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Neurocommunicative methodologies: attention and emotion of the audiovisual story in the classroom

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Abstract
Audiovisual content as a learning tool has been incorporated extensively into lecture classes. Emotion-cognition is intrinsic to the functioning of the human brain, and therefore can explain the acquisition of knowledge and competencies in the educational field, and more specifically, the transformative impact on digital natives. Advances in the study of the brain have allowed for quantitative measurement of attentional (EDL) and emotional (EDR) terms. The objective of this article is to analyze and evaluate the correlation between attention and emotion during the viewing of two videos shown in a classroom in the academic space of a university. The method consisted of recording the electrodermal activity of various groups of Audiovisual Communication and Advertising and Public Relations students during the viewing of the two audiovisual stories. The main results and conclusions link characteristics of the audiovisual narrative and technical-expressive qualities and objectives of the videos with the levels of EDL and EDR recorded by the device and establish advanced lines of research in the field of neuroeducation and neurocommunication.

Keywords
Neuroeducation, Audiovisual didactic, Teaching methodology, Attention, Emotion, Electrodermal activity, Story, Audiovisual language

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1. Introduction and status of the question

Educommunication integrates two disciplines of the social and human sciences that historically have been developed in parallel, communication and education, to form a new pedagogical paradigm (Freire, 1970). Recognized by UNESCO in 1979, educommunication "includes all forms of study, learning and teaching, at all levels and in all circumstances, the history, creation, use and evaluation of communications media as practical arts and techniques" (Morduchowicz, 1997). Masterman refers to the possibilities of education through audiovisual content (Masterman, 1985). Aparici (2010), meanwhile, warns of the danger of digital technologies repeating vertical and non-participatory pedagogical models, i.e., that greater frequency of use of audiovisual resources does not assume a real change in learning processes. Dejaeghere (2009) and Martinez-Rodrigo & Segura Garcia (2011) link the use of digital communications media in education to socio-cultural and personal-emotional transformations.

Analysis of the teaching and learning process through digital audiovisual media in the classroom can be approached from very heterogeneous perspectives, such as a study of the educational technology involved (Garcia Garcia & Rajas, 2011), the procedures for acquiring competences (Ferres & Piscitelli, 2012; Perez-Rodriguez & Delgado, 2012), media literacy in digital content (Perez-Tornero & Cerda, 2011), or in the field in which this article is developed, the effectiveness of current technology as a methodological tool in student learning (Aranda, Sanchez-Navarro & Tabernero, 2009, Gabelas & Marta-Lazo, 2008, Garcia Garcia & Gertrudix, 2009, Caceres, Ruiz San Roman & Brandle, 2011, Area, 2012).

Digital technology has boosted the production and distribution of online audiovisual content through the Internet and social networks (Gonzalez Valles & Valderrama Santome, 2014). In this media context in which visual text and sound

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predominate, the videographic format acquires special relevance as audiovisual content support. With quantitative and qualitative exponential growth, young people invest hours of attention in viewing videos on the web. Written text gives way to image and sound as the predominant expressive substances in the learning process (Buckingham, 2003).

The search to optimize educational resources used in university classrooms has led to analyzing the attention that audiovisual content awakens in students. Equally, the interest in understanding, from rigorous scientific approaches, the quality of audiovisual teaching methods has raised interest in new research tools that measure the effects of the use of video in the classroom.

In this context, neuroeducation is a discipline that combines knowledge of neuroscience, education and psychology with the objective of understanding learning and teaching processes and their direct link with communication (Salas, 2013). It can be stated that "neuroscience allows for an approach that complements traditional research methods. Qualitative research offers variety and depth through interpretation, while the quantitative counterpart offers data" (Garcia Guardia & Llorente Barroso, 2014).

Several authors have established the direct relationship between neuroscience and education (Cacioppo, 2002, Battro, Fischer & Lena, 2008, Hardiman, Rinne, Gregory & Yarmolinskaya, 2012), and specifically between emotion and learning processes (Pekrun, 1992; Fernandez Abascal, 1995, Masson, 2015). Students, as emotional beings, learn and memorize better that which involves them, that which demands their sensory participation and that which they love. Information, before being processed by the cerebral cortex, passes through the limbic or emotional brain system, in whose areas of association neural networks are produced and

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distributed, creating the abstract, ideas and the basic elements of thought (Mora, 2013).

The action of paying attention is one of the processes that most concerns teaching activities (Anderson, 2014). Without attention from the student, the communication involved in any act of teaching-learning achieves satisfactory results, either because it does not end, or because it does not even occur. Attentional, emotional and motivational processes are closely linked to the achievement of learning objectives (Carew & Magsamen, 2010).

This article provides an approach to analyzing the effects of audiovisual media on student learning through a neuroscientific experiment: measuring the attention (EDL) and emotion (EDR) that a series of audiovisual resources of a narrative nature provoke in the classroom.

Based on research on electrodermal activity and measurement of EDL and EDR levels (Ketterer & Smith, 1982, Tranel, 2000, Dawson, Schell & Filion, 2000, Martinez Herrador, Garrido Martín, Valdunquillo Carlón & Macaya Sanchez, 2008; Gomez, 2013) applied to audiovisual productions, an analysis was conducted to determine if videographic content in a didactic context can reinforce attentional and emotional levels; therefore, its use in the classroom merges the communicative-didactic process which concludes successfully with the acquisition of knowledge and competency by the student.

The study of audiovisual material in the classroom from this perspective is pertinent since attention and emotion are two cognitive processes strongly related to memory and consequently play a key role in learning.

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2. Material and methods

The general objective of this research is to understand the attentional and emotional efficacy of the screening of audiovisual materials in university classrooms. Specifically, if the screening of audiovisuals during a given classroom lesson causes variation in attention and emotion during viewing that results in an increase in the attentional and emotional development of the class as a whole. The specific objectives are to test diverse audiovisual materials to compare the level of attention and emotion of each, and secondly, to test their efficacy in the communicative flow in relation to the audiovisual character of the lesson taught.

To achieve these objectives, we have chosen to conduct an experiment from applied neuroscientific formulations (Sutil, 2013). We are aware that we are faced with flexible and generic indicators (Ferres and Piscitelli, 2012) and that they must be adapted to the applicable educational situation, depending on age, objectives and competencies required by the curricular content; therefore particular attention has been given to the design of the experiment for a specific situation. Media communication depends to a large extent on reception spaces, therefore we have implemented a neuroeducative approach for a specific environment and experiment. In this specific case, a lecture was prepared to be taught by professors of Audiovisual Communication and Advertising and Public Relations that included the screening of a Video A and a Video B to determine which of the two videos was more relevant in attentional and emotional terms for the students.

The two audiovisual materials were selected and validated by a committee of experts in audiovisual narrative and emerging technologies consisting of 7 teacher-researchers from a general sample of 20 audiovisual productions. The videos address, in accordance with the above regarding emerging technologies and

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education, the digital society of social networks, and include images, animation style *motion graphics*, voice over and different types of musical content. The image presents strong chromatic contrasts and different playback or *timewarp* speeds.

The videos validated by the committee of experts and screened were *The Social Media Revolution* by Evan Kutsko (2016) - Video A - and Socialnomics by Erik Qualman (2014) - Video B - both broadcasted on the YouTube platform. The screening of the materials began with Video A, longer in duration (4:25), followed by Video B, shorter in duration (2:22). The sampling procedure chosen was convenient, given the commitment the method offers in cost and reliability, since the sample was non-random.

The sample chosen consisted of 54 people between 18 and 30 years old - the most common age of enrollment in university studies - from both sexes in a similar proportion (50%): 26 students - Degree in Audiovisual Communication and 28 students - Degree in Advertising and Public Relations, at the Complutense University of Madrid. The size of the sample has been validated in accordance with recent studies and can be considered correct and reliable with respect to the neuroscientific method performed in this research in comparison with similar research (Martinez Herrador, 2007; Vecchiato, Cherubino, Maglione et al. 2014; Reimann, 2012; Karmarkar, Yoon & Plassman, 2015; Orzan, Zara & Purcarea, 2015; Tapia & Martín, 2016).

Field work was conducted in April 2017 at the Faculty of Information Sciences of the Complutense University of Madrid. The participants in this study were informed of the purpose of the research and subsequently provided the applicable verbal consent.

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The procedure used for recording attention and emotion of the group was the measurement of the electrodermal activity (EDA) of the subjects. Due to reliability and efficiency of measurement, electrodermal activity is one of the most frequently used methods in analogous experiments (Martinez Herrador, Monge Benito & Valduquillo, 2012, Tapia, Martin & Puentes, 2016).

The technology used to observe electrodermal activity was developed by the scientific marketing company, Sociograph (www.sociograph.es). The technology consists of a wristband with two diodes placed on the index and middle fingers, which measures electrodermal activity; subsequently, the devices send the measurements to a central calculation unit for storage and processing (Aiger, Palacín & Cornejo, 2013).

The technology measures two parameters:

1) Tonic activity: related to attention (EDL). The unit of measurement used is the summation of the electrodermal resistance in kilo ohms (KΩ) of all the participants. In this article, the inverted values are shown to facilitate reading.
2) Phasic activity: related to emotion (EDR). The unit of measurement is the arithmetic mean of the electrodermal resistance in kilo ohms (KΩ) of all the participants. As a note, the machine simply detects the presence and intensity of emotion, but not the content or quality of it, research objectives that extend beyond the methodological framework of this experiment.

For the use of results, cross-sectional statistical models and techniques applicable to the study of time series were employed.

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Over the course of the class, the videos were screened separately to ensure each viewing was independent of the other – Video A was broadcast first, and after a sixty second pause, Video B was broadcast. The university professor taught a class that developed the content related to the videographic materials before and after the broadcasts, content that was part of the theme of the two subjects.

The sessions were also recorded with the objective of detecting potential deviations in terms of instructions received by the students from the teacher, performance of the task in general, correct broadcasting of the videos and development of the session.

3. Analysis and results

First, in relation to the attentional function (EDL), it should be noted that the model utilized demonstrates significant autocorrelation (0.838 in 16 delays, p value 0.000), which indicates the dependence of subsequent values on previous values. However, this data is applicable to the study of attention (EDL), but not to the study of emotion, as due to the sudden nature of emotion it does not demonstrate dependence.

3.1. Analysis of attention (EDL)

The average attention level demonstrated during the screening of Video A, longer in duration, maintained at an average attention measurement of -666.051 KΩ with a standard deviation of 16.926 KΩ. For the screening of Video B, -671.400 KΩ with a standard deviation of 5.488 KΩ. Given that the exposed value measures the inverse resistance, it can be stated, firstly, that more attention was paid on average

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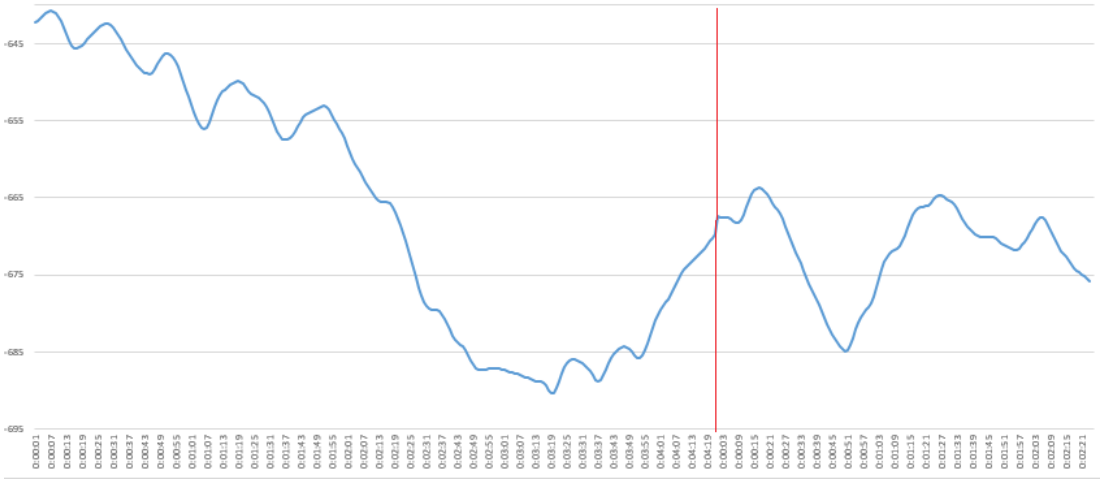
to the screening of the longer video than to the viewing of the shorter video. However, it is important to emphasize that the attentional dispersion was much higher in the case of longer video. I.e., more attention was paid during Video A on average, but that attention showed more ups and downs, which could be a relevant factor in the learning process. The difference was also statistically significant (T test of difference between averages, p value 0.000 per p value in Levene Test 0.000).

However, an analysis of the structure of the attention during the screening, as can be seen in the following figure (up to the red line of Video A, then Video B), allows extraction of other significant data.

Figure 1. EDL recording (Attention) during broadcast of the videos (-ΣΚΩ)



Source: compiled by the author

The broadcast of Video A maintains - with slight ups and downs - attention for the first two minutes, at which time attention drops very intensely almost until the end - four minutes -, where a turning point occurs during which it increases again but without recovering the levels prior to the descent. I.e., during the broadcast of

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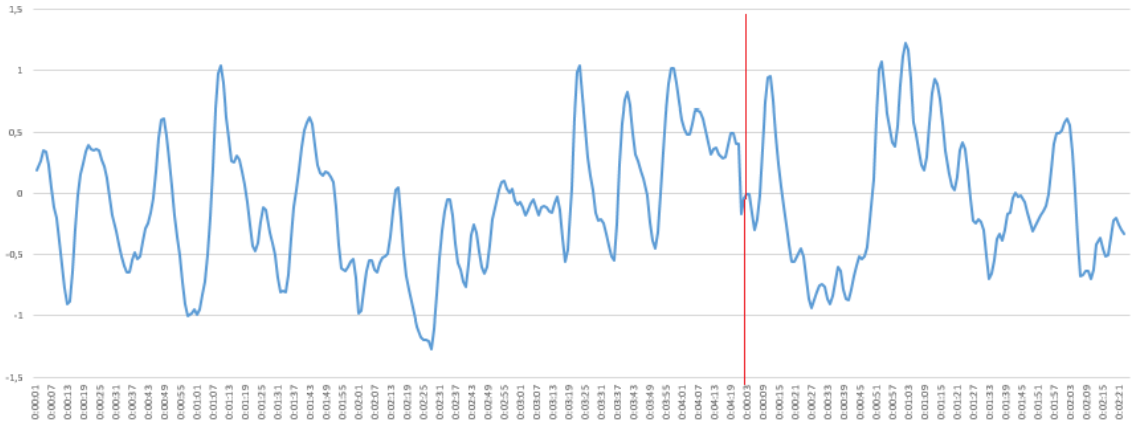
almost half of the video - from minute two to four -, the students paid a low level of attention. Additionally, during this segment, the level of attention was significantly lower than during the course of the screening of Video B.

However, the structure of the attention given to Video B demonstrates a different evolution. It increases slightly during the first 20 seconds, notably declines during the next 30 seconds, and increases again - up to minute 1:20 - until recovering and maintaining the levels prior to the descent until the end of the screening.

Analysis of the attention of both videos must also be based on the study of the rate of change of the variable. This data reveals moments of increase and decrease in attention in response to the stimuli deployed.

The following figure shows the rate of change in EDL of the two pieces - equally, Video A extends to the red line and then Video B begins.

Figure 2. Rate of Change in EDL (-KΩ)



Source: compiled by the author

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As shown, the recording of the rate of change in EDL demonstrates notable attentional alterations which are described in detail in the following table.

Table 1. EDL increments in rate of change

Temporary segment	∑KΩ	Description
Video A		
00:13-00:21	1.30	Audio: electronic music. Alters tones on a constant basis. Image: on white background appears overlaid: "Welcome to the revolution. Over 50% of the population is under 30 years old. 96% of millennials have joined a social network."
00:39-00:49	1.1480	Audio: electronic music continues. Image: on white background appears overlaid: "Years to reach 50 millions users. Radio. 38 years. TV. 13 years. Internet. 4 years."
00:59-01:10	2.0274	Audio: electronic music continues. Image: on white background appears overlaid: "We don´t have a choice on whether we do social media, the question is how well we do it."
01:34-01:43	1.4315	Audio: electronic music continues. A drum sample is added. Image: appears overlaid: "Twitter. What´s happening? Ashton Kutcher and Britney Spears have more Facebook followers than the population of Sweden, Israel, Switzerland, Ireland, Norway and Panama."
02:28-02:34	1.2178	Audio: electronic music continues. A repetitive and unintelligible voice sound is added. Image: on white background appears overlaid: "If you were paid $1 for every article posted on Wikipedia you would earn $1,712.32 per hour. There are over 200,000,000 blogs."
03:18-03:23	1.5969	Audio: electronic music continues. The voice does not continue. Image: on white background appears an image of a TV overlaid and the text: "Only 18% of traditional TV campaigns generate a positive ROI. 90% of people skip ads via TiVo/DVR."
03:36-03:41	1.3615	Audio: electronic music continues. The same voice indicated above is added. Image: on a search box similar to that of Google appears the writing: "We no longer search for the news. The news find us. We no longer search for products and services."
03:50-04:19	1.4053	Audio: electronic music continues. The voice does not continue.

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		Image: on white background appears overlaid, "Successful companies in social media act more like Dale Carnegie and less like Mad Men. Listening first, selling second."
Video B		
00:09-00:13	0.9599	Audio: electronic music. Image: on blue background appears overlaid: "World Population. 1. China, 2. Facebook, 3. India, 4. Tencent, 5. WhastApp, 6. United States, 7. Google+, 8. Indonesia, 9. LinkedIn, 10. Twitter."
00:50-00:54	1.299	Audio: electronic music. Image: on blue background appears overlaid: "1 in 5 divorces involve Social Media. What happens in Vegas stays in Facebook."
00:59-01:03	0.8391	Audio: electronic music. Image: on blue background, an image of a mobile phone. On the phone, an image of a group taking a selfie, and above in white text, it reads, "Selfie is now a word in Webster."
01:10-01:14	0.7393	Audio: electronic music continues. A repetitive and unintelligible voice is added. Image: on white background appears various shields from American universities.
01:56-02:22	0.6203	Audio: electronic music continues and the voice is repetitive and unintelligible. Image: on blue background Oreo cookies and traces of milk can be seen. The text states: "Real time marketing and newsjacking are becoming staples for savvy brands. Goodbye 4 Ps of marketing: product, place, price promotion."

Source: compiled by the author

Considering times when attentional increase occurs as a whole, a certain common pattern can be seen. The background, whether white or blue, focuses attention on the graphic overlay elements. The text on the image *background* stands out.

Regarding the text, large headings stood out with data that was surprising and unknown to the audience a priori, and attracted attention due to showing very high statistics in comparison with other numbers - for example, the relationship between the population of certain countries and inhabitants of the social networks.

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8 attentional increases above 0.5 KΩ were detected during the screening of Video A, and 5 during the course of Video B, which indicate on average an increase in attention in the case of the first video every 33 seconds and in the case of the second every 29 seconds.

3.2. Analysis of emotion (EDR)

The average level of emotion recorded during the broadcast of Video A was 0.1489 with a standard deviation of 0.08280. The average value for Video B was 0.1572 with a standard deviation of 0.08724. Therefore, it is important to note, in the first instance, the similarity of the emotional values of both screenings. Therefore, this indicates a similar display of average emotional intensity. Additionally, a T test of difference between averages was conducted, which ruled out significant differences - p value 0.352 with p value 0.282 in the Levene test for equality of variances.

However, the fact that there are no relevant differences in terms of average intensity does not indicate the same homogeneity in emotional peaks. These are moments in which, in response to a certain stimulus, the audience responded suddenly with a peak of intensity.

The responses, as shown in the following figure, are produced on four occasions during the screening of Video A, and also on four other occasions during Video B, the difference being that in this case the peaks are much closer to one another.

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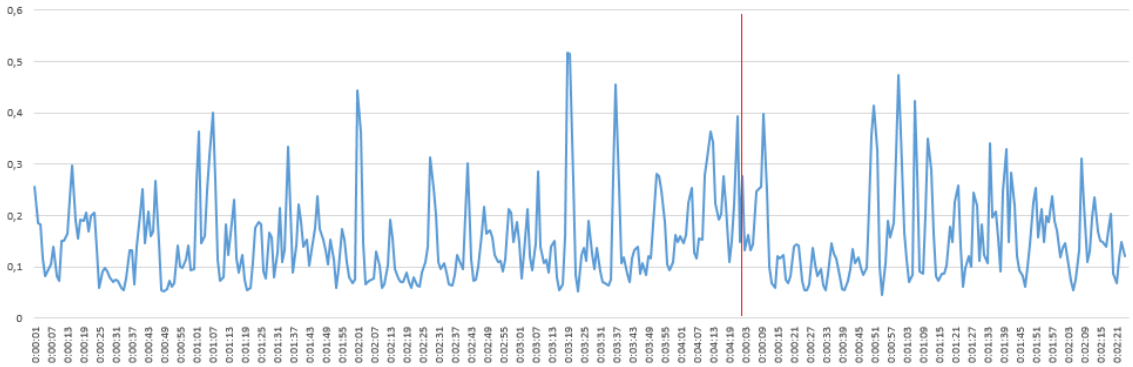
Figure 3. EDR of the screenings (KΩ)



Source: compiled by the author

The times indicated, of a sudden and independent character with respect to the previous content, are described in the auditory and visual plan in the following table.

Table 2. EDR increases (KΩ)

Temporary segment	KΩ	Description
Video A		
01:07	0.3993	Audio: electronic music; a voice repeats: “Right here, right now.” Image: a list appears in columns with the most populated countries in black text with the following highlighted in blue text: “3. Facebook.”
02:01	0.4436	Audio: electronic music; a repetitive voice, this time unintelligible. Image: on black background, white and blue text that states, "Instead they are distributing: ereaders, ipads, tablets. The social media revolution 2016.”

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03:19	1.0307	Audio: electronic music, this time without a voice. Image: on white background, image of a TV and the text, "Only 18% of traditional TV campaigns generate a positive ROI." Suddenly the text, "90% of people skip ads via TiVo/DVR," appears.
03:37	0.4556	Audio: electronic music; the same unintelligible voice as before is added. Image: "We no longer search for the news. The news finds us," is written on a search box similar to that of Google.
Video B		
00:10	0.3987	Audio: electronic music. There is the sound effect of a typewriter. Image: a classification on blue background is displayed: "World population. 1. China, 2. Facebook."
00:51	0.413	Audio: electronic music. There is also a sound effect of broken glass. Image: on blue background appears an overlay: "1 in 5 divorces involve Social Media."
01:00	0.4745	Audio: electronic music. There is no voice or sound effect. Image: on blue background, the image of a mobile phone is formed; a group of people taking a selfie is seen. White text states, "Selfie is now a Word in Webster."
01:06	0.4223	Audio: electronic music; a repetitive voice states, "Right here, right now." Image: on a white background, black text is shown that states, "Every second 2 new members join LinkedIn."

Source: compiled by the author

As with attentional increases, emotional increases of a more sudden and brief character are seen above the electronic music that keeps the viewer in a state of alert, in this case more frequent use of voice and sound effects that highlight or amplify the meaning of the image. The text is also shown as a large headline intended to provoke surprise in the audience.

It is important to note also, coinciding with the above, that in the case of Video A, two of the four times during which emotional content was generated took place in

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sections of increased attention. The same situation is found in three of the four times during the screening of Video B.

Therefore, emotional content was generated more frequently in sections of increased attention. However, a related issue is whether there is a significant relationship between emotional and attentional increase, or formulated in another way, if attentional increase indicates emotional increase or not – and vice versa. The tests performed -Pearson correlations - do not allow for this relationship to be significantly validated (p value 0.517), therefore this link is not emphasized as significant.

3.3. Proposal for the development of an audiovisual performance factor.

As Mora (2013) emphasizes, attention and emotion are two fundamental cognitive processes in the learning process. Following this approach, we propose the establishment of a comparative performance index for audiovisual materials viewed in the classroom.

To accomplish this, the average rate of change and the average EDR at N(0.1) are normalized, as shown in the following table.

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Table 3. Average EDL rate of change and Average EDR normalized to N(0.1).

		EDL (Average Rate of Change)		EDR (Average EDR)	
		Data Source	Standardized Rate N(0.1)	Data Source	Standardized Rate N(0.1)
Video A	Average	-0.1058	-0.0314	0.1489	-0.0348
	Standard Deviation	0.5163	0.9792	0.828	0.9812
Video B	Average	-0.059	0.057	0.1572	0.0634
	Standard Deviation	0.5473	1.038	0.8724	1.0339

Source: compiled by the author

These indexes are considered in terms of attention and emotion equivalence. Likewise, the value of the standard deviation is studied to indiscriminately consider the intrinsic variation in the average values of each of the videos, the IPerformance correlation coefficient.

IPerformance = EDL (Average + 2*Std. Dev.) + EDR (Average + 2*Std. Dev.).

In this way, the performance for Video A would obtain a value of 3.8546 and 4.2642 for Video B, which would indicate a higher general value for Video B. Video B achieves a higher score in EDL - where it decreases, but less than Video A -, and it also obtains a somewhat higher value in average EDR - although it also has greater dispersion -, which definitively describes why Video B obtained a significantly higher score.

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4. Conclusions

When comparing the attention (EDL) of students during a university class on two videos, *The Social Media Revolution* by Evan Kutsko (2016) and *Socialnomics* by Erik Qualman (2014), the following conclusions were drawn.

In relation to the objectives proposed in the research, in the sense of understanding attentional and emotional efficacy of the screening of audiovisual materials in the university classroom by comparing the levels of attention and emotion of the different materials used, there is less attention regarding Video B, shorter in duration, although the attentional dispersion was greater. Video A, longer in duration, maintains attention with slight ups and downs during the first two minutes. Subsequently, there is a moment in which attention decreases very intensely until the end, with lower attention in the final two minutes than throughout the course of Video B. This fact indicates that the order of the videos and their total duration influenced the attention process, since they deal with two subjects that are very similar in content and form, which excludes other audiovisual language and narrative variables in the case of having used different recording or post-production techniques.

On average, attentional increases differed depending on the duration of the video: during the long duration video every 33 seconds and during the short duration video every 29 seconds.

In particular, there is an overall increase in attention when text overlaid on an image appears on a blue or white background. I.e., this type of expressive resource increases the attention of the students, equal to what was observed in the tables

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above, a variety of surprising data due to the unsuspected nature both quantitatively and qualitatively, producing the same result where more attention is concerned.

On the other hand, when analyzing emotion, the values of both screenings were similar: the Pearson correlation with a value of 0.517 confirms that there is no relationship between attention and emotion in the two videos.

Similar to that which occurred with attention, sudden and short increases in emotion, which coincided with the use of electronic music, kept the students in a state of alert, in this case the use of voice and sound effects was more common, as explained in the experiment, to highlight the different informative and emotional messages intended to reach the spectators through the story.

Finally, it is important to note that IPerformance demonstrates that Video B obtains a higher value than Video A.

According to this data, it can be concluded that neuroeducational analysis can yield significant results regarding which audiovisual materials may be the most effective in provoking attention and emotion in the classroom, and when its efficacy or measurement is positive or negative.

After comparing and contrasting the results of this research, we propose to open discussion regarding the influence of the order of the screening of the videos by performing an experiment which begins with the screening of Video B, shorter in duration, followed by Video A, longer in duration, and likewise, if the merging of different expressive substances - audiovisual resources that bring into play other languages of image and sound - improves attention and emotion. Similarly, the possibility of crossing data with other research methods will be assessed - in

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addition to video recording of the expressions made by the students - such as the use of a survey or focus group and other neuroscientific measurement systems including eye-tracking and microexpression analysis software.

The results obtained in this work refer to a given context, therefore it would be of scientific interest to create the experience with other types of learners in other knowledge areas, with different ages or other geographical environments, as well as to measure the delivery of content type lecture classes given in conjunction with audiovisual materials. This study presents relevant results given the lack of previous analysis regarding this type of experiment with audiovisual content in university classrooms, but its weakness is in the context; it is essential not to over emphasize the results, and to propose new experiments that result in greater global knowledge of the subject of study.

Therefore, neuroscientific experiments applied to the use of audiovisual resources in the classroom is a field of study that can provide relevant data and interpretations in the scope of teaching methodologies: attention and emotion are two fundamental aspects of the process of teaching a classroom or virtual class, and knowledge and use of these concepts can be applied to the development of audiovisual content and to the improvement of the way in which the communicative act of teaching and learning is produced and shared, the didactic story, ultimately.

Thus, for example, content analysis facilitates obtainment of valuable data when evaluating the narrative and aesthetic structure of videos, or in another area of equal interest, a comparison of EDL and EDR of the same content taught exclusively orally -lecture-, with the support of visual presentations, or in audiovisual form with a video, among other fascinating lines of research in the interrelated field of education, communication and neuroscience.

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6. Key ideas

The study interrelates the use of audiovisual resources in the classroom with the analysis of attention and emotion in a group of communication sciences (Advertising and Public Relations and Audiovisual Communication) students. The introduction of various visual and sound stimuli - such as key words in *motion graphics* and specific references in the voice over -, as well as the temporal construction of stimuli displayed by the videos produced significant changes in EDL and EDR values.

Therefore, we highlight the possibility that neuroscientific experiments can be applied to the use of audiovisual resources, in the narrative and aesthetic construction of these materials to obtain higher levels of attention and emotion, as well as in the integration in university classrooms with other types of content and how it can provide relevant data and interpretations in the field of teaching methodologies, both in the classroom and in virtual classes, with the intention of improving the teaching-learning process in the era of digital content.