Information and communication technologies and students' out-of-school learning experiences

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Abstract

The widespread availability of information and communication technologies (ICTs) has generated new activity contexts that provide opportunities and resources for learning, at the same time as expanding the learning potential of traditional contexts such as the family and schools. Within this framework the present study analyses the frequency with which students of three ages (10, 13 and 16 years) participate in ICT-mediated activities outside school, as well as the learning experiences associated with this participation. To this end, we used a multimethod approach combining administration of a questionnaire with focus groups and individual interviews. The analysis revealed low rates of participation in ICT-mediated activities outside school and showed that these activities were associated with limited learning experiences. These results highlight the importance of educational institutions building closer links between students' learning experiences in and outside school, as well as the need to develop initiatives that can foster the acquisition of the digital skills required to maximize the learning potential of new activity contexts.

Keywords

Activity contexts; subjective learning experiences; information and communication technologies

I. Introduction

The development of the information society has produced a qualitative leap in many areas of human activity and learning. Indeed, the social, economic, political and cultural transformations that have taken place in recent decades have had a profound impact on social practices, altering as a result the parameters of human learning. Accompanying these changes, which various authors refer to as a new ecology or a new model of learning (Barron, 2004; Coll, 2013; Redecker et al., 2011), is a series of new and unprecedented activity contexts that are frequently associated with the development of digital information and communication technologies (ICT), such as social networking services, virtual worlds or environments, virtual communities of interest, practice and learning, or online gaming. These contexts are true potential niches of learning which provide opportunities and resources for learning to those who participate in them. This, together with the fact that information and communication technologies (ICTs) have also enhanced the learning potential of traditional activity contexts (e.g. the family, schools, the workplace, or cultural and leisure organizations) challenges the idea that formal educational institutions are the sole context in which learning takes place. In the information society, children and adolescents can learn by engaging with activities that take place in a variety of contexts. Consequently, there are opportunities for both lifelong and life-wide learning (Banks et al., 2007), and ICTs play a key role in this process of expansion.

Never before in the history of developed societies has it been possible for children and adolescents to participate in so many and such a variety of activity contexts that offer opportunities and resources for learning. However, the possibility of participation is not the same for all young people. On the one hand, the activity contexts that are available to them and in which they may take part differ not only in number but also, and especially, in terms of the richness and variety of learning opportunities and resources. Furthermore, not all young people have achieved, or have had the chance to acquire and develop, the competences required to take advantage of these opportunities and resources, especially as regards the use of ICT tools and devices. It is of interest, therefore, to study the ICT-mediated activities in which children and adolescents participate outside school and to examine the extent to which they take advantage of the learning opportunities and resources associated with them, as well as the degree to which they perceive these activities as sources of learning.

Over the last two decades, metaphors such as 'digital natives' (Prensky, 2001a, 2001b), 'net generation' (Tapscott, 1998) or 'new millennium learners' (Pedró, 2006) have become popular among educationalists and the public at large to refer to young people born since the 1980s, the idea being that they have grown up surrounded by digital devices and resources and, as a result, make frequent use of them in a wide range of activities. Moreover, they are regarded as being skilled users of these technologies without having received any formal instruction in how to do so (for a review of these metaphors, see Gallardo-Echenique, Marqués-Molías, Bullen & Strijbos, 2015). Numerous studies, however, have questioned whether there is any sound empirical basis for the deterministic relationship between age and technological skill that underpins these metaphors, a relationship which seems to be founded solely on anecdotes and unsystematic informal observations. The results of several studies that have surveyed the use of digital technologies among large samples of undergraduates in different countries indicate that the level of use is generally much lower than might be expected were the aforementioned metaphors accurate (Czerniewicz & Brown, 2010; Hargittai, 2010; Kennedy et al., 2010; Kennedy & Fox, 2013; Margaryan et al., 2011;

Romero et al., 2013). In addition, the findings suggest that young people's ability to access and make use of digital technologies is determined by their socioeconomic status and social class, as well as by gender and where they live.

There has been less research examining the activities in which school-age children use ICTs and what uses they make of them. The studies by Bullen et al. (2008), Hinostroza et al. (2015), Livingstone et al. (2011), Luckin et al. (2009), Torres and Valencia (2013), Selwyn (2006), van Deursen and van Diepen (2013) and Wang et al. (2014) all conclude that outside school children and adolescents mainly use digital technologies for the purposes of communication, leisure and entertainment, and internet searches, but they do not generally utilize them for activities that imply a high cognitive level or as an aid in constructive or creative processes. Some of these studies have found significant differences in the uses of ICTs and internet according to age, a finding that is attributed to the different social and cultural contexts in which children participate at different ages. Others report certain differences among similarly aged children and adolescents depending on whether the live in a rural or urban environment, their gender or the educational level of their parents. Overall, therefore, the results of these studies indicate that while digital technologies form part of young people's everyday lives, the uses they make of them are rather limited. However, a clear relationship has yet to be established between these uses and the sociodemographic variables studied.

Some studies have compared the uses of ICTs in and outside the school context. Selwyn, Potter and Cranmer (2009) found that at school students used these technologies for writing tasks or presentations, as well as to search for information or images online; older children also made use of spreadsheets and databases. Outside school, by contrast, the main uses involved gaming (either online or in a particular place), watching videos and, to a lesser extent, communication and social media. Creative and collaborative uses of so-called Web 2.0 applications for active and creative output were not common either in or outside the school context, and the main form of participation involved passive consumption. In general, children reported that, both in and outside school, they feel that with ICT they learn mostly in terms of discovering or creating things that they could not do without ICT, but that they learn much less in terms of curricular contents. There were no significant gender differences in relation to accessing ICTs, how they are used or the perceived learning that results. By contrast, age was associated with significant differences in perceived learning through ICTs, both in and outside school: the older the students the greater their perceived learning.

For their part, Spires et al. (2008) found that the young people they surveyed made greater use of ICTs outside school, and girls more so than boys; this gender difference was not observed within the school context. The majority of the young people had basic knowledge of word processing and spreadsheets, and they stated that these skills were learned at school. With respect to the use of ICTs outside school, the students classified themselves primarily as consumers/users of digital music, videogames and smartphones. These authors also used focus groups to gain a deeper understanding of students' perceptions regarding ICTs. The results of this second level of analysis showed that students associated the use of ICTs outside school with entertainment and communication, and inside school with boredom. At all events, their preference was to use ICTs.

According to Bennett and Maton (2010), there is a growing body of evidence that not only challenges the simplistic notion of 'digital natives' but also highlights the complexity of

studying the technological experiences of young people. These authors stress the need for further research on this topic, since the overall picture we have regarding young people's use of ICTs remains somewhat fragmented. They also argue that this research should take at least two forms. One would involve large-scale surveys that can provide general information about trends or patterns in the way that children and adolescents use these technologies, with follow-up studies being conducted as new forms of ICTs emerge. The other would see the incorporation of qualitative research methods, which are crucial for understanding in greater depth any differences regarding the activities in which ICTs are used, young people's access to and participation in these activities, and what it means to them to use these technologies in the context of such activities.

While agreeing with the arguments and proposals made by Bennett and Maton, we believe that there are at least two further gaps in the literature that are hampering the development of a more detailed profile of the ways in which digital technologies impact on the lives of children and adolescents. The first has to do with the fact that most studies to date have focused on the use of ICTs and have failed to consider both the activity contexts in which they are used and the extent to which ICT-mediated activities reflect young people's daily activities as a whole. The second gap concerns the lack of research that, in line with the study by Selwyn, Potter and Cranmer (2009), examines not only the ICT-mediated activities in which young people participate but also the learning experiences associated with them.

In our view, a focus on learning experiences has particular relevance and interest in relation to the new ecology of learning and the challenges it poses for formal educational institutions. In a scenario where children and adolescents may regularly engage with different activity contexts that offer opportunities and resources for learning, any of these contexts can generate learning and learning experiences. Hence, in order to understand how children and adolescents learn in such a scenario it is necessary to examine the learning and the learning experiences that may originate in these different activity contexts, and especially the kind of connections and relationships that are — or are not — established between what is learned and these learning experiences. The focus of interest therefore shifts from the learning processes that take place in a single activity context – traditionally, the school or family context — to individual learning trajectories, that is, the set of learning experiences that result from participation in different activity contexts and the relationships — of continuity or discontinuity, among others — that the learner establishes between them (Arnseth & Silseth, 2013; Coll, 2016; Kumpulainen, 2013; Rajala et al., 2016).

In this vein, the present study is part of a broader research project whose aim is to study the subjective learning experiences that constitute the individual learning trajectories of school-age children and adolescents and the mediating role which ICTs play in these experiences. Within the framework of this project, this study has two specific objectives and seek to provide answers to a series of questions associated with each:

- To identify and analyse the ICT-mediated activities in which a sample of children and adolescents participate outside school. In what ICT-mediated activities do these young people take part when not at school? Do the ICT-mediated activities in which they participate outside school differ significantly according to their age, gender, the socioeconomic status of their family or where they live? How many of their everyday out-of-school activities are ICT-mediated?
- To identify and analyse the subjective learning experiences that a sample of children

and adolescents achieve through the ICT-mediated activities in which they participate outside school. To what extent do these children and adolescents associate their subjective learning experiences with the ICT-mediated activities in which they participate outside school? What links do they make between their perceived learning through these ICT-mediated activities and what they learn at school?

II. Method

In order to achieve these objectives we used a multimethod approach combining both quantitative and qualitative instruments and procedures for data collection and analysis, namely a questionnaire and statistical analysis, and interviews and thematic analysis, respectively.

The research project of which this study forms a part comprised three stages, with the results of each stage providing the starting point for the subsequent one. The basic unit of sampling in each stage was schools, which were selected according to the following criteria: the level of education being taught (primary and secondary), area where the school was located (urban: towns or cities with more than 10,000 inhabitants; rural: towns with fewer than 10,000 inhabitants), and socioeconomic status of students' families (high or medium-high and low or medium-low). It should be noted that our aim was not to obtain a representative sample of primary and secondary schools in Catalonia, but rather to ensure that the sample included as balanced a spread as possible of different combinations of the three aforementioned variables (educational level, urban vs. rural location of school, family socioeconomic status), variables which we considered could have an important impact on the variety and characteristics of the activity contexts in which children and adolescents participated. We also chose to recruit students of three different ages (10, 13 and 16 years), corresponding to three points at which one would expect there to be significant changes in the activities and activity contexts in which young people participate.

The aim of stage 1 was to identify the activities in which the children and adolescents regularly participated outside school and which offered them learning opportunities and resources. To this end we interviewed and recorded 17 groups comprising children and adolescents, their parents and teachers. The recordings were then subjected to thematic analysis to identify the activities that would feature in the questionnaire to be administered in stage 2 of the study.

The aim of stage 2 was to explore how often and the extent to which the children and adolescents participated in the activities identified in stage 1, and to examine the characteristics of the social and/or institutional contexts in which these activities took place, the role of ICTs in these activities and the learning experiences associated with them. To this end we designed a questionnaire that enquired about the 23 activities identified in stage 1. After validating the questionnaire through expert appraisal and a pilot study we produced a definitive version, with slight variations in the wording of items depending on the age of respondents. The final questionnaire comprised three sections. The first gathered sociodemographic information from students. The second presented them with a list of the 23 activities and asked them to specify how often they participated in them and the importance they ascribed to doing so. They were also asked to describe the characteristics of

activities identified by them as most frequent and important and in which they most frequently participated, and to indicate which digital technology they used when engaging in these activities, how much they thought they learned through these activities and how important this learning was to them. Finally, in the third section, and after excluding those activities which students had previously associated with little or no learning and had indicated that what they learned was not important to them, they were asked to answer a series of questions about what they learned in the remaining activities and any links between their perceived learning in these activities and what they learned at school.

In stage 2 the secondary unit of sampling was school classes, which were selected according to the criteria of students' age and availability during the 2014-15 academic year. In the majority of cases the questionnaire was completed by whole classes of students (from primary year 4 and secondary years 2 and 4), thus ensuring a reasonable balance in terms of gender, a variable that according to previous research has an important impact on the aspects under study. Any questionnaires completed by students whose age did not correspond to the three ages chosen for this study were excluded from the analysis. A total of 1406 students took part in this stage of the research: 411 at age 10 (± 6 months), 460 at age 13 (± 6 months) and 535 at age 16 (± 6 months). Questionnaire data were analysed by calculating descriptive and inferential statistics.

The aim of stage 3 was to explore in greater depth the subjective learning experiences reported by a sample of children and adolescents and the role that ICTs played in them. In this case, data were collected by means of semi-structured interviews. In addition to identifying learning experiences the interview guide covered four main areas: ideas about learning, connections between learning experiences in and outside the school context, how students' saw themselves as learners and the perceived relationships between learning and ICTs. These interviews were conducted with a sub-sample of children and adolescents from each of the three age levels whose responses to the questionnaire in stage 2 suggested a range of learning experiences. A total of 72 students were interviewed. The interviews were recorded and transcribed, and thematic analysis was used to identify the students' subjective learning experiences and to analyse them according to the aforementioned areas of interest. In order to ensure the reliability of results the researchers worked in pairs and applied a previously agreed category system to analyse the content of interviews. Any discrepancies between coders were resolved by consensus, and in the event that agreement could not be reached the opinion of a third independent rater was sought.

The volume of results obtained in the three stages of the research project goes beyond the scope of the present article. Therefore, in what follows we focus exclusively on the results most closely related to the two study objectives.

III. Results

We will present the results in two sub-sections corresponding to the two study objectives.

a. ICT-mediated activities in which the children and adolescents participate outside school

Regarding the ICT-mediated activities in which the children and adolescents participate outside school, we will consider two sets of results. The analysis of the use of ICTs in the 23

activities identified in stage 1 showed that the latter can be grouped into four categories (see Table 1). The first corresponds to activities in which the use of ICTs is essential, and thus they are used by all the students who participate in them. The second category comprises three activities (doing homework, shopping and travel) in which ICTs are used by the majority of students. For the activities in the third category the proportion of students who use ICTs is similar to the proportion who do not (difference of less than 3%). Finally, the fourth category corresponds to activities in which only a small number of students use ICTs.

1. The use of ICTs is essential	1. Listening to music 2. Taking photos 3. Playing videogames 4. Watching TV 5. Using social media platforms
2. Proportion of students who use ICTs is higher than proportion who do not	6. Doing homework 7. Shopping 8. Travel
3. Similar proportions of students using and not using ICTs	9. Singing, playing a musical instrument or dancing 10. Learning a language 11. Visiting museums, exhibitions or the zoo 12. Playing alone or with friends
4. Proportion of students who use ICTs is lower than proportion who do not	13. Cooking 14. Collecting things 15. Looking after pets 16. Looking after plants 17. Studying music 18. Physical exercise 19. Sport 20. Exploring nature 21. Playing board games 22. Reading 23. Painting, drawing or handicrafts

Table 1. Activities organized according to whether they involve the use of ICTs

The second set of results derive from the analysis of whether the use of ICTs in these activities differs significantly (based on the chi-square test, $p < .05$) according to the socioeconomic status, area of residence, gender or age of the students surveyed. For this analysis we considered only the 18 activities in which the use of ICTs was not essential. It can be seen in Table 2 that there are only three activities in which the use of ICTs differed significantly according to family socioeconomic status, and in each case it was students of lower socioeconomic background who reported making greater use of ICTs. With regard to area of residence (urban vs. rural), significant differences were observed in relation to four activities, although the direction of the association varied: in two of these activities (physical exercise and visiting museums, exhibitions or the zoo) the proportion of students who used ICTs was higher in rural areas, whereas for the other two (learning a language and doing homework) the higher proportion corresponded to students from urban areas. As for gender, significant differences were found for three activities: in two of them (shopping and painting, drawing or handicrafts) girls were more likely than boys to make use of ICTs, whereas for the other (playing alone or with friends) the higher proportion corresponded to boys.

Activity	Socio-economic status	Area of residence	Gender	Age
Collecting things	.027	-	-	-
Cooking	-	-	-	.001
Doing homework	.027	.000	-	.001
Exploring nature	-	-	-	.001
Learning a language	-	.014	-	.001
Looking after pets	-	-	-	-
Looking after plants	-	-	-	.021
Painting, drawing or handicrafts	-	-	.011	.001
Physical exercise	-	.042	-	.001
Playing alone or with friends	-	-	.019	.001
Playing board games	-	-	-	-
Reading	-	-	-	.014
Shopping	-	-	.010	.001
Singing, playing a musical instrument or dancing	.024	-	-	.012
Sport	-	-	-	.023
Studying music	-	-	-	-
Travel	-	-	-	.001
Visiting museums, exhibitions or the zoo	-	.026	-	.001

Table 2. Significant differences in the use of ICTs according to family socioeconomic status, area of residence, gender and age.

In summary, only a small number of activities were associated with significant differences in the use of ICTs according to socioeconomic status, area of residence or gender, and no clear pattern emerged. By contrast, significant differences according to age were much more apparent (see Table 2) and were observed for 14 of the activities considered. Furthermore, a number of age-related trends can be observed in the percentages of students who take part in ICT-mediated activities (see Table 3). For two activities, namely looking after plants and painting, drawing and handicrafts, close to half of the students aged 10 (42.0%) reported using ICTs, a higher proportion than for the other age levels. Similarly, for the activities exploring nature and playing alone or with friends, ICTs were most likely to be used by 13-year-old students (41.3% and 40.1%, respectively). By contrast, the use of ICTs was more common among 16-year-old students for a much wider range of activities. Specifically, 40% or more of students aged 16 used ICTs in the following activities: singing, playing a musical instrument or dancing; cooking; learning a language; physical exercise; doing homework; sport; shopping; and travel.

In terms of age-related trends, the results indicate that the use of ICTs clearly increases with age for participation in seven activities (cooking, learning a language, physical exercise, doing homework, sport, shopping and travel), and also to a lesser extent for the activity of visiting museums, exhibitions or the zoo. The opposite trend, that is, a decreasing use of ICTs with age, is only observed for two activities (looking after plants and painting, drawing and handicrafts). For the remaining four activities (singing, playing a musical instrument or

dancing; exploring nature; playing alone or with friends; and reading) there is no clear trend in the association between age and the use of ICTs.

	Age			Sig.
	10	13	16	dif.
Collecting things	68.8	21.9	9.4	
Cooking	18.8	37.1	44.1	*
Doing homework	15.9	37.5	46.6	*
Exploring nature	32.9	41.3	25.8	*
Learning a language	21.4	33.5	45.1	*
Looking after pets	31.8	32.7	35.5	
Looking after plants	41.5	29.3	29.3	*
Painting, drawing or handicrafts	42.4	28.5	29.1	*
Physical exercise	15.3	34.3	50.3	*
Playing alone or with friends	31.3	40.1	28.6	*
Playing board games	64.1	17.2	18.8	
Reading	35.2	27.4	37.4	*
Shopping	17.9	35.7	46.4	*
Singing, playing a musical instrument or dancing	31.5	28.9	39.7	*
Sport	23.3	33.9	42.9	*
Studying music	43.9	18.4	37.8	
Travel	23.9	35.6	40.5	*
Visiting museums, exhibitions or the zoo	30.8	33.8	35.4	*

* $p < .05$

Table 3. Percentage of students participating in ICT-mediated activities by age. The darker the shading the higher the percentage of students using ICTs in the corresponding activities.

Overall, the results regarding the first of our study objectives indicate that ICTs are not widely used across all the everyday activities in which our sample of students participate, and they tend to be linked to specific activities. We also observed a clear trend towards the use of ICTs in a wider range of activities as age increased. Factors such as family socioeconomic status, living in an urban or rural area and gender do not appear to have a significant impact on the extent to which these students use ICTs in the activities considered.

b. Subjective learning experiences reported by children and adolescents for ICT-mediated activities outside school

We will now present the results from the analysis of students' responses to the three questions (in the questionnaire) that asked about their perceived learning through ICT-mediated activities, the importance they ascribed to this learning and how they related it to what they learned at school. By definition, this analysis only considers the responses of students who reported using ICTs in at least some of the activities proposed. After summarizing the results we will then add further detail by referring to material gathered in some of the individual interviews conducted in stage 3 of the project.

Overall, 10-year-old students perceived a high degree of learning when participating in ICT-mediated activities outside school; for almost all the activities considered the majority of these younger students reported learning. The opposite trend was observed, however, among students aged 13 and 16, since the majority in these age groups perceived no learning through ICT-mediated activities. A detailed analysis of students' responses regarding each of the activities showed that for eight of them there were no significant age-related differences in the perceived learning associated with them. These activities were: cooking; learning a language; studying music; visiting museums, exhibitions or the zoo; playing videogames; playing board games; reading; and collecting things. By contrast, significant age-related differences were observed for 14 activities[1].

It can be seen in Figure 1 that for all 14 activities it was 10-year-old students who were most likely to report learning. The proportions of 13- and 16-year-old students who perceived learning through ICT-mediated activities were not only lower but similar to one another. Furthermore, the difference between the 10-year-old students and their older peers was, in most cases, considerable. More specifically, over 40% of 10-year-old students reported learning for all 14 activities, whereas among those aged 13 this 40% threshold was only exceeded for eight activities: singing, playing a musical instrument or dancing; looking after animals; listening to music; doing homework; sport; exploring nature; painting, drawing and handicrafts; and travel. Over 40% of 16-year-old students reported learning for these same eight activities, plus a further one: watching television.

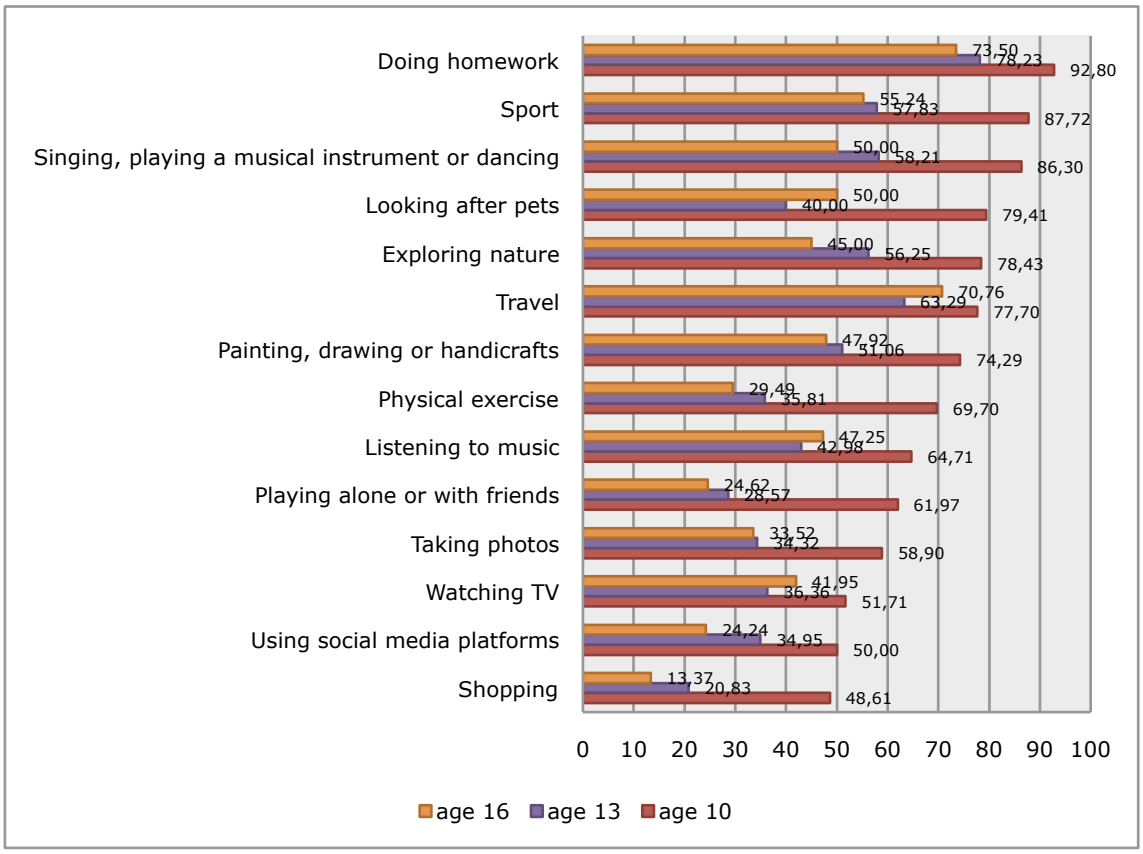

Figure 1. Percentage of students who perceived learning through the 14 ICT-mediated activities for which significant age-related differences were observed

[1] The sample of students for the activity 'looking after plants' is too small to calculate statistical significance using the chi-square test.

Regarding the importance that students ascribed to the learning achieved through ICT-mediated activities (the second question), the responses were similar across the three age groups. In general, over 70% of students thought that for all the activities in which they participated what they learned was important. The exception concerned the activity 'playing board games' and the 13-year-old students, among whom only 50% thought that what they learned through this activity was important.

The third question explored the type of knowledge that students considered they acquired through ICT-mediated activities, and offered them three response options: what they learned was related to their school-based learning, what they learned was not related to what they learned at school, or both. The majority of students across all age groups considered that what they learned through most of the ICT-mediated activities comprised aspects that both reflected and differed from what they learned at school. Between 40% and 48% of responses corresponded to this category.

Regarding the activities which students related exclusively with the kind of knowledge and learning they achieved at school, doing homework was listed by all three age groups. The results also showed that the activities which students of all ages saw as teaching them things they also learned at school were mostly those that took place in structured contexts (e.g. sports clubs, music or language schools, or museums). There was also a clear trend with increasing age for students to regard fewer activities as offering them the kind of learning they achieved at school.

The opposite trend was observed when analysing the ICT-mediated activities in which students believed they learned different things to what they were taught at school. Specifically, over 25% of students aged 10, 13 and 16 identified, respectively, six, ten and fourteen activities in which they felt they learned things that were unrelated to school-based learning. Almost all the activities of this kind that were indicated by 10-year-old students and the majority of those referred to by their 13-year-old peers were activities that usually took place in relatively unstructured contexts such as the family or with friends. By contrast, the 16-year-old students also indicated activities that generally took place in structured contexts, for example, sport, studying music, or visiting museums or exhibitions.

Finally, there were some students, especially in the 13-year-old age group, who seemed unsure about the kind of learning they achieved through ICT-mediated activities: these students did not relate what they learned to the knowledge they acquired at school, but neither did they relate it to other kinds of learning.

Broadly speaking, the analysis of responses to the three questions indicates that the youngest students perceived a much greater degree of learning through ICT-mediated activities outside school, as compared with their older peers. However, we found no age-related differences in the importance that students ascribed to what they learned through participation in these activities, since all students saw what they learned as being of value. By contrast, there were age-related differences regarding the kind of knowledge that students believed they acquired through these activities: the youngest students tended to relate what they learned to their school-based learning, whereas the trend with increasing age was for students to regard an increasing number of activities as providing learning that was different to what was learned at school.

The content analysis of individual interviews, which focused on students' subjective learning experiences when participating in ICT-mediated activities outside school, offers some pointers for interpreting these results and for evaluating their scope and meaning. A first issue to highlight, closely linked to the high percentage of students who perceived no learning through ICT-mediated activities, is that in the interviews they rarely referred spontaneously to learning experiences linked to these kinds of activities. When they were mentioned it was in response to a direct question by the interviewer about their use of ICTs and what they learned in the process.

With respect to the quantitative data indicating low levels of perceived learning among 13- and 16-year-old students, the interviews revealed a considerable degree of scepticism about the possibility of learning through the use of digital devices:

> *Student, age 13: Yeah, I use my smartphone, but I don't like to do it a lot because it's slow, and also you get really distracted. And this idea of using computers at school, I don't think it's a good idea, because lots of my classmates, they install games instead of studying or whatever.*

Some responses, such as the following, reflected a prevalent social narrative about learning and ICTs, one that was especially common among the youngest students:

> *Student, age 10: It depends. Sometimes you get really hooked on the computer and I think, and my Dad says it too, he likes it, that paper is better (…) it's better to read on paper because it's more fun.*

They were also doubtful about or even dismissive of the possibility of learning through the use of social networking platforms (*Facebook*, *Instagram*, *Snapchat*, *YouTube* or *Twitter*):

> *Student, age 16: If you can learn things? … Very little, I think, almost nothing, because, I don't know, use it for what…? To look at other people's photos…? Sometimes I guess, sometimes opinions get shared, but they're opinions of other people who… I don't know, I don't think it's much use.*
>
> *Interviewer: (…) for example, do you think you learn things with Twitter?*
> *Student, age 16: Yeah, how to spread gossip.*
> *Interviewer: To spread gossip?*
> *Student, age 16: (laughing) That's all.*

For the youngest students, whether or not they perceived learning through ICTs depended on whether they saw what they were doing as related to school work:

> *Interviewer: Do you learn things through these games?*
> *Student, age 10: No.*
> *Interviewer: No?*
> *Student, age 10: I think it's about having fun, because we don't have to be learning all the time, sometimes you can just relax.*
>
> *Interviewer: Do you learn things by using the computer or tablet or smartphone?*
> *Student, age 10: Hmm, sort of.*

Interviewer: Sort of? What do you mean, sort of?
Student, age 10: Well, I do learn things, but at the same time I don't. It's like (...) I don't learn things because I'm having fun and I can't stop having fun to learn things. But if the games are about the human body or fractions or maths... well then I do learn things, but when I'm playing it's just about having fun...

The close link that students make between learning and what they do at school is also reflected in frequent references to the use of ICTs for doing homework:

Student, age 10: Well, to do my homework, English for example, I need to know things, the translations, so I use Google Translate for what I need. And sometimes at school we have to find out about the life of a painter, or search for information about something, and so I need it then, like this year, when we studied the painter Dalí...

Student, age 10: Yeah, Google to (...) yesterday, for example, I used it for (...) for my homework. Because I didn't know and neither did my Mum, so we looked it up on Google.

Even when associated with activities other than homework, the reported learning is mostly linked to academic content:

Student, age 13: Hmm, yeah… I use my smartphone to watch videos, and sometimes I watch 'El Hormiguero' ('The Anthill'; a comedy/science/talk show on Spanish TV), where you can learn new things about science and technology. And lately I've learnt more.
Interviewer: About the experiments that those puppet ants do?
Student, age 13: Yeah.
Interviewer: (laughing) Ah. And you like that?
Student, age 13: Yeah, it's interesting because they explain things, how… why things happen, what are the factors…
Interviewer: OK. And do you think you've learnt anything new through social media lately? Through using social networking sites?
Student, age 13: No, although if a friend shares something that has happened, something important that's happened in America or some other faraway country, well then you can learn … (…) more things.
Interviewer: You can learn…
Student, age 13: (interrupting) Yeah.
Interviewer: ...about what's happening in the world.
Student, age 13: Yeah.

One of the aspects which the students most frequently referred to in the interviews was that ICTs were an essential tool for learning a language, as they allowed you to watch videos or listen to music in the original language:

Student, age 16: Especially if, well, if it's music then I learn English, and since most of the music I listen to is in English….
Interviewer: And does it help you afterwards, for example, with your English studies here... [at school]
Student, age 16: Of course. Sometimes I'll be in class and the teacher will use a new

word, and I'll think, hey, that word was in that song, and I learnt it through that song.

References to knowledge that was not directly related to school-based learning were almost exclusively restricted to 16-year-old students:

Interviewer: And do you learn things when you listen to music or watch a TV series?
Student, age 16: Hmm, well, from a series you can learn about the values of friendship or… of course, it depends on the series, but yes, the values of friendship, I guess.

A final set of references to learning concern the proper knowledge and use of ICTs. In this case, many of the interviewees, and especially the older students, said they have learned to use digital technologies autonomously or through friends:

Interviewer: OK. And who showed you how to use digital technologies, you know, smartphones, computers …?
Student, age 13: Hmm, mostly my friends… friends through the internet, because normally the ones I mix with don't know much because they're not interested. So most of what I know I taught myself, not just through friends but through websites or things like that that teach you how to program, and then little by little… you learn on your own.

Once again, some of the responses reflected a prevalent narrative in students' everyday lives:

Interviewer: How did you learn to use a smartphone, a computer…?
Student, age 13: On my own.
Interviewer: Nobody taught you, or at school… they haven't taught you how to use…?
Student, age 13: I remember when I was small that we had ICT classes, but they didn't teach us, well, all they did was teach us to write, to use the keyboard, when you're seven or eight they teach you how to use letters.

Interviewer: And who taught you to use these technologies?
Student, age 16: I think we're a generation who are growing up… we've grown up with computers… and maybe, well, I've got an older brother… maybe he's influenced me. He's helped me sometimes, but you know, I think it's been such a part of our lives that it comes naturally.
Interviewer: So in other words, you use it without anybody having…
Student, age 16: Yeah, without anybody here or wherever having told us…

Schools are only mentioned as a source of knowledge about ICTs when referring to specific learning experiences such as how to use certain software:

Student, age 16: Well, tools like Word or Excel, things for your computer... I went to some classes when I was younger, not here, it was after school… so I could learn how to use PowerPoint, in case I had to do it at school. But most things, like your

smartphone, well, you just get it, you just know, you play around with your phone and you discover what you can do with it...
Interviewer: So you see it as something intuitive?
Student, age 16: Absolutely.

In general, these interview fragments highlight how students' reported learning experiences involve a relatively simple use of ICTs that does not require higher-level cognitive skills and which often implies a passive relationship to information. They download content, watch series, programmes or documentaries, listen to music, consult online tutorials, use social networking platforms, play videogames and search for information, but they rarely refer to using ICTs to organize, rework or publish information, or even for discussing or sharing information with others. The analysis of interviews also shows that ICTs are more likely to be used for the purposes of entertainment and communication than for learning. In addition, learning is seen as something closely linked to the school curriculum, and students do not, it seems, regard the acquisition of other kinds of knowledge and skills as learning experiences.

IV. Discussion and conclusions

Regarding the first study objective, the results indicate that the students in our sample use ICTs in a small number of activities outside school. Aside from activities such as social media in which the use of digital technologies is essential, there were only three activities — doing homework, shopping and travel — where the proportion of students who reported using ICTs was higher than the proportion who did not. By contrast, there were 11 activities which for the majority of students surveyed were not associated with the use of ICTs. The picture that emerges from these results challenges the premise of metaphors such as 'digital natives', 'net generation' or 'new millennium learners', and it supports a point made by several authors (Bennett & Maton, 2010; Bullen et al., 2008; Selwyn, 2006), namely that young people today are less immersed in the digital world than has been claimed.

The variables socioeconomic status, urban versus rural area of residence and gender were associated with only a few significant differences in the use of ICTs in the activities considered by our questionnaire, and there was no clear pattern or trend in the differences detected. These results are consistent with the findings of Hinostroza et al. (2015), who concluded that place of residence and socioeconomic level were not the main determining factors in young people's use of ICTs, and also with the studies by Livingston et al. (2011), Selwyn, Potter and Cranmer (2009) and Spires et al. (2008), showing that neither is gender a key factor in this respect. By contrast, age did give rise to a number of significant differences in the use of ICTs among our sample of students, specifically in 14 of the 23 activities considered. The number of activities in which ICTs were used tended to increase with age, and only for two activities (looking after plants and painting, drawing and handicrafts) did we observe the opposite trend, that is, a decrease in the use of ICTs with age.

With respect to the second study objective, namely the analysis of students' subjective learning experiences in ICT-mediated activities, the results showed that more than half the 10-year-old students reported learning for 20 of the 23 activities considered. With increasing age, however, the extent of perceived learning decreased considerably. Thus, there were only 13 activities in which more than half of the 13-year-old students reported learning,

falling to 9 activities by age 16. This relationship between age and perceived learning is contrary to that reported by Selwyn, Potter and Cranmer (2009), who found that older students perceived greater learning than their younger peers. This discrepancy may well be due to differences in the questionnaires used. The one employed by these authors asked students specifically about their learning in terms of discovering new things, preparing for exams or understanding ideas that previously they had not understood, whereas the first question in our questionnaire (from which the abovementioned result is derived) was very general and simply asked them whether (yes or no) they had learned things through these activities.

Regarding the relationship that students perceived between their school-based learning and what they had learned through ICT-mediated activities outside school, we again found important age-related differences. The youngest students tended to see a much closer link between the two learning contexts, whereas with increasing age, students also reported learning experiences that went beyond what they learned at school. Nevertheless, and as the interview fragments illustrate, students' of all ages continue to have a strongly academic notion of learning.

In general, the analysis of individual interviews sheds further light on students' use of ICTs outside school. Notably, the learning experiences they report do not generally involve creative or constructive processes, since ICTs tend to be used primarily for accessing information and very rarely for organizing or analysing it, for linking content or for summarizing and sharing information. Furthermore, these uses suggest a passive consumption of information, and only occasionally do the students interviewed use ICTs to create, publish or share digital content. These results are in line with those obtained by Luckin et al. (2009), Selwyn, Potter and Cranmer (2009), Spires et al. (2008) and Wang et al. (2014), who found that the majority of students used ICTs outside the school context for gaming, communicating with one another, listening to music or watching videos, the conclusion being that young people do not make a particularly sophisticated use of digital technologies outside school. Our results support another point made by these authors, namely that the main motivation for using ICTs outside school, when they are not being used for a specific school-related task, is entertainment and communication, rather than learning.

Finally, the analysis of interviews also drew attention to some of the prevalent narratives in the social and cultural contexts in which students conduct their learning. Thus, for example, reference was made to how ICTs can interfere with learning ("you get distracted with these technologies", "it's better to have it on paper…", "social media is just for sharing gossip..."), and also to ideas consistent with the metaphor of 'digital natives' ("I think it's been such a part of our lives that it comes naturally", "most of what I know I taught myself", "you just get it, you just know"). This highlights the importance of studying more closely the ways in which young people take on board the predominant social discourses (which are mainly those of their parents and teachers) regarding the role and uses of ICTs in relation to learning and how they then incorporate them into their own narratives about their learning experiences.

The scenario commonly associated with the new ecology of learning, with the emergence of new contexts of activity that offer opportunities and resources to learn, largely as a consequence of ICT, is in stark contrast to the results of this study. This is particularly apparent in the limited use that the young people we surveyed made of these technologies,

as well as in the low or inconsistent levels of perceived learning that they associated with the activities in which ICTs were used. These results, in line with those of other authors (Bennett & Maton, 2010; Selwyn, Potter & Cranmer, 2009; Wang et al. 2014, among others), cast doubt on the extent to which many children and adolescents are taking advantage of the learning opportunities and resources that are offered by these new activity contexts. Indeed, given their limited use of ICTs, and the fact that this usage is geared more towards entertainment than learning and involves relatively low cognitive demands, there is a high risk that many young people will fail to acquire the skills and competences required to take full advantage of these new opportunities and resources.

This risk highlights the need to question the belief, widespread among the general public and shared by some educationalists, that children and adolescents acquire these competences spontaneously, without the need for instruction. Contrary to this belief, the development and acquisition of the skills needed to benefit fully from the enormous potential of ICTs as resources and to engage in lifelong and life-wide learning is something that requires specific and precise educational input. In our view, educational institutions are the activity context that is best suited to providing this input without exclusion or discrimination of any kind (author). Schools and similar institutions not only provide opportunities and resources for learning but are also best placed to ensure that the focus is firmly on young people's learning experiences, both in and outside school.

Focusing education on students' learning experiences implies designing and developing school-based activities that allow students to incorporate their learning experiences from other contexts, both real-world and virtual, encouraging them to make links between these experiences and their in-school learning, and to reflect on the learning opportunities that are available to them, to what extent they are taking advantage of these opportunities and how they might be extended. There is a need, therefore, to help students use ICTs (1) to build knowledge, (2) to identify virtual activity contexts (virtual communities of interest, practice and learning, social networks, online forums, etc.) that can offer them learning experiences which reflect their interests and personal preferences, and (3) to use mobile and wireless devices (smartphones, tablets and laptops) to connect their learning experiences from different activity contexts and across different points in time. In short, they need to be taught how to construct their own learning environments using the analogue and digital tools and resources that are available to them, and to create a network of people and relationships that can assist them with their learning.

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