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Choice of electronic v/s printed documents by southern Chilean dental students.

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Abstract: In recent decades, the use of digital texts has replaced printed documents. This has generated changes in the way texts are presented and diffused as well as the students' choice and the way of reading materials related to medicine. While some reports have evaluated the use of digital compared to print formats, there is no evidence about dental students' preferences. The objective of this study is to determine preferences among dental students from six universities in the south of Chile for using printed versus electronic documents. A descriptive study based on a survey which was conducted among dental students in May and June, 2013, was designed. The proposed survey was adapted for collecting general student data and preferences for using electronic or traditional printed documents. Six schools and a total of 1,022 students, with an average age of 21.4 years, participated. A 93.3% of them reported using both types of documents. However, a 59.7% preferred printed documents. Only a 9.3% read documents directly from an electronic device. Students overwhelmingly preferred using printed documents than the electronic type. It is imperative to investigate the impact of new learning technologies in Chilean dental education.

Keywords: Dentistry, dental education, electronic devices, e-learning, learning technologies.

Uso de documentos electrónicos v/s impresos por estudiantes de odontología del sur de Chile.

Resumen: El uso de textos en formato digital ha reemplazado en las últimas décadas el uso de documentos impresos, generando cambios en la disposición y difusión de éstos como también en la elección de los estudiantes y la forma de lectura de materias relacionadas con la medicina. Si bien existen reportes que valoran el uso de formato digital en comparación a textos impresos, no existe evidencia de las preferencias en estudiantes de Odontología. El objetivo de este estudio es determinar la preferencia de uso de documentos en formato impreso versus electrónico en estudiantes de odontología de seis universidades del sur de Chile. Se diseñó un estudio descriptivo basado en una encuesta aplicada a estudiantes de Odontología entre mayo y junio del año 2013. Se adaptó la encuesta propuesta para ello, recolectando datos generales del estudiante, preferencia de uso de documentos electrónicos y documentos tradicionales impresos. Participaron seis escuelas, con un total de 1.022 estudiantes con un promedio de edad de 21.4 años. El 93.3% declara usar ambos tipos de documentos, sin embargo, el 59.7% prefieren el uso de documentos impresos versus documentos electrónicos. Sólo el 9.3% lee directamente los documentos desde un dispositivo electrónico. Los estudiantes prefieren mayoritariamente el uso de documentos impresos por sobre los de tipo electrónicos. Es perentorio investigar el impacto de nuevas tecnologías de aprendizaje en la educación odontológica chilena.

Palabras clave: Odontología, educación dental, dispositivos electrónicos, e-learning, tecnologías del aprendizaje.

Introduction.

Electronic books have been around since 1970. However, their use begins to increase with the massive appearance of electronic devices such as computers and *tablets*, causing major changes in the editorial industry¹. Besides, the current generation of students has evolved and presents a remarkable difference from twenty years ago. This is mainly because of their greater familiarity with digital technology² which has even surpassed their teachers' pre-computing capabilities.

In medical science, this digital evolution has been observed in the new students' preference for reading and learning with digital versions of books and documents. Although studies indicate there are no

significant differences in students' scores regarding the use of digital or print book versions^{3,4}, there are still few reports comparing the students' preference for electronic versus printed books. Christianson⁵ noted that electronic books were more popular than printed ones in the scientific area. In relation to medical students, Phua⁶ found interns and residents prefer printed books. Also, Ditmyer¹ concluded that dental students in the United States, Puerto Rico and Canada do not have a specific preference.

Although the main advantage of e-books lies in their mobility and visualization so far, these were not considered sufficient reason to replace printed texts. Research has described the disadvantages such as higher

consumption of time⁷, difficulty in use⁷ and many more distracting elements in the reading process⁸.

While universities have only been implementing the use of e-books in recent times and the stock is considerably lower than printed ones, it is important to define the profile of the students' preferences for one format or the other. The result could be interesting for the development and modernization of libraries and for modifying dental curricula.

The objective of this study is to determine preferences for using printed versus electronic documents among dental students from six universities in the south of Chile in 2013.

Materials and methods.

This descriptive study was based on a survey conducted among dental students at universities in the south of Chile between May and June, 2013. This study was approved by the Ethics Committee of the Faculty of Medicine of the Universidad Austral de Chile.

The principal investigators (KS, AP) adapted the survey provided by Ditmyer¹. For this purpose, a researcher (KS) translated the survey into Spanish. Then, it was presented to ten teachers and twenty five students from the School of Dentistry of the Universidad Austral de Chile. The idea was to obtain, through open questions, opinions on its layout and interpretation of the questions. Afterwards, two researchers (PA, CR) made changes and linguistic adaptations of the original scale by consensus. Finally, it was obtained an instrument with four sections: 1) general information; 2) use of electronic documents, 3) traditional printed documents and 3) general demographic information (Table 1).

By e-mail, the directors of dental schools from cities between Talca and Puerto Montt in the south of Chile were requested authorization to apply the survey to their students, prior presentation and acceptance through informed consent.

In case of approval, dental students from first to fifth year were surveyed. These students and those who were available on the day and time agreed by each principal were surveyed, obtaining a convenience sample. The universities which did not respond to the first request to participate or did not allow the investigators at the time of applying the survey were excluded. Also some sixth-year students were not able to participate for being in activities outside the campus.

Two investigators (AP, KS) conducted the printed survey in person, anonymously and voluntarily. The survey process was administered at the beginning or end of classes at each university. At the same place, both researchers orally presented the objective and survey instructions to the students. They were handled

the document and given ten minutes to answer. In case of doubt, these were answered by the researchers, without interfering in their final decision.

In the survey, the formats: doc, docx, PDF, DjVu, ePub, HTML, lit, mobi, OEB, OPF, prc, rtf, aeh, azw, BBeB, CBR / CBZ, CHM, DTB, FB2, Irf, pdb, pml, rb, TCR, TR2, TR3, WOLF were considered as a choice of *electronic documents*. Additionally, any digital or scanned version of a printed document was also considered as electronic. All electronic documents had to be visible through a computer screen, mobile device, cell phone, tablet or e-book reader. On the other hand, any text printed on any kind of paper was considered as a *printed document*. The definition of *device* comprises any appliance or electronic equipment designed to control and take advantage of electrical signals, facilitating the dynamic dissemination of information to meet the knowledge and training needs of humankind, for instance, mobile phones, tablets and computers among others. The *mode of acquisition* is seen as the way in which the student has acquired the document, either electronic or printed.

Regarding the use of electronic or printed documents, the survey collected data on: type of document used in college and preferred type. For the use of electronic documents, students were consulted about their preference for: i) print; ii) electronic format; iii) the way the electronic document was obtained; iv) usage time; v) type of electronic device and vi) preference for the same e-book in print. For printed documents, students were asked about: i) the origin of the document; ii) usage time and iii) mode of preservation (Table 1).

Personal student data was obtained for gender (male / female), age (years old); year in the dental program (1st to 5th year) and university.

Data were tabulated in a spreadsheet from Google Drive (Google Inc., CA, USA). Then they were presented using descriptive statistics (mean values and standard deviation) and were analyzed using STATA 10.0 software (STATA Corp., TX, USA).

Results.

Six dental schools were included and a total of 1,022 students with an average age of 21.4 (SD: 2.4) years old. Details of demographic data are presented in Table 2.

From the participating universities, a 93.3% reported using both types of documents. However, a 59.7% preferred the use of printed versus electronic documents (Figure 1).

Depending on the use of the electronic document, a 50.2% download it for free from internet (Table 3). From them, 81.7% prefer printing and only 9.3% read directly from the device. Most of them do it on a daily

| SECTION | QUESTION | ANSWER | | | | | |
|-----------------------------|---|-------------|-----------------------------|--------------------------------|---------------------|--------|-----|
| GENERAL INFORMATION | 1. At your university, you use what type of documents: | Electronic | Traditional | Both | None | | |
| | 2. Which of the two types of documents do you prefer? | Electronic | Tradicional | | | | |
| USE OF ELECTRONIC DOCUMENTS | 3. Do you prefer to print them to read their content?: | Always | Sometimes | Never | | | |
| | 4. If the teacher provides material or detailed,notes do you prefer to use the electronic format. | Always | Sometimes | Never | | | |
| | 5. How do you get electronic documents? | Buy online | Free download from internet | By professor /University | By classmates | Other | |
| | 6. How often do you use them? | Daily | 2-3 times a week | Weekly | Monthly | | |
| | 7. Which electronic devices do you use to study? | Computer | Tablet | Cell phone | Others | | |
| USE OF PRINTED DOCUMENTS | 8. Have you purchased a traditional book despite having it electronically? | Yes | No | | | | |
| | 9. How do you get the printed document? | Buy online | Free download from internet | Given by professor /University | Given by classmates | Others | |
| | 10. How often do you use them? | Daily | 2-3 times a week | Weekly | Monthly | | |
| | 11. What do you do once you are done using the printed document? | Resell | Keep | Dispose | Other | | |
| PERSONAL INFORMATION | 12. Sex: | Male | Female | | | | |
| | 13. Age: | (years old) | | | | | |
| | 14. Current school year | 1st | 2nd | 3rd | 4th | 5th | 6th |

Table 1. Electronic v/s Printed Documents Preference Survey (Adapted from Ditmeyer, 2011)

basis (49.76%) (Figure 2) using the computer a 60.3% of the time, followed by the use of computer or cell phone (22.7%) and the use of computer, cell phone or tablet (9.2%) and other devices (7.8%).

| Variable | | N | % |
|------------|--------------------------------|-----|-------|
| Sex | Female | 602 | 58.9 |
| | Male | 520 | 41.1 |
| Year | 1° | 198 | 19.41 |
| | 2° | 202 | 19.80 |
| | 3° | 180 | 17.65 |
| | 4° | 232 | 22.75 |
| | 5° | 208 | 20.39 |
| University | U. de Talca | 238 | 23.29 |
| | U. de Concepción | 220 | 21.53 |
| | U. Austral de Chile | 197 | 19.28 |
| | U. San Sebastián-Vadivía | 105 | 10.27 |
| | U. San Sebastián-Osorno | 147 | 11.25 |
| | U. San Sebastián- Puerto Montt | 115 | 14.38 |

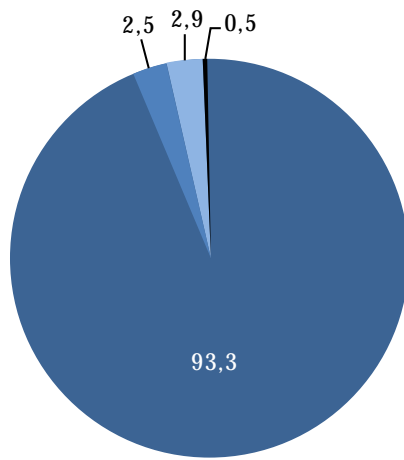
Table 2. Demographic characteristics of surveyed dentistry students, 2013.

Regarding the use of printed documents, an 83.9% printed them from an electronic device. Only nine students (0.88%) stated they purchased books from a bookstore (Table 3), 48.1% use them daily (Figure 2). Most students reported keeping them once used (90.5%), followed by dispose (4.89%) and recycle paper (2.94%).

| Way of getting the document: | Answer | N° | % |
|------------------------------|---------------------------------------|-----|-------|
| Electronic | Buy Online | 4 | 0.39 |
| | Given by classmates | 178 | 17.43 |
| | Given by professor/University/Library | 326 | 31.93 |
| | Free download from internet | 513 | 50.24 |
| Printed | Buy at bookstore | 9 | 0.88 |
| | Given by classmates | 34 | 3.33 |
| | Given by professor/University/Library | 121 | 11.84 |
| | I print | 858 | 83.95 |

Table 3. Distribution of mode for obtaining electronic or printed documents.

1. At your University, what type of document do you use?



2. Which type do you prefer?

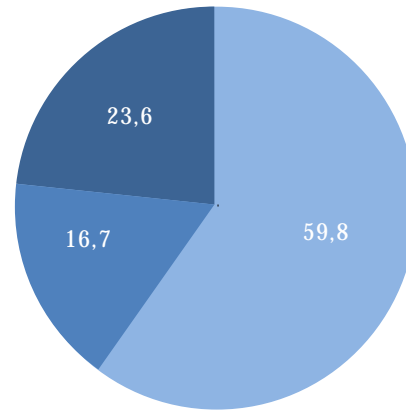


Figure 1. Percentage distribution by type of document and preference of dental students in the south of Chile, 2013.

Discussion.

Most dental students in the south of Chile prefer using printed documents. These findings are similar to those about medical students reported by Phua⁶ but contrary to those about students in North America reported by Christianson⁵ and Ditmyer¹. This fact reveals the easy access students currently have to both formats, but preferably to the choice of the printed type. The reasons to support this election are based on the possibility of making handwritten notes on page, carrying the document without electric power consumption or physically transferring the material to student peers⁹. It could also depend on the student's socioeconomic status and the chance of owning a portable and ergonomic electronic device (tablet or touch phone) to freely carry the document¹⁰.

This reveals the impact of the internet and free documentation available for studying, either by direct availability at universities or download platforms, including internet sites offering original scanned documents without formal authorization from the authors or journal editors¹¹. This digital evolution has been observed in the new students' preference for reading and learning with digital versions of books and documents. The factors which benefit their use lies in saving time regarding acquisition and portability. However, their use can be affected given the attached elements (social networks, internet) which could distract the student⁷ and be detrimental for their reading comprehension⁸.

While e-books supply has significantly increased

over the past two decades with global online stores like Amazon and Apple Ebook Store¹², this impact is not reflected in the studied population. Less than 1% reported having paid for material obtained either at electronic stores or bookstores. This fact makes one reflect on the real impact these stores have when distributing content that students learn, at least in the context of the south of Chile. This reality suggests that texts currently used by students are not from reliable sources of information. Instead, they are either notes from professors who do not report their source of information as well as handwritten entries created by undergraduates using scanned texts or images from original works with registered authorship. This makes textbooks in digital format unreliable or generate plagiarism¹³⁻¹⁴, something university authorities are often not aware of. Nevertheless, according to the data presented in this study, it is necessary to review such materials in order to know the type of document they are and the origin or source of their content.

Moreover, data recorded at least one third of the students obtained digital documents from the teacher or the university library. This makes it necessary to analyze the type of given text by the teacher, including texts like original scientific papers displayed on electronic databases which are properly acquired by the study center.

Some of the limitations of the study include: Students are a sample of the participating universities, since only some subjects available at the time of the interview were consulted. At the same time, the survey had closed questions which required the students to

select one of the proposed alternatives even when it does not wholeheartedly express their real personal thought. Despite these limitations, it is important to present this work because it is the first report on the type of device used by Chilean dental students for reading and studying available on electronic databases.

The results of this study call to investigate on the type of information being used in both formats (original articles, scanned books, notes or transcripts of expository lectures, etc.) to assess the level of scientific evidence students have access to. It is also relevant to determine whether the texts, electronic databases or information sources have been duly authorized and paid for by universities in order to avoid unaware plagiarism or misuse of data by the students.

Future research should further explore the use of other information and communication technologies (ICTs)

in our country¹⁵ and how they have evolved in recent years. On the other hand, the impact that using tools with a more interactive multimedia character tested in other countries, such as podcasts¹⁶, classes on video available on internet¹⁷, online tutorials¹⁸ among others, could have on the context of the Chilean dental education should be analyzed. Finally, it is important not to forget that ICTs are tools available to improve dental education, in this case. Therefore, no educational methodologies of this kind should be implemented only to justify some modernization in the professional formation¹⁹.

In conclusion, dental students in the south of Chile mostly prefer using printed documents than the electronic type. It is necessary to continue investigating patterns of use for these tools, the opinion of other national universities, as well as the impact of other ICTs in Chilean dental education.

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