School performance: New multimedia resources versus traditional notes

El rendimiento escolar: Nuevos recursos multimedia frente a los apuntes tradicionales

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ABSTRACT

With the increasing adoption of information and communication technologies among youngsters, it has become common for high school students to incorporate the use of multiple devices and digital platforms in their study habits. Although these digital resources support and motivate them to learn, these are also a source of continuous distraction. This research analyzes the impact of studying with handwritten notes, WhatsApp, YouTube and searching the Internet in academic performance, through a mixed method that combines 31 focus groups and a survey of 7,217 students from 12 to 18 years of age in Chile. The results of the focus groups show that the positive impact of technologies in learning would depend on the students' motivation for learning, their ability to efficiently control and manage the available digital resources, and their capacity to search and evaluate information on the Internet. The survey concludes that those who study with their notes more frequently have better academic performance, whereas those who frequently study with YouTube and WhatsApp have a lower GPA, with no significant differences when it comes to internet browsing. These results reinforce the need raised by scholars to generate policies that promote digital literacy both inside and outside the school.

RESUMEN

Con la creciente masificación de las tecnologías de información y comunicación entre los jóvenes, es cada vez más común que los estudiantes de secundaria incorporen el uso de múltiples dispositivos y plataformas en sus hábitos de estudio, lo que sería una fuente de apoyo y motivación, pero también de constante distracción. Esta investigación compara el impacto que tiene estudiar con apuntes escritos a mano, WhatsApp, YouTube y navegando por Internet, en el rendimiento académico, a través de un método mixto que combina 31 grupos focales y una encuesta a 7.217 estudiantes de 12 a 18 años en Chile. El análisis de los grupos focales muestra que el buen uso de tecnologías al estudiar dependería de la capacidad de los estudiantes para controlar y hacer un uso eficiente de los recursos digitales disponibles, de sus motivaciones individuales y de la habilidad que tienen para buscar y evaluar la información en Internet. Por su parte, los resultados de la encuesta concluyen que aquellos jóvenes que estudian con mayor frecuencia con sus apuntes presentan un promedio de calificaciones más alto y los que estudian frecuentemente con YouTube y WhatsApp, un promedio de calificaciones más bajo, sin encontrar diferencias significativas en el caso de los navegadores de Internet. Esto reforzaría la necesidad observada por académicos de generar políticas que promuevan la alfabetización digital tanto dentro como fuera del colegio.

KEYWORDS | PALABRAS CLAVE

WhatsApp, YouTube, Google, Internet, learning, academic performance, ICT adoption, digital literacy.
WhatsApp, YouTube, Google, Internet, aprendizaje, rendimiento académico, adopción de TIC, alfabetización digital.

1. Introduction and state of the art

The implementation of information and communication technologies (ICTs) in educational environments has been a constant concern in the last decades for academics and policymakers (Livingstone et al., 2018). Interestingly enough, despite the efforts of several governments to ensure universal access to ICTs, a digital divide has persisted within schools, which could be understood due to the differences in the use and appropriation of technology by students (Claro et al., 2012; Hohlfeld et al., 2017; Warschauer & Matuchniak, 2010).

Aiming to understand this situation, some scholars have questioned the approach by authors such as Prensky (2001) for proposing that both children and young people present digital and cognitive skills since birth due to their early exposure to technologies. In fact, most recent research suggests there is not enough evidence to demonstrate that these skills are present in students only from their exposure to technologies (Bullen et al., 2011; Ruíz, 2013; Sweller et al., 2007). Furthermore, it seems that the development of these digital abilities depends on how young people use them and could not be attributed to a whole generation (Cabra-Torres & Marciales-Vivas, 2009).

The Chilean case is a good example of this phenomenon: although there is an extremely high Internet penetration (87.4% of households have Internet access according to SUBTEL, 2019), only 1.8% of school students present an advanced level of skills and competences in managing online information, communication, and ethics in the digital world (Ministry of Education, 2014). These results show the need to improve digital skills and knowledge in schoolchildren (Claro et al., 2015).

Furthermore, as our modern society assimilates new and more information and communication technologies, the boundaries between school and home have broken up, as well as those between work and leisure (Furlong & Davies, 2012), creating a new context in which students can learn outside school and have leisure activities within school (Persson, 2014). Thus, technologies could support formal learning at home (Selwyn et al., 2009) as students can decide between different learning strategies in order to do their homework or study and communicate with their classmates (Furlong & Davies, 2012; García-Martín & Cantón-Mayo, 2019). Examples of these strategies may be related to how they search for online content, access different types of resources (e.g. audiovisual contents) or create digital products (Furlong & Davies, 2012; García-Valcárcel & Tejedor-Tejedor, 2017; Matamala-Riquelme, 2016; Ruiz, 2013).

Relevant to our research, previous studies have shown that the use of technologies for learning purposes can affect academic performance in two ways. On the one hand, in terms of information management, research has shown that by accessing multiple resources and different perspectives, technology can facilitate the comprehension of more complex processes and promote active learning (Noor-Ul-Amin, 2013). Thus, searching for online information could predict, for example, higher levels of academic efficiency (Shen, 2018), and it is correlated with informational literacy (Çoklar et al., 2017). Similarly, it has been observed that using technologies for learning not only increases students' motivation (Noor-Ul-Amin, 2013; Ruiz, 2013), but also their involvement and the development of transversal skills such as collaboration and self-regulated autonomous learning (Claro et al., 2015; Fazey & Fazey, 2001; Torrano-Montalvo & González-Torres, 2004; Zhang, 2015), which are positively related to academic performance (Hu et al., 2018). Likewise, research has shown that students who use technology autonomously and are able to search for information to complete their academic projects, present a greater engagement during video visualization (Guo et al., 2014).

On the other hand, scholars have observed that the use of electronic media in classes or at home is related to the implementation of more than one activity at the same time, or "multitasking", which increases students' distraction and decreases their ability to retain the information they learn (Cabañas & Korzeniowski, 2015; Flanigan & Babchuk, 2015; Matamala-Riquelme, 2016; Rosen et al., 2013). Furthermore, as they present lower capacities to control interference of information, this would negatively impact their academic performance (Bellur et al., 2015; Giunchiglia et al., 2018; Junco & Cotten, 2012). Similarly, the use of electronic media could promote counterproductive learning habits such as "copying and pasting" information from the Internet (Bellur et al., 2015), simplifying the content as they search directly for answers or summaries of what they need to learn, which negatively affect their critical thinking skills (Matamala-Riquelme, 2016). Thus, in students who lack strategies for online search, the large

amounts of information could produce a cognitive overload from multiple stimuli, without them being able to differentiate what is important (Kolikant & Ma'ayan, 2018). Taking these aspects into account, it is possible that the use of ICTs in educational contexts is displacing traditional resources, such as taking handwritten notes, a process that has been proven to improve recall and quality of information (Aragón-Mendizábal et al., 2016) as well as stimulating cognitive processes through learning strategies that positively impact academic performance (Roux & Anzures-González, 2015). This study aims to respond to two questions related to the effects of ICTs in learning processes: 1) Which aspects are considered by students in deciding how they study and which resources are they using for that purpose? 2) What impact does the use of WhatsApp, YouTube, the Internet, and handwritten notes have in academic performance?

2. Materials and methods

This investigation was exploratory in nature, based in a correlational model, carried out through a mixed methods approach.

2.1. Participants

From the universe of 11,749 educational establishments of primary and secondary education in Chile (Ministry of Education, 2018) for the qualitative analysis, a simple random sample of 11 schools in different regions of the country was selected. A total of 176 students between 12 and 18 years old were interviewed (44.8% female). For the quantitative analysis, students in the same age range were selected from 84 schools (N=7,217; 57% female) with the following distribution from the three most populated regions in the country (V, RM, and VIII): 19% from public schools, 59.5% from private subsidized schools and 21.5% from private schools. Both samples were selected randomly from schools by using prior consent from the school authorities, parents, and guardians, in accordance with the ethical norms for working with minors established by the Pontifical Catholic University of Chile.

2.2. Instruments

Students participated in 31 focus groups, each comprised of between 4 and 10 participants. Three focus groups were constituted only by female students, three were constituted only by male students, and 25 were mixed. The discussions were conducted with a semi-structured questionnaire that focused on three main topics: 1) The use of technologies for formal education; 2) The use of technologies inside the classroom, and 3) the use of technologies for studying at home.

Quantitative information was collected through a questionnaire made from the following variables (Annex 1 in https://bit.ly/2YYyJEd):

- Dependent variable: grade point average. The Chilean grading scale was used which goes from 1.0 (0% achievement) to 7.0 (100% achievement), where 4.0 is the lowest passing grade. In this case the following scale was constructed for working with the GPA: 6=6.0-7.0 (very good); 5= 5.0-5.9 (good); 4= 4.0-4.9 (sufficient); 3= 3.0-3.9 (less than sufficient); 2= 2.0-2.9 (deficient); and 1= 1.0-1.9 (very deficient).
- Independent variables: Study resources. We asked students how frequently they utilize four different resources for studying. These were measured in a Likert scale of 5 points from 1 (never) to 5 (always): handwritten notes (M=3.79; SD=1.09), search engines such as Google (M=3.74; SD=1.07), YouTube (M=2.86; SD=1.29) and WhatsApp (M=2.87; SD=1.36).
- Study strategies: According to the frequency of use of these study resources, we established four profiles by combining high-level use (always and frequently) and low-level use (never, rarely, and sometimes). In the first profile those students with high-level use of handwritten notes and low-level ICT use (YouTube, Internet, and WhatsApp) (M=5.95; SD=0.68). Profile II considered high level of ICT use and low level of handwritten notes (M=5.43; SD=0.64). Profile III included students with high levels of handwritten notes and ICT use (M=5.82; SD=0.63). Profile IV considered low levels of handwritten notes and ICT (M=5.53; SD=0.68).
- Control variables: Type of educational establishment. It was differentiated by the type of administration of Chilean schools to control for differences in: 0= State subsidized (municipal and private subsidized schools) and 1= private. Grade: it was differentiated between primary

grades, seventh and eighth grades (13-14 years old), and secondary, from first to fourth year of High School (15-18 years old).

2.3. Procedure

Both phases were conducted during school hours and members of the research team guided the focus groups and supervised the students answering the survey inside the educational establishments.

2.4. Data analysis

Transcriptions of each focus group were analyzed through axial coding with NVivo 11. This process allowed researchers to distinguish between different study practices, and to understand how students evaluate the use of handwritten notes and technologies for learning purposes. Additionally, the analysis revealed the most used resources for studying and learning, three main aspects that influence how they decide to study, and their positive and negative perceptions of their study sessions.

Data survey was analyzed with the statistical software RStudio v1.1.463 (RStudio Team, 2018-2019). To analyze the differences between groups, the researchers ran a multivariate analysis of variance (MANOVA of Fishers') and calculated the homogeneity of these using the K-squared test by Bartlett (1937). The Scheffe test was conducted as a post-hoc test to determine if the frequency of use was statistically significant. Once the MANOVA was conducted, the significance of individual and combined factors was analyzed through an eta-squared test (Kennedy, 1970). Lastly, a linear regression was estimated to establish how the learning resources (handwritten notes, searching on Internet, YouTube, and WhatsApp) impacted participants' GPA.

3. Results

3.1. Focus groups

It was determined that the most utilized devices were mobile phones (106 references) and the computer (44 references). Out of the most-mentioned study resources, the students highlighted using their handwritten notes (123 references) to review what was explained by the teacher during classes, YouTube to search for videos about contents viewed in classes (131 references), WhatsApp to share information or to ask questions to classmates (163 mentions), and search engines (153 references) (mentioned either as "Google" or "Internet") to look up more concrete content. They also mentioned specific websites and applications, such as PuntajeNacional.cl or PhotoMath (31 total references). It is worth noting that every student had access to technologies in their homes, and that they had at least one device when studying. In fact, several students recognized facing study sessions using different resources simultaneously: "I have the cellphone in case someone needs to ask me something, the computer to look up information, the notebook [written notes] to do homework or study, and the book in case I need it." (FG number 5, male, 15 years old).

When students were asked about their study practices and how they select different resources for that purpose, three aspects that have an impact on how they make these decisions were identified.

3.1.1. Control and efficient use of tools

Students recognized that the mere presence of devices made it difficult for them to regulate as they feel a constant worry to avoid checking their social media accounts (78 references), which is why many of them developed practices to eliminate stimuli that made them lose their focus (123 references). Thus, they mentioned mainly their cellphones, considering them a source of distraction, which affected them negatively by dilating the time needed to complete tasks: "Sometimes the lack of concentration is because of Instagram… studying with my classmates on WhatsApp, I always tend to open my phone and automatically, Instagram. What I have to do is uninstall it. In fact, I kind of make an attempt at logging in and it's not there, then I turn off my phone and keep studying." (FG N7, man 17 years old).

In fact, they related their distraction to their cellphones rather than to the computers, as they can access faster to their social media platforms or activities not related to the academic context through their mobile devices. Similarly, they mentioned WhatsApp and YouTube as their main sources of distraction, as both platforms take them away from their studies, which happens less frequently with search engines [through

their computers], or when studying with their notes or books. Among the positive aspects of the use of devices and platforms, they mentioned the usefulness of the resources to optimize study time for solving concrete issues (43 references), communicating with others, and working as a group without sharing a physical space (53 references): "My best friend is very good in Biology and Chemistry, but she is bad at Spanish language and History. So, we do video calls and we explain to each other, because what she does not know how to do, I know, and vice versa." (FG N4, Female, 15 years old) "For Math, I look up exercises and use the calculator. For science classes, I print what the teacher sends us, the PowerPoint, and then I study. The computer is better for me because there I can use translators, dictionaries, find exercises…" (FG N1, Male, 14 years old).

Thus, search engines and WhatsApp would be more efficient when answering concrete questions, which would happen when the students do not find or do not understand the information in their handwritten notes.

3.1.2. Personal motivations and preferences in subject and formats

According to the students, the selection of different study strategies (such as incorporating the use of technologies) would depend on the motivation generated by the content (43 references) and their preference for different resources that would allow them to focus or to entertain when studying. "It has to do with whether you like something. Actually, what I like I don't study, and what I don't like I do study. Because if I like something, I'm going to pay more attention in class and I would need less study time at home." (FG N22, male, 15 years old).

Thus, participants associated their motivation to take notes in classes in terms of how much they like the class, while the use of search engines and YouTube depended on the different purposes, such as whether they need to find out more information, to understand the relevance of the subject, or to simplify and shorten study time, among others: "In Biology, I always search on the internet because that's what I like, but everything else, I don't." (FG N23, Female, 13 years old). "… I don't study Math because I'm not interested, so in the end, when I have to study, I'm listening to music or watching videos, but in my house" (FG N7, mal 18 years old).

3.1.3. Search and evaluation of available information

The strategies to manage information with specific purposes (knowing the content needed to take a test), would depend on how the students understood and conceived the use of the Internet: they would use it differently if they saw it as a primary or a secondary source of information. This means the following: while some students would search in platforms to complement what they have been studying (169 references) (to clarify and sum up the information in their notes), other students admitted to searching as a replacement for that information (98 references), especially when they are less motivated to pay attention in class or when there is a vacuum of knowledge. "There are people who prefer not to pay attention in class… that happens to me sometimes. I decide that I'm not going to listen if I can search on the internet afterwards and learn just the same as in the class. And I think this happens to most of us." (FG N6, Male, 16 years old). "If it's History, for example, the Cold War. I search for 'Cold War' and look up different articles. Because, in order to learn something specific, I prefer to read from everywhere to reinforce what I already know and to search what I don't understand" (FG N14, woman 14 years old).

Thus, the use of handwritten notes would be useful to understand the content given by a teacher in a class when there is the main source of information, while WhatsApp, YouTube, and Internet browsers could open the possibility of accessing content given by their peers or experts (YouTube channels or specialized websites) or undetermined Internet sources. For this reason, when evaluating the quality of information, some students preferred to saturate the information (43 references) through searching on different websites, while others preferred to stay with the simplest content (64 references): "What they give you in school is always vague, it's not as profound as what I could look up beyond. There are always tricky questions in the tests where you have to infer, and people who do not have that capacity, need to look up more information to solve them." (FG N8, Female, 17 years old). "You search for a formula and go straight to the point… you search: how to solve this, and it goes directly to where they explain it, and

that's it" (FG N24, Male, 17 years old). Through this way, it can be understood how the students select their learning resources according to their individual preferences, which could vary in different situations and contexts. Thus, the different uses of technology for studying would imply difficulties and opportunities according to their own skills, motivations, and purposes.

3.2. Survey

From the qualitative results and the bibliographic research, the researchers formulated hypotheses about the relation between the use of technologies and academic performance. Firstly, and given that taking notes in class presupposes a higher interest in the subject, being more attentive in classes and recalling the information (Aragón-Mendizábal et al., 2016), it is assumed that a larger use of handwritten notes when studying would be associated to a higher GPA. On the other hand, the use of the Internet would be useful for specific doubts, but it could be thought that a higher use of the internet as a replacement for contents seen in the classroom would require a larger effort for evaluating and selecting the important information (Kolikan and Ma'ayan, 2018). A similar effect could be seen in the prolonged use of YouTube and WhatsApp, because in both cases we could assume a lesser prior understanding of the information than with the use of notes, which could speak of a lesser motivation –associated to more distractions when studying (Matamala-Riquelme, 2016)– and to the necessity of searching for complex explanations from other classmates or specialized videos. Thus, four hypotheses were formulated:

- H1: Students who study more frequently with their handwritten notes would present a higher GPA.
- H2: Students who study more frequently with search engines would present a lower GPA.
- H3: Students who study more frequently with YouTube would present a lower GPA.
- H4: Students who study more frequently with WhatsApp would present a lower GPA.

In order to corroborate the hypotheses and analyze the association between students' use of technology for study and their grade point average, three types of analysis were done. The first one, a multifactorial variance analysis (MANOVA) with post-hoc tests done through the Scheffe test, showed statistically significant differences in the means between the use of handwritten notes and the digital resources (F=1046.98 p<.001). As Table 1 illustrates, the results show that the higher grade point averages are seen in students who answered studying Always with notes (M=6.01; SD=0.576), while lower grade point averages said they used notes with a lower frequency, corroborating H1: Frequently (M=5.75; SD=0.590); Sometimes (M=5.48; SD=0.620); Rarely (M=5.39; SD=0.664); or Never (M=5.37; SD=0.744).

Regarding the relationship between frequency of search engines with academic goals (F=24.96 p<.001), there were no significant differences in grade point averages, so H2 could not be corroborated.

Table 1. Results of the analysis of variances								
Study resource	**Notes**		**Internet**		**YouTube**		**WhatsApp**	
Frequency of use	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Always	6.01[bcde]	0.57	5.71	0.61	5.63[de]	0.62	5.64[bcde]	0.63
Frequently	5.75[acde]	0.59	5.71	0.63	5.67[de]	0.63	5.71[a]	0.66
Sometimes	5.48[abde]	0.62	5.74	0.67	5.68[de]	0.66	5.73[a]	0.62
Rarely	5.39[abc]	0.66	5.76	0.69	5.80[ab]	0.64	5.77[a]	0.64
Never	5.37[abc]	0.74	5.65	0.76	5.79[ab]	0.68	5.73[a]	0.69

Note. Residual standard error 0.6063 in 7212 degrees of freedom; Multiple R2: 0.133, Adjusted R2: 0.1328; Statistical F 277.2 in 4 and 7212 dl, p<2.2e-16.

The presence of the letters a, b, c, d, and e indicate statistical significance to a level of at least p≤.05 between the measures of frequency of use reported with the grade point average in accordance with the test of significant difference in the Scheffe test.

Concerning the use of YouTube (F=39.17 p<.001), Table 1 shows significant differences between the students who claim to use it Always (M=5.63; SD=0.63), Frequently (M=5.67; SD=0.63), and/or Sometimes (M=5.68; SD=0.66), with those who use it Rarely (M=5.80; SD=0.64), or Never (M=5.79; SD=0.68), which would prove H3. A similar effect is seen in H4 with WhatsApp (F=3.651 p<.0561), though, while we can identify statistically significant differences in academic performance, the contrast is only between those who Always use it to study (M=5.64; SD=0.630) with the rest.

To corroborate the previous results, we did a series of hierarchical linear regressions displayed in Table 2. Model 2 shows that studying with handwritten notes is the factor that most influences the grade point average (β=0.17, p<0.001). Something similar can be observed in models 3, 4, and 5, where, with a higher use of notes, the better the GPA, even controlling for all the other technological resources, which would corroborate H1. For H2, as observed in Model 5, there is no significant relation between the use of search engines on the internet to study and the GPA.

Table 2. Regressions for the use of study resources					
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Type of Educational establishment (1=Private)	0.467***	0.362***	0.35***	0.358***	0.359***
Grade (1= High School)	-0.046**	-0.080***	-0.072***	-0.068***	-0.068***
$\Delta R2$ (%)	8.950	8.950	8.950	8.950	8.950
Notes		0.171***	0.172***	0.171***	0.170***
$\Delta R2$ (%)		7.460	7.460	7.460	7.460
YouTube			-0.026***	-0.020***	-0.022***
$\Delta R2$ (%)			0.240	0.240	0.240
WhatsApp				- 0.022***	-0.022***
$\Delta R2$ (%)				0.180	0.180
Internet					0.004
$\Delta R2$ (%)					0.010
Constant	5.656	5.052	5.123	5.167	5.159
Adjusted R2 (%)	8.950	16.410	16.650	16.830	16.840
DW	1.99	1.94	1.95	1.95	1.95

Note. All the entries are standardized coefficients. The change in R2 refers to the unique contribution of each group of variables controlling for the previous variables entered in the regression model *p<0.05, **p<0.01, ***p<0.001.

From what was observed in models 3 and 4, it can be seen that, the higher the use of YouTube (β=-0.03, p<0.001) and of WhatsApp (β=-0.02, p<0.001) to study, the lower the grade point average is, which corroborates H3 and H4, respectively.

Finally, profiles of study strategies were established (which would respond to the qualitative and quantitative analyses), which were tested with a MANOVA, which found significant differences in academic performance (F=83.26 p<.001). Table 3 shows that the students with a high use of notes and low use of ICT (profile I) present a higher GPA in comparison to those who used strategies that fit profile II (high use of ICT and low use of notes), profile III (high use of notes and ICT) and profile IV (low use of notes and ICT).

From the Scheffe test it is observed that, facing a low use of handwritten notes, independently of their level of usage of ICT, there are no statistically significant differences. In other words, facing a low use of notes when studying, in every case, the grade point average will be lower in comparison with a higher use of notes.

Table 3. Results of the study strategies analysis		
	Grades	
Study strategies	**Mean**	**SD**
Profile I	5.95[bcd]	0.64
Profile II	5.43[ac]	0.64
Profile III	5.82[bd]	0.63
Profile IV	5.53[ac]	0.68

Note. [abd] the presence of the letters a, b, and d indicate statistical significance in a level of at least p≤.05 between the means in the grade point average in accordance with the test of significant difference of the Scheffe test.

4. Discussion and conclusions

This research aimed to understand how students decide which types of resources they use for studying, and the impact that the use of WhatsApp, YouTube, the Internet, and handwritten notes have on academic performance. The research left three major results.

First, it was observed that most of the students simultaneously use different devices and platforms to study. Second, according to the opinions expressed in the focus groups, the decision of using digital

resources depends on their motivation and skills to search and evaluate information on the internet, but the efficiency would be given by their ability to regulate and control the use of these digital resources for academic purposes. Third, consistent with these results, those who study most frequently with their handwritten notes present higher grade point average, while those who frequently study with YouTube and WhatsApp present lower GPA. This is because, contrary to what was proposed by authors such as Prensky (2001), students recognize that they do not possess higher abilities to manage the information they found on the Internet nor the skills to self-regulate their use of devices when studying. For this reason, one of the main challenges that students have today is to increase their capacity to regulate their exposition to different stimuli, and to learn how to select online resources more efficiently, which facilitates the learning process (Claro et al., 2015).

Thus, the fact that the use of handwritten notes is associated to a higher GPA has two main implications. On the one hand it confirms that this method helps students to better recall the information (Aragón et al., 2016) because taking notes stimulates cognitive process (Roux & Anzures-González, 2015), and shows an active attitude and higher motivation to pay attention in classes. On the other hand, as students take notes, they are also isolating other distractions as they focus on what the teacher explains and not in the notifications they receive, with a cellphone as the main distractor. Furthermore, these results are also consistent with previous research, that increasing the probabilities of being exposed to distractions and "multi-tasking" with ICT has a negative impact on academic performance (Giunchiglia et al., 2018).

Another implication would be that technologies are a positive contribution when they are used as a support and not as a replacement for studying with notes, as the latter would diminish academic performance. Moreover, it seems that only in specific cases can technology make the study process more efficient by helping students to increase their motivation (Noor-Ul-Amin, 2013; Ruiz, 2013). Thus, it is clear that the role of teachers is fundamental regarding the in-class' contents, since, according to the focus groups, when students do not trust what the teacher is explaining or are not motivated by their manner of teaching the information, they prefer digital resources as a replacement. However, most literature agrees that most of the students do not have the skills to evaluate large amounts of information found on the internet (Coklar et al., 2017), which could explain, for instance, that the use of search engines does not yield positive results nor does the information shared via WhatsApp.

Finally, this research makes evident the need to develop programs that consider the students' need for digital literacy skills that would help them to make more efficient the use of technologies when studying, something that must be taught so that the use of ICT would go together with better academic results.

As for the limitations, it is important to mention that in both methods, only the students' perception was considered, and their skills were not measured. While the research, in its qualitative and quantitative phases, was done in a similar sample of students, each one had a different objective. This way, the focus groups inquired on the vision and interpretation of positive and negative aspects of their learning, while the quantitative results showed the relation between the frequencies of use of ICT that they did say they had in their study and academic performance. For this reason, it is suggested for future research to include specific questions about their use of devices in a qualitative phase and an evaluation of their skills when using ICTs to achieve learning goals outside the classrooms. Finally, it is also important to note the digital divide between the type of educational establishments, public or private, something that is not discussed in this article, which is why it is suggested to work on this aspect separately in the future, due to its great importance.

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