Analysis of the applicability of animation films as a teaching tool in natural sciences and biology

Análise da aplicabilidade de filmes de animação como ferramenta de ensino em ciências e biologia

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ABSTRACT
Currently, it is possible to observe a significant lack of interest in Basic Education students; individuals for whom information is available increasingly quickly and easily via the internet. With this cultural profile, the search for innovative methodologies that attract attention in the formal teaching environment becomes a necessary challenge for teachers. In this research, analysis and description of several aspects of children’s animations were made that can be addressed in Natural Sciences and/or Biology classes, allowing its use as a rich teaching-learning tools. Analysis of 9 films (Portuguese dubbed versions for Brazil) was made: “A Bug’s Life”, “Rango”, “The Lion King”, “Rio”, “Finding Nemo”, “Brother Bear”, “Happy Feet”, “Happy Feet Two” and “Wall-e”. The main contents observed in the animations were those in the areas of ecology, zoology, environmental education and evolution. It was observed that realistic characteristics can be used for the demonstration and visualization of the contents and the errors, also very present due to cinematographic objectives, can serve for the development of a critical sense. It was concluded that animations present beneficial characteristics for the learning of Natural Sciences and Biology and also for the development of the student, both by the knowledge transmitted and by the ease of memorizing information added to already known sources.

Keywords: Methodology, Teaching, Natural Science Disciplines, Motion Pictures, Animation.

RESUMO
Atualmente, é possível observar significativa falta de interesse em alunos da Educação Básica, indivíduos para os quais informações estão disponíveis cada vez de forma mais rápida e fácil via internet. Com esse perfil cultural, a busca por metodologias inovadoras que atraiam a atenção no ambiente formal de ensino se torna um desafio necessário para os professores. Nessa pesquisa foi feita análise e descrição de diversos aspectos de animações infantis que podem ser abordados em aulas de Ciências e/ou Biologia permitindo sua utilização como uma rica ferramenta de ensino-
aprendizagem. Foi feita análise de 9 filmes (versão dublada em língua portuguesa para o Brasil): “Vida de Inseto”, “Rango”, “o Rei Leão”, “Rio”, “Procurando Nemo”, “Irmão Urso”, “Happy Feet - O Pinguim”, “Happy Feet 2 - O Pinguim” e “Wall-e”. Os principais conteúdos observados nas animações foram os das áreas de ecologia, zoologia, educação ambiental e evolução. Foi observado que características realistas podem ser utilizadas para a demonstração e visualização dos conteúdos e os erros, também muito presentes devido a objetivos cinematográficos, podem servir para o desenvolvimento de senso crítico. Conclui-se que as animações apresentam características benéficas para o aprendizado de Ciências e Biologia e também para o desenvolvimento do aluno, tanto pelos conhecimentos transmitidos quanto pela facilidade de memorização de informações agregadas a fontes já conhecidas.

Palavras-chave: Metodologia, Ensino, Disciplinas das Ciências Naturais, Filmes Cinematográficos, Animação.

1 INTRODUCTION

Nowadays, a great challenge for Education is to maintain students’ focus on their studies, since many of them see classes only as an exhausting obligation. Therefore, learning needs forms, methods and media that are more varied and also speculative (HAVIZ, 2018). Considering the students' attention spans, the education methodology needs to add new ways of involving them; the search for alternatives being essential so that the interest is aroused and maintained when it comes to learning, for that, the interactive methods could be quite efficient, however, it is not very common to study these methodologies (KLEMENC-KETIS; KERSNIK, 2011; RULE; AUGE, 2005).

Many subjects addressed in Natural Sciences and Biology classes are identified by students in their personal experience, such as health problems, environmental issues, among others. However, even with this approach to reality, interest is often lost, and the teaching-learning process is impaired. This problem could be reduced if components of the student’s experience outside school, considered pleasurable, were brought into this environment, showing an integration between the knowledge that must be acquired in a formal educational institution and constant information in their personal lives, which are not usually considered of great scientific importance.

The contextualization of formal education with informal sources of learning, often disregarded, can help students understand that often they create a prejudice against science, identifying it as an area of difficult understanding and ignoring its presence in less-expected places. In this way, cinema, considered as a cultural mediator, enables the idea of reconstruction, and can also lead students to imagine what they did not experience directly (MARTINS; SILVA; DELIBERADOR, 2018). Films, currently very present in the daily lives of school-age youth, are becoming increasingly easy to access. However, even with the practice of watching films being widespread, many teachers use them only as illustrations, without exploring their possibilities in the classroom (MARTINS; SILVA; DELIBERADOR, 2018). In the 21st century, for learning to be
considered true, the individual must not only be able to memorize and repeat facts, but also have the ability to gather, organize and evaluate information using it to solve problems and innovate ideas through new technologies (JIMOYIANNIS, 2010). What is in line with problematizing education, which focuses on the protagonism of the student, who starts to be considered as the center of his educational process and also as a constructive agent of his own learning, (WEYH; NEHRING; WEYH, 2020).

It is true that different cultural, social and economic situations must be considered, but nowadays, due to technological development, an important change has occurred in the way digital tools take their place in society, a factor that has great potential to improve the teaching and learning process (VOOGT et al., 2013) if the available resources allow this use. Thus, teachers can act by instigating and guiding the development of reflection and critical thinking from films (MARTINS; SILVA; DELIBERADOR, 2018). A great debate has been evolving among researchers, policy makers and educators regarding the integration of ICTs (Information and Communication Technologies) in education since the 1990s (JIMOYIANNIS, 2010). However, its application in schools was driven more by the conformity of technology than by pedagogical and didactic demands (JIMOYIANNIS, 2010). It is necessary that the use of these technologies is not considered as a special event or as an extra tool that contributes to what is considered traditional; it is essential that the use is conceived in pedagogical dimensions (JIMOYIANNIS, 2010).

Some genres of films have already been studied as teaching tools: Rose (2003), verified the quality of science fiction films in order to identify their usefulness in promoting the public's understanding of science, in addition to also seeking attractive tools for involving non-scientist students. There are studies that also demonstrate other methodologies, such as the use of demonstrative animations and documentaries (BARNETT; KAFKA, 2007; KAPUCU; CAKMAKCI; AYDOGDУ, 2015; O’DAY, 2007; STITH, 2004), however, their themes are already directly related to the Natural Sciences, being able to clearly contribute to learning in this area and to critical development.

Children's animated films, on the other hand, often present plots that develop in natural environments with wild animals and show relationships between living beings, their interactions with their environment, etc., and may also present other implicit or explicit information that generate reflections on values. Thus, these films may present a potential that has not yet been explored, which makes it possible to demonstrate the content covered in the classroom more clearly and in a more attractive way, especially for younger children, as it is a pleasant film and not a documentary, considered tedious by many. When watching a story, information is usually assimilated more easily because it comes from a source of fun and distraction, which can end up generating greater interest
and absorption of knowledge than conventional explanations. In addition, films usually offer their viewers both affective and cognitive experiences (SMITHIKRAI, 2016) and, more recently, teachers argue that this tool can generate mental images that last longer, being related to scientific theory (BARNETT; KAFKA, 2007).

Despite being very present in the daily lives of children and presenting the possibility of being used in favor of the teaching-learning process, there are not many studies about children's animated films in the literature. Even so, some research shows positive results with the use of these media such as "Finding Nemo", "The Lion King" and "A Bug’s Life" (also used in this work) in Natural Sciences and Biology teaching, demonstrating that the practice can promote improvements in the educational process (SOARES; VIEIRA; FONSECA, 2014; FRIEDRICH; SANTOS, 2010).

Although there are many positive aspects to the use of films, not all teachers use this resource: Jimoyiannis (2010) identified that the main difficulties presented by teachers regarding the use of ICT in their classes involve the school context, including the status of the schools and the educational system. There is a need to comply with a large content established by the curriculum and teaching material, in addition to the restrictions made by science books, the need to prepare for exams and the resistance of schools to change (JIMOYIANNIS, 2010). This causes teachers to conform to the established instructions in school culture and practices (JIMOYIANNIS, 2010).

Thus, the objective of the present work was to analyze and describe in detail the various aspects of nine children's animations (versions dubbed in Portuguese - Brazil) that can be used in Natural Sciences and Biology classes. The research also seeks to present more clearly the content present in these films so that Basic Education teachers can more easily apply this innovative teaching tool.

2 METHODOLOGY

Nine films were chosen for description: "A Bug’s Life", "Rango", "The Lion King", "Rio", "Finding Nemo", "Brother Bear", "Happy Feet", "Happy Feet Two" and “Wall-e”.

The films were selected because of their information of educational interest. Other films were considered, but their description was discarded because they did not present enough characteristics relevant to the theme (Natural Sciences and Biology teaching), diverging from the purpose of the present work.

Since the same film can present information related to different themes, each animation is analyzed separately addressing the sub-areas of Biological Sciences.
3 RESULTS

“A BUG’S LIFE”

The plot is focused on the life of ants, and the protagonist, one of the inhabitants of the anthill, causes an accident harming all the ants, which makes him go out in search of help to solve the problem (A BUG’S…, 1998).

As for the Ecological content, the perspective of insects in relation to a predator (a bird) is shown, illustrating the interactions in a food chain, as well as the dynamics of society developed in an anthill (A BUG’S…, 1998). The search for food is also demonstrated; however, this relationship is treated as slavery in which locusts feed on what ants collect (A BUG’S…, 1998). The environment in which the anthill is located is a place with little vegetation, mostly grass (with only one large tree), illustrating a semi-arid environment, and in some scenes, the vegetation is even poorer, with only some cacti indicating the setting in a desert (A BUG’S…, 1998).

Regarding Zoology, the film shows anatomy to a certain extent realistic for some insects such as grasshoppers and woodpeckers, for example (A BUG’S…, 1998). However, there are errors such as bipedalism in most species (A BUG’S…, 1998). One can also mention the number of appendages of ants, fleas, praying mantis, ladybug and butterfly that are presented with four legs instead of six, as with real insects (A BUG’S…, 1998). The heads are also not realistic in general: the eyes of the insects do not respect their compound characteristic formed by omatids, in addition to differences in the mouth etc. (A BUG’S…, 1998). An interesting event for discussions about arthropods is a scene in which it is possible to observe an exoskeleton being abandoned by a grasshopper, a characteristic typical of the phylum (A BUG’S…, 1998). Although the ecdisisis portrayed in little detail and as very fast compared to what occurs in nature, it is possible that a simplified visualization of the structure is made, facilitating the understanding of this concept (A BUG’S…, 1998).

“RANGO”

This film takes place in a Californian desert (United States of America), and is played by a chameleon who has lived his whole life as a pet and finds himself alone in the arid environment due to a car accident that forces him to face the adversities of this new habitat (RANGO, 2011).

For the teaching of Ecology it is possible to observe the well-illustrated desert biome, also showing some animals that have underground habits, which is essential to protect themselves from extreme heat and survive in such an environment (RANGO, 2011). The concept of the food chain is also extensively explored and shows how the elimination of one species affects the others, causing
an imbalance: a snake that did not frequent the city for fear of its predator, an eagle, starts to frequent it after its death, causing concern in several other species that could become its prey (RANGO, 2011).

For Environmental Education, the lack of water is the most relevant subject in the film, and it can be widely addressed in classes because there is a constant concern regarding the lack of this resource, being an essential awareness (RANGO, 2011). The story uses the idea that whoever has water has more power, even keeping it in the city bank, which can generate great reflection on a future in which water becomes even scarcer, more valuable and in the possession of a few (RANGO, 2011).

In relation to Zoology, several species of reptiles (snakes, lizards, turtles, etc.), birds (eagles and owls, among others) and some characteristic mammals such as moles are shown, however, there is not much realism, the greatest aggravating factor being the characterization of animals as people (with hair, clothes and accessories), in addition to having altered eyes and bipedalism (RANGO, 2011). Another fictitious feature that deserves to be highlighted is the presence of a revolver where the snake’s rattle would be located (RANGO, 2011).

Human interference in this film is presented as harmful, this species being blamed for the main problem, the lack of water, due to its use for irrigation of golf courses and for the maintenance of a large neighboring city (RANGO, 2011), demonstrating waste, the need for conscious consumption, and also how our daily attitudes cause harm to other species.

“THE LION KING”

This film presents the journey of the protagonist, a lion cub, who initially dreams of taking over the throne in place of his father, but who goes through difficulties and ends up encountering new environments, habits and animals (THE LION…, 1994).

In Ecology, one can highlight the countless scenes illustrating the African savannah, desert regions and also the jungle (THE LION…, 1994). The film demonstrates very well the importance of balance in nature and how the food chain is important, also mentioning its functioning (THE LION…, 1994). In the intraspecific relationship between lions, society is demonstrated by including an adult lion with a large group of lionesses and in interspecific relationships the interaction between lions and hyenas is shown in the film as a hierarchy in which hyenas fear and respect lions in most parts of the time, despite challenging them in some situations (THE LION…, 1994). It is known that in nature these animals usually develop a relationship of commensalism that can become interspecific competition for food in some cases (THE LION…, 1994). With respect to other species, lions are considered the leaders in a relationship demonstrated as a harmonious monarchy, and can be a representation of lions as the top of the food chain (THE LION…, 1994).
As for Zoology, many of the animals shown have a morphology that can be considered similar to reality with few errors, which are usually found on the head, especially in the eyes (which can be explained by the need to “personify” the animals) (THE LION…, 1994). It is possible to observe mammals such as lions, zebras, elephants, giraffes, among others, and in a less realistic way, crocodiles, ostriches, rhinos, hyenas, a meerkat, a boar, a baboon, birds, insects and other representatives of the characteristic fauna of the savanna are also presented with great diversity (THE LION…, 1994). During the film, one can also analyze the parental care as well as the displacement behavior in herds of some species (THE LION…, 1994).

“RIO”

This animation tells the story of a blue macaw that lives in the United States of America as a pet and is discovered by a Brazilian who loves birds and intends to contribute to the preservation of the species (RIO, 2011). For this to happen, the bird must go to Brazil to reproduce and it is in this country that the story develops (RIO, 2011).

Ecology is not widely addressed, and may include only a few images of Rio de Janeiro (Brazil), showing a little of the Atlantic Forest biome, especially its tropical forest vegetation (RIO, 2011). It is important to note that the species featured in the film is not characteristic of forests, as shown in the film, but of the Caatinga biome (RIO, 2011).

In Environmental Education the most important aspect of the film is included: awareness of the danger of species extinction and the demonstration that by removing birds or other wild animals from their habitat, these and other beings are harmed causing the imbalance of nature, a theme that diverges a lot from the other films analyzed, as well as its scenario (RIO, 2011).

For Zoology, it is important to emphasize that, although the macaws and toucans are portrayed in a similar way to reality, other birds are shown incorrectly in relation to the size of the wings and/or heads compared to the body, as well as the eyes of animals in general (RIO, 2011). An interesting fact shown in relation to birds is that the female is portrayed singing poorly while the male sings well, which may be a representation of what occurs in nature, where there are species in which males sing more often (but not necessarily better), to attract a female to mate, for example (RIO, 2011).

A major problem of human interference in nature, which is present in several countries, is portrayed in the film: the trafficking of birds, which removes species from their natural environment to sell them (RIO, 2011). One observation that must be emphasized is the fact that the main character, being a pet (which could also have been acquired through animal trafficking), never learned to fly,
which causes great difficulties in the course of the story, as well as his lack of experience with freedom and the dangers of life outside a home (RIO, 2011).

“FINDING NEMO”

This film is set mainly in the Pacific Ocean, reaching the Australian continent, always in a tropical region (FINDING..., 2003). The animation shows the life of a clown fish who loses his son and goes on a journey to retrieve him, in which he meets a female *Paracanthurus hepatus* that helps him in his search (FINDING..., 2003).

The approach in Ecology is favored by the great variety of animals, it being possible to analyze some of their habits: the behavior of shoals (despite exaggerated demonstration), the dynamics of the food chain between fish, between them and birds and also human beings (FINDING..., 2003). It also demonstrates feeding on clown fish eggs, in which other species threaten these animals from the beginning of their lives, justifying the need for a large quantity of eggs that is common among fish (FINDING..., 2003). A group with three sharks that try not to feed on other fish can also be highlighted, although one of them gives in to its instincts when it senses the presence of blood in the water, demonstrating the use of the sense of smell of these predators in hunting (FINDING..., 2003). The ecological tenancy relationship between clown fish and anemones is also presented (FINDING..., 2003). The marine ecosystem is richly illustrated by showing the variation between depths in the sea and the species of each region, including the appearance of a fish in an abyssal habitat (FINDING..., 2003).

Zoology is also favored in this film, since from its beginning, numerous species are shown, including specimens of porifers, cnidarians, crustaceans, molluscs, bony and cartilaginous fish, turtles, birds and mammals (including humans), and in several situations, the morphology can be visualized in a very credible way (FINDING..., 2003). Some errors can be observed such as the presence of eyelids in several fish, some imperfections in the morphologies of the species and also the parental care of the turtles (FINDING..., 2003).

The human being is also shown as a threat in this film, when a diver captures the clown fish and removes it from its natural environment, taking it to the stressful environment of an aquarium (FINDING..., 2003). In addition, a situation is also shown in which a group of fishermen try to fish an entire shoal with a net (FINDING..., 2003).

“BROTHER BEAR”

A group of human beings share their territory with several animals, among them, the bears, with whom they do not live in harmony (BROTHER..., 2003). Because of the death of his brother,
the protagonist of the story chases a bear that he believes is the culprit of the event and kills him (BROTHER..., 2003). Then the boy is transformed into a bear and meets a cub of the same species, with whom he ends up living an adventure (BROTHER..., 2003).

One of the most important characteristics of the film in relation to Ecology is the illustration of Taiga and its surroundings, showing various elements of flora and fauna, such as bears, moose, buffaloes, squirrels, eagles, among others, being somewhat realistic, except for the structures of the heads (BROTHER..., 2003). In addition, an exaggerated representation of the migration that the salmon make by swimming against the current is also shown, which makes them a source of food for the bears, presenting the food chain in addition to other references to the cycle of matter (BROTHER..., 2003).

In the film there is also a demonstration of the northern lights, in which, despite the presentation of legends related to the phenomenon, makes possible the discussion of its real causes and characteristics (BROTHER..., 2003).

Once again, human beings are shown from the perspective of other animals and who unbalance the lives of several species that are hunted or affected in some way (BROTHER..., 2003). When transforming into a bear, the protagonist starts to look at life from another perspective and sees that bears are threats for humans, but for bears the situation is reversed, introducing an important point for reflection (BROTHER..., 2003).

“HAPPY FEET”

The focus of the film is on a penguin chick that was born with different characteristics from other penguins and suffers prejudice for this (HAPPY…, 2006).

For the study of Ecology, the frozen environment of Antarctica is presented, with a good illustration of the ecosystem (HAPPY…, 2006). There is a contribution to the concept of the food chain, showing the concern of penguins in relation to their predators (HAPPY…, 2006).

As for Zoology, an important characteristic demonstrated is that the eggs of the emperor penguins are hatched by the males, while the females seek food, and the importance of not “dropping the egg” is also emphasized (HAPPY…, 2006); in nature, if the egg separates from the father, the embryo dies of cold, so it is abandoned immediately. In the film the chick that was born from the fallen egg shows only a few behavioral differences in relation to its group: instead of having the gift of singing like the others, this chick dances (HAPPY…, 2006). In addition, the penguin morphology can also be considered realistic (HAPPY…, 2006).

Throughout the plot there is speculation about extraterrestrial beings that would be exterminating the fish that serve as food for the penguins, thus causing a great environmental
imbalance, so in the final part of the film it is revealed that the cause of so many problems for the animals are humans (HAPPY…, 2006), transmitting an important message of how the current habits of humanity are affecting the ecological balance and how preservation is important, since everyone is interconnected in different ways, including through the food chain.

"HAPPY FEET TWO"

Being a sequel to the first film (HAPPY..., 2006), it shows some of the same characters and some new ones, with emphasis on the same species of penguins (HAPPY..., 2011).

For approaches in Ecology, the new story has a second nucleus in which a pair of krill (small crustaceans) discover that there is an immense world beyond their reach, and that they are, in fact, the prey of larger animals (HAPPY…, 2011). It is interesting to observe the perspective in which these events are presented as if the viewer had the krill's point of view (HAPPY…, 2011). In this way, it is often difficult to understand what happens around them because of their limited vision, in addition to the other animals appear gigantic in comparison to the small crustaceans (HAPPY…, 2011). As in the first film (HAPPY..., 2006), it is possible to observe the food chain, it being even clearer in the second film (HAPPY..., 2011).

Environmental problems such as thawing and oil pollution are demonstrated and it is possible to observe how they affect the lives of animals (HAPPY…, 2011).

This film also presents moments when the concepts of Evolution are developed from the journey of a pair of krill (HAPPY…, 2011).

For Zoology it is possible to visualize very realistic morphologies in the emperor penguins (except the main character, who maintains the appearance of a baby), krill, elephant seals, jellyfish, orca, in addition to some other birds (although they are not always realistic) (HAPPY…, 2011).

In contrast to the first film, the sequence features people helping animals with difficulties, which can serve as inspiration for beneficial behaviors, in contrast to the great harmful tendency of humans in relation to the environment and other living beings (HAPPY…, 2011).

“WALL-E”

The story takes place in a dystopian future and Wall-e is a small robot whose function is to clean/organize the garbage left by human beings on planet Earth (WALL-E, 2008). The robot meets a probe sent to look for plants, falls in love and chases it back to the ship, where it encounters a society of human beings (WALL-E, 2008).

In its first part, the film essentially deals with Environmental Education with the production/accumulation of garbage and destruction of nature, and where the landscape shown is
composed mainly of garbage and generates a lot of impact, leading to reflection on the importance of preservation and a warning about the possibility of a future uninhabitable planet (WALL-E, 2008). The only living beings present on Earth are a cockroach and a small plant that is discovered and indicates to humans that the earth may, in the future, be restored and inhabited again (WALL-E, 2008).

This film also addresses health issues, since the extremely sedentary behavior of people living in space makes everyone overweight according to what is considered ideal by the current society, and they are always in floating chairs that move them around, without even having to walk (WALL-E, 2008). It is interesting to observe that, when an individual falls out of his chair, it is considered that there has been an accident, because people are unable to get up alone (WALL-E, 2008). In addition, a bone loss that passengers have suffered due to microgravity on the ship is also described (WALL-E, 2008).

Naturally, the cause of the planet’s destruction is the human beings who can no longer even inhabit the planet, and who live in the artificial environment of a spaceship exercising as little physical activity as possible, being always surrounded by robots that act as employees (WALL-E, 2008). After more than 700 years, people no longer know about what was on Earth and are completely alienated by technology without even directly interacting with each other (WALL-E, 2008), also causing us to reflect on human behavior in the face of technology, more present every day.

4 FINAL CONSIDERATIONS

In general, children’s films often contain situations with the purpose of encouraging respect, charity and positive actions, that is, developing values. Among the films previously analyzed, it is possible to mention some specific situations that fit this characteristic: In “A Bug’s Life” there is great emphasis on teamwork and organization (A BUG’S..., 1998); the main message of “Rango” is about lies and their consequences (RANGO, 2011); in “The Lion King” the protagonist learns, through his mistakes, not to disobey his father (THE LION... , 1994); "Finding Nemo" also portrays a case of disobedience, explaining the importance of respecting the rules (FINDING ..., 2003); in “Brother Bear” the importance of friendship is highlighted (BROTHER ..., 2003); “Río” shows solidarity in overcoming difficulties (RIO, 2011); “Happy Feet” portrays prejudice (HAPPY..., 2006) and “Wall-e” strongly criticizes behaviors that are quite common today, such as excessive consumption, alienation and the lack of concern for personal and planetary health (WALL-E, 2008).

Despite many relatively realistic items presented in the animations in relation to the content of Natural Sciences and Biology, there are also some flaws in the films, which could not be different considering their target audience and their main purpose. However, it is essential to see errors as an
extra possibility for learning and not as an obstacle. By associating animation films with discussions, explanations, research or other available methods, it is possible to stimulate critical thinking in students, allow them to make comparisons, investigate and point out the divergences between reality and fiction, which can be an exercise in observation and reasoning which can assist in the promotion of knowledge.

Thus, it is necessary to highlight the importance of using this and other innovative teaching methodologies so that, over time, there are changes in schools that allow new practices to be implemented, always with the objective of improving and facilitating the teaching-learning process. Therefore, the dissemination of the possibilities of using these tools seeks to demonstrate new ways to generate greater interest in the study of Natural Sciences, to facilitate and expand the understanding, to stimulate critical vision in students, allowing them to identify, interpret and reflect on the aspects presented, whether they are realistic or not. Although some teachers do not consider the use of humor in the classroom to be professional, as stated by Rule and Auge (2005), an important objective of this craft is certainly to make learning more enjoyable and students more satisfied.

5 CONCLUSION

From the analysis of these films, it can be concluded that the children's animations studied have characteristics that can be considered beneficial for learning the contents of the classes of Natural Sciences and Biology if applied appropriately, but that they also present values that can add positive characteristics for student development. The benefits of these materials can include both the knowledge transmitted and the ease of memorizing the information presented, which are added to sources already known and loved by students: films.

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