THE USE OF THE EDUCATIONAL ANIMATED FILM IN PRIMARY EDUCATION IN ROMANIA. LITERATURE REVIEW

SANDA VEREŞ

Babeş-Bolyai University, Faculty of Psychology and Sciences of Education, "Tradition, Development, Innovation" Doctoral School of Didactics, Cluj-Napoca; "Lucian Blaga" Secondary School, Jibou, Sălaj County, Romania, e-mail: sandaveres2005@yahoo.com

IOANA MAGDAŞ*

Babeş-Bolyai University, Faculty of Psychology and Sciences of Education, Department of Exact Sciences Didactics, Cluj-Napoca, Romania, e-mail: magdas_ioana@yahoo.com
* *corresponding author*

Abstract

This study aims to review, analyse and synthesize the literature, which refers to the use of educational film in education in Romania and which deepens aspects related to the use of animated film in primary education. The aim was to review the literature on: classification of animated films in the category of educational means; the functions of animated films; types and sources of animated films; teacher preparation for the use of film for educational purposes; integrating the film into the lesson; how to use animated films in primary education and the results of their use. Existing information in papers in the field of education sciences from the last three decades was analysed. Regarding the use of animation films in primary education, five studies were analysed in depth.

Keywords: educational means, teaching methods, assessment, environmental education, learning efficiency

INTRODUCTION

Animated films are recommended to be used in activities with students (Dulamă, 1996). Similarly, films that faithfully represent reality, animated films can highlight distant cosmic bodies, very small objects, dangerous phenomena, processes that occur too quickly or too slowly to perceive them directly (Dulamă, 2000, pp. 134-135). Teachers in Romania have the opinion that the use of films in the teaching process increases the quality of

learning because it contributes to capturing attention (Dulamă, 2006) and they are an essential source for information that cannot be obtained through other educational means (Dulamă, 2008a). They are of the opinion that films are important in achieving environmental education (Iurean, 2018, 2019; Ilovan et al., 2018b; Ilovan et al., 2019), in the knowledge of forests (Dulamă et al., 2016; Dulamă, Ilovan & Magdaș, 2017).

Teachers claim that they use multimedia in activities with students (Magdaș, Vereș & Dulamă, 2019). After the suspension of face-to-face courses in pre-university education in Romania, beginning with March 11, 2020, teachers were forced to continue teaching activities online (Botnariuc et al., 2020). In this context, teachers had the opportunity to use more multimedia in the teaching process, including animated films and searched for such products on the Internet, especially on YouTube. In some studies, it has been found that teachers in Romania have difficulty choosing an animated film because there is no base of animated films in Romanian, accessible for free and that there is a very limited offer of animated films suitable for learning science in primary education with the soundtrack in this language (Vereș & Magdaș, 2020; Vereș et al., 2020a). Iurean (2019) notes the lack of control in the proper selection by teachers of animated films used for teaching purposes.

Going through the studies in the literature on this subject, we found that, in Romania, few studies have been conducted on the use of animated film in primary education. For this reason, conducting research on this topic can contribute to increasing the general interest in Romanian research in this field. The purpose of this research is to conduct a review, analysis and synthesis of the literature, which refers to the use, in general, of educational films and animation films, especially in primary education in Romania. Starting from this, we aimed to achieve several objectives:

(1) reviewing the literature on the inclusion of animated films in the category of educational media;

(2) reviewing the literature on the functions of animated films;

(3) reviewing the literature on the types and sources of animated films;

(4) reviewing the literature on teacher preparation for the use of films for educational purposes;

(5) reviewing the literature on film integration in the lesson;

(6) review the literature on the use of animated films in primary education and the results obtained from their use.

The study has important implications in the process of constructing the theory because it aims to deeply understand this topic and clarify some issues regarding the use of animated films from the perspective of theory, methodology and practice. A review of the literature can provide useful suggestions and ideas for researchers who will study this topic.

METHOD

To identify information on the use of animated films in primary education, we studied a series of pedagogical and didactics of speciality papers in Romania in the last three decades, in which this subject was approached. From these papers, we extracted information on the place of animated films within the educational means, we deduced the functions of these films, we identified several classifications and types of animated films, as well as issues related to the methods used and the ways of organizing learning activities.

To identify studies on the use of animation films in primary education in Romania, we searched for articles in databases (Web of Science, Science Direct, Scopus, Proquest, Eric), using the keyword "animation film". We also used the Google Scholar search engine. We identified four studies conducted after 2018 and the summary of a doctoral thesis that refers to animated films. In order to get a more comprehensive picture of animated films, we extrapolated information that refers to the broader category of educational films. The results indicate that, in Romania, there was little interest in the use of animated film in primary education and in researching this process.

RESULTS

(1) Classification of animated films in the category of educational means

In the pedagogical papers of the 1980s, the films were included in the category of actual audiovisual means of education, also called dynamic based on the argument that "their message reproduces movement and transformation" (Creţu & Ionescu, 1982, p. 144). In the 1990s, Bontaș (1995, p. 130) included audiovisual representations in the category of didactic materials. In the classification he made according to the criterion of their natural or substitution character, some films were included in the category of alternative means of education: films without sound, in the class of video representations that can be projected on the screen; didactic films transmitted with film cameras, films transmitted through television, recordings on videotapes in the class of video-visual representations that can be projected on the screen (Bontaș 1995, p. 133).

In 2000, in the classification of educational means according to the historical criterion, film and audiovisual means were included in the third generation of educational means, published at the end of the 19th century and the beginning of the 20th century (Ionescu, 2000, p. 230). In the classification made according to the requested analyzer, they were included in the category of technical means of audiovisual training (devices and materials). Depending on the static or dynamic character of the image, the film is part of the technical means of dynamic training (of fascination)

(Ionescu, 2000, p. 236). In the classification according to the pedagogical function, the audiovisual means were included in the category of means of illustration and demonstration and in the category of means of information because they fulfill the function of communication and information (Ionescu, 2000, p. 237).

(2) Functions of animated films

The pedagogical literature specifies the psycho-pedagogical functions of the means of education and, from their analysis, we deduced the functions that animation films fulfill. From the analysis of the description of the cognitive-formative function (of documentation and didactics) by Bontaş (1995, p. 132), we consider that animation films also fulfill this function because "they provide data, information on the studied reality", facilitate the knowledge process by combining the representation through images with the one with words, the sensory knowledge with the rational one. We appreciate that animated films have the function of connecting the educational process with the socio-professional reality, fulfilled by the educational means, because, through them, teaching-learning is related to the aspects of life, to the phenomena and facts from reality (Bontaş, 1995, pp. 132).

After 2000, in Romanian literature, are presented several functions of educational means, from which we selected the most appropriate to animated films: *the stimulating function* of motivation, curiosity, desire and interest in knowledge (Ionescu, 2000, p. 231; Dulamă, 2001, p. 100), which determines their intrinsic motivation (Dulamă, 2010, p. 100); *communication and information function* (Ionescu, 2000, p. 231; Dulamă, 2001, p. 100) because "it facilitates the transmission of information on a fast, economic and efficient communication route", it "ensures the acquisition of knowledge through inductive strategies, from concrete to the abstract" (Dulamă, 2010, p. 100); *the illustrative function* "by ensuring the substitution of reality in its own way", the reconstruction of phenomena or processes carried out in the past, the compression of a long process, the decompression of a short phenomenon, the visualization of phenomena and processes hidden from direct observation, located at great or dangerous distances (earthquakes, volcanic eruptions, chemical reactions, etc.) (Dulamă, 2010, p. 100); *the demonstrative function* (formation of representations and acquisition of knowledge based on the didactic material and the teacher's explanations) (Ionescu, 2000, p. 231); *the formative function* because it ensures a favorable context for "the conscious practice of the operations of thinking by students (analysis, comparison, synthesis, abstraction, generalization), of reasoning" (Dulamă, 2010, p. 100); *the ergonomic function* because through them "a large volume of information is transmitted, in a short time", with maximum efficiency (Dulamă, 2010, p. 100), contributing to "rationalizing the efforts of teachers and students in teaching activities" (Ionescu, 2000, p. 231).

(3) Types and sources of animated films

a. Types of animated films. Regarding films, the names of video, video film, video information are used (Todoran, 2004, pp. 36-37). It is specified that the video information can be entered "in a computer-coordinated environment" in two ways: *the analog video film*, which is taken directly from the source (video recorder, video disc, television network), played on the monitor, but without being stored and manipulated by computer (Todoran, 2004, p. 37); *the digital video film* is made (through specialized programs or by digitizing an analog video sequence), stored and manipulated by computer. Both movies are "motion picture sequences" (samples), but the digital movie can display a variable number of images displayed in a second, loses information through scanning, and has poorer quality, larger file sizes, allows interactivity with the user (stop, resume, scroll back and forth), lower production and delivery costs to the user (Todoran, 2004, pp. 37-38).

Depending on the support material, several types of films are mentioned: movies on film of 8 or 16 mm; videotape movies; electronic movies (CD, DVD); movies on the Internet; movies stored on hard disk (Dulamă & Roșcovan, 2007, p. 280). Depending on the purpose, several types of films are listed and described: motivational film ("stimulating students' interest"); the film-lesson in which the phenomena, processes and events are presented in the order imposed by the lesson, according to its structure or internal logic, but without substituting the lesson; *the problem-film*, which has no introduction and end and in which a problem is presented in order to be discussed at a certain point in the lesson; *the synthesis film*, with a recapitulation and fixing role and which is integrated at the end of the study of a theme or chapter (Dulamă, 2000, p. 135; Dulamă & Roșcovan, 2007, p. 280).

Dulamă & Ilovan (2007) present six didactic animation models established based on the analysis of the characteristics of the message transmitted through film (informative, descriptive, narrative, expository, explanatory, interactive), function, embedded method (exposition, storytelling, description, explanation, conversation, simulation, modeling, observation), integrated multimedia elements. The described models are: the illustrative model, the expository model, the descriptive model, the narrative model, the explanatory model, the interactive model (Dulamă & Ilovan, 2007, pp. 74-78).

Iurean (2019, p. 8) identifies several categories of animated films for preschoolers and young schoolchildren (5-7 years): animations in the form of stories / fairy tales; animations with informative-scientific valences; animations in the field of ecological education; animations that stimulate introspection and personal development; animations that promote social values; animations with soundtrack / songs that are capitalized musically-rhythmically; animated films designed to train and develop competences specific to the visual arts and practical abilities.

In the work "History of animation film", Duma (2020) presents animation films made in Romania. The author refers to the "pill film" ("Balance", "Rain") (Duma, 2020, p. 76), feature films (pp. 148-162), author series (p. 118), and thematic series. A series for preschoolers and high school students includes entertainment films, historical films, science fiction, stories and fairy tales, musicals (Duma, 2020, pp. 114-115). Other series are dedicated to education in general ("I want to know", "The Curious") (p. 122), music education ("Universe of music") and art education ("The mysteries of drawing") (Duma, 2020, p. 123).

b. Film sources. The literature states that the teacher should identify the places where he can find movies (teaching, documentaries). Thus, the libraries (film library) are indicated (Dulamă, 2000, p. 135; Dulamă, 2001, p. 101), bookstores, private companies for renting videotapes, the Teachers Training House, schools, universities, manufacturing companies, the Internet, etc.). (Dulamă & Roșcovan, 2007, p. 280).

The Internet is considered an excellent source where movies of various types can be watched (Dulamă, Magdaș & Osaci-Costache, 2015). The current development of communication and information technology provides the necessary conditions for teachers and students to make films for educational purposes (Dulamă et al., 2019; Dulamă, Magdaș & Chiş, 2020; Dulamă et al., 2020). Another source for films is the digital textbooks of Mathematics and Environmental Exploration (Buzilă et al., 2017; Dulamă, et al., 2017; Magdaș et al., 2017; Ilovan et al., 2018a).

(4) Preparing teachers for the use of films for educational purposes

The pedagogical works emphasize that "the presence of an educational means" … "is not sufficient to ensure the increase of the efficiency of the educational process" (Creţu & Ionescu, 1982, p. 156) and that the efficiency of the use of the educational means is determined significantly by "teacher preparation and his or her behavior during the lesson" (p. 158). The teacher's training includes: formulating the objectives that will be achieved by watching the film; consulting the list of films available from the film library or from the videotapes in the libraries (Dulamă, 2000, p. 135; Dulamă, 2001, p. 101); watching movies to know the theme and content of the film; the category (didactic, documentary, artistic, reportage); the quality and degree of accessibility; the duration; the language in which the comment is made (Dulamă & Roșcovan, 2007, p. 280); taking notes regarding the main problems and the succession of frames; determining when it will be viewed by which class.

Didacticiens recommend that in situations where the teacher gives up the original commentary of the film, to develop another commentary to expose it directly or to record it synchronizing with the projection of images (Dulamă, 2000, p. 135; Dulamă, 2001, p. 101). Teachers recommend compiling a collection of films and creating a database of films that includes

the list of films watched, information about them, what class or lessons can be used, some methodical indications (Dulamă & Roșcovan, 2007, pp. 280-281).

a. The process of selecting animated films for their educational use in primary education. Regarding the animation films intended to be used in primary education, Romanian researchers studied the selection process (Vereș & Magdaș, 2020; Vereș et al., 2020a, 2020b) and the selection criteria of animation films for their didactic use (Iurean, 2018, 2019; Vereș & Magdaș, 2020; Vereș et al., 2020a, 2020b).

The theme of animation films used in teaching activities in natural sciences in the primary cycle aimed at presenting and knowing some issues of ecology and consumerism (Iurean, 2018), the environment (Iurean, 2019), the solar system (Vereș & Magdaș, 2020), the water circuit in nature (Vereș et al., 2020a), the Earth's movements and the formation of the seasons (Vereș et al., 2020b).

Selection of animated films. Iurean (2018, 2019) used 2D and 3D animations in the teaching process. In choosing the animated films intended to be used in primary education, in the preparatory grade (children aged 5-7), Iurean (2019, p. 11) took into account the following aspects: adequacy to the proposed educational objectives; framing the estimated time of watching the film or film sequences, without wasting unnecessary time resources from the class. Iurean (2018, p. 257) claims that students who watched a 3D animation film obtained superior results to those who watched a film with similar content, but in a 2D animation. The result was explained / justified by several reasons / arguments: identifying the children with the characters due to the realistic shape and the special aspect of the background made by 3D graphics; detailing the plot that facilitates clarity of understanding of the action; the characteristics of the musical column (songs and musical themes) that induce pleasure in children and determine an easy memory and their singing by them. We appreciate these aspects as criteria that teachers should take into account when choosing animated films to use in the classroom. Regarding the selection of films, Iurean (2018, p. 258) warns that the teacher has the responsibility to check, analyze and extract from the animated films used in class the scenes in which violence and sexuality are manifested. Iurean (2019) notes the lack of control in the proper selection by teachers of animated films used for teaching purposes.

In choosing the most appropriate animated film for the knowledge of the Solar System by children aged 7-8 years, Vereș & Magdaș (2020), went through several stages: watching several animated films available on the Internet, establishing criteria for selection of animated films, selection of the film based on them. The same steps were taken in choosing the most suitable animated film for understanding the water circuit in nature (Vereș et al., 2020a) and the formation of seasons, days and nights (Vereș et al., 2020b).

The selection of the most suitable animated film was made after watching on YouTube and analyzing three films (Vereș & Magdaș, 2020; Vereș et al., 2020b), or four films respectively (Vereș et al., 2020a),

identified and available free of charge on the Internet for the subject concerned. These animated films were analyzed taking into account the criteria established by Vereș & Magdaș (2020). During the process of analyzing animated films, Vereș & Magdaș (2020, pp. 44-45) established several criteria based on which they selected the most appropriate film to use for educational purposes in an activity designed and organized by a teacher of natural sciences, in primary education: the existence of the soundtrack in the mother tongue (Romanian, in this case); the existence of a character who offers explanations; the duration of watching the film (maximum 5-6 minutes), adapting / matching the content of the film to the children's level of knowledge; presentation in film of the phenomenon or process proposed for the study. Vereș et al. (2020a) argue that children's animated films should contain all the elements that attract and retain their attention throughout the viewing.

b. The analysis of animation films was performed in several identified papers (Dulamă & Gurscă, 2006; Iurean, 2018, 2019; Vereș & Magdaș, 2020; Vereș et al., 2020a, 2020b). The analyzed studies presented the analysis of three animated films produced by the European Space Agency: "Paxi-Solar System" (ESA, 2016) (Vereș & Magdaș, 2020), "Paxi - The water circuit in nature" (ESA, 2014) (Vereș et al., 2020a), "Paxi - Day and night. The Seasons" (ESA, 2017) (Vereș et al., 2020b). The films are part of a series that aims to enable children know the universe and some natural processes that take place on a global scale and in which the main and unique character is Paxi.

Vereș & Magdaș (2020) note that this cartoon character proposes to children to research areas that cannot be adequately studied in documentaries or feature films. Researchers claim that Paxi is a character with whom children identify, empathize, interact and that they learn more easily with this animated character than with a teacher (Vereș & Magdaș, 2020, p. 45). Vereș et al. (2020a) complete the characterization of this character. They note that Paxi plays the role of the "favourite space researcher" of children, who exploits their curiosity when proposing the subject and invites them to accompany him on an adventure to discover how to produce the water circuit in nature. Vereș et al. (2020b) appreciate that the character Paxi fulfills several roles with instructive and educational purpose: arousing curiosity, motivation for knowledge, initiating an approach to observe cosmic bodies and their dynamics, stimulating the formulation of questions and problem-solving by children, and directing the process of identifying contradictions.

Regarding the duration of the films, they have 3.52 minutes ("Paxi - Day and night. The seasons") (Vereș et al., 2020b), 4.08 minutes ("Paxi - The water circuit in nature") (Vereș et al., 2020a), 5.18 minutes ("Paxi-Solar System") (Vereș & Magdaș, 2020) (Table 1). The duration of watching these animated films is appreciated by researchers as optimal for children aged 7-8 years. In the literature, it is recommended that films with a duration of more than 10-15 minutes and that have polynomial messages be used only in recapitulation lessons. The films with uninotional message,

in which an aspect or a notion is clarified, and the loop films with a duration of 2-3 minutes that revise in order to fully understand the present aspect are considered effective when teachers cannot use other means (Creţu & Ionescu, 1982, p. 155).

Romanian researchers analysed the number of words in the oral text of animated films, the number of concepts needed to understand the topics presented and related them to the time factor (Vereș & Magdaș, 2020, p. 45; Vereș et al., 2020, 2020b, p. 96) (Table 1). In order to have a clearer picture, we calculated, in addition to the three studies, the number of words related to the time factor (minute). Vereș et al. (2020a) estimate as very high the number of eight concepts that are used, on average, every minute of the animated film.

In the analysed studies, a classification of the concepts identified in the oral text of the films is also made. Vereș et al. (2020a) group these concepts into five categories: "meteorological phenomena, precipitation produced in the atmosphere, water aggregation states, hydrological processes, hydrographic units". In this study, the content of the film is analysed in depth, so it is found that the film provides explanations on: the cause and manner of the water circuit; the spread of water in nature; the importance of water for plants, people, animals; the negative impact of the water circuit (Vereș et al., 2020a).

Table 1. Some quantitative features of animated films. Synthesis based on the analysed studies

Title of the film	Duration (min.)	No. of words	No. of words/minute	Total no. of concepts	No. of concepts /minute
Paxi – The Solar System	5.18	691	133-134	38	7-8
Paxi – The water circuit in nature	4.08	458	112-113	30	7-8
Paxi – Day and night. The seasons	3.52	482	136-137	30	8-9

Source: Own elaboration based on Vereș & Magdaș, 2020, p. 45; Vereș et al., 2020a; Vereș et al., 2020b, p. 96

In two studies, the types of texts that make up the soundtrack of the film were analysed (Vereș et al., 2020a, 2020b). The researchers found that they fall into three categories: narrative texts, explanatory texts, and informative texts. From the presentation of Paxi's actions, we found in this analysis that descriptive texts and injunctive texts were also used.

c. Ways to improve animated films for use in primary education. Vereș et al. (2020a) have improved the interactivity of animated films with the help of Edpuzzle, an application that offers four tools that can be used to: cut a part of the video, delete the original soundtrack of the video, insert a soundtrack, create a test, and enter comments at certain times. The researchers chose to introduce in the soundtrack of the film nine open-ended questions to guide students in learning the new notions, questions that students in an experimental group answered when they watched the film. Through these questions, they aimed for students to define concepts, to specify the stages of the water cycle in nature, to list the states of water accumulation in nature. The students answered these questions, in writing, while reviewing the film at home and sending the answers to the class group. After analysing the answers, the researchers found that it was difficult for some students to understand certain concepts: condensation, the water cycle in nature, groundwater and evaporation. Those concepts were clarified in the direct activity with the teacher, organized after the second viewing of the film. Ways to improve the films in order to be used in the teaching process carried out in the primary cycle were also presented by other researchers (Ilie et al., 2020a, 2020b).

(5) Integrating films into lessons

a. Recommendations regarding the use of films in lessons. The process of integrating a film into a lesson includes carrying out activities before watching the film: stimulating motivation through different procedures (questions, problems); communicating the objectives by watching the film; communicating information about the content of the film; specifying the problems they will pursue (Dulamă, 2000, p. 135). In the stage of preparation for the use of a means of education, some pedagogues recommend: presenting a didactic task based on it in order to motivate internally for that activity; providing a problem situation; promoting learning through discovery; orienting students towards essential problems that they will have to observe; providing support points for recognizing what they already know and for notifying the explicit message; studying new notions; fixing data related to its content; writing on the board the problems that the students will solve, of some notions that they will understand based on the means; presentation of the key problems (Creţu & Ionescu, 1982, pp. 157-158).

Regarding watching the film, recommendations are made: the film is watched quietly, at the beginning or during the moment of acquiring knowledge, "not at the end of the lesson as a bonus or example" (Dulamă, 2001, p. 101); "The teacher intervenes only sometimes with short warnings on important moments" (Dulamă, 2001, p. 117), because students cannot follow two comments simultaneously, and observe the images (Dulamă, 2000, p. 136; Dulamă & Roșcovan, 2007, p. 282). It is also recommended to watch short films or fragment the film into small sequences and alternate them with discussions with students (Dulamă, 2001, p. 101). Some films

contain elements through which attention is directed and students are determined, for example, by questions, to analyse, to compare, to synthesize the observations obtained on the basis of the film (Dulamă, 2000, p. 136; Dulamă & Roșcovan, 2007, p. 282).

After watching the film, it is not recommended that the teacher explains the content of the film (Dulamă, 2001, p. 101), but he or she should carry out some discussions or several activities: systematic analysis of the film content (identification of elements, moments and other aspects represented, relations between elements), the phrasing of questions and answers by students, the systematization of information and their writing on the board and in notebooks, the writing of conclusions, the location on the map of the places presented (Dulamă, 2000, p. 135).

During and after the use of an education means, some pedagogues support the imposition of specific didactic activities: "interpreting the observed aspects, establishing the relationships between the elements", "noticing the structure and meaning of the studied aspect", "full solution to the proposed problems", extrapolating the studied aspects, highlighting the implications and consequences, verifying the measure of identifying the essential elements, clarifying misunderstandings, "deepening of some notions and principles and correlating them with new concepts", "carrying out a creative activity" (Crețu & Ionescu, 1982, p. 158).

The integration of animation films in the lesson is facilitated and favoured by the existence of smart boards in the classroom (Magdaș, Zoltan & Dulamă, 2019; Zoltan, Magdaș & Dulamă, 2019), by the presence of digital textbooks (Magdaș & Drângu, 2016), by computers and of video projectors (Magdaș, Vereș & Dulamă, 2019; Ilie & Cristea, 2020), by the fact that teachers and students have smartphones (Botnariuc et al., 2020). Watching educational films is easy to do on training platforms and on video conferencing platforms (Dulamă & Ilovan, 2020; Vereș et al., 2020b).

b. Teaching methods associated with animation films. The pedagogical papers mention that the teaching means should be selected, used and combined according to the concrete pedagogical context, and the other component elements of the teaching strategies (Ionescu, 2000, p. 243), in correlation with the components of the teaching process (objectives, contents, principles, methods, forms of activity, teacher-student relations) (Bontaş, 1995, pp. 134-136), used as material support (natural, figurative, symbolic) through which the message is transmitted to students (Dulamă, 2001, p. 68). The didactic papers present the film exam, a method taken from world literature (Baloche, 1998), in which an educational film, chosen by the teacher, is watched at home by students, in groups of four, outside of class, in the presence of a parent. Based on this film, students formulate answers to the questions given by the teacher (Dulamă, 2008b, pp. 132-133).

Dulamă & Gurscă (2006) present learning situations directed by the teacher in which animated films are used. Within them are detailed: the exhibition approach in which the method of exposure was used, the

description and modelling; the explanatory approach, based on the method of explanation; the student-centred heuristic approach, in which the teacher asks students questions and gives them clues to discover the new information. Researchers point out that the quality of teaching and learning depends, firstly, on the way multimedia is produced and the quality of its content and, secondly, on the specialized, psycho-pedagogical, and methodological competence of the teacher, who can increase the multimedia value, even if it has a low level of digital competence (Dulamă & Gurscă, 2006, p. 258).

Ciascai, Dulamă & Marchiş (2007) present three learning situations in which animated films are used. In one situation, it is proposed to observe in the film how the floods occurred, then the teacher discussed with students based on the film (p. 58). In another situation, students are asked to write about the formation of a volcano, observe its formation in the film, then review the film and receive explanations from the teacher (pp. 59-60). In another situation, students are asked to anticipate, with the help of a simulation program, what type of volcano will form according to three characteristics (magma volume, viscosity, volatile substances) (p. 62).

c. Preparing students to watch films. Starting from the communication theory, the Romanian pedagogues emphasized that, in order to achieve the intended goal, the context should be considered carefully: the preparation of the receiver for communication, the existence of a common repertoire of sender and receiver, the organization of feedback, awareness for effort and intellectual cooperation (Creţu & Ionescu, 1982, p. 156). Preparing students to watch films includes: discussing the objectives, establishing the place and time of viewing, communicating information about the content of the film, and specifying the problems they will pursue (Dulamă, 2001, p. 101).

(6) How to use animated films in primary education and the obtained results

Researchers in Romania focused on several aspects related to the use of animation films in the study of natural sciences in primary education: determining the level of understanding of the content presented in a 2D animation film, compared to 3D (Iurean, 2018); establishing the volume of knowledge acquired as a result of individual viewing of the film (Vereș & Magdaș, 2020; Vereș et al., 2020a, 2020b); establishing the relationship or ratio between the number of views of the film and the volume of knowledge assimilated by students (Vereș et al., 2020a, 2020b); identifying and analysing the role of the teacher in capitalizing the animated film in increasing the degree of understanding and acquisition of knowledge (Vereș & Magdaș, 2020; Vereș et al., 2020a, 2020b). Next, we will analyse some activities organized based on animated films, students' results, the relationship among the number of views of the film, the reasons for multiple views and the volume of knowledge assimilated by students.

a. The analysis of activities organized based on animated films.
Iurean (2018) organized a research activity at two classes in the preparatory grade. One class watched the 2D version of the animated film *The Lorax*, made in 1972 after the homonymous book by Dr. Seuss, and the other class watched the 3D version of the film made in 2012, after the same book. The main purpose of the study was to investigate how students understood similar content presented in 2D animated films and 3D animated films. After watching the films, the students talked to the teacher and circled the pictures that represented the correct answers to a test. Based on the discussions and solutions proposed by the children, Iurean (2018, p. 256) concluded that the students who watched the 3D animation film had a higher level of understanding of the "message of the film, the importance of the main characters, in arguing to choose a favourite part of the film". The impact of the film on the children was strong, they were impressed by the way people could destroy nature (Iurean, 2018, p. 257).

Iurean (2019) organized an experimental research in October 2017 - February 2018, in which 108 students from the preparatory grade were involved (55 in the experimental group, 53 in the control group). The experiment included several stages: pretest administration; conducting the training experiment based on animated films during two thematic units ("Ants and other small creatures" and "Friendship of cars"); application of the posttest; application of the retest. The level of students' competences in the subjects *Communication in Romanian, Mathematics and Environmental Exploration, Music and Movement and Visual Arts and Practical Skills* was assessed. At the end of the study, it was concluded that animation films for children, used for teaching purposes, contributed to stimulating learning motivation and developing skills specific to students in the preparatory grade.

The animated films were used in three didactic activities organized for the discipline "Mathematics and Environmental Exploration", in the first grade, during 2020. In the research-action carried out in December 2019, based on the film "Paxi - Solar System", 27 first grade students participated, who formed an experimental group and a control group (Vereș & Magdaș, 2020). The activity took place over two hours. Several steps were taken: the written application of a pretext; watching the animated film in class; applying a posttest to verify the volume of knowledge; revision of the animation film by the students from the experimental group in the classroom; involvement of students from the experimental group in a learning activity organized by the teacher; application of a retest to students in the experimental group (Vereș & Magdaș, 2020). Students passionate about the subject watched this animated film with interest and curiosity.

In the action research carried out in May, 2020, based on the film "Paxi - Water Circuit in Nature", 16 first grade students participated voluntarily and formed an experimental group and a control group (Vereș et al., 2020a). Several steps were taken: online application of the pretext created in Google forms; individual viewing of the animated film by students at home; applying the posttest to both groups; involvement of students from the experimental group, at home, in learning activities in which they

reviewed the film accompanied by questions (study guide) and the task of answering them; the teacher's discussion with the students from the experimental group on zoom.us, providing additional information and explanations based on PPT presentations; playing in pairs the proposed game ("Game - Water Circuit"); online application to the retest experimental group created in Google forms.

In the research action carried out during the holidays, in August 2020, based on the animated film "Paxi - Formation of the seasons", 11 students from the first grade participated voluntarily. The steps were completed: applying a pretest sent to chat on the Zoom.us platform, a test created in Google Drive; sending a link to the animated film on the Facebook group to be watched at home, and writing down the number of views; apply a posttest created in Google Drive sent to chat on the Zoom.us platform to check the children's knowledge volume after watching the film; the teacher's discussion with the students on the Zoom.us platform to check if they have formed correct representations about the Earth's movements and the formation of the seasons; formulating answers to students' questions, explaining processes based on a PPT and clarifying concepts; individual play of the game "Day and night. The Seasons" created by the teacher on the *Wordwall* platform, with the template "Missing word"; sending a retest created in Google Drive to chat on the Zoom.us platform. The game contains a series of incomplete sentences, and the correct answer had to be chosen from a list of three answers. Through the game, the interactivity of the Wordwall lesson increased.

b. Analysing the students' results. In the activity based on the film "Paxi - Solar System" (Vereș & Magdaș, 2020), the results of the pretest (Table 2) showed that students have a low level of knowledge about the Solar System. The results obtained after the revision of the animated film show little progress and that the students failed to retain all the information transmitted, that they had difficulties in understanding, that they needed explanations and additional information from the teacher regarding the content of the watched films. After the discussion with the teacher, based on the film and other illustrative materials, which determined an active learning, facilitated the understanding, deepening and fixation of knowledge by students, the results of the retest indicated the progress of students.

The researchers concluded that students needed the teacher's help as a guide in the process of correctly understanding the content presented in the film animation, learning and thorough fixation of knowledge in memory and to learn (Vereș & Magdaș, 2020). To increase the degree of accessibility and understanding of its content, to ensure the transition from concrete to abstract, after watching the film, a second learning activity was performed, in which other teaching materials were used (animated films, representations 2D and 3D of the Solar System) that determined the perception through several analysers (auditory, visual, tactile, kinaesthetic), capturing and maintaining attention during the activity (Vereș & Magdaș, 2020).

In the activity based on the film "Paxi - The water circuit in nature" (Vereș et al., 2020a), the results obtained by students in the pretest (Table 2) indicate that some students have a greater volume of knowledge about water aggregation states than others. The researchers claimed that the poorer results in the posttest, in the control group, compared to those in the pretest were due to the impatience of two children to complete the task or due to problems with the internet connection. The volume of students' knowledge about water aggregation conditions, phenomena and processes that occur in the water circuit in nature has increased significantly since the pretest due to the involvement in online learning activities based on watching the animated film and discussions with the teacher. She explained the new concepts and used applications to increase the high degree of activities interactivity, so students learned logically, improving their school performance. The researchers argued that teachers had a crucial role in mediating the content of the film to facilitate students' understanding of the water cycle in nature.

Table 2. Synthesis of students' results based on the analyzed studies

Title of films	No. of students	Pretest (m)		Posttest (m)	Difference from the pretest	Retest (m)	Difference from the posttest
Paxi – The Solar System	27	GE	4.96	6.04	1.08	8.15	2.11
		GC	4.61	5.21	0.60	-	-
Paxi – The water circuit in nature	16	GE	9	9.38	0.38	9.63	0.25
		GC	8.88	8.13	0.75	9	0.87
Paxi – Day and night. The seasons	11	GE	9.73	8.09	1.64	9.91	1.82

Source: Own elaboration based on Vereș, Magdaș, 2020, pp. 42-44; Vereș et al., 2020a; Vereș et al., 2020b, p. 99

In the activity based on the animated film "Paxi - Day and night. Seasons", the results of the pretest (Table 2) proved that students had the necessary knowledge to understand the content of the animated film (Vereș et al., 2020b). The poorer results obtained after watching the film were explained by the high degree of difficulty of the items, compared to that of the items in the pretest. The results indicated a lack of understanding of aspects related to the movements made by the Earth and the formation of the seasons, even after several viewings. After the discussion with the teacher, in which she offered them additional information, asked them questions, listened to the answers and gave them feedback, after the game "Day and night - the seasons", the students understood, deepened and they fixed their knowledge.

The better retest results indicate the students' progress, that they clarified their previously misunderstood notions, filled in the gaps, and formed better quality representations compared to the previous stages. Vereș et al. (2020b) appreciated that learning activities in which animated films and interactive games were used and in which the teacher mediated the knowledge were more effective than the individual viewing of some animated films about natural phenomena.

c. The relationship among the number of viewings of the film, the reasons for multiple viewings and the volume of knowledge assimilated by students. Vereș et al. (2020b) found that of the 11 students who watched the animated film "Paxi - Day and night. Seasons", three viewed it once, four twice and four of them three or more times (Table 3). From the discussions with the students, it resulted that the number of viewings of the animated films was positively influenced by the students' curiosity, interest, and passion for the subject of the film, by the desire to clarify, deepen and better fix the acquired knowledge.

Vereș et al. (2020b) also found that the volume of knowledge was influenced by the number of views (Table 3), so that children who watched the film several times got better results. He pointed out that "a single viewing of the animated film did not determine the thorough acquisition of knowledge about the formation of days, nights and seasons, the rotational motion and the revolutionary motion of the Earth" and argued that even after several views, students needed a teacher to explain the phenomena and processes represented in the film watched in order to understand them (Vereș et al., 2020b, p. 99).

Table 3. The number of views of the animated film and the students' results in the posttest (Vereș et al., 2020b, p. 98)

Number of students	Number of views	Posttest mean
3	1	7.33
4	2	7.75
3	3	9
1	5	9

CONCLUSIONS

At the end of the study, some conclusions are drawn. In the papers in the field of education sciences, animation films have been included in the category of audio-visual means of education, fulfilling their most important functions from the perspective of achieving knowledge. Regarding the categories and typology of animation films, in the literature, there are no rigorous classifications based on criteria, but only a series of empirically constituted categories, within which certain films were included. Although

there is a seemingly rich offer of animated films worldwide, very few of them are suitable for use in formal primary education activities conducted in Romanian. Identifying these films and preparing them for integration into lessons requires a highly time-consuming effort on the part of teachers, specialized competence, psycho-pedagogical and didactic.

Regarding the use of animated films, several learning situations have been identified in the literature. Details of more extensive activities, carried out in the context of organizing the online school, were made in action research, on small samples of students, which reduced the chance of generalizing the results. In order to correlate the results of this study with the existing literature worldwide regarding the use of animation films in primary education, we intend to extend the analysis on studies conducted in other countries.

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