



Mathematics, Art and Manga: audiovisual culture in dialogue with young people

Matemática, Arte e Mangá: a cultura audiovisual em diálogo com as juventudes

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Abstract

This work studies the relationship between mathematics and art, considering the potential of the Manga theme in school education and the role of the media in the production of discourses that constitute youth cultures. The research has as theoretical and methodological support Cultural Studies, taking the centrality of culture in the constitution of social practices in math classes and operating with the concepts of culture and representation to look at artistic works and drawings of Manga, and recognize the relationships between mathematics and art built by the regimes of historical-cultural representation. Thus, we propose a reflection on the potentiality of Manga's drawings for the constitution of ways of looking at mathematics, helping to overcome obstacles in the understanding of this area of knowledge and enabling other spaces of production of mathematical knowledge, with the use of artifacts that are part of youth cultures.

Keywords: *Otaku* Culture; School Education; Cultural Studies; Representation.

Resumo

O presente trabalho estuda a relação entre matemática e arte, considerando o potencial da temática Mangá na educação escolar e o papel das mídias na produção de discursos que constituem culturas juvenis. A pesquisa tem como suporte teórico-metodológico os Estudos Culturais, tomando a centralidade da cultura na constituição de práticas sociais em aulas de matemática e operando com os conceitos de cultura e representação para olhar para obras artísticas e desenhos de Mangá, e reconhecer as relações entre matemática e arte construídas pelos regimes de representação histórico-culturais. Assim, propõe-se uma reflexão sobre a potencialidade dos desenhos de Mangá para a constituição de modos de olhar para a matemática, auxiliando na superação dos obstáculos na compreensão desta área de conhecimento e possibilitando outros espaços de produção de saber matemático, com o uso de artefatos que fazem parte das culturas juvenis.

Palavras-chave: Cultura *Otaku*; Educação Escolar; Estudos Culturais; Representação.

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Introduction

The generations at the end of the 20th century, said by Giddens (1994, apud Martín-Barbero, 2002) as more "detached from the figures, styles and practices of ancient traditions that define 'culture' and whose subjects are constituted from the connection/disconnection with [cultural] apparatuses", can be recognized in the young people of contemporary society who, challenged by media discourses and interactions with information and communication technologies, are impelled to consume goods and services as ways of life.

This causes these young people to organize themselves, in the midst of different cultural productions, by the ways of dressing and speaking, in the different ways of being young, as well as by the different tastes regarding the consumption of media cultural practices. These new ways that young people have to read the world need to be better understood by school, because, in this context, school is no longer the only legitimate space for the circulation of knowledge. According to Dubet (2006, apud Dayrell, 2007), the school is in increasing competition with the production of culture and with the social circulation of information, and it needs to dialogue with young people, at the risk of compromising the permanence and advancement of students in the school path.

For Martín-Barbero (2002, 2017), there is a reorganization of the models of socialization of customs and knowledge, previously centered on the model of family, school and book, with the media and technologies catalyzing a true reconfiguration in the ways of being young and involving a conflict between generations. With this, teachers find it difficult to constitute a school of this time that also values the language of audiovisual culture, in addition to the circularity and linearity of oral and literate cultures, respectively.

As Dayrell (2007) states, it is necessary to establish a dialogue with young people, considering their cultural expressions. For this dialogue to take place, teachers must recognize the relevance of working with contextualized knowledge that has to do with the daily lives of students and the society in which they live, so that they can understand how to connect classes and school content to their needs and realities.

In this work, we present a study that involves the relationship between mathematics and art, and considers the potentiality of the Manga theme in school education, seeking to recognize the centrality of culture in the constitution of cultural practices (Hall, 1997, 2016) to, from the relationship of students with the media and technologies, analyze and highlight how young people can develop school knowledge by linking these two areas of knowledge, in conducting school activities with paper toys and drawings of Manga.

Cultural Studies, Youth and Audiovisual Culture

Information and communication technologies are elements recognized as part of a "cultural revolution" (Hall, 1997), with global and local effects, and that make possible new spaces and modes of socialization, with more compressed times and faster changes in practices, which shows the central role of culture in the constitution of ways of being and

living of the subjects. The term "centrality of culture" refers to the way "culture penetrates every nook and cranny of contemporary social life, causing secondary environments to proliferate, mediating everything" (Hall, 1997, p. 22, author's emphasis), not being seen as a reflection, but as "constitutive of social life" (p. 28).

Following this same logic, language can be considered as constitutive of the facts it describes, and not just reporting them (Du Gay, 1994, apud Hall, 1997). In this sense, language and representation can be related, and discourses and practices of meaning can be considered as fundamental variables in the constitution of cultural identities, and this understanding is known as "cultural turning point".

Thus, the understanding of things is taken, not in their existence, but in their meaning, abandoning their transcendental character, since "what we consider natural facts are, therefore, also discursive phenomena" (Hall, 1997, p. 29). The meaning does not arise from the existence of things, as the "realistic" view has always assumed, "but from the language games and classification systems in which things are inserted [...] their meaning is the result not of their natural essence, but of their discursive character" (Hall, 1997, p. 29, author's emphasis).

From this perspective, according to Hall (1997), language constitutes practices of meaning and, as far as education is concerned, it can be understood that the school and teachers are subjects who can seek ways to make the school function, considering that "if the school of modernity no longer sustains itself, it transmutes itself, hybridizes into multiple crossroads and reproduces itself in the infinite discourses that enunciate about it. It certainly is not in a single way, it does not take only one form" (Costa, 2003, p. 22).

For Sibyllia (2012), the school of modernity, a transmitter of knowledge and a modeler of docile and useful citizens for the models of industrial production, no longer fits today, because neither the school nor the family would have the primacy of regulating the subjectivities of subjects. It is possible that, in contemporary society, children and young people are constituted as students, less in their relationship with the family and with school, and more in their interaction with information and communication technologies, in another context of modes of regulation, which points to the need to redefine the function of school (Sibyllia, 2012), which would not be able to meet the neoliberal demands of a market society, governed by the laws of desire and consumption.

For Souza and Gamba Jr. (2002), while orality and writing move a logic of reading and interpretation based on concentration, audiovisual culture, brought with the technological advents of interactive media and mass communication, demands a capacity for dispersion in the treatment of information that is transferred in the pulsating of images that leap to the eye, changing modes of reading and writing and their effects, especially in school education.

Martín-Barbero (2002, 2017) takes up a contribution pointed out by Margaret Mead on the conflict between the generations, recalling that with the arrival of television, there was a rupture in the forms of information control, promoting the decentralization of knowledge

and blurring the boundaries between reason and imagination, knowledge and information, work and play, with effects on the reconfiguration of family relationships and between generations. Conflict that, for the author, is aggravated today, considering young people as the first generation born in a "new country" [in the midst of digital information and communication technologies], leading adults to have to learn from youth how to take the first steps, to know how to deal with the effects of conflict in communication and understanding between generations, and possible difficulty in adapting to school objectives in the new times that arise (Green & Bigum, 2017; Martín-Barbero, 2002, 2017; Sibilia, 2012; Souza & Gamba Jr, 2002), as well as the way young people relate to leisure and work.

Regarding leisure, games and printed audiovisual materials are attractive technologies that mobilize the attention and productive energy of young people. In this universe, comic books, Mangás, Youtube videos, series and films are productions based on audiovisual culture that convey representations and produce ways of being young in this contemporaneity. In a society whose demands for technological mastery and an entrepreneurial attitude have been a form of capture, by having access to technologies and audiovisual culture, young people feel better prepared to act in a digital world that is increasingly "real" to their way of life.

However, school education uses little and sometimes demonizes audiovisual and interactive technologies, considering that they can "hinder" students' learning, which besides being a mistake, can contribute to the digital exclusion, since,

[...] while the children of the wealthy classes interact with the informational and communicative ecosystem through the computer and videogames they find in their own home, the children of the popular classes - whose public schools do not have, for the most part, the least interaction with the computer environment, [...] - are being excluded from the new work and professional space that the current technological culture already configures. (Martín-Barbero, 2002, p. 7, 2017, l. 1416, our translation)

In this sense, it is necessary to consider the possibility of the school constituting itself in the production of new practices that can aggregate this "[...] whirlwind of visual and sound stimuli that crosses us daily [and] announces the need to update our concepts on reading and writing, incorporating the experience with the new sign images" (Souza & Gamba Jr., 2002, p. 106). However, it is not about

[...] of using technology only as a way to expand the old forms of teaching-learning, or to have the media in school as a means to alleviate boredom in teaching, but it is a radically new way of inserting education into the complex communication processes of today's society (Martín-Barbero, 2000; Martín-Barbero & Rei, 2001, apud Souza & Gamba Jr.)

This does not mean to "exchange" orality and writing for audiovisual culture, but to associate artifacts of orality and writing with other cultural artifacts. Many young people are youtubers or streamers, others produce content on blogs, podcasts or video casts, others work subtitling series on platforms like Viki.com, others are Mangakás or subtitle Mangás and HQs for online dissemination and reading. These are some examples of writing and reading modes that, associated with art, can enter classrooms and expand teaching and learning

possibilities.

The Exercise of a Historical-Cultural and Mathematical Look for Classical Artist Works

Trying to point out the association between mathematics and art, some works of classical artists were selected, in which it is possible to perceive art, in its aesthetic, scientific, pedagogical, historical and cultural aspects, represented by forms and images of flat and three-dimensional figures.

According to Zaleski Filho (2013, p. 164), "art and mathematics were born together as human attempts to establish order in the existing chaos", and this is a way of organizing the subjects' thinking and helping in the interpretation of the reality around them. While mathematics creates models, categorizes numbers, and formulates theories that become tools in solving humanity's problems, art, with its spatial organization, places in order, proportion, and symmetry the patterns of aesthetics and the definition of artistic beauty. Throughout history, mathematics and art have constituted ways of understanding the world.

Prehistoric art had in the cave paintings representations about the ways of being and living of that time. The drawings showed hunters, angry herds and injured animals, representations of what was their reality, however, in making such representations, they shared senses to the practices, involving the hunts and producing knowledge about the subject.

In the Neolithic period, the objects were decorated with geometric patterns. Also, in this period, bones were found with markings, which suggest the mastery of counting, such as the Ishango bone, a baboon fibula with a sharp quartz stone embedded in one of the ends, being considered the oldest evidence of the relationship between mathematics and art (Zaleski Filho, 2013).

The medieval period, according to Machado and Flores (2013), prioritized the transmission of information over the portrayal of realistic scenes. With this, the sizes of the characters were determined by their social status, without considering mathematical aspects (proportion and perspective). This can be seen in the disposition and size of the bodies, in a time (XIII century - 1285) when there was no commitment to the "real" proportion or dimension of artistic creations (Figure 1).

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Figure 1. Hints of Pepo (Cimabue). Majesty. 1285-86.
Source: Web Gallery of Art³.

Art has always sought to represent ways of seeing the world, and these representations have changed in different historical periods. In the Renaissance period, the scientific view represents the construction of more "real" images, so it is noticeable the care with symmetry, proportion, depth etc., as in Leonardo Da Vinci's Renaissance painting (15th century - 1498) (Figure 2).

³ Withdrawn October 2, 2018, from: <http://www.wga.hu>.



Figure 2. Leonardo Da Vinci. The Last Supper. 1498.

Source: Web Gallery of Art⁴.

In this work, a perspective is used that gives depth to the painting, with the proportion of bodies and spaces, besides the notion of infinity, which was being much discussed at the time, when showing the world through the window, "a visual field [that] is limited by the visual pyramid at the same time that it is impelled to infinity, to a near and fictitious infinity, to the vanishing point" (Flores, 2007, p. 56). The symmetry in the work is shown in the architectural pattern drawn and painted, but also in the emphasis on the main information of the painting, with six apostles on each side of Jesus, divided into groups of three.

It was in the Renaissance period that the change of themes began, which until then had been exclusively religious, transforming the paths of art (Flores, 2007; Machado & Flores, 2013). In the representation of the Holy Supper (Figure 2), the painting of the environment and the world, seen through the window, broadens the information, also giving visibility to nature.

If, previously, the knowledge of the world and of men was under the power of religious entities, it was up to man only to learn the teachings provided in the sacred texts and in the texts of tradition, with the discovery of reason the subject of knowledge comes to know and represent the objects of knowledge. (Flores, 2007, p. 111)

Concomitant to the emergence of perspective techniques and human anatomy drawing, this was a period in which the use of geometric perspective and geometry of the human body made possible a realistic representation of life, according to the scientific knowledge applied to art, which ended up giving greater recognition and status to artists (Flores, 2007; Machado & Flores, 2013).

⁴ Withdrawn October 2, 2018, from: <http://www.wga.hu>.

In modernity, art has been driven by technological expansion and by political, social and economic transformations in society. According to Coelho (2005, apud Francisco, 2015, p.5), at that time, with the separation between "science, art, morality, laws, politics, [...] science gained autonomy; [and] art became [no longer] representative of the limits given by religion. With this, new artistic styles were imposed.

As for the artists, these, trying to order the modern arts, created movements with the suffix "ism" to differentiate the multiple styles, classifying art in movements with cubism, neoplasticism, Dadaism, surrealism, abstractionism, etc. (Zaleski Filho, 2013).

As an example, cubism would have broken with the traditional perspective, proposing different points of view of an object or figure, in a single painting (Francisco, 2015), referring to a deformation of reality, by suggesting a fourth dimension.

Cubists paint objects as if they were being seen from several different angles, (...) inducing a fourth dimension, by making it possible to see the same object from the front, in profile, by the contours. Their style of painting and representation creates a new reality, no longer as it is seen, but as it is thought, defining a simultaneous and multifaceted vision of the various aspects painted on the canvas. (Flores, 2010, p. 285)

The work "Guernica" (1937), by Pablo Picasso (Figure 3), problematizes the horror and tragedy that occurred in the city of Guernica, a place where a German air bombing occurred during the Spanish Civil War⁵. With a mathematical look, one can recognize, in this work, elements of geometrization and symmetry.

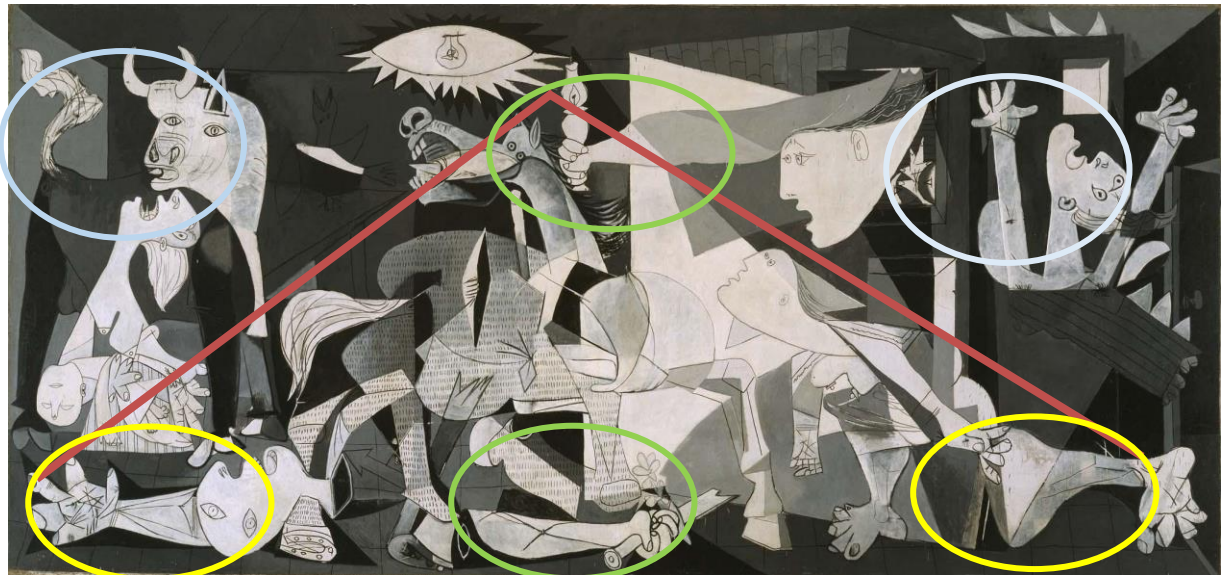


Figure 3 Pablo Ruiz Picasso. Guernica. 1937. Oil on canvas. 349,3 x 776,6 cm.

Source: Reina Sofia Art Center National Museum⁶.

⁵ This work represented Spain at the International Exhibition of Arts and Techniques in Paris in 1937.

⁶ Reina Sofia Art Center National Museum. Withdrawn on January 31, 2018, from: <http://www.museoreinasofia.es/en/collection/artwork/guernica>.

If a vertical line is drawn in the center of the canvas, one can notice the existence of images that harmonize on either side of the painting, giving a feeling of symmetry, such as the horn and tail of the bull on the left and the hands raised from the citizen on the right, or the arm extended to the left, and the leg extended to the right, or even the arm holding the candle and the arm holding the sword in a movement of symmetrical reflection on the horizontal and vertical axes.

Returning to Renaissance art, the influence of models and studies from ancient Greece is pointed out, with techniques of human anatomy drawing based on canons, which established a system of proportions for the representations of human figures.

[...] created by Policleto de Argos, who around the fifth century B.C. wrote a treatise entitled the Canon or Canon. The treatise consisted of a system of proportions which was established between a basic unit and the length of various parts of the body. (Souza & Zordan, 2013, p.102)

Later on, the Argos Polycycle, other painters and sculptors followed the representation of the human figure through canons (Figure 4), but creating their own models, such as Vitruvio (1st century BC), Poussin, Jean Dominique Ingress, Leonardo Da Vinci, Albrecht Dürer, Piero dela Francesca (Souza & Zordan, 2013). Thus one can think that the model, based on canons, even with different interpretations, lasts to the present day, being recognized in Manga style human figure drawing techniques (Figure 5), in which proportions based on the number of heads are used, with characters that can measure from six to ten heads.

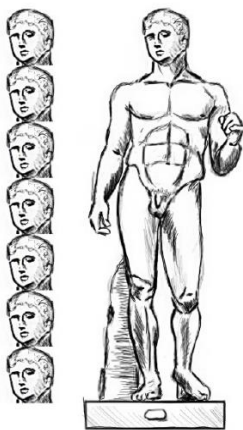


Figure 4: Argos polycycle. "Doriferous" with representation of 7 heads. Digital illustration: Anderson Luis de Souza.

Source: Souza & Zordan, 2013, p. 103.

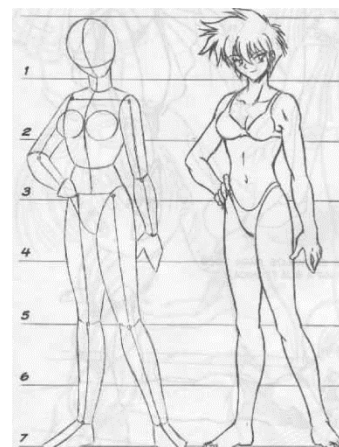


Figure 5: Manga style human figure drawing technique. Female body with 7 head height.

Source: Magazine Curso Básico de Mangá N° 05. How to draw Manga - Gatinhas. Editora Escala.

When drawing or looking at images, one goes through a process of representation of what one experiences, being able to combine artistic thinking with logical mathematical

thinking, through audiovisual culture, recognizing spaces, measures, proportions and geometrization of forms. Thus, perception is not determined only by material or scientific aspects, but by a cultural and discursive dimension, since the representations are filled with interpretations that depend on the subject's experience with regard to the meanings he gives to the objects about which he speaks.

From the understanding of the possible and productive relationship between art and mathematics, we consider the potentiality of valuing audiovisual culture for school education, because,

Investing in the relationship between Mathematics and Art, considering Art as a place where ways of looking and thinking are put into practice, may contribute to the construction of geometric knowledge, to the development of spatial perception skills, to the elaboration of mathematical knowledge, considering visuality as a means of problematizing and conceiving new forms of geometry. (Wagner, 2012, p. 115)

Flores (2007, 2010, 2015), in studies in the field of Mathematics Education, uses drawing and art as a form of mathematical experimentation that dislocates views on mathematics and historically and socially constructed proportionality, so that "[...] the experience is installed as a possibility of an education, of 'transformation'" (Flores, 2015, p. 249) and produces a poor pedagogy (Masschelein, 2008 apud. Flores, 2015), in the sense of working with another look at the object, from experimentation.

In this study⁷, an experience developed with students of 6th grade in elementary school is presented, who were instigated to perform a mathematical look at the works of artists of different times and styles, the construction of the three-dimensional from paper toys, and the drawing of human figures in Manga style. These students discussed measurements, the use of ruler, protractor and compass, proportion and perspective, while making relations with cultural artifacts of youth. In addition, the mathematical discussion arose from their use in drawing techniques and made it possible to look at math teaching and the visions about this science in School Education.

The experience with the use of Manga drawings in math classes made it possible to hold discussions on art, math and science, producing spaces for dialogue about these relationships and how they are approached at school or even forgotten due to compartmentalization in school subjects. Thus, the importance that artifacts of audiovisual culture, such as Mangá and paper toys, can print is made known, in order to make possible the construction and circulation of mathematical senses different from those of daily school life, of literate culture.

Otaku Culture, Manga Drawings and School Education

Mangás and Animes are artifacts of Japanese audiovisual culture, which are part of the otaku culture, a culture that has in information and communication technologies and

⁷ Referring to the Master's dissertation done at the Graduate Program in Science and Mathematics Teaching of the Federal University of Pelotas (UFPel). Available at: <http://guaiaca.ufpel.edu.br:8080/handle/prefix/4794>.

consumption, support for the production of collections of comic books and collectibles, the making of costumes for parades of characters and the intense funding of the online game market.

In Brazil, events of the otaku culture are promoted in some state capitals of the federation, which gather young people to share experiences, socialize common interests and consume goods and services of this culture, like the Anime Friends, in São Paulo, which moves an audience of about 50 thousand people in four days of event, being the largest in the country.

Japanese comics readers, in its majority, have the brands of this time, guided by consume, image and speed. It impresses that the Japanese media culture has influenced a generous portion of young Brazilians who sometimes call themselves otaku, and have been building a new youth representation deeply related to media and technologies.

In the case of Manga, the term is associated with comics of Japanese origin or made in the Japanese style. It has its roots in the *ê-makimono*, which associated paintings and texts on scrolls of parchment, to unveil a narrative as they were unfolded. The *ê-makimono* appeared during the Nara period (7th century AD), however, the term Manga was first used only in 1814 by the ukiyo-e painter Katsura Hokusai (1760-1849), who bound 15 successions of drawings, baptizing them Hokusai Manga (Faria, 2007).

Luyten (2012, p. 20) indicates that, in part, the expansion of the Mangas in Japan was due to the "perennial interest in the figurative in oriental culture," evidently preponderant when compared to western culture. According to the author, the characters in Japanese writing have the tradition of originating from the abstraction of traces of pictorial representation, different from our alphabetic writing that is not related to the form of the object, individual or real or fictional event of which it speaks.

Luyten (2012, p. 22) also points out the difficulty of Kanji writing, since it implies the recognition by the reader of at least two thousand ideograms. This means that not all Japanese people, even with a high literacy rate, are able to read texts that are apparently simple in our culture, hence the relevance of Manga in Japan, as a low-cost, easy-to-read printed media.

Several Mangás have given rise to Animes, although the reverse process also occurs. Osamu Tezuka, in the 50's, was the great responsible for revolutionizing the Mangás and the Animes, transforming them into the current models, with the increase of the eyes and adding to the comics, the techniques of cinematographic framing and animation (influenced by Walt Disney and Max Fleicher) (Faria, 2007).

Westerners differentiate the comics, in general, from the Mangas, according to characteristics that the Japanese style prints on their drawings and stories. Among these characteristics appear: characters with big eyes, to make it easier to highlight their facial expressiveness; stylized onomatopies, drawings in black and white, on newsprint with reticles for light, shadow and speed effects and kinetic effects that make the actions performed more emphatic and visual (Figure 6).



Figure 6: Manga Bleach. Onomatopoeia and film framing format.

Source: Mangá Bleach. Volume 1, Chapter 1, p. 36⁸.

Another difference concerns the stories, which are produced for different audiences, dealing with different themes. The main types of Manga are classified into: Shounen - stories for boys, combining action and adventure, associating values like friendship, courage, teamwork and fidelity; Shoujo - stories for girls, almost always with some romance as the main story, emphasizing daily and school life, focusing on psychological and emotional themes; Seinen and Josei - stories for adult male and female audiences, respectively, dealing with issues from everyday life, work and daily relationships, focusing on philosophical and dramatic themes; Kodomo - simpler and more educational stories, aimed at the children, with active participation of animals.

Besides these, they can be found with the classification by gender: action and adventure (Nekketsu), sports (Spokon), drama (Gekiga), robots (Mecha), going to more polemic themes, such as those that deal with gender issues (Yuri "romance between girls" and Yaoi "romance between boys") and sexual and erotic themes for adults (Hentai and Echi).

⁸ Download Union Mangás website. Withdrawn October 13, 2018, from: <http://unionmangas.site/leitor/Bleach/01>.

Unlike several successful Western comics, which can be published for up to sixty years, with short and independent stories, and with anachronistic characters that most of the time do not age, the Mangás have a definite theme and ending. Their characters, including those with superpowers, often age and have children, like Goku de Dragonball and Aihara Kotoko de Itasura Na Kiss.

Mangás are released in numbered volumes, which together compose a narrative with beginning, middle and end, usually in brochure format, with a square spine like that of books, being read in oriental mode: from top to bottom, but back to front and right to left.

In addition, they can be recognized as the fruit of hybridization between texts and images, fixed and sliding identities, which enable "the construction of a post-modern imaginary, while fully breaking with its modernist roots" (Faria, 2007, p. 121). The author (2007) identifies concepts of postmodernity in characters that do not always follow the ideal of perfection and purity of western comics, whose values are coined in modern society. The story of Mangá Ranma ½, reported below, shows characters with slippery identities and "imperfect" behavior for modern conceptions.

In Rumiko Takahashi's ½ Ranma, published in 1987, the main character, Ranma, is cursed when he falls into a lake in China. The curse consists in: every time he comes in contact with cold water he becomes a girl, and with hot water he becomes a boy again. In addition, Ranma is a rude, rude and irreverent boy, a kind of anti-hero. (Faria, 2007, p. 106)

In this sense, it becomes possible to perceive Manga as the fruit of cultural hybridization (Hall, 1997), in which distinct cultural styles have amalgamated into a new composition. Its style, built with the North American influence on Japanese culture, was intertwined with the traditionally Japanese comic style and the "genuinely"⁹ American comic, amidst the expansion of cinematographic technologies, resulting in a hybrid: the "updated" Japanese comic Mangá, a "mix" of styles inherent to the different cultures that compose it.

Winterstein (2009) states that Brazil was one of the first countries in the West to appreciate Mangás, with the exhibition of the tokusatsu Jaspion and the Anime Cavaleiros do Zodíaco, by the extinct Manchete Network in the 1980s, however, the greatest visibility of this media occurred in the first two decades of the 2000s.

The expansion of Manga from Japan to other countries takes place mainly through internet forums and file sharing sites without copyrights and/or editorials. In the case of Brazil, it occurs through the Brazilian otaku community, which, in an amateur way, scans and translates the Mangás and subtitles the Animes into Portuguese.

⁹ The word in quotation marks appears for lack of an expression that better emphasizes the cultural differentiation among the artifacts mentioned there. We make it clear that the ideal of cultural purity does not exist in a globalized society, and the American culture itself, for example, is the fruit of English colonization and the historical events that built its ways of life, so that this new culture emerges from complex movements that articulate themselves, such as the colonization process in articulation with the territory (contact with the peoples already existing in the contested territory, with climatic and geographic conditions, etc.).

It is important to point out that at the entrance of oriental media into western culture, a "mix" occurs from the translation of the comic book text into a new cultural context. An example of what can be considered a hybrid ("mix") is the Anime Yu Hakusho, dubbed in Portuguese and broadcasted by Rede Manchete, which became famous for incorporating into the story, popular Brazilian sayings¹⁰ such as: "*Rapadura* is sweet, but it isn't soft!", "It's not the *pamonha* car, but it interfered anyway right? Obviously, these would not be expressions used in Japanese Anime, but a translation of the cultural artifact to Brazil, which produces a hybrid Anime, sharing new senses and producing other types of subjects in the relationship with this media.

For Barral (1999, apud Winterstein, 2009, p. 27), otaku culture in Japan is associated with "the result of an oppressive society in an era of economic prosperity, unbridled consumerism, and strong competition in schools," which could generate individuals cloistered from the rest of society and strongly linked to social experiences only in virtual reality environments. On the other hand, Brazilian otakus are characterized by the sociability that occurs, not only in virtual environments, but also by more collective experiences, the sharing of information and media, or the search for friendships that have the same interest for Japanese pop culture in events related to this culture (Winterstein, 2009). For this author:

There is a great fear among Brazilian otakus of being taxed as antisocial, excluded individuals and the social coexistence part. Perhaps the fear of a stigmatization that defines them as individuals averse to coexistence is that sociability and the 'willingness to make friends' have become intrinsic to the very idea of what it is to be otaku in Brazil. (p. 29)

In addition, the importation of this media into Brazil implied a "re-appropriation of codes [...]. The 'read mangás' in Brazil, despite having Japan at the center of the whole process of meaning is not equal to 'read mangás' there" (Winterstein, 2009, p. 22-23). The author relates the Otaku culture in Brazil, not only to the reading of Mangas, but to the need of young people to manifest a knowledge that puts them close to Japan, demarcated by the desire for a traditional Japanese culture idealized, which relates to food, clothing, music, language, martial arts, electronic games, etc.

Winterstein (2009) also points out the strong relationship with the image manifested by the use of facial expressions, gestures and specific mannerisms of Animes and Mangas, the use of accessories and costumes (cosplay) and communication by plaques, recurrent practices in Brazilian events, related to the condition of youth that relates to the otaku culture. The plaques are a way for young people to make friends in events, maintaining a certain distance and security (in the same way that occurs in the virtual environment), where those who are questioned by what is written on the plaque can, or not, interact.

These signs are made of paper by the young people themselves or bought in kits, accompanying pen and eraser. They function as balloons of comic books where otakus can

¹⁰ YouTube. Withdrawn October 6, 2018, from: http://www.youtube.com/results?search_query=Yu+Yu+Hakusho++Frases+Brazilian

write questions, talks or polls, as a way of communication that escapes orality and, at the same time, gives them a sense of belonging to the environment. In one of the events, it could be read on a plaque "I have a plaque, therefore I exist", indicating a way of belonging to the otaku culture, as part of the same way of life (Winterstein, 2009, p.52).

For Martín-Barbero (2002, 2017), the ways in which young people travel through cities are related to the expansion of anonymity, similar to the way they live in information and communication networks. The plaques used in the conventions are an example of this mode of contact, which often occurs in cities through billboards and electronic equipment, avoiding direct contact with the other. Thus, it is possible to recognize that

[...] the new ways of inhabiting the city of anonymity, especially by the generations who were born with this city, either by grouping themselves in tribes whose connection does not come from a fixed territory or from a rational and lasting consensus, but from age and gender, aesthetic repertoires and sexual tastes, lifestyles and social exclusions. (Martín-Barbero, 2002, p.3; 2017, l. 1309, our translation)

Hall (2014, p.11), in dealing with the postmodern subject, states that the identity of this type of subject "becomes a 'mobile celebration': continually formed and transformed in relation to the ways in which we are represented or challenged in the cultural systems around us. In this sense, young people in general, and especially those of Otaku culture, have their identities largely related to image and technologies.

The movement on issues of tradability within cultural differences, whether by defining the word otaku (in Japan and Brazil), or in relation to modes of consumption or ways of living in relation to the Internet, otaku culture, Mangas and Animes promote a cultural hybridization that takes place from the relationship of young people with Japanese media cultural artifacts, a local culture and a broader global culture. As Martín-Barbero (2002, p.4, 2017, l. 1320, our translation) states, it is "the identity that is managed in the des-territorializing movement that crosses cultural demarcations, because, detached, cultures inevitably tend to hybridize.

In a research work with students, Santoni (2017) interviewed young people who said they prefer Mangás and Animes, for the complex stories, with beginning, middle and end, and characters that mature and age in the development of the plot. According to the author, the young people recognize life teachings in these media, mainly that life is difficult, that many times we don't get what we want and that to reach the objectives it is necessary fight and perseverance.

These young people usually begin to watch the animes motivated by scenes of violent fights, because "it is visual, imagetic and attracts people's interest [...]" (Santoni, 2017, p. 92), but after this first contact, they begin to identify themselves by the characteristics of the characters: introspection, leadership, perseverance, courage, elevation of status given to collectivity and friendship, etc.

For Luyten (2012, p. 56 - 57),

In modern manga, heroes are drawn from the real world. This is where the fundamental difference with Western characters lies - they are ordinary people in appearance and modest conduct. They can be company employees, students, apprentices in restaurants, sportsmen, housewives, who, however, in the course of the plot of the story, can accomplish fantastic things. [...] They can be anything they want, in their imagination, as long as they stick to the norms of their social life. The reader identifies with the hero because they portray his daily life and send him into this fantasy world.

In the Santoni (2017) study, most students said they would like Animes and Mangás to be used in classes because they know these materials and say they are part of the conversations with friends, and they like to draw the characters in art classes when there is a possibility. For the author, although it is not foreseen in the curriculum or in the school's practices to work with comics, it would be possible to carry out activities with the Manga theme in the school, because the teachers would have autonomy to work with themes that would enhance teaching, in their areas of knowledge.

[...] comics, as well as other elements of pop culture, be it music, TV series, internet, games, can act as playful ways of working on teaching, and can be used by teachers to stimulate students' interest in certain themes, [...] in understanding ideas and/or problems. (Santoni, 2017, p. 118)

In relation to hybridization, this is also shown in the textual genres, in narratives constituted in the experiences of students with the media. Araújo (2013) considers the potentiality of bringing audiovisual culture articulated to school education, for example, in textual production classes (Portuguese), as a way to confront the negation of the school and teachers for the insertion of verb audiovisual narratives¹¹ to the text genres consecrated and legitimized by the academy, defending the need for a reflection on the modes of teaching, to "cover the various uses, practices and forms of written language in different media, their modes of registration, insertions, use of expressive resources, their genres [...]" (p. 34).

It is noteworthy that in the dialogue with different authors (Dayrell, 2007; Green & Bigum, 2017; Hall, 1997, 2014, 2016; Martín-Barbero, 2002, 2017; Sibilia, 2012; Souza & Gamba Jr., 2002, among others), cultural changes are pointed out that reorganize the writing and reading media, and that these changes operate in the identities of the young people born with the technological and media revolution, producing other modes of representation. Thus,

[...] this great cultural and epistemological change [youth cultures - literate in the media and culture of the elderly - literate in the print] involves changes in terms of technology and pedagogy and, therefore, new understandings of the relationship between technology and pedagogy, schooling and media culture. (Green & Bigum, 2017)

All this points to the use of audiovisual culture in the school environment, which can occur in different areas of knowledge, including mathematics, making it possible, with the

¹¹ The author uses the term verb visual narratives, referring to printed media (HQs and Mangás) and technological, television and cinematographic media.

use of new writing and reading media, to relate art and mathematics through work with images and drawings, in order to favor the understanding of concepts and the development of skills that help students learn.

Final Considerations

The study carried out in this work on the subject of Manga shows the connection between the otaku culture and information and communication technologies, especially the Internet, pointing to the transit of young people between online and offline, to access and share media and also to form friendships that, They can either appear in a virtual form and become face-to-face, or they can begin in events, with continuity in the virtual space, showing that the Internet operates as a living environment, in which young people produce stories and share interests and problems of adolescence, with effects on their daily practices and the constitution of their identities. In other words, the virtual space deterritorialized produces practices of meaning that configure new ways of being young, and this should be considered in school education.

When considering the possibility of redefining school and curricular objectives in order to adapt them to the contemporary context, this work points out the audiovisual culture that, associated to this new time, brings changes in the ways of reading and writing commonly used in the school environment and that need to be rethought in order to broaden the understanding about young people and the way they move in society, as well as to problematize the role of school in this contemporaneity.

In this sense, the articulation between mathematics and art, through the drawing of human figures in the Manga style, makes it possible to look at this artifact of audiovisual culture as a way of understanding notions of measurement, perspective, proportion, symmetry, etc., and to contribute to overcoming obstacles in the communication between generations and in the reorganization of school objectives, considering other spaces of production of mathematical knowledge, with the use of media and digital information and communication technologies.

In other words, it is important that the school looks for ways to dialogue with young people and that it considers the contributions that audiovisual culture can make to school education and curricular innovation.

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