

## **Color motivated PowerPoint presentation texts and Bioethics learning management**

### **Presentaciones de PowerPoint con textos motivados por colores y gestión del aprendizaje en Bioética**

*Artículo de investigación*

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#### **Abstract**

PowerPoint presentations are ubiquitous in contemporary education. Objective: To demonstrate the positive influence of

#### **Resumen**

Las presentaciones en PowerPoint son ubicuas en la educación contemporánea. Objetivo: Demostrar la influencia positiva

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motivated color texts of PowerPoint presentations in Bioethics learning. Method: Four Level V groups of 35 medicine students each, of the Manabí Technical University were included. Group A1 and A2 received classical black texts PowerPoint presentations during the first half and color texts presentations in the second half of the Bioethics course semester. Red and green colors were intentionally used according to the ethical value of the terms. Groups B1 and B2 presentations order was inverse, color texts during first half and black texts in the final half of the semester. Daily evaluation and final exam qualification scores with color texts presentations were compared to those with black texts. Results: Daily evaluations and exams scores were significantly better with the use of color motivated texts Bioethics presentations in all four groups. Conclusions: Learning results are positively affected by color motivated presentations texts in Bioethics teaching for medicine students.

**Palabras clave:** Bioethics, PowerPoint, Medical Educations, Color. Visual Anchors.

de las presentaciones de PowerPoint con textos motivados por colores en el aprendizaje de la Bioética. Método: Cuatro grupos de 35 estudiantes de medicina del Nivel V de la Universidad Técnica de Manabí formaron parte de la investigación, Los Grupos A1 y A2 recibieron clases de la asignatura Bioética con prestaciones de Powerpoint con textos clásicos escritos en negro durante la primera mitad del semestre y con textos motivados por colores rojo y verde según el término, en la segunda mitad. Con los grupos B1 y B2 se siguió un orden inverso. Se comparan los promedios de las calificaciones con textos en negro con las de textos a color de las evaluaciones diarias y del examen final de cada ciclo. Reultados: Las calificaciones diarias y del examen final fueron significativamente superiores cuando se utilizaron presentaciones con textos a color comparadas con las calificaciones con textos en negro. Conclusiones: El uso de textos motivados por color facilita el aprendizaje en la asignatura Bioética.

**Keywords:** Bioética, PowerPoint, Educación Médica, Color, Anclas visuales.

## Introduction

Sight is the most information rewarding sense and is paramount for the learning process, for this reason colors must be fundamental part of the didactical strategies (Gallili and Hazan, 2000; Castillo et al.,2017). Colors affect personal mood status and produce physiological changes including emotions, heart rate and skin galvanic conductivity. (Jacobs and Hustmayer,1974; Al-Ayash et al., 2015; Wilms and Oberfeld, 2018) color

aids are widely used to underpin presentations and improve learning (Dandekar et al., 2017; Chitapure and Hindoliya, 2019). It happens in different disciplines and multiple types of education (Tang and Intai, 2017; Broma et al., 2018). Red color has traditionally been identified with threat and danger (Binzak-Fugate and Franco, 2019) while green color has been linked to nature, life, growth, health and positive emotions, (Song and Yamada, 2017; Mammarella et al., 2016; Valdez and Mehrabian, 1994) as in the traffic lights practical example. This fact of color interpretations and effects has been vastly investigated in the educational field as it would be discussed in this article.

Even though chalks and blackboards are still useful in everyday classroom activities, for both professors and students, PowerPoint and other recently incorporated sorts of presentations are widely utilized in virtual and presential education, these didactical tools have become ubiquitous in contemporary education. (Adams, 2006; Stacy et al., 2017; Chavez et al., 2020)

Bioethics, coined by Potter in last century 70's decade (Potter, 1970), is among the humanities forming part of the health career pensum internationally. Medicine career is one in which the bioethical subjects should be taught as a transverse axis. (Ruiz-Alvarado 2019; Marín-Pérez et al., 2017). In these careers Bioethics deals with different dilemmas such as ethics of the biomedical research and sanitary assistance, beginning and end of life critical decisions etc. (Deliverska and Grandinarova, 2017; Woellert, 2019), In Bioethics a great deal of negative emotional load terms is used and studied such as death, euthanasia, abortion, terminal cases etc. and other terms with positive emotional meaning are also studied as values, life, beneficence, justice, autonomy etc., this fact ease the possibility to associate bioethical terms writing with intentionally selected colors in presentations. The aim of this article is to demonstrate the positive influence of intentionally selected colors of PowerPoint texts on Bioethics teaching-learning process in Manabí Technical University (UTM) medicine career students.

## Methodology and methods

Four groups of Manabí Technical University medicine students receiving Bioethics classes were included in this investigation, each group n=35. This university Medicine curriculum has 12 six months Levels (semester) and Bioethics are taught in Level V, each Level (semester) is divided into two 8 weeks periods or half-cycles, first half-cycle and final half-cycle, each having separated contents, daily evaluations and final exam. In each half-cycle the daily oral/written evaluation ranks 5 points and the final exam is 15 points worth. During this investigation Groups A1 and A2 received Level V Bioethics classes using mono color black writing in all PowerPoint presentations of the first half-cycle and red and green colors motivated texts were used in the final half-cycle of the semester. Red colors text words were used intentionally in negative emotion concepts and green color in positive emotion words accordingly. An inverse fashion was applied in Groups B1 and B2, color motivated texts Bioethics presentations in the first half-cycle and black color in the final half-cycle of Level V. Presentations were exactly the same for all Groups, and also presented by same professor.

First cycles and final cycles exams and oral/written daily evaluations scores in all Groups with mono color presentations were compared to the red and green color motivated text PowerPoint presentations. Arithmetic Mean ( $\bar{x}$ ) and Standard Deviation (S) were calculated for each group. Results were compared using right-tail Hypothesis Test with a Confidence Interval =95%,  $\alpha = 0.05\%$ , Z critic=1,64, using the following formula:

$$Z_p = \frac{(m_c - m_b)}{\sqrt{(s_c)^2/4 + (s_b)^2/4}} =$$

c-color texts. b-black texts. m- Arithmetic mean S- Standard deviation.

## Results

Average qualifications scores for each category of all four groups are shown in Table 1. Hypothesis test was applied for a 95% Confidence Interval and 0,05% error range, The Hypothesis test was applied for both daily evaluations and exams to compare if points

scored with color texts presentations were statistically superior to the points scored with black text presentations: ( $H_0$ :  $m$  color text score =  $m$  black text score and  $H_p$ :  $m$  color text score  $>$   $m$  black text score), with a  $Z_{critic} = 1.64$ .

This was the  $Z_{proof}$  for the daily evaluations:

$$Z_p = (4,29 - 3,10) / \sqrt{(0,45)^2 / 4 + (0,047)^2 / 4} = 1,68$$

This was the  $Z_{proof}$  for exams:

$$Z_p = (12,99 - 11,96) / \sqrt{(0,11)^2 / 4 + (0,82)^2 / 4} = 2,42$$

From these Equations results, Daily Evaluation  $Z_{proof}$  was 1,68 and  $Z_{proof}$  for Exams was 2,42, both results were higher than  $Z_{critic}$  1.64 ( $Z_p > Z_c$ ), plotted in the  $H_0$  Rejection Zone of a right-tail Hypothesis Test and obviously accepting the  $H_p$ , meaning that the color text presentations qualifications scores were significantly higher than the evaluations when black text presentations were used.

Table 1: Mean qualifications (points) obtained by each group in both categories of evaluations (daily and exam): With black color texts PowerPoint presentations (upper) and with color motivated texts PowerPoints presentations (down), Arithmetic Mean ( $m$ ) and Standard Deviations ( $s$ )

BLACK COLOR TEXT POWERPOINT PRESENTATIONS						
GROUPS QUALIFICATION	A1	A2	B1	B2	m	s
Daily Evaluations. (5pts)	3.15	3.05	3.06	3.14	3.10	0.45
Exam (15pts)	11.8	12.10	12.04	11.93	11.96	0.11
COLOR MOTIVATED TEXT POWERPOINT PRESENTATIONS						
Daily Evaluations (5pts)	4.32	4.26	4.35	4.23	4.29	0.047
Exam (15pts)	13,05	12,93	12,89	13.09	12,99	0.82

Source: Authors elaboration.

## Discussion

As the statistical results show, the daily qualifications and the exam results were higher when color motivated texts Bioethics PowerPoint presentation were used compared to black text PowerPoint presentations.

According to Furman in Neurolinguistic Programming there are three anchors affecting unconsciously our conscience and memory, visual, auditive and kinesthetic anchors. (Furman, 2017) Subjects dealt in Bioethics classes and presentations transmit an important emotional, moral and ethical load to students and other persons, because they refer to life, death, sufferings, terminal patients, brain death, justice, autonomy, vulnerability, abortion, euthanasia, religions etc. depending on the particular term students emotional feelings are positive or negatively affected.

Language is vital for learning, and it has two main forms, sounds, when it is spoken and colors when it is written, colors are considered very helpful tools in the learning process (Barani et al., 2017), A 33 investigations meta-analysis with total n = 2914 carried out in Czech Republic concluded that colors are very important in learning and together with anthropomorphism contribute to achieve better goals in virtual education (Broma et al., 2018). Authors of this article agree with Ahn, highlighting the negative influence in education of colors misuse in virtual books (Ahn and Lee, 2017). This investigation shows that the correct management of color texts in Bioethics PowerPoint presentation which are full of emotion rich terms resulted in better qualification scores. In this case green color texts were linked to positive emotion terms and red color was used with negative emotion terms.

This strategy of using colors in the teaching-learning process has been vastly accomplished. In Sweden it was applied to Mathematics teaching, resulting in improved learning and exercise resolution time (Walliulah and Ekman, 2019). Colors motivated feelings have been demonstrated also in marketing, publicity and sales management (Pancer et al., 2017; Jahanian et al., 2017). In Texas, USA investigators observed that essays corrected and scores signed by professors using red ink pens eventually produced bad personal relations between the students authors of the essays and the



relevant teachers, fact not found when using blue ink pens (Richards and Fink, 2017). There is abundant international evidence of color effects on students learning and emotions.

The fact that in this investigation the color text and black texts were applied inversely in Group B1 and B2 than in Groups A1 and A2 rule out the possible bias of the students being more familiar to the Bioethics contents in the final half-cycle of the semester. Also, same one professor and identical PowerPoints presentations for all groups warrant avoiding personal bias too.

### Conclusions

PowerPoint presentations may be designed in such a fashion of texts colors provoking effects on students' emotions rendering learning improvement. Bioethics is a discipline dealing with moral and ethical terms that convey moods changes to students, allowing the right use of meaningful colors in the presentation's texts. This investigation concludes that with the use of color intentionally motivated texts in Bioethics Powerpoint presentation students' evaluations results were significantly better than with black traditional text presentations.

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