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Elaboration of a multimedia book on the importance of statistics and presentation of the information for the statistical subjects taught at the FESC

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Abstract

Interactive digital book was produced on the topics importance of statistics and presentation of information, for the statistical subjects taught at the Faculty of Higher Studies Cuautitlán, the book was made with an interactive approach, that is, in most chapters there are HTML5 objects that students can access by connecting to the Internet from any mobile device or PC. The themes of this interactive book were statistics, variables and measurement levels, pie graph, bar graph, histogram, dot graph, stem and leaf graph, line graph and form. The interactive digital book contemplates that each chapter indicates prerequisites, learning objectives, written development of the topic in the form of questions and answers, videos with explanation, interactive exercises, widget (html 5, interactive galleries, interactive images, etc.) review questions, internet activities and resources.

The interactive digital book will offer students a full-screen experience with galleries, videos, interactive diagrams, mathematical expressions and more, these books bring content to life in ways that a printed page cannot. Students will no longer be limited to static images illustrating traditional texts, but can now immerse themselves in an image with interactive captions, bringing an answer to life in a chapter review.

They can flip through a book by simply sliding a finger on the screen. They can also highlight text, take notes, search for content, and find definitions in a glossary very easily. Plus, they can take them wherever they go, allowing students to learn not only within the classroom walls, but also in the virtual space that these books make up.

Keywords: *multimedia book, importance of statistics, and presentation of the information.*

1. Introduction

Information and Communication Technologies pose new scenarios that require a revision of the classic teaching model, since both the methodologies, the way of accessing, the acquisition of new knowledge and the resources used are affected by this technology. Today's students have grown up immersed in technology, where the computer, tablets and cell phones, etc., are ways in which they interact with their world, so they need study material that adjusts to the way they learn.

Didactic material according to these ideas are the digital textbooks integrated into suitable virtual environments. A digital book is a publication whose medium is an electronic file that can be stored on different digital media and allows the incorporation of interactive and multimedia elements. Within this context, an electronic book was developed with interactive material in pdf format on the topics of Importance of statistics and presentation of information. In this book in the first chapters the importance of statistics in the real world is developed. The second part of this book is the statistical graphs.

Charts visually represent information through the combined use of points, lines, numbers, symbols, coordinate systems, words, colors, shadows, etc. It was until 1750-1800 that statistical graphs were developed, surprisingly long after logarithms, Cartesian coordinates, calculus, and basic probability theory. It is important to mention that William Playfair (1759-1823) developed and improved all the designs of the fundamental graphs in order to replace the conventional number tables with visual representations.

Modern charts are more than just a substitute for statistical tables. They are instruments that allow reasoning about the information they present. They are generally effective in describing, exploring, and summarizing a group of numbers even when it is large. A well-designed graph is generally easy to build and at the same time a powerful communication tool. Charts, as well as statistical calculations, are adequate to the extent that the information they represent is "good" and aid in a reasonably clear purpose: description and exploration.

The preparation of the digital book on the topics Importance of statistics and presentation of information, for the statistical courses that are taught at the FES-Cuautitlán in a virtual environment, is based on the theory of social constructivism, which maintains that An optimal learning environment is one where there is a dynamic interaction between teachers, students, and assignments that provide opportunities for students to build their own knowledge, which occurs due to interaction with others.

2. Development

The content of the digital book, Importance of statistics and presentation of information is made up of the following chapters: Introduction video, Chapter 1 Statistics and its field of application, Chapter 2 Variables and levels of measurement, Chapter 3 Presentation of Information, Chapter 4 Pie Graph, Chapter 5 Bar Graph, Chapter 6 Histogram, Chapter 7 Dot Graph, Chapter 8 Stem and Leaf Graph, Chapter 9 Line Graph, Chapter 10 Formulas, Chapter 11 Activities, Chapter 12 Review Questions, Chapter 13 Internet Resources and Chapter 14 Bibliography. Figure 1 shows the content of the chapters of the developed interactive digital book.

Fig. 1 Form of the chapters of the interactive digital book

The introduction video is shown in figure 2 and this one tells us about the concept and application of statistics, as well as the use of different types of statistical graphs.

Fig. 2 Video introduction of the book.

In each chapter, the theoretical part was developed in the form of questions and answers, in order to make it easier for students to understand each of the topics, and they are to support the content of the book. On the other hand, widgets were added, the "widgets" tool consists

of small applications that allow the integration of interactive content in the digital book. On the other hand, widgets were added, the "widgets" tool consists of small applications that allow the integration of interactive content in the digital book. The widgets used in this book are: gallery, multimedia, review, interactive image, HTM and popup. To highlight and exemplify the important concepts in the topics, a link was made to the texts, that is to say, if the student has doubts about the example, a “hand” will appear with which they can click and automatically direct them to a website where This concept is explained, in figure 3 we can see one of these widget.

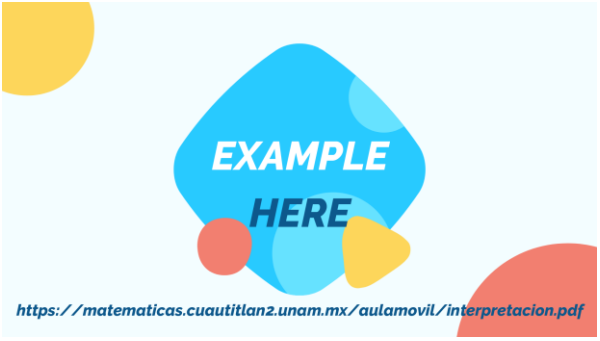

Fig. 3 Example of a widget to read an interpretation in the text.

In each chapter the theoretical part was developed in the form of questions and answers, in order to make it easier for students to understand each of the topics. Figure 4 shows how the questions of Chapter 1 are posed, where the subject of experimental design is explained.

Fig. 4 Questions and answers format of the book.

In the interactive gallery instead of seeing a single image on the page, the student can go through an entire collection giving next or previous, including captions. The galleries that were used can by clicking on the image and sending them to a website, where the gallery can be seen, it should be noted that each of the interactive images has a voice, to better

understand what it shows. Figure 5 shows us the image gallery of different histograms in the book and what opens on the website.

Fig. 5 Interactive gallery of the histogram theme

To give a more interactive approach to the book developed at the end of the first chapters, a video was made, which consists of solving a practical problem but using statistical software. Figure 6 shows a video of the use of software to make a bar graph, which is at the end of the chapter.

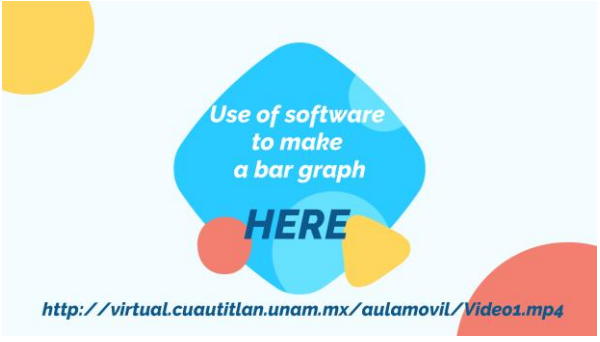

Fig. 6 Bar graph video

Readers can take review activities to test their knowledge of the topics: answer a multiple-choice questionnaire, choose the correct photo, and name an image or a mixture of all. Chapter 12 of this book contains the review questions, in which the student is asked to answer the following review questions, which will allow the student to reinforce the different concepts studied in this book. Figure 7 shows the review questions developed.

Figure 7. Chapter 12 review questions.

3. Results

The resources of the multimedia book on the topics of importance of statistics and presentation of information in a pilot group (group A), the results of the exam corresponding to the topics of importance of statistics and presentation of information (statistical graphs were used.) were compared with another group that did not use it (group B). Furthermore, the groups that were compared were groups of the same teacher and in the same degree. Figure 8 shows the results of the examination of the subject of Importance of Statistics of both groups.

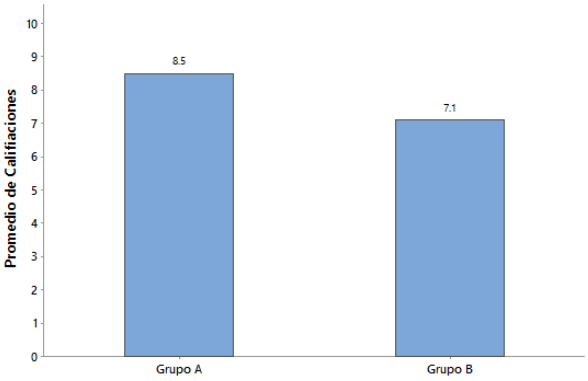

Figure 8. Average scores of the Importance of Statistics topic.

The grades of group A correspond to the students who used the resources of the multimedia book as a complement to what was learned in the classroom, these students were provided in .pdf format so that they could use it from any electronic device (PC, Laptop, tablets,

iPad, etc.) and that they had free access. Figure 8 shows the results of the exam corresponding to the topic of Presentation of Information.

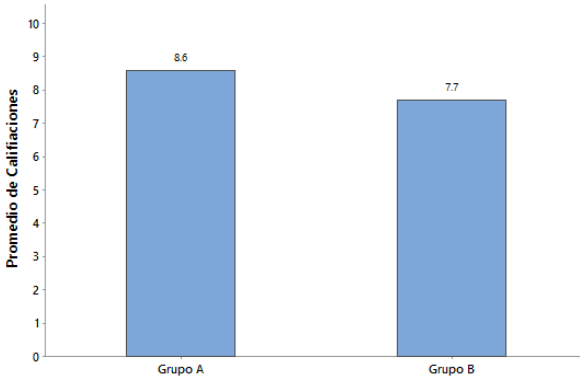

Figure 9. Average scores of the topic of Presentation of the information.

It is important to mention that in the exams that were carried out for each group, apart from the exercises to be solved, they were also asked questions about concepts and interpretation of the results obtained.

4. Conclusions

Technology that has been integrated into the educational process is changing teaching paradigms. We can see this even in low-income schools. Thanks to technology, books are also changing the way of teaching, we consider that the student, by using the electronic book developed from the statistical charts topic, will have a better way of learning when considering the book as a complementary material for the course topics.

It is also considered that when using the electronic book the student can focus on the interpretation of the results and the understanding of the topics, rather than on the memorization of formulas; since with the use of proposed software the results are obtained in a faster way and the student must focus on the interpretation of these with critical thinking that helps decision-making.

In summary, the audiovisual content of these books will provide advantages when it comes to explaining and understanding the concepts. By being interactive, you will take advantage of all the benefits of the network and its applications.

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