

## Teaching beyond Socrates: an experiment with ICTs for an undergraduate course of business administration at a University in southern Brazil

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### ABSTRACT

This research examined the influence of multimedia presentations on content retention and satisfaction of business administration students when subjected to different didactic standards. For this study we used experimental procedures with 147 undergraduate students of Business Administration at a university in southern Brazil. As for the retention of the contents, statistical differences were found between the experimental groups; classes with dynamic slides showed better results. As for the influences of teaching tools in students' satisfaction, the survey indicated that dynamic slides facilitate the logical and rational development of the discipline and raise students' motivation. Traditional slides, in turn, can disperse the interest of the student and suppress attention to the teacher.

## 1 Introduction

With the advances in information and knowledge for the society, educational institutions are facing an environment of rapid development and significant competition in which the challenge is the balance between operational efficiency and the quality of education offered (UZ, ORHAN & BILGIC, 2010). In this perspective, Ferreira et al. (2010) point out that one of the evidences of this new context that has changed the behavior of teachers, students and their own higher education institutions (HEIs) is the increased use of information and communication technologies (ICTs) in the classroom, especially with

audiovisual resources.

According to these authors, the use is even more pronounced in the area of applied social sciences, due to this area being close to the business one, in which such practice is indeed employed. In a complementary way, James, Burke and Hutchins (2006), point to the greater utilization effectiveness of audiovisual resources in theoretical and qualitative subjects and courses (marketing, economics, business administration), because the format of the multimedia software does not facilitate numerical manipulation (finance, mathematics and statistics).

Despite the apparent institutionalization of audiovisual resources in the area of applied social sciences (FERREIRA et al., 2010), there is a wide divergence in literature about the actual effectiveness of these resources in educational institutions. Several studies showed positive effects on the use of presentation software (slidewares) in the learning process (MANTEI, 2000; NOURI & SHAHID, 2005; SUSSKIND, 2008). In contrast, several studies have also pointed to the lack of relation or effect of its use in education (BEETS & LOBINGIER, 2001; KARREMAN & STRANNEGARD, 2004; HARDIN, 2007).

Another relevant factor is that many of these studies did not focus the elaboration of this didactic material. Because it is based on a software, there are numerous ways of handling it, which may vary from the correct and innovative use to the misuse of this feature.

Some authors advise that the teachers should focus on the text, visuals and the structure of the slide (UZ, ORHAN & BILGIC, 2010). Apperson, Laws and Scepanisky (2006) recommend that teachers use these resources wisely in order to support their speech and stimulate attention and productive discussion in class.

Regarding this, Wecker (2012) pointed out a difference between the regular slides (with too much text) and concise slides (in topics). According to his research, there is disagreement in the retention of designed content and those contained in the teacher's speech, depending on the type of slide used (WECKER, 2012).

Thus, this study sought to answer the following question: What is the influence of multimedia presentations in the retention of content and its impact on students' satisfaction in the classroom?

Therefore, this study aimed to analyze the influence of multimedia presentations on retention of content and satisfaction of academic management in the classroom by using mixed methods, when subjected to different didactic standards. An investigation about the effectiveness of the use of multimedia resources was conducted, taking into account their construction parameters and presentation as

indicated in the specialized literature.

After this first introductory section, we present in the second section the literature review with the major concepts, rules and evidence of proper application of these technologies in the classroom. The third section addresses the methodological design used to conduct this mixed methods research. The fourth section seeks to analyze and interpret the main results of the research, and finally, the fifth and final section will express the final considerations in order to address the research question and present limitations and suggestions for future research.

## 2 Theoretical Framework

The use of multimedia presentations is institutionalized in applied social sciences courses in Brazil (FERREIRA et al., 2010). The teacher adopts the use of multimedia resources with the thought "I do it because that is how things are done", as well as students require their use because "that's how the area should be" (BERGER & LUCKMANN, 2008).

Several studies over the past 10 years indicate students believe that the use of multimedia, in particular slide projection, facilitate their learning (APPERSON, LAWS & SCEPANSKY, 2006; MANTEI, 2000). The study by Apperson, Laws and Scepanisky (2006) indicated that although there was no significant difference between the scores of students with the use of slides in class, there are significant differences in their perception of the class. Thus, these authors concluded that students who have classes with slides believe that their classes are more organized, clear and interesting. Also, they have a better view of the teacher, and feel more encouraged to take notes about the classes (APPERSON, LAWS & SCEPANSKY, 2006).

In a complementary way, the study of Susskind (2008) also noted a positive effect of students with the use of slides in the classroom, and further pointed out that students feel more motivated during lessons to participate with questions and to carry out activities, exercises and tasks requested by the teacher. A piece of information resulting from this research is that even being more motivated, these students did not

feel bad about missing classes. For them, because it is easy to take notes during these subject classes, they believed their colleagues would also take good notes in their absence.

Other studies show a positive effect on retention of content with the use of slides produced by software (slidewares). In experiment 2, performed by Szabo and Hastings (2000) through a knowledge test, there was a significant difference between classes with slides (78% correct) and without slides (49% correct). Carrel and Menzell (2001), in Experiment 2, compared a slide presentation combined with an audio recording of a lecture, with this lecture without slides, and a video recording of the same lecture without slides. This study found significant differences between the three conditions, with the highest score retention of the content being the one presented with slides.

Still on the potential use of slides in content retention, research Wecker (2012) compared lectures (no slides), with classes with regular slides (built with whole sentences) and with lessons with concise slides (topics). The author separated the information contained in the slides and also the information transmitted orally, which were not contained in the slides. As a result, regular slides showed a large deletion of information transmitted orally by the teacher, in which learning was lower than in traditional lectures. However, the concise slides showed an enlargement of the retention of content, both through content of the slides, and in the knowledge communicated orally. (WECKER, 2012).

As for teachers, Hardin (2007) argues that the media did not interfere with classes in this positive perception on the part of students in the area of psychology. Although one of the teachers got a better assessment of classes with multimedia presentations, another one had a decrease in performance. Thus, the author points out the need to focus on the quality of classes in which the teacher needs to worry about his teaching style, his skill with the use of technology, and finally, his experience and training with multimedia presentations before using them in teaching (HARDIN, 2007).

The use of technology in education can be

more effective when used appropriately (SAVOY, PROCTOR & SALVENDY, 2009). To Savoy, Proctor and Salvendy (2009) in classes with the need to retain graphics, complex models, figures and schemes, the use of multimedia presentations can present a great advantage. However, in classes in which the student is expected to retain information and more abstract concepts, lecture-type classes with discussions were more efficient. In contrast, this study demonstrates the preference of students for lessons with multimedia presentations regarding traditional expository lessons (lectures), although there is not a direct relationship between content retention and preference for certain types of classes.

A study by Bucher and Niemann (2012) published in the journal "Visual Communication", used a device called "Eyes Tracking", in which is possible to identify the stimuli received from the environment by eye movement, and identify the level of attention, interest, as well as indicating in real-time which information which the viewer pays attention to, and which he ignores. The authors claim that the many criticisms of using slides may be put into check, because until then there was the notion of slides as text content, ignoring its capacity of being a multimodal instrument (including text, image, graphics, etc).

The study also points out the need to orchestrate presentations, synchronizing the verbal references with body language and visual projection (text and image). This fact allows a retention of non-linear content that enhances learning, which seems to emerge in the student learning environment, and interacts with all elements (speech, image, text) and not just focuses on a single element (BUCHER & NIEMANN, 2012).

Therefore, the slides used regularly with phrases may cause misunderstanding of teacher's speech, demonstrating not only the importance of the use (or no use), but also caution in the formulation of the material.

On the structural aspects, studies by Rickmann and Grudzinski (2000) indicate that although students believe that the use of slides is a technological resource which is more effective in the classroom, they may be dissatisfied with slides built incorrectly, or when flicked, without adding

examples and experiences. They conclude further that presentations prepared without following the "best practices" in the area have a negative effect on learning.

Susskind (2008) also found that students perceive lectures with slides as more pre-prepared and with less spontaneity. Also according to the author, as the slides present a formal structure, students may have less freedom to interrupt the teacher. Gabriel (2006) states that knowledge comes to be "parceled out" due to the use of markers and an extremely rational division of content, and the students begin to internalize these topics as the entire contents to be learned, and to study for exams only using them.

Thus, there is a considerable importance in "how to prepare" a multimedia presentation, as this may be one of the factors responsible for the success or failure in the teaching and learning process that uses this didactic resource. The literature in this sense is very broad and covers the use of text, images, colors, shapes, graphics, music and sounds, videos and training aids through presentation software. The following is a summary table (Table 1) of the fundamental principles, which are a consensus among experts for preparing the material effectively:

**Table 1: Fundamental principles for development of multimedia material (slides)**

| Elements | Variables               | Utilization method  | Authors   |
|----------|-------------------------|---|---|
| Text     | Font Type               | Not serif (e.g. Arial, Calibri, Verdana)                                  | Holtz (1997), Hobson (1997); Seaman (1998); Rickmann and Grudzinski (2000); James, Burke and Hutchins (2006); Wecker (2012) |
|          | Font Size               | Greater than 32 to 28 for titles and text                                 |   |
|          | Number of Sources       | No more than two (one for title and one for text)                         |   |
|          | Font Styles and Effects | Bold, italic and underlined only occasionally. Avoid capitalized phrases. |   |
|          | Text Quantity           | No more than 25 words per slide   |   |
|          | Use of Markers          | Avoid indiscriminate  |   |

|                                 |                         | use   |   |
|---------------------------------|-------------------------|---|---|
| Structure                       | Background              | Conservative and intentional (to allow maximum utilization)                                 | Gotsick and Gotsick (1996); Holtz (1997), Hobson (1997); Bolling and Lee (1999), Mayer and Moreno (2002); Apperson, Laws and Scepanisky (2008). |
|                                 | Colors.                 | Sober (Establish a standard color for the presentation)                                     |   |
|                                 | Contrast                | Allow the overlap of elements   |   |
|                                 | Distribution of Content | Diversify with balance, symmetry, unity and harmony   |   |
| Images:                         | Relevance               | Allow for reference or link to the content  | Holtz (1997); Bolling and Lee (1999), Mayer (2002); Moreno and Mayer (2002); Tuft (2003), Clark (2008)  |
|                                 | Originality             | Innovative (avoid already seen pictures, drawings)  |   |
|                                 | Size                    | Medium to large, not being limited to a predetermined space                                 |   |
| Graphics and Tables             | Relevance               | Allow for reference or link to the content  | Holtz (1997), Keller-McNulty and Becker (1996); Bartsch and Cobern (2003)   |
|                                 | Size                    | Medium to large, to facilitate the reading of details of elements (subtitles, percentages). |   |
| Animations and slide transition | Use of Animation        | Timely and synchronized with the content in order to highlight certain elements             | Holtz (1997); Moreno and Mayer (2002); Hoffler and Leutner (2007); Beard, Wilson and McCarter (2007); Berk (2012)                               |
|                                 | Use of Slide Transition | Used intelligently, and synchronized with speech  |   |
|                                 | Relevance               | Emphasize or contribute to the development and  |   |

|                   |                  |  |   |
|-------------------|------------------|--|---|
|                   |                  | understanding of student   |   |
| Sounds and Videos | Use of Sound     | As an intro or ending, or encouragement to a particular behavior (calm or excited) | Apperson, Laws and Scepansky (2008); Dosseville, Laborde, Scelles (2012); Berk (2012) |
|                   | Use of Video     | Exemplifying or enriching the subject in question                                  |   |
| Didactics         | Questions        | To stimulate discussion and understanding  | Seaman (1998); Quible (2002); DenBeste (2003), James, Burke and Hutchins (2006);      |
|                   | Reflective image | Picture to stimulate a brainstorm to promote participation and interest            |   |
|                   | Good Taste Humor | Punctually to hold the attention and break the monotony                            |   |

Source: Authors.

With the diversity of evidence presented, it is important that teachers try to vary their presentations and promote the "wise use" of this technology in favor of their classes. For Mayer and Moreno (2003) the use of "smart" educational technology can be studied from three components: cognition, instruction and technology. The item cognition would be related to how people learn; instruction is about how the process of teaching and learning can be facilitated, and technology is about how to use it in a positive way in the process.

It is noteworthy, therefore, to mention the important role of information technology, especially multimedia presentations, as instruments of class facilitators, substantially supporting teachers in their challenge of teaching. The technology is at the teachers' service and help, offering organization and dynamics in their classes.

### 3 Methodology

This study aimed to verify the influence of multimedia presentations on retention of content

and satisfaction of students in an undergraduate course of Business Administration at a university in southern Brazil. We used a mixed approach (qualitative / quantitative), descriptive / explanatory with factorial experimental design (MONTGOMERY, 1997).

Therefore, with a population of 1044 students, we composed a non-probability sample of 147 students from the 7th term of the evening undergraduate course of Business Administration at a university in the southern region of Brazil, with an average age of 22 years (Reliability of the sample - 90% and margin of error of 6.3%). The public surveyed was divided into three (3) different classes of the course subject Strategic Planning.

The survey was conducted between August and October 2012, with the weekly observation of three classes, for a total of 60 classes, featuring such cross-sectional survey as for temporality.

As elucidated in Table 2, this study was divided into three distinct phases for a better understanding of the methodological process.

**Table 2: Phases of research**

|                   | Phase I  | Phase II              | Phase III   |
|-------------------|--|-----------------------|---|
| <b>Stages:</b>    | Period Experimental  | Quantitative Analysis | Qualitative Analysis  |
| <b>Procedures</b> | Expository / dialogued Traditional Slideshow Dynamic Slideshow | Evaluation (test)     | Focus group Interview   |
| <b>Analysis</b>   | -  | Retention of content  | Satisfaction in the lesson (Organization, concentration, motivation and overall satisfaction) |

Source: Authors.

#### 3.1 Phase I - Experiment

Experimental research is seen as a good example of scientific research by the level of control of the situation that is given to the researcher. Thus we can isolate all of the structures of the possible outside interference and this offers credibility to the results (KERLINGER,

1979). This author points out that the characteristic of experimental research, therefore, is that the independent variable is manipulated by the researcher avoiding misunderstandings and ambiguities.

Being a research in Applied Social Sciences, in which the elements of analysis are people and their reactions, there is no possibility of isolation according to the area of Natural Sciences; however, as described, all intervening variables were isolated to avoid biased research, and increasing the reliability of the experiment.

All classes were taught by the same teacher with the same content, syllabus, bibliography and duration, only with different pedagogical forms. During the period from August to October 2012, we followed 10 weeks of classes, two hours per week (4 credits) for each of the three classes, totaling 60 classes in which this experiment consists of. To avoid bias the teacher who conducted the lectures was not the researcher.

Thus the dependent variable was composed by the didactic conduction of content separated into three different groups:

- Group 1 - Expository: The classes were taught by means of lectures and dialogue. This is the control group of the experiment;

- Group 2 - Traditional slideshow: Subject (lessons) taught by traditional slides, as a single source and standard white background and black font color, font size medium to small, significant amount of text per slide, distribution of rational content, frequent use of markers, the absence of images, sounds, videos and graphs that promote interaction with students. (Not in accordance with the "wise use" characterized in the literature review of this article).

- Group 3 - Dynamic Slideshow: Classes taught by means of dynamic slides in accordance with the principles presented in Table 1. To characterize the dynamics we used slides with non serif fonts, sober colors, background contrast, large font size, few words per slide, distribution of creative content, occasional use of markers, use of images, sounds and videos relevant to the subject.

At the end of stage 01, in which subjects were exposed to different stimuli, we simultaneously performed phases two and three, which characterize the mixed characteristic of the

research. In the mixed method, there is an interconnection among the various pieces of information that can be compared, allowing greater openness from the perspective of research and further analysis of the data (CRESWELL, 2007).

This author also points out that in research employing mixed methods, the integration of numerical data and textual or visual data in a single study can be developed simultaneously, i.e., quantitative and qualitative data are collected in the same period of the research.

### 3.2 Phase II – Retention

Students of the 3 groups were submitted to and an evaluation at the end of the period of the experiment with opened questionnaires to check the variation of content retention. Such assessments were applied on the same day and period, in order to avoid bias in the research. Therefore, we formulated the following hypotheses:

H0: The mean range of scores that confirm content retention of different learning resources adopted are equal.

H1: The mean range of scores that confirm content retention of different learning resources applied are different.

With the hypotheses, we proceeded to a statistical analysis of the data to verify their variability and accordance with the normal model (Jarque and Bera Test for Normality). For variance analysis we used the analysis of variance one-way (ANOVA) which allows studying whether there are significant differences between the experimental responses which is used to measure statistical differences between the averages of two or more factors and t-test for independent samples to evaluate whether there is a statistical difference between the three groups surveyed. To aid the statistical analysis we used the SPSS Statistics (Statistical Package for Social Sciences) software, version 20.0 of IBM.

### 3.3 Phase III - Satisfaction

This phase aimed to verify students' satisfaction in the classroom, using the different didactic forms. Data collection was conducted with three focus groups with 8 members in each

group and mean time of one hour and thirty minutes.

We also held an interview with the professor of the course, in order to verify the perception of the use of different didactic forms of teaching according to his/her vision.

Focus groups and interviews were held by means of semi-structured guideline based on Birnbaum and Frey (2002), Apperson, Laws and Scepanisky (2006), Susskind (2008), Savoy, Proctor and Salvendy (2009), Uz, Orhan and Bilgic (2009). These interviews were recorded and later transcribed, generating 60 pages verbatim.

We used the technique of thematic content analysis to investigate the satisfaction of students, linking them with the educational resources adopted. According to Bardin (2010), content analysis consists of analysis techniques for messages through objective and systematic procedures, either qualitative or quantitative, which allow inference about the content of the message. The analysis was performed with the aid of the Atlas.ti 6.0 software

The students' satisfaction analysis in the classroom was expanded into four distinct topics to deepen the results: organization, concentration, motivation and overall satisfaction.

For organization we asked about the clarity of understanding, logical sequence of content, readiness in note-taking. The item concentration sought to identify whether students followed with ease the teacher's speech, if the content taught was easy to remember, and if there was dispersion of attention during activities.

In the item motivation we discussed with the students the willingness and initiative to attend classes, perform activities requested by the teacher, and the attendance of the subject lessons. To identify the overall satisfaction of the students in the classroom, we asked about the adequacy of the methodology of teaching the subject and the critical view of students about the approaches.

#### 4 Analysis

After the evaluations, the scores were tested with the Jarque-Bera test for verification of data normality. Because the result of the analysis was 5.32, that is, below the critical value of 5.99, it can

be said that this is a normal distribution. With the prerequisite of normal distribution of grades for evaluation, we used the analysis of variance test, ANOVA and t-test to verify the hypothesis established by research.

Table 3 shows the result of variations in average scores per class, and the result of ANOVA:

**Table 3: ANOVA Results**

| Groups                          | Number of Respondents | Standard Deviation | F    | Sig. |
|---------------------------------|-----------------------|--------------------|------|------|
| Groups 1 - lecture and dialogue | 44                    | 1.83               | 5,07 | 0.08 |
| Group 2 - Traditional Slideshow | 23                    | 2.49               |      |      |
| Group 3 - Dynamic Slideshow     | 58                    | 1.62               |      |      |

Source: Authors.

Based on Table 3 above, and determined after the results of 125 evaluations of groups surveyed, it can be stated that there is evidence that there are differences in the average scores of the groups. Therefore, there is no statistical difference in the content retention element in relation to the textbook used. It is suggested, in accordance with Table 3, the reliability of the result is 0.92% (Significance 0.08).

The use of dynamic slides (average 7.37) was proven to be more effective in helping content retention than other didactic forms (dialogued lecture - average 6.22, and traditional slides - 7.28 average). In addition, the presentation with traditional slides also proved to foster better student performance than lectures.

Table 4 shows the results using the t test for independent samples.

**Table 4: t-test result**

| Comparison between groups (t test for independent samples) |         | t     | Sig.            |
|--|---------|-------|-----------------|
| Group1   | Group 2 | 1.792 | 0.08            |
| Group 1  | Group 3 | 3.284 | 0.01            |
| Group 2  | Group 3 | 1.157 | No sig. (0.876) |

Source: Authors.

The t-test showed the following results: dialogued lectures and traditional slides (significance 0.08); dialogued lecture and dynamic slides (significance 0.01); traditional slides and dynamic slides (no representative significance). Although the results between traditional and dynamic slides did not show statistical differences between them, it can be stated that there is a difference in retention of content when classes with lectures are compared to classes with slides.

Through analysis of the result means and statistical tests (t-test and ANOVA), group 1 was different from groups 2 and 3, which were similar. The proximity of variance between groups 1 and 3 could also be noticed, opposing group 2, which is different. Therefore, there is statistical evidence that the results between the groups is not homogeneous.

This result confirms the positive effect of the use of slides in content retention. It is also important to mention the importance of using dynamic slides according to the literature of the field, because students who attended classes with such instruments outperformed the assessments. This data reflects the results of the research by Wecker (2012) in which concise slides (with topics) also resulted in higher performance in the sample.

After the presentation of the statistical results, a qualitative analysis was performed in Phase III of this research, which includes qualitative analysis regarding the satisfaction of students in the classroom, their concentration during the course and even their perception of the organization of classes.

#### 4.1 Group 1 - Dialogued Lectures

In this group the teacher taught the content only supported by his/her speech and experience, and punctually with the use of the blackboard as support.

Students participating in the focus group indicated that as for the organization, this type of methodology was difficult to understand because there was not a logical and gradual line of reasoning. Thus, repetition of content, ideas, examples and mixed issues hampered the overall

understanding of the subject. Moreover, the difficulty in organizing the content reported by students generated a direct and negative impact on concentration and motivation of the students in this group.

According to an interview with the students, the dialogued class decreased their interest in paying attention to the subject, and thus, the use of the computer for other activities such as accessing social networks, reading about other topics, and even parallel conversations among students became more frequent.

This result meets the considerations made by Apperson, Laws and Scepanisky (2006) that dialogued lectures are perceived as less clear and organized by the students than classes with slides.

Also due to the lack of clarity in the organization of content, the motivation of the students was also hampered because of the difficulty in focusing on the teacher's speech and also, according to them, making the classes somewhat monotonous and dull.

It is noteworthy to mention that, for relying overwhelmingly on the teacher's talk, such subject eventually became tiring and exhausting, in the view of the students surveyed and, therefore, during the first semester the students' participation in the proposed activities and the classes was decreased. In contrast, the fact that the teacher had brought examples and previous academic and professional experiences, even punctually, was evaluated as positive and stimulating by students. Thus, this study reflects the findings of Susskind (2008) in which dialogued classes had a lower participation rate during the course when compared to classes that use slides.

In addition, because the class was presented without a visually structured sequence, it eventually hindered students' note taking, who reported great difficulty in keeping notes organized and continuous during the class period under review.

Finally, these scholars have cited the use of innovative technologies, combined with images and videos as a way to increase motivation, satisfaction and interest in participating in class. Thus, they emphasize the need for constant recycling by the teachers/professors of the institution, in order to track trends and news



available to magnify the teaching / learning process.

However, they also highlighted that the teachers' role and performance could also be leveraged with a more active participation with the students, especially regarding the interaction during class.

#### 4.2 Group 2 - Classes with Traditional Slideshows

In this group, besides using the dialogued class technique, the teacher also used slides with a traditional format, i.e. using basic software, a single source and standard white background and black font color, font size medium to small, an expressive amount of text per slide, rational distribution of content, frequent use of markers, the absence of images, sounds, videos, graphics and didactic elements that promote interaction with students.

As an organization, these students perceived a greater ease in following the development of the curriculum, for it was possible to visualize the evolution of content during class. In addition, according to the research group the slides make it easier to associate the examples and experiences shared by teachers with the specific content being studied.

However, they considered that the slides, exactly because of their way of introduction, made the class become "dull", especially due to the lack of creativity and excessive amount of text. This fact confirms the claims of Rickmann and Grudzinski (2000) that presentations built incorrectly can cause dissatisfaction in the target audience.

According to students, due to the large amount of information on the slides, concentration and attention on the teacher were divided with the material content shown in the classroom. This division in concentration led to loss of focus on the content displayed by the teacher.

Thus, these facts can be understood from the research by Bucher and Niemann (2012), in which the "static slides" focused the attention of the students surveyed in a single element only. Moreover, the considerations by Wecker (2012) are confirmed, in which "regular slides" (with lots

of text) can restrict attention to the teacher talk and retention of the content transmitted orally.

For these reasons, the concentration of students was dispersed, according to their own report, due to the lack of innovation in the material presented by the teacher and also by the lack of interaction with the class. According to reports, the use of software in a "more advanced" way, that is, animations, videos and pictures, could have aroused the interest and motivation of the student to interact during the process of teaching and learning. Such information reflects the statements of Gabriel (2006), because the slides constructed in a linear and rational manner may have restricted the participation of academics during classes.

Such students, as well as then ones in the group with lecture/dialogued classes highlighted the professional and academic experience of the teacher, especially with the addition of examples during lectures. In contrast, students' satisfaction, as reported, could be expanded with the addition of dynamic activities, interaction and creativity on the part of the teacher, both in terms of technological and educational aspects. These considerations meet the claims of Hardin (2007), in which the teacher, besides worrying about his/her technological skills, needs to worry about his/her teaching style.

As for note taking, there was no consensus in the class because some students positioned themselves in the sense that they took their notes during lectures and studied to the evaluation through these notes, while others said they could not take notes and just studied the supplementary material provided by the teacher.

One factor highlighted by the students is that the teacher's refusal to share the slides on the virtual learning environment of the institution made it difficult to use these as material for note taking and study. In contrast, the teacher does not share the slides in a virtual learning environment because, according to him, the students only use this material as the basis for their studies. This discussion reflects another impasse for students of this field, which, according to Gabriel (2008) make students consider the slides as an element for studying, limiting themselves to the exclusive study of these slides for evaluations.

### 4.3 Group 3 - Lessons with Dynamic Slideshows

For this group, the content was taught with the aid of visual material made according to the rules of intelligent use listed in Table 1. Thus, we used videos, images, movements and didactic elements to support the teacher's speech.

As for organization, students said it was easier to follow the sequence reasoning and content taught by the teacher. Thus, unlike Groups 1 and 2 (Dialogued Lectures and Traditional Slides), classes with dynamic slides were perceived as more effective to organize the curriculum of classes.

However, this group also stressed the importance of the teacher in manipulating more appropriately the technological resources in order to better support their speech and avoid abrupt transitions and lack of harmony between speech and visually projected material. Thus, the need for synchronization between verbal reference and the teacher's body language to visual projection is reflected, in accordance with the notes by Bucher and Niemann (2012).

Yet such students highlighted the use of slides as an important factor to aid their concentration in class, as this feature is rarely used by teachers of this institution.

As for students' satisfaction with the course, there was more praise and less criticism compared to previous classes; however, this group also stressed the need for participation and interaction of the teacher with the class as a way to increase the group satisfaction with the course.

Students realized more clearness, clarity and fluidity in classes with dynamic slides because of the logical and dynamic structure, resulting in an increased motivation to attend classes.

Also, according to what the teacher of this subject stated in an interview, there was greater student participation during lessons, with appropriate questions and relevant and constructive participation, in line with the results by Susskind (2008).

Regarding the notes about the content, most students said it was easier to take notes of the content displayed by the teacher and projected on screen; however, some students pointed out the

difficulty in tracking all the elements together, sometimes losing the sequence of class. Although most students in this group have confirmed the use of their notes to study for the evaluation, the teacher noticed a smaller commitment of the class with dynamic slides to make notes during the exhibitions.

## 5 Conclusion

Socrates, the greatest philosopher, perceived the transition of oral language to written language. This could turn out to be a revolution, and he feared that young people with the resource of writing and reading would harm the exercising of memory. Nowadays, the teaching transition to a digital era can be compared to a revolution, such as, the invention of the alphabet. In this sense, the use of ICTs in Education brings out the same characteristics of an event of change: uncertainty, instability, and contradiction.

This research aimed to examine the influence of multimedia presentations on retention of content and satisfaction of students in an undergraduate course of Business Administration at a university in southern Brazil.

Regarding the retention of the content, statistical differences were found between the groups in the experiment. The group in which classes were taught with dynamic slides outperformed the assessments/evaluations.

As for the influences of teaching tools in students' satisfaction, the survey indicated the importance of using slides to facilitate the logical and rational development of the course (organization). Furthermore, the divergence in using slides on the concentration of students was pointed out, because traditional slides can disperse students' interest and suppress attention to the teacher. However, if used dynamically and synchronized with the exhibition, including innovative features like videos, motion pictures, such instruments contribute positively to the "immersion" of the student in class.

Dynamic classes with slides, as a rule, can raise students' motivation in the course, especially regarding the student's ability to interact with the teacher and perform the tasks requested.

For students, overall satisfaction with

dialogued classes promote less satisfaction in the group, compared to classes with slides ; if these are dynamic, satisfaction is maximized.

The innovative character of the research is related to the fact that the use of multimedia presentations is not generalized, separating traditional and dynamic slides. Thus, it is evident that the proper use, innovative and creative, of this feature, based on the main principles of developing multimedia material, assist the teacher both in promoting retention of content and also students' satisfaction with the course.

However, even with the innovative possibility of these features, it is necessary to avoid the "show by the show" or "beauty for beauty". In other words, much more than the form of the material, it is necessary to use such elements and technological effects in order to contribute to the construction and dissemination of knowledge.

In all the experimental groups it was expressed that s multimedia presentations, when properly employed, can support the teacher to raise the class participation; however, the role of the teacher, his teaching, commitment and relationship with the class are crucial for maximizing the quality of education. Thus, the search of the teacher for skills in using and applying such technology needs to be shared with his/her concern about his/her teaching style (HARDIN, 2007).

## 6 Implications and Further Research

As a theoretical contribution this research breaks new grounds in defining slides built from the foundations described by experts in the field, clearing the understanding of the object under study. Such importance is justified by the fact that previous studies did not include construction parameters and their presentations, giving a broad connotation to the term slide.

Furthermore, slides are most effective when used correctly, so it is up to the teacher the clever use of specific software (SAVOY, PROCTOR & SALVENDY, 2009). Thus, as an empirical contribution there is the need to broaden the knowledge of teachers in the use of technological resources. As a result, the higher education

institutions (HEIs) lack teacher training activities to have the information about when and how to properly use these resources.

The limitations of this research are evidenced by the possibility of having intervening factors influencing the experiment; nevertheless, the careful way of establishing groups of the same population to maintain equal stimuli between groups allied to employment of mixed methods, triangulation with literature and statistical reliability contributed to minimize these limitations.

For future research, the use of comparative studies with other institutions and the use of different didactic forms of the same group can extend the results of this research.

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