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Artículos Científicos

Herramientas tecnológicas en el proceso de enseñanza-aprendizaje en estudiantes de educación superior

Technological Tools in the Teaching-Learning Process in Higher Education Students

Ferramentas tecnológicas no processo de ensino-aprendizagem em estudantes do ensino superior

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Resumen

El objetivo de este trabajo fue investigar cuáles son las herramientas tecnológicas más utilizadas por estudiantes universitarios en una institución de educación superior e identificar cómo éstas influyen en su proceso educativo. La metodología fue cuantitativa. El instrumento utilizado fue una encuesta electrónica para recabar la información. Participaron 224 estudiantes de licenciatura y posgrado. Los datos aquí presentados tienen relación directa con el uso de las herramientas tanto a nivel escolar como individual.

Dentro de los resultados obtenidos, sobresale el uso de Microsoft Word como procesador de textos y Microsoft PowerPoint para efectuar presentaciones. En cuanto al uso de videoconferencias, son muy pocos los profesores y estudiantes que utilizan este medio. El *software* de comunicación que más sobresale es Skype. Por otra parte, el dispositivo que más utilizan los estudiantes para sus trabajos escolares es la computadora, pero en su vida cotidiana recurren sobre todo al *smartphone*. También se pudo detectar que los estudiantes utilizan cada vez más herramientas tecnológicas en la escuela y en su vida común y que estas no necesariamente concuerdan con las que el profesor recomienda y revisa en clase. Ellos mismos se dan a la tarea de buscar aplicaciones que les sirvan para sus actividades escolares. Esto se demostró con las plataformas educativas que utilizan, pues no solo han utilizado la institucional, sino que sobresalen otras como Canvas y Socrative.

En esta investigación se pudo observar que, a pesar de que existen diversas aplicaciones para presentaciones, los estudiantes siguen prefiriendo los programas de Microsoft Office para sus trabajos escolares. Esta información es relevante para los docentes, y puede ser útil para generar y aplicar estrategias diversas en el salón de clase, ya que para los alumnos estas herramientas son necesarias en su proceso educativo y pueden ayudar a mejorar su desempeño académico.

Palabras clave: aprendizaje, educación superior, enseñanza, estudiantes, herramientas tecnológicas, tecnología.

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Abstract

The objective of this work was to investigate the technological tools most used by university students in a higher education institution and to identify how these influence their educational process. The methodology was quantitative. And the instrument used was an electronic survey to collect information. In total, 224 undergraduate and graduate students participated.

The results obtained show that programs such as Microsoft Word and Microsoft PowerPoint stand out. Regarding videoconferencing, there are still very few teachers and students who use it. The software that excels in this aspect is Skype. On the other hand, the device that most students use for their work at school is the computer, but the one they most use for a game or application is the telephone. Likewise, it was observed that students use more and more technological tools in the school and not only those used by teachers. They themselves are given the task of looking for applications that serve their school activities. This was demonstrated with the educational platforms that they use, since not only have they used the institutional one, but others like Canvas and Socrative stand out.

With this research it was possible to demonstrate that although there are diverse applications for presentations, students still prefer the Microsoft Office programs for their school work. This information is relevant for teachers, and can be useful to generate and apply different strategies in the classroom, since for students these tools are necessary in their educational process and can help improve their performance.

Keywords: learning, higher education, teaching, students, technological tools, technology.

Resumo

O objetivo deste trabalho foi investigar quais são os instrumentos tecnológicos mais utilizados por estudantes universitários de uma instituição de ensino superior e identificar como estes influenciam seu processo educacional. A metodologia foi quantitativa. O instrumento utilizado foi uma pesquisa eletrônica para coletar informações. 224 estudantes de graduação e pós-graduação participaram. Os dados aqui apresentados estão diretamente relacionados ao uso de ferramentas tanto na escola quanto no nível individual.

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Entre os resultados obtidos, destaca-se o uso do Microsoft Word como processador de texto e Microsoft PowerPoint para fazer apresentações. Em relação ao uso de videoconferências, existem muito poucos professores e alunos que utilizam esse meio. O software de comunicação mais notável é o Skype. Por outro lado, o dispositivo que a maioria dos alunos usa para o trabalho escolar é o computador, mas em suas vidas diárias eles usam principalmente o smartphone. Foi também detectado que os alunos utilizam cada vez mais ferramentas tecnológicas na escola e na sua vida em comum e que estes não necessariamente concordam são aqueles que o professor recomenda e revê em aula. Eles mesmos recebem a tarefa de procurar aplicativos que atendam às suas atividades escolares. Isso foi demonstrado pelas plataformas educacionais que utilizam, já que não só usaram a institucional, como destacam outras como Canvas e Socrative.

Nesta pesquisa, observou-se que, embora existam várias aplicações para apresentações, os alunos ainda preferem programas do Microsoft Office para o trabalho escolar. Essa informação é relevante para os professores e pode ser útil para gerar e aplicar diferentes estratégias em sala de aula, uma vez que para os alunos essas ferramentas são necessárias em seu processo educacional e podem ajudar a melhorar seu desempenho acadêmico.

Palavras-chave: aprendizagem, ensino superior, ensino, estudantes, ferramentas tecnológicas, tecnologia.

Fecha Recepción: Marzo 2019 **Fecha Aceptación:** Junio 2019

Introduction

At present, talking about technological tools is nothing new. The development of digital applications has adopted a fast pace. In the educational context, since the computer age appeared, it is quite common for students to use several of these tools when performing their academic tasks. Undoubtedly these resources have made their work easier: the time they use now is less than what they used previously. Before, you had to physically go to the library, for example; now it is not necessary to move, because the consultation of informative material can be done from home through a laptop or desktop, mobile phone, tablet, in short, any device that is connected to the Internet.

Likewise, these tools have helped in the teaching-learning process, and not only the students, but also teachers and parents. Now parents can become more involved in teaching their children, reach limits that some time ago could not imagine. It is worth mentioning that students sometimes handle applications better than a teacher, especially if the teacher is older, since those were born at a time closer to the prevailing technological development.

This helps both teachers and students to be able to learn in a more dynamic way, since the teacher also learns when teaching. The level of competitiveness will be higher as more information and communication technologies (ICT) are used for projects, tasks and exercises in class.

Due to the above, this paper inquires about the applications that a student uses in school, whether it is the laptop, the smartphone or the tablet. The objective is to know these tools to make them known and that this can be useful for some teachers when choosing which ones to use in the classroom, and if they do not know them, begin to familiarize themselves with them for their classes. This is how ICTs have helped to make work easy and enjoyable.

Objectives

- Investigate which are the technological tools most used by university students in a higher education institution.
- Identify how these tools influence their educational process.
- State the most outstanding tools so that teachers can generate and apply different strategies in the classroom and with them help improve student performance.
- Specify the technological tools in which the teacher should continue to be updated.

Problem

The excessive number of digital tools that exist today allows students to use some for school and others for personal use, in addition to causing teachers not know what tools to use in class, whether for work, homework or Projects.

The diverse use of these tools can make the performance of the student not enough when delivering jobs, tasks or projects.

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The era of technology

In the last 20 years technology has been modified, both in computers and in phones, tablets and other electronic devices that students have used and which, when handled so well, have been appropriated.

In 2006, the treatment of information and digital competence as essential learning was included in the curriculum. Upon completion of compulsory schooling, students must achieve the following:

> The treatment of information and digital competence implies being an autonomous, effective, responsible, critical and reflective person when selecting, treating and using the available information, contrasting it when necessary and respecting the socially agreed rules of conduct to regulate the use of the information and its sources in the different supports (Ministerio de Educación y Ciencia [MEC], 2006).

The digital competence in teachers, according to the United Nations Educational, Scientific and Cultural Organization [Unesco] (2008), should be the purpose of training, since students must acquire digital competency and the treatment of the explicit information in the curriculum. For this, teacher training should be directed towards a model that fits to be carried out in the preliminary and permanent training regarding the integration of ICT. This model is the Technological Pedagogical Content Knowledge (TPACK) (Mishra and Koehler, 2006).

This model admits to understand and specify the types of knowledge required by a teacher and the necessary skills for the effective integration of technology. This model refers to the following concepts:

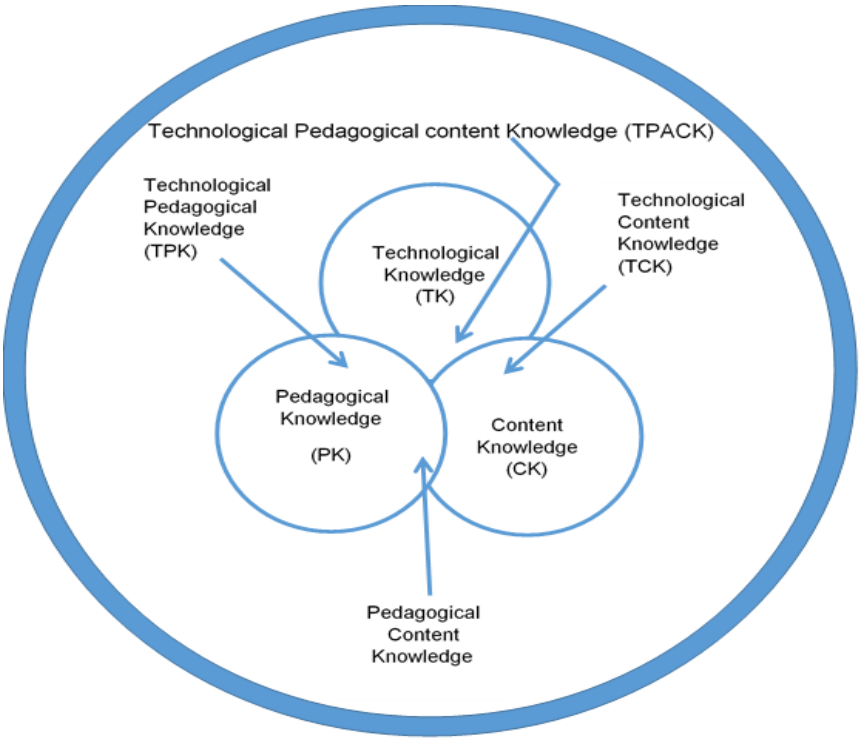
a) *Technology*. It represents technical knowledge, the ability to use software and applications.

b) *Content knowledge.* Content knowledge, which includes what is known about the subject or area being taught. What the teacher imparts to the students.

c) *Pedagogical knowledge.* Pedagogical knowledge, which refers to how to teach.

The integration of these three prototypes of knowledge is essential for the success of the use of technologies in the classroom. The teacher needs to be an expert in the content of the subject in his charge, as well as know how to teach such content. The above mentioned model is presented in figure 1.

Figura 1. Conocimiento del contenido pedagógico tecnológico



Fuente: Pico (2013, p. 72).

ICT

In this era, the use of ICT has been increasing. Students decide on what device they want to work on, as well as when to do it. It is quite convenient to bring your cell phone or tablet and get to work anywhere, as long as there is access to the Internet.

ICT have also helped in the learning process of students, because, thanks to them, there are digital educational resources that allow both the teacher and the student to perform exercises, tasks or projects. You can work even by computer thanks to the Google Docs tool.

The university must be prepared to face the radical changes that characterize the information society, according to Sangrá and González (2004). Teachers need to adapt to a new teaching-learning process influenced by ICT. However, although universities provide resources (computers and Internet access) to their faculties or educational centers, as Tejedor (2006)

mentions, "the mere allocation of resources is not enough to produce a true integration of ICTs in school practice "(p 21).

On the other hand, Cabrol and Severin (2010) consider ICT as a disruptive innovation, insofar as they force the change of teaching practices, the institutional projects of schools and educational policies. In that sense, Moreira, Salvat and García (2008) propose that the objectives of digital literacy should be addressed to all.

With the term digital literacy is perceived that there may be teachers with the need to "literate". That is why there is this great challenge to understand and promote the knowmads of society 3.0, which Moravec proposes (2013). This term, knowmads, refers to the nomads of knowledge and innovation.

The challenge is complex for some teachers and will continue to be complex with the rapid advancement of technology, since, as mentioned by Cassany and Castellà (2011), critical literacy is the ability to read and understand the ideology of digital messages, to be able to write and produce own texts based on a critical analysis.

Learning strategies and ICT

Necuzzi (2013) notes that ICTs have impacted on other aspects of students such as motivation, digital literacy and cross-cutting skills. Therefore, it is important to know these tools in order to use them in class and thus modify the dynamics of the same. In other words, the existing paradigm must be broken and students must be allowed to make use of ICT both to learn and to generate knowledge.

Learning strategies are also currently being modified, because, due to the modernization of the educational model, it has to be reflected in some way so that teachers at both the upper and higher levels can modify their pedagogical actions. Secondary school students are learning in a different way thanks to ICT; they were born with the technology at the door and since they are small they know how to manipulate a mobile phone, which makes their behavior in classes different, for example, they no longer take notes, they take pictures with their cell phone. For them, this is more convenient, practical and easy. Even the tasks are already sent by WhatsApp to the group leader and this is responsible for notifying everyone.

ICTs have been used daily by students, which means that non-obvious competences are invisible in formal environments. And they become invisible because some are ignored or irrelevant within the academic circle. On the other hand, Cobo and Moravec (2011) point out central issues that make the construction of the notion of learning invisible.

The invisible learning is also taking place in the teachers, since some of them individually use existing tools on the Internet without attending a course or training of said tool, but they use it because they consider it useful for their class; or, they consider that it can be pleasant, dynamic and easy to use for the students.

On the other hand, Siemens (2014) mentions the following: "Learning is a continuous process, which lasts a lifetime and technology is altering (rewiring) our brains. The tools we use define and shape our thinking "(p.1). However, before there were technological tools, learning had to adapt to new situations. As they explain it Díaz and Hernández (2002):

> Learning to learn implies the ability to reflect on the way in which one learns and act accordingly, self-regulating the learning process itself through the use of flexible and appropriate strategies that are transferred and adapted to new situations (p. 12).

There lies precisely the importance of knowing which tools are the most used by students today, so that teachers can also keep updating, but above all to apply different and innovative learning strategies.

Methodology

For this work, a research modality of quantitative type was chosen. The two types of methodological design that are included in the quantitative methodology are the experimental and the non-experimental. The research shown here is within the latter and is of the survey type (McMillan and Schumacher, 2005). The technological advance allows to question about which are the tools that most students use. If they represent improvements in the perception towards the content of the class and the effectiveness of the teaching-learning process itself. Knowing certain indicators on which to pay attention for educational improvement is of great importance.

First, the instrument was made with the help of a Google form. Later it was sent to diverse groups of diverse faculties, as much at degree level as at graduate level, this with the help of the

professors and with the help of the group leader in some cases, since some of these have group mail. So, the league was sent to that email and everyone was responsible for answering the survey. This was done in a public institution of higher education.

For the variables, initially, the following dimensions were taken: "Demography", "Tools used in class", "Internet and social networks" and, finally, "Games", but later they were not grouped according to said dimensions. The variables were left as they appear in the graphs of the results, that is, the variable for "Text tool" was taken and its percentage was left according to the number of times it appears, although it can be grouped in the dimension of "Tools used in class" so that there is a better description. It is worth mentioning that the instrument was generated in accordance with the programs that are managed in this institution.

The variables to be used were the following: "Student tools", "Tools for personal use", "Tools for mail and browsers" and "Tools for games".

To collect the information, the electronic form with the data collected in the surveys was taken from the Google form. It was downloaded as an Excel sheet and, from then on, the program began to work on percentages and graphs. Dynamic tables and their respective graphs were made. It is worth mentioning that our own graphs were made, the ones that the Google form generates automatically were not used.

Population and sample

A quantitative-descriptive design was carried out with a comparative analysis between the tools most used by the students. From then on, use was understood both for the school and for personal use. A population of 1161 students of different faculties of a higher education institution was taken into consideration, and the resulting sample was 224 students of different semesters, both undergraduate and postgraduate. It should be noted that there was greater participation of some faculties over others, but the reason is not known, it was simply more those of certain faculties who answered the questionnaire online in comparison with those of others (possibly it could be the time in which they were sent, that it was in the afternoon, but we do not think that has really influenced that).

Instrument

To collect the information, the survey evaluation technique was used. And the instrument used for this work was an online electronic survey with the help of a Google Docs form.

The answers were grouped and analyzed, depending on the item to which they belonged. For example, "Tools for personal use", "Electronic tools used in the school", or "Platforms used", "Antivirus" and "Most used mail" by said students. The percentage was calculated for all cases using the Microsoft Excel sheet.

Results

Table 1 shows the percentages of the representation of the faculties that participated in this work. The one that had greater participation was the one of Chemistry.

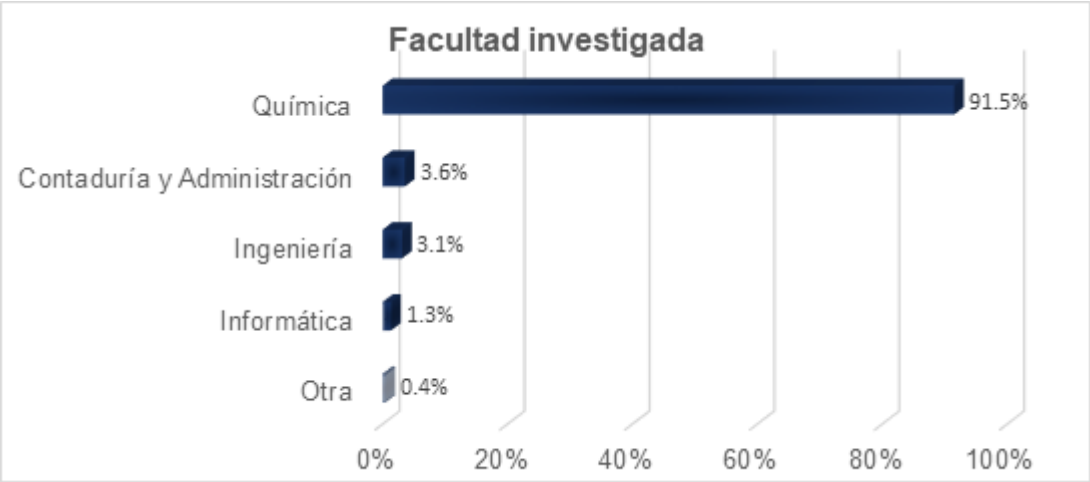
Tabla 1. Facultades participantes

Facultad en la que te encuentras	**Porcentaje**
Otra	0 %
Informática	1 %
Ingeniería	3 %
Contaduría y Administración	4 %
Química	92 %

Fuente: Elaboración propia

Figure 1 shows that there was greater participation of the Faculty of Chemistry, following the Faculty of Accounting and Administration, and not far from it the Faculty of Engineering.

Figura 1. Gráfica que muestra la participación de los estudiantes por facultad



Fuente: Elaboración propia

Next, table 2 shows the percentages of the semesters that participated in this research work. It can be seen that the third semester was the one with the highest participation.

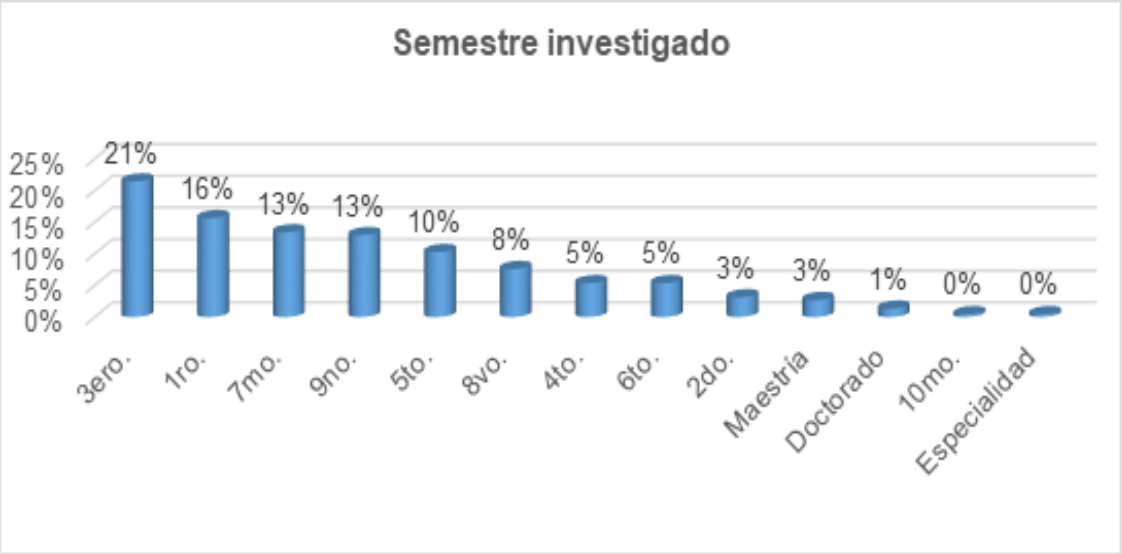
Tabla 2. Semestres que participaron

Semestre	Porcentaje
3. º	21 %
1. º	16 %
7. º	13 %
9. º	13 %
5.º	10 %
8. º	8 %
4. º	5 %
6. º	5 %
2. º	3 %
Maestría	3 %
Doctorado	1 %
10.º	0 %
Especialidad	0 %

Fuente: Elaboración propia

Figure 2 shows that the semester with the highest participation was the third semester, and behind it the first semester, not to mention the participation of the graduate area.

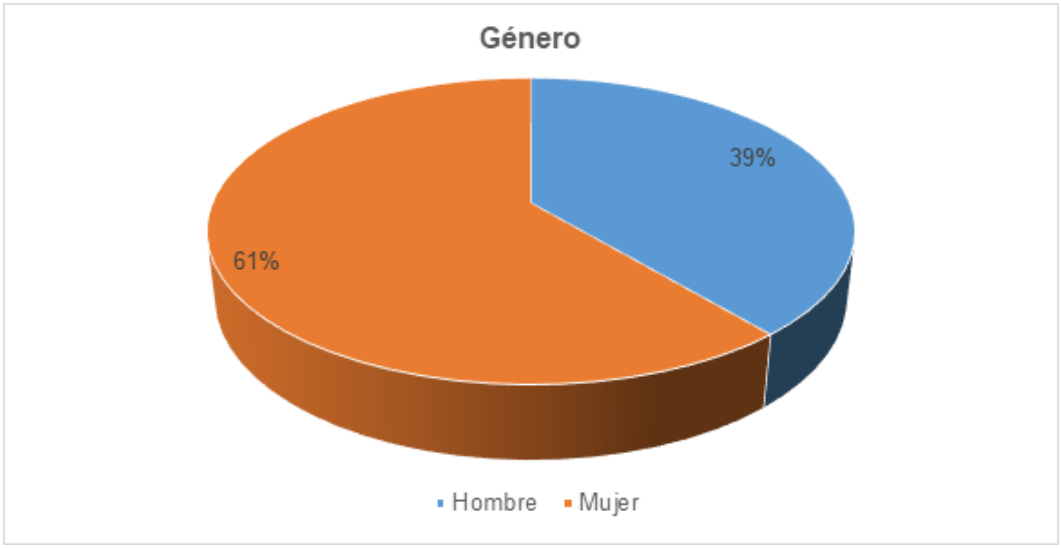
Figura 2. Gráfica de estudiantes que participaron por semestre



Fuente: Elaboración propia

Figure 3 shows that female participation was significantly greater than male participation.

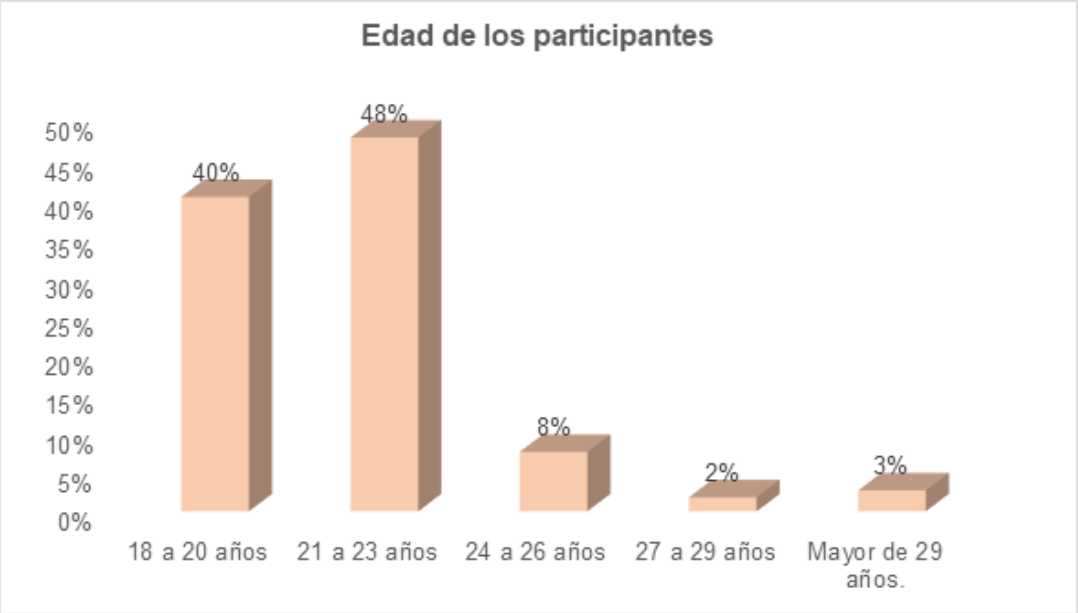
Figura 3. Gráfica de participación por género



Fuente: Elaboración propia

Figure 4 shows the participation by age of the students. The rank with greater representation was 21-23 years, followed by 18-20 years.

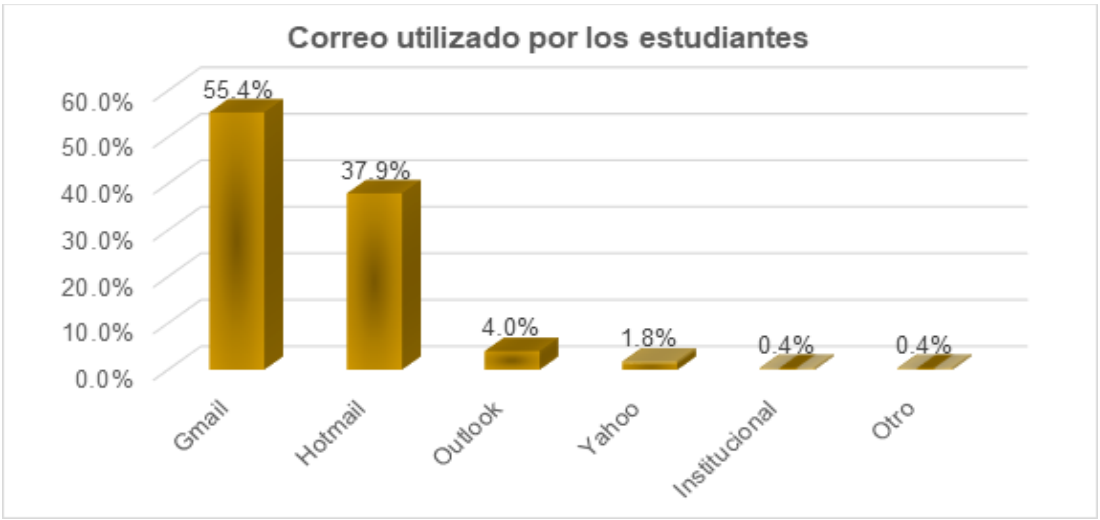
Figura 4. Gráfica de participación por edad de los estudiantes



Fuente: Elaboración propia

Figure 5 details the mail most used by students. Here Gmail stands out, followed by the Hotmail service. It is noteworthy that the institutional mail is almost not used.

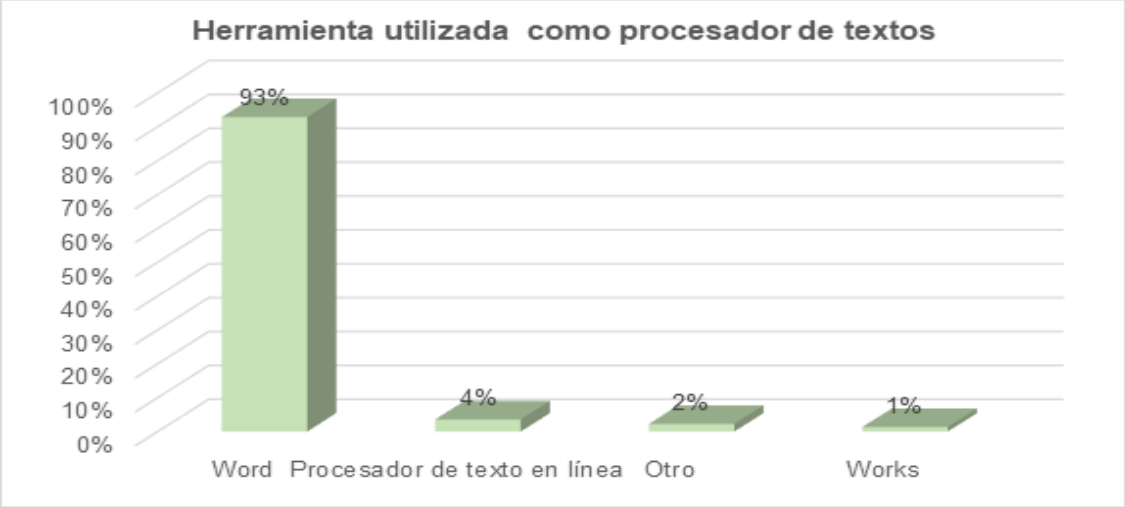
Figura 5. Gráfica de correo que más utilizan los estudiantes



Fuente: Elaboración propia

Figure 6 shows that the Microsoft Word word processor is the most used by students.

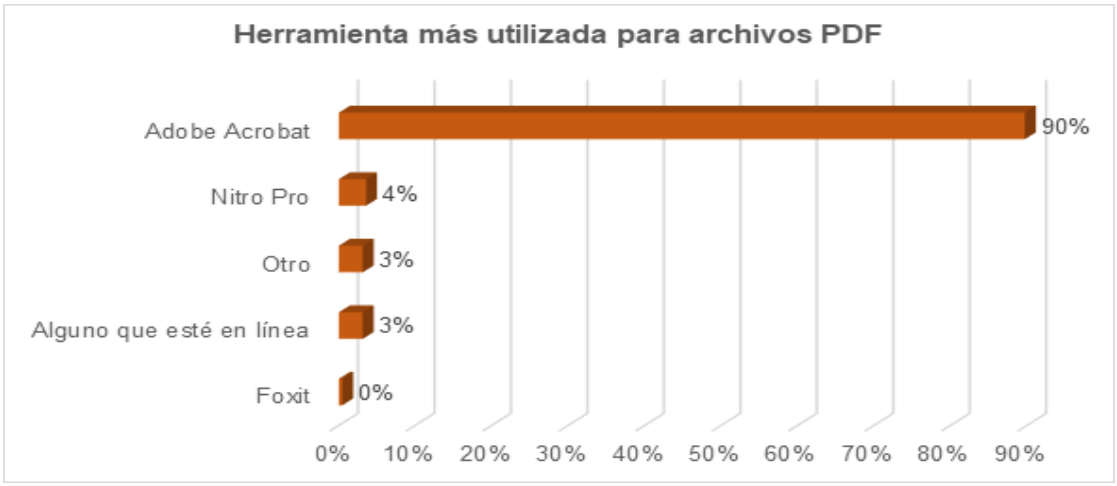
Figura 6. Gráfica de procesador de textos más utilizado



Fuente: Elaboración propia

Figure 7 shows the tool that is most used for PDF files: Adobe Acrobat is the one that stands out, followed by Nitro Pro.

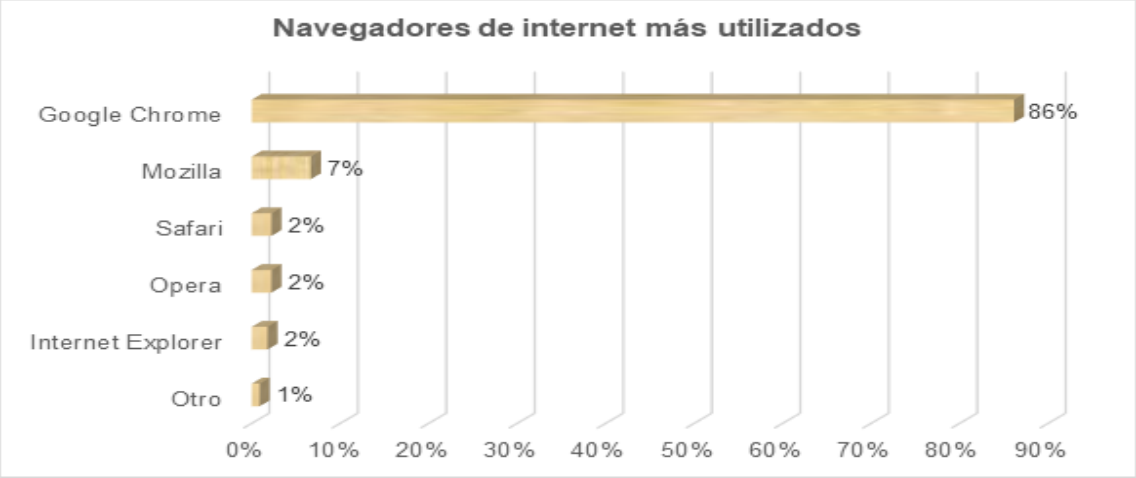
Figura 7. Herramienta más utilizada por los estudiantes para archivos PDF



Fuente: Elaboración propia

Figure 8, on the other hand, shows the browsers that students use most frequently. Google Chrome stars in this category with much difference on Mozilla, which is the second.

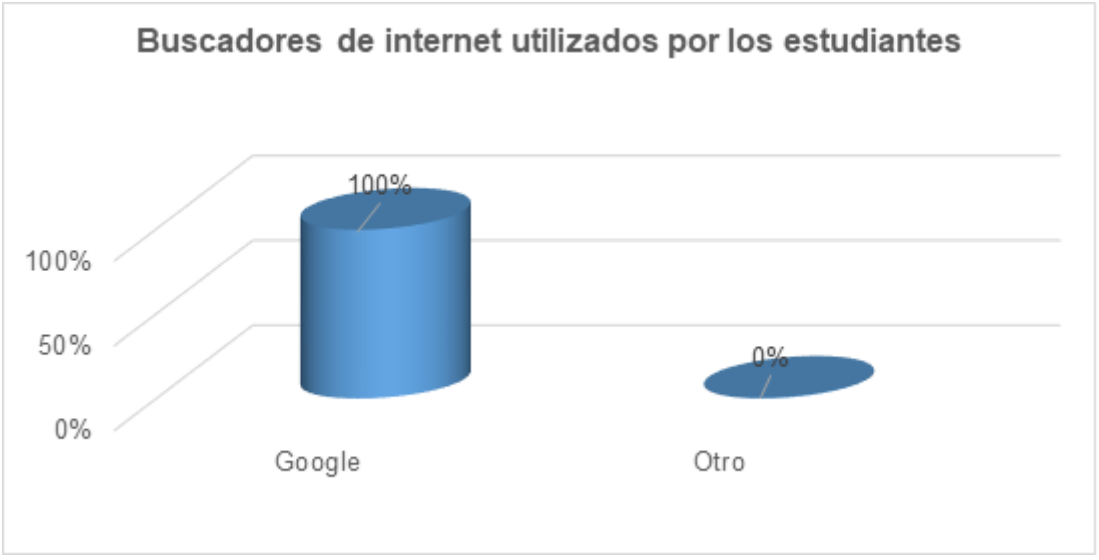
Figura 8. Herramienta de navegadores de internet que más utilizan los estudiantes



Fuente: Elaboración propia

Figure 9 details that the web browser that stands out and by far is that of Google. Although there are more search engines, they are not used by students.

Figura 9. Buscadores de internet utilizados por los estudiantes



Fuente: Elaboración propia

Table 3 shows the tool that most students prefer for their classes, where powerpoint stands out with a high percentage.

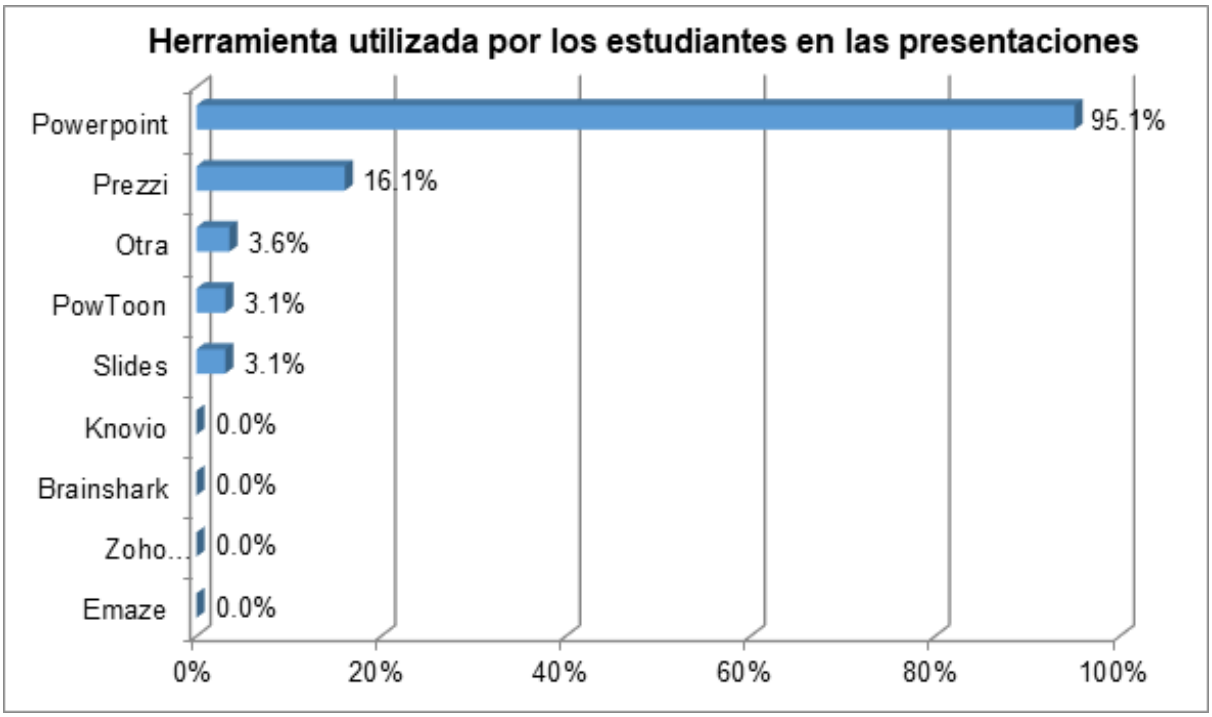
Tabla 3. Porcentaje de herramientas más utilizadas para presentaciones

Herramienta que más utilizas para presentaciones en tus clases	**Porcentaje**
Emaze	0 %
Zoho Presentation	0 %
Brainshark	0 %
Knovio	0 %
Slides	3 %
PowToon	3 %
Otra	4 %
Prezzi	16 %
PowerPoint	95 %

Fuente: Elaboración propia

In figure 10 it is pointed out that the most used tool in presentations is Microsoft PowerPoint, although there are other very dynamic ones, such as PowToon.

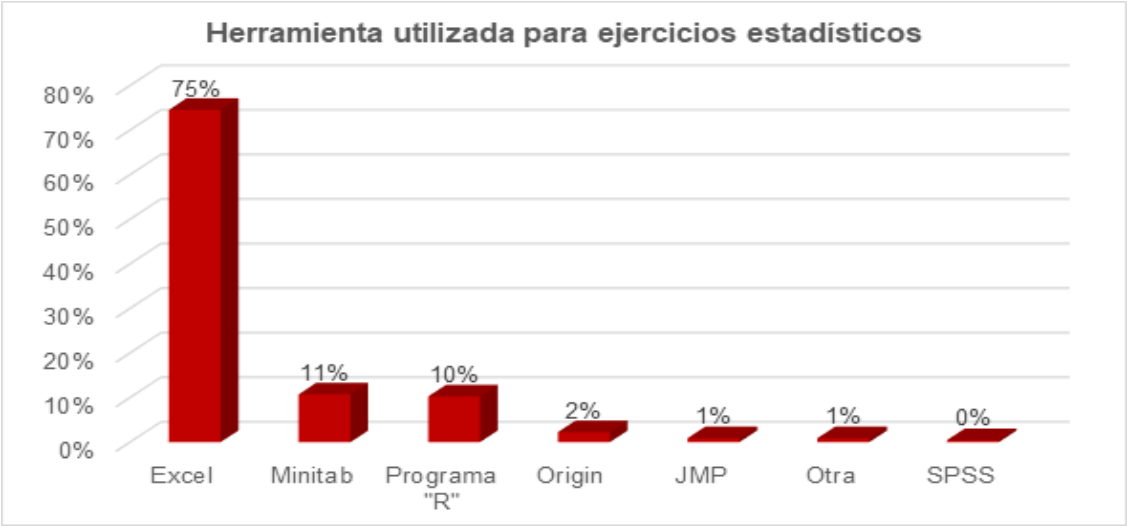
Figura 10. Herramienta utilizada por los estudiantes para las presentaciones



Fuente: Elaboración propia

In Figure 11, meanwhile, it is detailed that the most outstanding tool for statistical exercises is that of Excel, followed by that of Minitab.

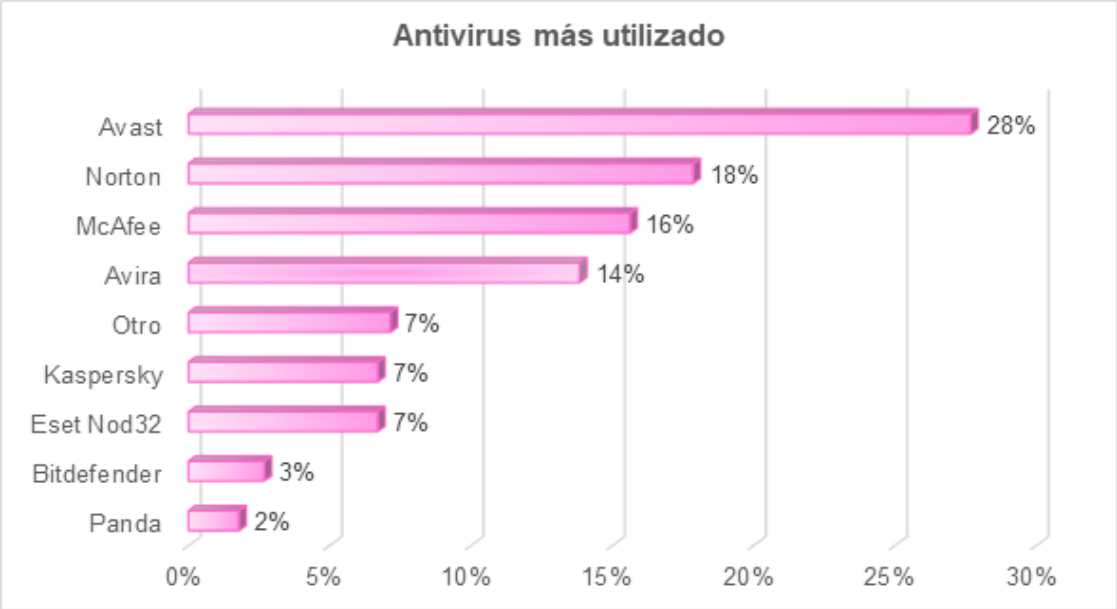
Figura 11. Herramienta más utilizada por los estudiantes para ejercicios estadísticos



Fuente: Elaboración propia

Figure 12 specifies that the most used antivirus for students is Avast; Norton and McAfee were ranked second and third respectively.

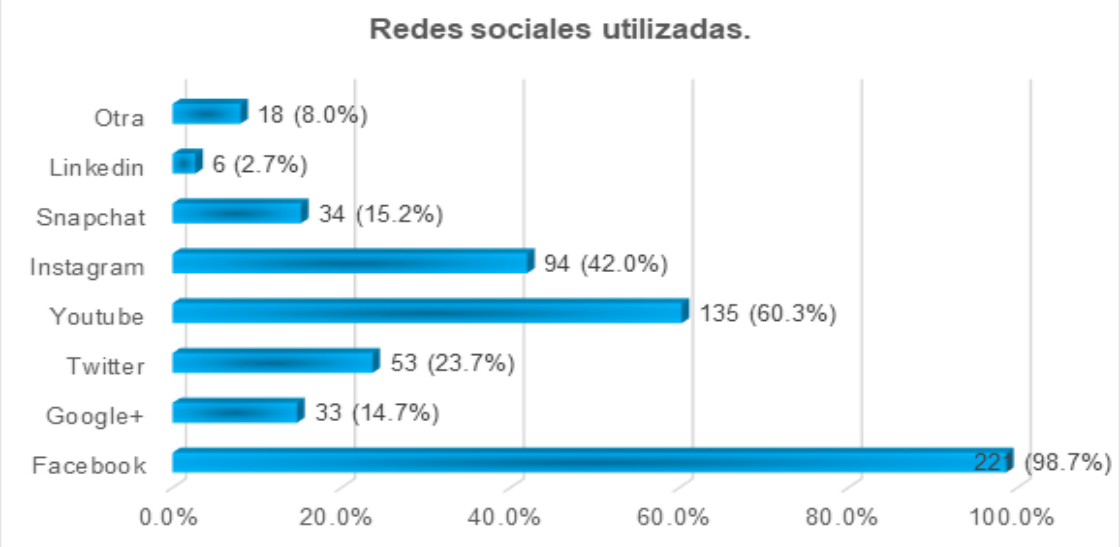
Figura 12. Antivirus más utilizado por los estudiantes



Fuente: Elaboración propia

In figure 13, Facebook stands out as the most used social network, followed by Youtube.

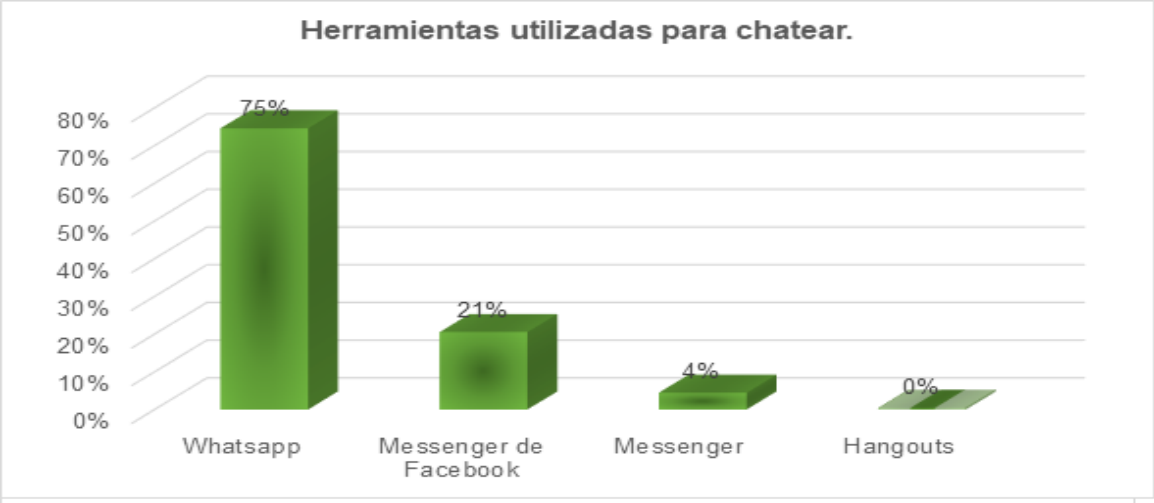
Figura 13. Redes sociales utilizadas por los estudiantes



Fuente: Elaboración propia

Figure 14 shows that the most used tool for chatting is WhatsApp, followed by Facebook Messenger.

Figura 14. Herramientas utilizadas por los estudiantes para chatear



Fuente: Elaboración propia

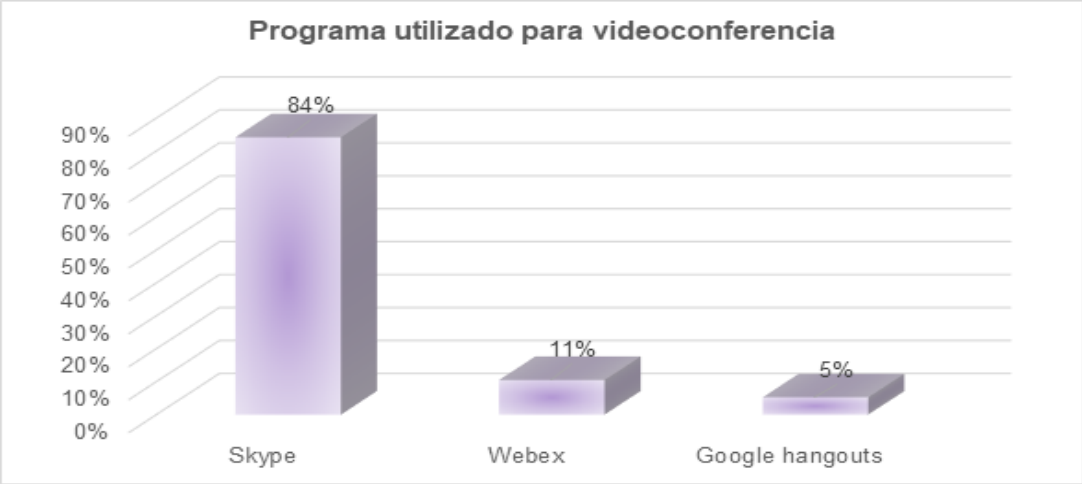
Figure 15 shows if students have used videoconferencing or not in their classes. It stands out that the majority has not used it. In fact, only 7% have used it.

Figura 15. Videoconferencia utilizada en clases por los estudiantes

Fuente: Elaboración propia

Figure 16 specifies the program that students use for videoconferencing. Skype is placed first.

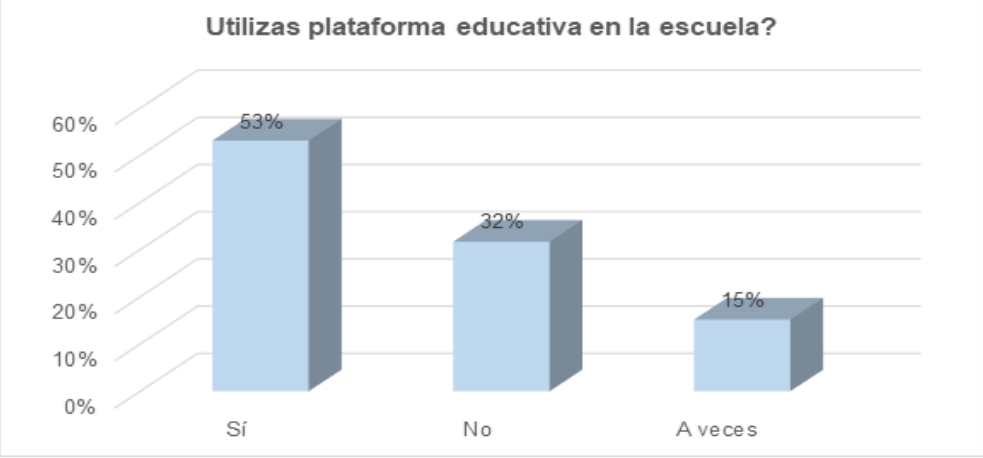
Figura 16. *Software* utilizado para videoconferencia por los estudiantes



Fuente: Elaboración propia

Figure 17 details whether students use any educational platform in the school: 53% do so regularly, while 15% only eventually.

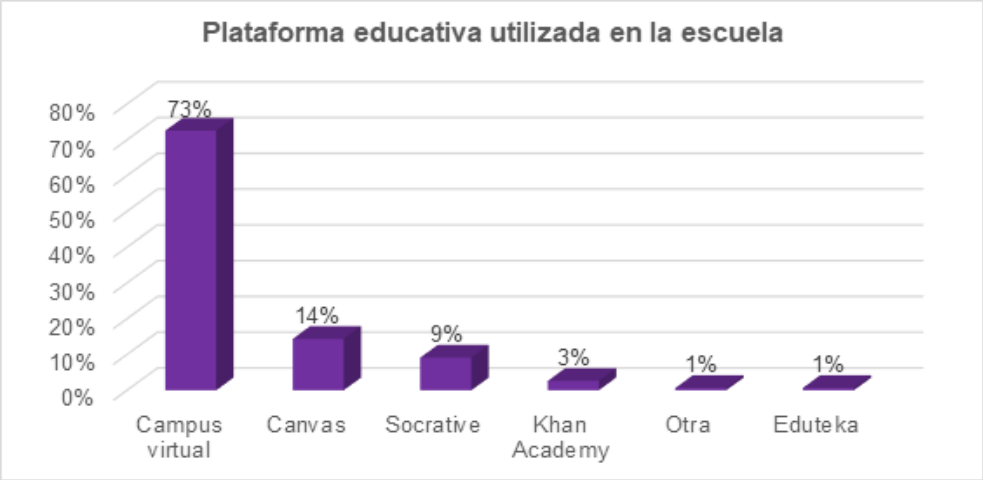
Figura 17. Frecuencia de uso de plataforma educativa en la escuela por los estudiantes



Fuente: Elaboración propia

Figure 18 shows the type of educational platform that students use. Virtual Campus, which is the institutional platform, is above the rest. However, it is important not to mention that they also use alternatives such as Canvas.

Figura 18. Plataformas educativas utilizadas en la escuela por los estudiantes



Fuente: Elaboración propia

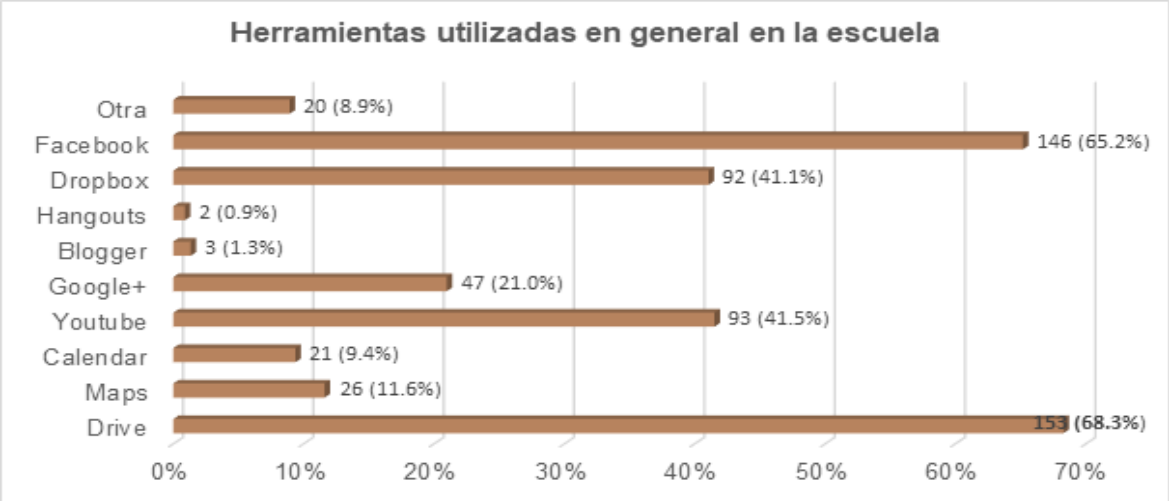
Figure 19 shows the device most used by students in school. The computer and the cell phone are placed on the tip.

Figura 19. Dispositivos utilizados en la escuela por los estudiantes

Fuente: Elaboración propia

Figure 20 shows that the most commonly used tools by students in the school are Drive, Facebook and YouTube.

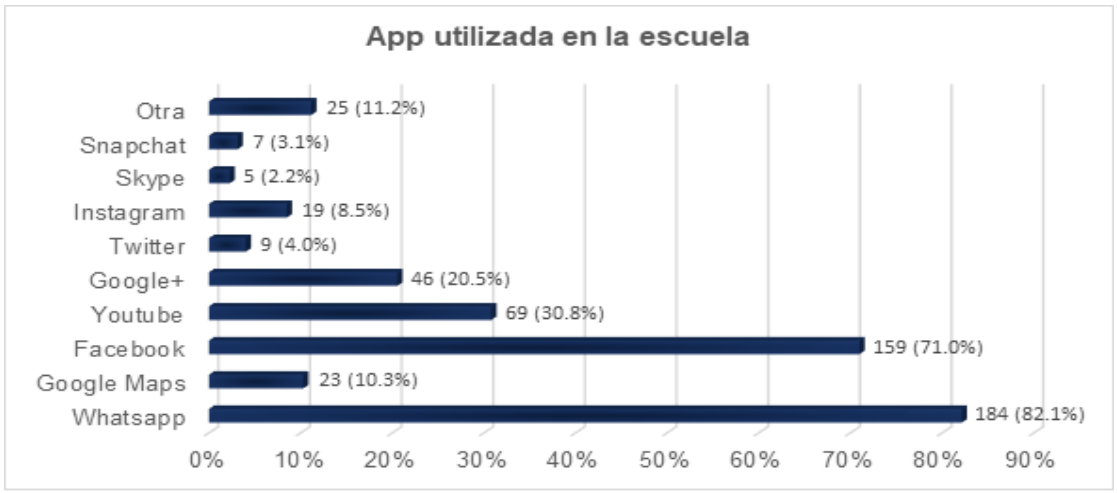
Figura 20. Herramientas utilizadas en general por los estudiantes en la escuela



Fuente: Elaboración propia

Figure 21 shows the apps used at school by students: WhatsApp, Facebook and YouTube make up the podium.

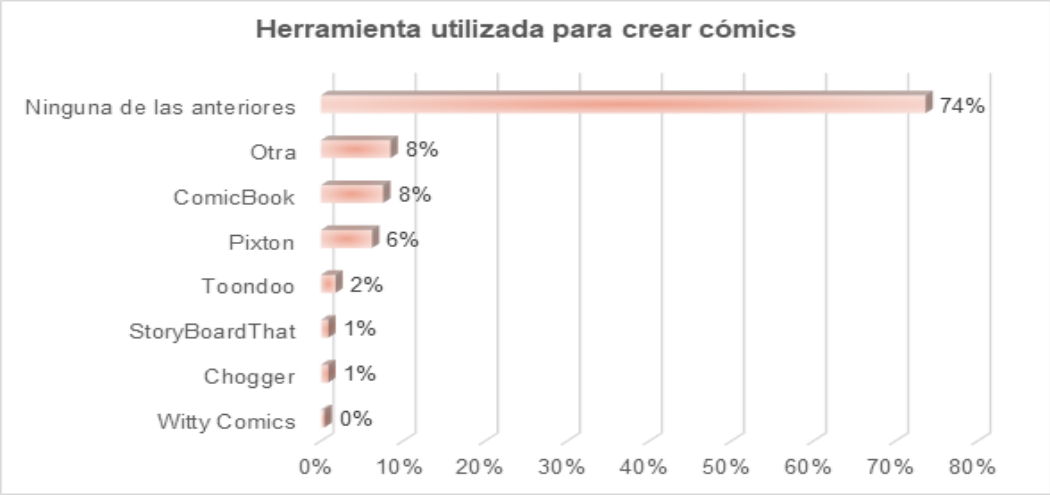
Figura 21. Apps más utilizadas por los estudiantes en la escuela



Fuente: Elaboración propia

Figure 22 shows the tools that students use to create comics. As you can see, they use them very little. Despite this, ComicBook and Pixton stand out.

Figura 22. Porcentaje de herramienta más utilizada por los estudiantes para crear cómics



Fuente: Elaboración propia

Figure 23 details the device that students use for a game. The phone stands out and the computer follows.

Figura 23. Porcentaje de dispositivos más utilizados por los estudiantes para jugar

Fuente: Elaboración propia

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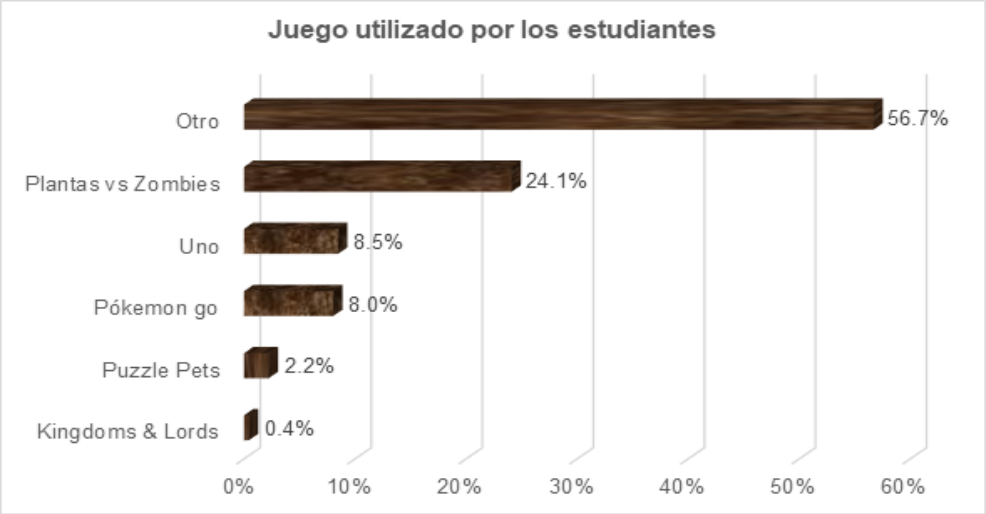
Finally, Figure 24 shows that 56.7% spend time with a game that is not specified in the answers, but in general they all play.

Figura 24. Juego utilizado por los estudiantes



Fuente: Elaboración propia

Discussion

The present research work had the limitation of working only with a public university, so the project is open to be carried out in other universities, both public and private. On the other hand, the data obtained in this research will be useful for teachers to be informed of the tools used by students and, once this information is processed, they can request the work on these tools and thus support them in their teaching-learning process, or as a teacher to begin to know them, because it usually happens that some teachers are not familiar with certain tools.

It is necessary to bear in mind that we asked about the tools used at that time and in the moment, and that the technology is advancing very quickly; In fact, more and more applications arise for both the computer and the telephone, which makes students use different tools from one year to the next.

Conclusions

The students are related to the technological tools, since they use several applications in the school and for their personal use, as well as electronic devices such as the computer, telephone and tablet.

The device that most students use at school is the computer, and the most used applications there are Drive, Facebook and YouTube. Regarding social networks, the most outstanding are Facebook, YouTube and Instagram. The most used applications in the cell phone, meanwhile, are WhatsApp, Facebook and YouTube.

For the educational platforms, the most outstanding one was the institutional one (Virtual Campus); but not only use this, but have also come to use others such as Canvas and Socrative. And although most have not resorted to videoconferencing for their classes, among the students who have used it, the Skype tool stood out, followed by Webex. With regard to the most used Internet browsers, the one that stands out is Google Chrome, with a great advantage over Mozilla and Safari.

It is noteworthy that, despite the time that has passed, Microsoft Office programs are still preferred by students, since the word processor that is most used is Word, followed by the online word processor. For the statistical exercises, the most used is Excel, followed by Minitab and the program R. In what refers to the presentations, the most outstanding is PowerPoint, followed by Prezzi. For PDF documents, the program that stood out was Adobe Acrobat and then Nitro Pro.

This leads to think that students are very involved with the technological tools, because, although they keep appearing new applications, they will be willing to use them. One of the most recent applications is WhatsApp, and it is one of the most used. Teachers also have to get involved with these tools and applications, since the new developments enable entertaining and dynamic classes. It is important to emphasize that technological tools are not only providing academic support, but we could even envision an emotional support and training. This could be the subject of later investigations. For now, the school can be a great winner if we observe, plan and act well using these tools strategically.

With this, students can be motivated during their stay at the university, as well as being involved in their training by actively participating in the teaching-learning process, using and

applying tools to achieve maximum school performance, while increasing your social space. If the teacher uses them and helps them to use them properly, the use may be better.

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