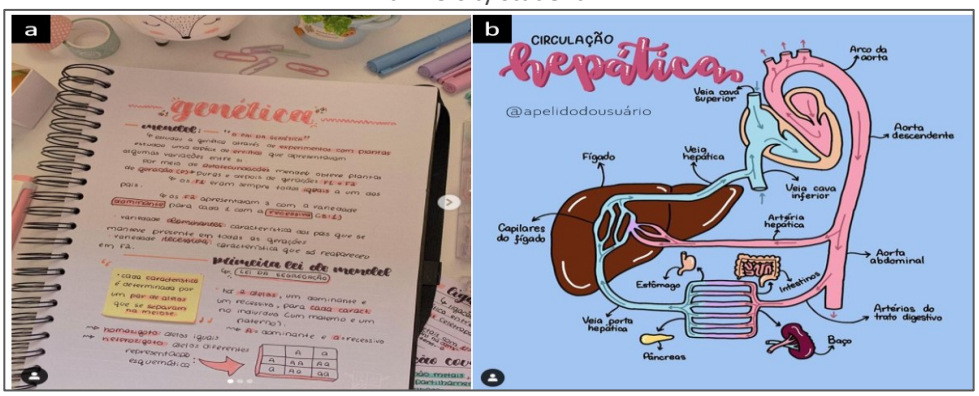
It is noteworthy that in Studygram Experts, a large portion of the posts present links that direct the follower to other web pages to access more information or the bibliographic references of what is presented. It is considered that the presence of this information can contribute to ensuring and retaining followers because it qualifies what is presented and expands the possibilities of hypermedia paths and free navigation. These profiles were highly sought after during the global public health crisis caused by SARS-CoV-2 (the etiological agent of coronavirus disease - COVID-19) in 2020 for disseminating research results in a professional, clear, and objective manner, with a strong influence on government decision-making and individual behaviors.

3.5 Biology in Posts

Regardless of the type of Studygram or the platform where the posts are made, all the analyzed profiles posted specific content related to science, especially Biology.

On pages managed by high school students, it is also common to see posts about content from other disciplines because, as observed, the Studygram posting routine follows the manager's study routine in real time. So, if it's not a day to study Biology, most likely the posted content will be from another discipline. Or, if, for example, the subject reviewed by the student was genetics, the produced and posted material will be about genetics. The elaboration of mind maps and summaries, in many cases, handwritten with drawn letters - lettering - are the privileged ways to communicate information about the contents (Image 3.a). Some Studygrammers also sell these materials.

Image 3. Posts made by Student Studygram (a) by a high school student and (b) by a university student.



Source: Adapted from instagram.com (2020)[3].

On the other hand, university Studygrammers usually focus their posts on the subjects they are studying in their undergraduate program. It was noticed that most of these student Studygrams are managed by students in the health sciences field, such as pharmacy, nutrition, physiotherapy, biomedical sciences, and medicine. Since Biology is present in the majority of the basic cycle courses in health programs, there are a large number of posts on physiology, anatomy, embryology, cytology, genetics, among others, along with more specific topics for each course. In addition to mind maps and lettering summaries, these managers also often create schemes explaining biological processes (Image 3.b).

In addition to the quality of the information published and the responsibility of being considered "model students," there is undoubtedly a strong concern with the aesthetics of each post and the profile as a whole. Therefore, we agree with Castro and Biadeni (2020, p.80) when they affirm that "each connected student seems to have the opportunity to exhaustively perfect the version of themselves that will be presented publicly." Through this process of intense improvement, these students can develop not only competencies and skills related to the studied content to produce the posts but also those related to digital and content marketing, which are increasingly necessary in the profile of professionals in the cyberculture.

In Expert Studygrams, the focus of the posts is on scientific news. Frequently presented in a multiple cards format (Image 4), the post shows a sequence of photos and/or videos with concise information, in which the follower/visitor follows as if it were a slideshow that tells a story. In reality, this "story" is commonly based on recent scientific articles published in renowned journals. The simple, direct, and humorous language attracts followers and popularizes science, which seems to be the primary goal of this type of profile.

Image 4. Multiple cards format post from an Expert Studygram, with only 2 of the 10 cards that composed the post shown.

Source: Adapted from instagram.com (2020)[3].

Usually, the content on commercial Science and Biology Studygrams presents explanations for some curiosity, myth, or discovery. As the main goal of these profiles is often the sale of educational products, it has been observed that the content presented for free in the posts is explored in greater detail in the services/products offered by the profile. To attract followers/visitors who are potential clients, managers use various content marketing resources to simultaneously arouse interest in the posts and increase engagement with the account and posts, such as large letters, ambiguities, humor, provocative and catchy phrases, questions, and so on. In this type of profile, a high number of short video posts (maximum of 1 minute) were noted, in which teachers explain/contextualize a subject, answer questions, or discuss a topic.

4 THE POSSIBILITIES OF USING STUDYGRAMS IN THE TEACHING AND LEARNING OF BIOLOGY

Studygrams have great potential for use in Biology class educational practices at any level of education. Another interface for hybrid education is envisioned, as it can articulate more formal teaching- learning processes with informal, open, and networked education processes by mixing and integrating different professionals and students in distinct spaces and times (MORAN, 2015).

Because of their distinctive dynamics of using social media, profiles of this nature, Studygrams, have the potential to foster dialogue and reduce transactional distance, bringing students closer to their teachers and colleagues, and, above all, to the world and society in general that contextualizes and dynamizes their learning. Therefore, it is believed that these profiles can be explored in the teaching and learning of Science and Biology, both as a source of information, since, in many contexts, the use of DICTs in education is limited to information search and processing, and as a space for carrying out activities used in educational practices that allow for collaboration, creation, and dissemination of information.

4.1 Studygrams as a source of information

Since many Studygrammers share their school/academic routines, study methods, and materials produced during their study processes, teachers can be inspired by these profiles' publications to plan their pedagogical practices.

Teachers can create their own studygrams, individually or as a group, to transmit posts about their field of interest in biology or directly to the classes they teach, assuming the role of curator of open content. By following the posting dynamics of a Studygram managed by the teacher, students can establish a closer relationship with the teacher and feel more comfortable asking questions, practicing research, conducting supplementary studies, and seeking information from reliable sources.

Through careful selection, teachers can also recommend Studygrams or links to specific publications for students to follow and/or access during or after classes. This allows students to not only expand their sources of information but also obtain concise summaries of the content, observe scientific developments in accessible, clear, and objective language, and interact with influential researchers or fellow students who have undergone similar learning experiences, among other possibilities. If the student becomes a follower of the recommended profiles, they will have continuous access to course content without the space-time limitations and erudite language often found in educational institutions.

In this scenario, Studygrams present a possibility of extending access and participation of students and teachers in scientific culture and promoting the understanding of phenomena, terms, concepts, ideas, and representations in a different format and production/dissemination pace than that of many educational institutions. Furthermore, it allows the student to perceive that the teacher is integrated into the same cyberspace they navigate and that the use of social media is no longer repressed but has become part of the teaching-learning process.

Following Studygrams' activities can provide personalized hypermedia experiences, where followers can visit both the original sources of transmitted information and supplementary materials. Usually accessed through links in the Bio, these are contents or pages hosted outside of Instagram, produced or not by the Studygrammers themselves, and include videos, scientific blogs, sites with journal articles, audio platforms with podcasts, news and reports in influential newspapers, among others.

Given the above, maximum care is necessary in selecting the profiles that will be recommended and in the contents posted by teachers in their Studygrams, in order to avoid contact with common fake news or incomplete, inaccurate, and outdated information. Before suggesting a Studygram, the teacher needs to gather information about the manager(s), analyze the content, language, and regularity of the posts, evaluate the sources of (re)transmitted information, and verify the interaction strategies and initiatives, in order to ensure that their students access reliable information and frequent virtual spaces that prioritize dialogue. When making posts, it is necessary to ensure that the information conveyed has been previously checked and/or produced from reliable sources, and to indicate the source in the post's caption and/or image.

4.2 Studygrams as a space for activity

In Biology classes, the use of Studygrams can go beyond simply consulting information to illustrate or complement what is seen in the classroom. In this approach, the focus is on putting the student and their productions at the center

of the learning process, making them act as their own Studygrammer, content producer, and not just a mere consumer. The teacher, in turn, assumes the role of tutor or mentor, with the role of accompanying the learning process, maintaining different degrees of involvement in the process, yielding control to the student when they are able to assume it, and exercising the role of guide when the student needs it, as recommended by Mauri and Onrubia (2010).

Studygrams can be created to function as an audiovisual and hypermedia portfolio or diary of students' experiences while taking courses in basic or higher education. Images, videos, and texts produced based on field visits, laboratory classes, elaborated works, and respective construction processes, classroom dynamics, summaries, and mind maps of content, parodies, reposts of related themes, among others, are part of the set of possible content to be shared on the profile.

Motivating students to develop profiles of this nature seeks to make them value their learning moments and allows the teacher to monitor personal growth and understanding of scientific knowledge throughout this process. As it is a resource that has the chance to gain visibility among the general population, including classmates, family, and followers of the personal profile, it is possible that the activities developed have superior quality and formal teaching experiences are more exciting, engaging, and experienced with more dedication. Zabalza (2004) recognizes that the consolidation of DICTs in education has reinforced the possibility of monitoring by teachers and as a tool for sharing experiences among students themselves.

Another possibility is the construction of Studygrams that serve to deepen and contextualize the contents worked in the classroom, as well as establish interdisciplinary connections and integration of students with each other and with the school community in general. In this perspective, students have the freedom to create publications, seek partnerships, and articulate interaction and dialogue strategies, under attentive supervision and guidance from the teacher in such movements so that the focus is not lost.

These activities aim to develop research, selection, analysis, synthesis, and (re)transmission competencies on the studied themes, as well as other potentialities that can be explored with collaborative and participatory work, dialogue, and the creative process. The management and dynamism of Studygrams also materialize as a customized way of studying, learning, and teaching other people. The way information is published and the standards of aesthetics and organization can generate strong identification in other groups of students and teachers and thus serve as a repository of information and a source of inspiration for other educational contexts.

Reading, writing, and recurrent interaction with scientific knowledge from recommended and/or evaluated sources by the teacher, guides students, in some circumstances, in the construction of ideas and concepts, critical thinking, and explicit logical relationships of thoughts that guide (or not) their actions in the world. They also provide an opportunity to understand that science is present in everyday situations, whether in technological objects and processes or in the dissemination of their results and explanatory models used to support political, economic, and even "lifestyles" decisions (DELIZOICOV; ANGOTTI; PERNAMBUCO,

2018), and favor an exploratory, playful, and communicative attitude in those who participate in the process.

5 REFLECTIONS AND CONTROVERSIES

According to Delizoicov, Angotti, and Pernambuco (2018), there is no specific place and space for learning, as they understand it as a continuous construction of interaction between individuals and the surrounding natural and social environment. With the incorporation of DICTs in the "natural" development environment of individuals, cyberspace has become a constituent of society's daily life and has brought thousands of new opportunities for interaction and, consequently, learning.

Regardless of the curriculum, Pedagogical Political Project, lesson plans, and the like, Web 2.0 encourages changes in learning practices and the construction of scientific knowledge. By providing information sources in an open, free, and asynchronous manner, it enables teaching and learning processes that privilege autonomy, co-authorship, and socialization; and stimulates "experimentation, reflection, and the generation of individual and collective knowledge, favoring the formation of a cyberspace of inter-creativity that contributes to creating a collaborative learning environment" (COBO ROMANÍ, 2007, p.101).

One of the greatest synonyms for sociability and interactional relationships supported by Web 2.0 technologies are internet social networks, virtual spaces that consolidate, form, and/or demand multiple connections between diverse social actors. Although they were not produced for use in education, the software in which such networks are established has been used as a space where students and teachers can learn and teach formally or informally (MATTAR, 2013). Thus, due to the ease of creating, organizing, configuring, publishing, expanding resources, and using Instagram, the potential for collaboration and dialogue, Studygrams can occupy a prominent position in contemporary education, just as blogs have assumed in the last two decades (MATTAR, 2013).

The audiovisual and aesthetic resources used in Studygrams facilitate the decoding of information, making it possible to access scientific content and discussions from different realities and cultures, often without even requiring advanced reading and/or writing techniques, highlighting the democratic role and universal contributions that DICTs support.

On the one hand, one agrees with the ideas of Mauri and Onrubia (2010) when they affirm that the possible improvements in learning opportunities provided by DICTs are linked to the participation and involvement of training subjects (students and teachers) in the proposed activities. On the other hand, it is necessary to highlight that while educational contexts do not pay attention to the real current demands of the mobility culture and do not organize themselves at a pedagogical and structural level, simple fragmented memorization of information and oral presentation will continue to be the main form of teaching and learning, and the discourse that DICTs are primary adversaries of teaching and learning will continue among students and teachers.

The unfortunate arrival of the COVID-19 pandemic has contributed to discussions regarding the use of resources for emergency remote teaching. Many

of these resources were not created specifically for this purpose but were already available, although largely ignored or underutilized by educational institutions and teachers. These resources had to undergo a rapid and unexpected process of improvement in response to the demands of the health crisis.

6 FINAL CONSIDERATIONS

Studygrams represent a new culture of teaching, learning, and science dissemination. Often developed by individual initiatives, they offer a diverse approach to scientific knowledge and show concern for aesthetics, language, organization, and information sources.

The existence of these profiles demonstrates that contemporary society wants and develops its own, more free and creative ways of learning and teaching. Schools and educational policies need to pay attention to these initiatives, both to stimulate and invest time, effort, and financial resources. Studygrams can be employed in pedagogical practices from basic education to higher education, due to their versatile and adaptable nature to different realities, including those without sophisticated technological structures.

Although the use of technology/Studygrams is suggested to broaden student participation, sharing, interactivity, and horizontalize the teacher-student relationship, there is no one-size-fits-all solution for all educational contexts. The complexity and multidimensionality of different, often adverse, educational contexts must be analyzed to decide whether to use technology/Studygrams. It should be remembered that as innovative as a planned intervention proposal may be, technology alone cannot solve all problems.

The interpretations presented here are dynamic and should be periodically reviewed. The results of this research can lead to further studies that investigate how interaction and collaboration between students and teachers are established through the use of Studygrams in science and biology education as a source of information and/or activity space. Additionally, it can help to identify the challenges, limits, difficulties, and contributions to the learning/teaching process that emerge from real pedagogical practices that utilize Studygrams.

STUDYGRAMS: CARACTERÍSTICAS E POSSIBILIDADES DE UTILIZAÇÃO NO ENSINO DE CIÊNCIAS E BIOLOGIA

RESUMO

Studygrams são perfis na rede social Instagram que compartilham diferentes tipos de conteúdo digital de viés educativo, informativo e instrucional, como rotinas e materiais de estudo. O crescimento desse tipo de perfil é um dos indicadores do interesse da sociedade contemporânea em aprender, ensinar e se informar de maneiras diferentes das tradicionais. Na expectativa de explorar esse novo movimento de uso das redes sociais da internet na educação, este estudo teve como objetivo caracterizar os *Studygrams* brasileiros que buscam divulgar e/ou ensinar conteúdos relacionados às Ciências Biológicas e que contam com a maior aceitação do público, bem como entender possíveis aplicações dessa interface no ensino de Ciências. Dez *Studygrams* foram observados durante dois meses. As informações sobre diferentes aspectos dos perfis foram registradas em diário hipertextual de campo e em uma planilha, e, posteriormente, submetidos à técnica da Análise Textual Discursiva. Identificou-se a ocorrência de *Studygrams* Comerciais, estruturados por empresas que tem como finalidade a comercialização de cursos ou demais serviços educacionais; e *Studygrams* Independentes, gerenciados por iniciativas individuais ou coletivas espontâneas, sejam estudantes da educação básica e superior ou professores-pesquisadores, com o intuito de divulgar o conhecimento científico e vivências de ensino-aprendizagem particulares. A organização das partes estruturais dos perfis, como a biografia; a identidade visual; e a forma como os conteúdos de ciências e biologia são trabalhados nas abordagens das postagens, variam de acordo com suas finalidades. Observou-se ainda que existem possibilidades de utilização dos *Studygrams* no processo de ensino e aprendizagem formal de ciências e biologia, pois podem servir tanto como fonte de informação quanto espaço para realização de atividades. Diante desse cenário, acredita-se que *Studygrams* representam uma nova cultura tanto de ensino quanto de aprendizagem e divulgação da ciência, pois apresentam uma diversificação na forma de abordar os conhecimentos científicos e preocupação com a estética, linguagem, organização e fonte das informações.

PALAVRAS-CHAVE: Tecnologias Digitais da Informação e Comunicação. Cibercultura. Redes Sociais.

NOTES

1 Upon realizing that the necessary dichotomies for the development of sciences in modernity brought limits to the thoughts formed in their research on/within/with daily life, Alves (2012) began to write the pairs, which we learned to see as dichotomous, in the following way: spacetimes, learningteaching, insideoutside, localglobal, and so on. In this article, we agree with this perspective and seek to write in the same manner.

2 Quantity verified on June 14th, 2020.

3 The images were adapted in order to maintain the anonymity of the profiles participating in the research.

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