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USES AND ATTITUDES OF YOUNG PEOPLE TOWARD  
TECHNOLOGY AND MOBILE TELEPHONY

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## **USES AND ATTITUDES OF YOUNG PEOPLE TOWARD TECHNOLOGY AND MOBILE TELEPHONY**

### **Abstract**

This paper aims at showing how young people are developing new and innovative ways of interacting using technology. Previous literature shows that technology adoption depends not only on the technology per se, but also on situational and contextual issues. Mobile telephony has been claimed to change young people's lifestyles, although only scarce empirical evidence exists. We have conducted an empirical study in which we first analyze the existence of differences in technology adoption, acquisition, and usage of technology and mobile telephony between young people in general and those that are online. We find that there are some significant differences in certain dimensions. Next, we carried out the same analysis differentiating between young people that assess themselves as technology-savvy and those that consider themselves inexpert in technology matters. We find that patterns of mobile phone usage in these two groups vary significantly along all analyzed dimensions

**Keywords:** mobile telephony, Internet, technology adoption, uses and attitudes

# USES AND ATTITUDES OF YOUNG PEOPLE TOWARD TECHNOLOGY AND MOBILE TELEPHONY\*

## 1. Introduction

New information and communication technologies are having a profound impact on business and society. Regardless of one's ideological position with respect to technology, it is changing the ways in which we coordinate everyday life, the ways in which young people interact, the ways in which business is done, and the ways in which we make and maintain contact with others.

In addition, it has been widely claimed (Tapscott, 1998; Chu, 1997) that new technologies are particularly impacting the younger generations, fundamentally changing their lifestyle. Both the Internet and mobile telephony offer them new ways of expressing themselves; existing relationships in onground reality can be created anew in online reality, as described by Chu (1997) in her exploration of youth zines. This, in turn, influences onground activities and interactions. Thus, Tapscott (1998) claims that the Net generation or "N-Gen" which is growing up in a digital environment is developing new ways of learning, a new language and new values. As he points out,

"rather than losing social skills, N-Geners are actually developing these skills at an earlier age than their parents' generation. It's not just a new toy in the home to share with friends and siblings, but the N-Generation children have a new medium to reach out beyond the immediate world, to experience and to engage in play, learning, and overall social intercourse. Digital kids are learning precisely the social skills which will be required for effective interaction in the digital economy. They are learning about peer relationships, about teamwork, about being critical, about how to have fun online, about friendships across geographies, about standing up for what they think, and about how to effectively communicate their ideas." (p.107)

As an example, SMS has grown steadily in Europe since its introduction in the mid-1990s, when young people discovered that they could send messages to each other anytime and anywhere. When the service was originally made available, most of the operators were unsure of who would use it, how to market it, and how to charge for it. Young people started exploding the service before the operators could respond, and so the operators were left with a self-educated market forcing them to respond.

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Young people tend to be early adopters of technology, not only in Europe but also in the US and Japan (InphoMatch, 2001). Increasing our understanding of youth behavior and attitudes toward technology is therefore not only important from a societal point of view, but identifying the needs of the younger generation will also be critical to understand new uses of technology in society, which in turn will allow new business opportunities to emerge.

On the other hand, technology has often been conceived of as a deterministic force that shapes individuals' and organizations' lives, allowing them to do things better and faster, and to do new things that no one had ever thought of before. Nevertheless, as recent research has shown, this technological determinism does not take into account the intertwinedness of technology and its context, as well as its subsequent evolution over time. In this sense, technology has been conceived from a structuration theory point of view, showing how it may help in structuring processes (Barley, 1986) or computer-supported collaborative work (DeSanctis and Poole, 1994). As Orlikowski (1992) coins it, there is a "duality of technology", in which human action and the social context in which these actions take place shape technology, while at the same time technology influences human actions and social structures. Still, and even more, technology itself can be perceived in different ways (Orlikowski, 1996; MacKenzie and Wajcman, 1999), and there is a fundamental difference between technology per se and the practical use of technology (1).

This paper aims at showing how young people are developing new and innovative ways of interacting using technology. We will also study how young people's technological background and exposure to technology and the ways in which they acquire new knowledge about technologies influences the ways in which they use technology for day-to-day communication. In particular, we analyze how exposure to the Internet influences not only their overall technological knowledge, but also the ways in which they use one particular technology: mobile telephony.

## Literature review

The popular press is full of information about the adoption of mobile telephony, as well as anecdotal commentary about the impact of mobile telephony on people's lifestyle. Mobile communications are exploding all over the globe, as some of the news collected by Mibileyouth.org show. In September 2002, more than 1 billion SMS messages were sent in the US. On New Year's Eve, Italy sent 150 million and the UK over 100 million text greetings. In Austria 91% of 15-24 year olds owned a mobile phone at the end of 2002. On January 16, 2003 Lufthansa started trials of its new FlyNet program of wireless Internet access in transoceanic flights, an industry first.

The mobile phone is increasingly perceived as a multi-purpose device (Hulme and Peters, 2001) which has a series of social connotations that are reshaping our ways of interacting (Brown, Green and Harper, 2001). Aside from being a communication tool through voice telephony and SMS text messaging, it is also an entertainment device through games, a locational device, an information tool, an alarm clock, and an agenda and address book. In this way, the mobile phone covers different customer needs and motivations (Lin, 1996). Some of these are new and were not traditionally expected from fixed telephony. As

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(1) This difference has also been labeled as technology-as-artifact and technology-in-practice (Orlikowski, 2000).

Leung and Wei (2000) found, mobile telephony not only provides the obvious enhancement of mobility, but also six additional gratifications: fashion/status, affection/sociability, relaxation, immediate access, instrumentality, and reassurance. Still, the degree to which these objectives are accomplished varies depending on the *culture of interaction* (Sacher and Margolis, 2000), which is shaped by the concepts and protocols that exist in a given culture or subculture

Still, few empirical research studies have been conducted about the social adoption of mobile services (three exceptions are the studies by Hinds and Kiesler, 1995; Manning, 1996; and Green, Harper, Murtagh and Cooper, 2001), and very scarce evidence exists about the particularities of mobile telephony adoption by young people. Taylor and Harper (2002) show how mobile telephony mediates and gives new forms and meanings to a very ancient social practice, gift-giving, among teenage mobile phone users. Using ethnographic techniques, they show that mobile phones provide teenagers with a means of exchanging tangible objects, in the form of SMS messages, that embody shared meanings, thus providing them with new ways of sustaining their relationships.

On the other hand, both businesses and the popular press have devoted great attention to the adoption of mobile phones and SMS messaging by young people. Thus, Siemens conducted a Mobile Lifestyle Survey in the Asia region in 2001 which reported similar findings, showing new patterns of behavior among Filipino youth. Young Filipinos were found to use their phones not only to keep in touch via voice or SMS messaging, but also to exchange jokes (89%) or to cheat during exams (17%). Still, cultural and technological differences matter. For example, in a qualitative study carried out by Mobilethink (2001) significant differences in mobile phone usage, and especially text messaging, were found between teens (age 13-15) and young adults (age 18-22). While teens seemed to be more lifestyle-driven and were more cost-conscious, just looking for simple phones that were easy to use and offered cheap calls and SMS, young adults were looking for more efficiency-driven applications. Ananova (2001) put emphasis on the perceived importance of mobile phones for young people, showing that in the UK more than 82% of 14-16 year-olds owned a mobile phone, conceiving it as a fashion statement, therefore changing the cover of handsets and ring-tones.

Nevertheless, most of these affirmations are of a speculative nature, based on sporadic observations. Other studies have adopted an exploratory, mostly ethnographic approach, which has improved our understanding of this emergent phenomenon. Still, little quantitative empirical evidence exists about how technology adoption and literacy influences the use of mobile telephony among young people. In view of the current state of research, we aim at validating some of these insights.

### **3. Research design and methodology**

We wanted to investigate whether technological knowledge has any bearing on the way youngsters use mobile telephony in all its dimensions: voice, SMS, games, etc. A two-step approach was adopted for the empirical study. As we wanted to find out if the adoption and uses of mobile telephony varied according to the previous degree of technology expertise, we decided to differentiate among young people that are intensive users of the Internet, and those that are not. We assumed that Internet users had a higher level of technological expertise than people chosen randomly on the street.

We conducted 156 structured closed interviews with young people aged between 14 and 22. We chose this age span to be able to analyze both the so-called “teens” (14-18) and the “young adults” (19-22). Interviewees were purposefully chosen among the overall population of young people in Catalonia, Spain, in representative schools and shopping malls. Interviews were conducted in August and September of 2002. In each interview we asked questions about technology and mobile telephony, including the following dimensions:

Technology:

- Self-assessed level of technology knowledge
- Ways in which this knowledge had been acquired
- How do they keep informed about technology news

Mobile telephony:

- Ownership of a mobile phone
- Main uses of the mobile phone
- Who influenced the decision to adopt the technology
- What services are used and their relative importance, both voice and non-voice

Afterward, an online survey with identical questions was conducted between October 15 and the end of November 30, 2002. Banners and the corresponding links were published in the most popular sites for the targeted audience in Spain (Portalmix, Lycos). By responding to the survey, participants entered a raffle to win a top-of-the-line multimedia G2.5 mobile phone. As a result, 1274 valid responses were collected, which, when estimating proportions, resulted in a 2.7% error margin at a 95% level of confidence.

Questions referring to the relative use of different services and their importance were asked in textual form, such as from “Very High” to “Very Low”, rather than using a 1-5 Likert scale. We did not want to make the assumption that a reply of “Very High” (a 5) was 5 times more valuable than a “Very Low” (a 1) and 1.7 times better than an “Average” (a 3) reply. This decision forced us to compare the results of the different cohorts using contingency tables and Chi-square test of independence.

The research was designed establishing six hypotheses:

- H1: The level of (self-assessed) technological knowledge is different in the Internet respondents than in the off-line interviewees.
- H2a: The primary source of technological knowledge is different in the two groups.
- H2b: The primary source of technology news is different in the two groups.
- H3: Mobile phone ownership is different in the Internet cohort than in the off-line respondent set
- H4: The prescriptors of the purchase are different in the two groups
- H5a: The pattern of use of voice communication is different in the two groups
- H5b: The pattern of use of SMS is different in the two groups
- H5c: The pattern of use of games is different in the two groups
- H5d: The pattern of use of news by SMS is different in the two groups
- H5e: The pattern of use of calendar features is different in the two groups
- H5f: The pattern of use of Internet access is different in the two groups
- H6: The relative attractiveness of the different mobile services is different in the two groups

The results of the interviews and online survey were first analyzed separately. Next, we started a comparison to assess the eventual existence of differences among offline interviews and the online surveys. As Spain is a country with very limited Internet readiness of the population, we considered that we could use Internet usage as a proxy for early technology adopters. Finally, we analyzed the data comparing young people who consider themselves technology savvy and those who consider themselves less knowledgeable, looking for significant differences in the adoption and use of mobile telephony.

#### 4. Results (2)

##### *Comparison of results between off-line and on-line survey*

Both the off-line interviews and online surveys show that young people in both samples consider themselves technologically savvy rather than ignorant. Comparison of the two samples shows that our first hypothesis of significant differences in self-assessed knowledge can be accepted at a 95% confidence level (Table 1).

**Table 1. Self-assessed level of technology knowledge**

	On-line survey	Off-line interviews
Very low	1%	2%
Low	7%	8%
Medium	54%	48%
High	31%	28%
Very high	7%	14%

**Chi-square**                    **11.16**  
**p**                                    **0.025\***

Our second hypothesis was the existence of differences in the way people acquire technological knowledge and in which they know about new technologies. The chi-square test shows that the differences are not significant and both hypothesis 2a and hypothesis 2b have to be rejected (see Table 2).

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(2) In all statistical tests, we have marked (\*) when significance is at the 95% level, (\*\*) at 99%, and (+) when differences are not statistically significant.

**Table 2. Primary sources of technology acquisition and technology news**

Acquisition of new technology knowledge

	On-line survey	Off-line interviews
Self-learning	51%	52%
Structured courses / school	21%	28%
Friend	6%	7%
Browsing the Internet	15%	9%
Books or specialized magazines	3%	2%
Other	4%	3%
<b>Chi-square</b>	<b>8.21</b>	
<b>p</b>	<b>0.116 (non significant)</b>	

How do you find out about new technologies?

	On-line survey	Off-line interview
Banners	1%	4%
Advertising emails	5%	7%
Browsing the Web	81%	55%
Pop ups	5%	15%
Specialized press	2%	1%
Others	7%	18%
<b>Chi-square</b>	<b>66.33</b>	
<b>p</b>	<b>5.95E-13**</b>	

Regarding mobile phone ownership, almost the same proportion of young people had cell-phones, at 89% and 88%, respectively, for online and offline respondents. No differences could be found regarding the prescriptors either (Table 3).

**Table 3. Mobile phone purchase prescriptors**

	On-line survey	Off-line interviews
Friends	38%	29%
Nobody prescribes	29%	35%
Parents	18%	16%
Advertising	3%	0%
Company	1%	7%
Teachers / Professors	1%	1%
Others	7%	8%
No response	4%	3%
<b>Chi-square</b>	<b>29.92</b>	
<b>p</b>	<b>9.816E-05**</b>	

Finally, regarding the use and attractiveness of mobile phones, some differences can be reported. Different uses have been found for voice, SMS, calendar, and mobile Internet. No statistically relevant differences were found for games and news. The results of the test are shown in Appendix 1.

***Comparison of results between high and low technology expertise levels in the on-line cohort***

In a second analysis we set up contingency tables between technology-savvy and non-technology literates, and compared them using chi-square tests. To do this, we grouped together, on the one hand, respondents that considered themselves as having “very high” or “high” technological knowledge and, on the other, those that considered themselves as having “very poor” or “poor” technological knowledge. We thus ended up with three categories. In the tables below, we label these categories “High”, “Average” and “Low.” The statistical analysis showed that we got statistically relevant differences in almost all categories.

Regarding the acquisition of new knowledge and the sources of information about new technologies (see Table 4), we see that self-instruction is significantly higher for the technology-savvy group than for the other two, which are much more likely to learn from friends. The Web is the primary source of technology news for all three groups, but with higher weight the more knowledgeable the respondents consider themselves.

**Table 4. Acquisition of new knowledge and technology information**

Acquisition of new technology knowledge

	High	Average	Low
Self-learning	55%	48%	48%
Structured courses / school	24%	20%	11%
Friend	3%	7%	14%
Browsing the Internet	11%	18%	20%
Other	3%	4%	6%
Books or specialized magazines	4%	3%	1%

**Chi-square** 43.937  
**p** 3E-06 \*\*

How do you find out about new technologies?

	High	Average	Low
Banners	1%	1%	2%
Advertising emails	4%	6%	5%
Browsing the Web	81%	82%	68%
Others	4%	5%	14%
Pop ups	2%	2%	4%
Specialized press	9%	5%	7%

**Chi-square** 38.281  
**p** 3E-05 \*\*

Regarding the prescription of mobile technology, the differences are statistically significant at the 95% level (Hypothesis 4 accepted, see Table 5) and basically are due to the high proportion (34%) of knowledgeable respondents that use no advice, compared with 21% of the people with low knowledge. It is also interesting to note the extremely low percentage of youngsters that claim to have been influenced by advertising: 2 to 3%.

**Table 5. Prescriptors for adoption of mobile phones**

Prescriptors

	High	Average	Low
Friends	36%	38%	37%
Employer	2%	1%	0%
Nobody	34%	26%	21%
Don't know / No answer	2%	5%	5%
Others	7%	7%	5%
Professors	1%	1%	2%
Advertising	3%	3%	2%
Parents	15%	18%	29%

**Chi-square**

**23.987**

**p**

**0.046 \***

Regarding the tests of mobile services use, the results are shown in the tables in Appendix 2. In summary, all uses are higher in the high knowledge group, but the statistically significant differences are in SMS, Games, Calendar, and Internet Access. Traditional voice communication and Internet Access are not statistically different.

## 5. Discussion

As the results of our analysis show, both the fact of whether they are heavy Internet users or not and their self-assessed technology savviness affect the ways in which young people use and adopt technology in general, and mobile telephony in particular.

The first part of our results show that young people's self-assessment of their technology knowledge and expertise differs significantly depending on whether they habitually use the Internet or not (H1 accepted). Nevertheless, no significant differences can be reported regarding the ways in which young people acquire new technology knowledge, although the Internet does change the way young people find out about new technologies (H2a rejected, H2b accepted). In this sense, online young people consider themselves more knowledgeable about technologies, and the Internet increases their awareness of new developments in the technology arena, although it does not change the way in which people learn about technologies. Therefore, it seems that the Internet is more an information seeking tool and does not fundamentally affect young people's learning attitudes. Nevertheless, online young people do show a different adoption (H4 accepted), usage (H5a, H5b, H5e, H5f accepted) and value pattern of mobile telephony in a series of dimensions. In this sense, online youngsters use mobile telephony for voice more often, send more SMS messages, and use the calendar function of the handset, although the use of games and news reception is similar for both groups.

Still, the second part of the analysis shows even stronger differences among technology-savvy and technology-inexpert young people, as all hypotheses can be accepted. Thus, while all youngsters rely on self-learning for the acquisition of new technology knowledge, young people with high technology expertise do this more, and they combine it with structured courses, while youngsters with low expertise adopt a more unstructured approach to it, combining it with Internet browsing. Similarly, browsing the Web is the preferred mode of finding out about new technologies, but technology-inexpert youngsters combine this method with that of seeking opinions from others. Regarding the ownership of mobile phones, no significant differences exist, and it can be said that the mobile phone is not considered to be a technological tool, as we could not find any differences in any of our tests. Nevertheless, young people rely on different prescriptors, with the more technology-knowledgeable ones relying either on friends or on themselves, while those with low technology knowledge also rely very frequently on the opinion of their parents. It is noticeable that advertising has only a very small impact (2-3%) on any youngster's mobile phone purchase decisions. Still, usage among different groups differs, and high technology youngsters use their mobile phones more frequently for all activities, and especially for SMS, games and mobile Internet. Thus, while young people with low technology knowledge consider the mobile mainly as a communication tool, technology-savvies also use it for entertainment, information gathering and organizing purposes.

## 6. Conclusions and further research

In this research we have contributed empirical evidence that supports some of the previous theoretical developments and insights from qualitative research. We have shown that young people's adoption of technology does not depend only on their technological knowledge, but also on their overall environment, as young people in Spain adopt mobile phones regardless of their technology expertise. Nevertheless, mobile phone usage varies depending on the technology savviness of each youngster, and only those with high technology knowledge think of their mobile phone as a multi-purpose device, as suggested by Hulmes and Peters (2001). It is reshaping some youngsters' lifestyle and the ways they interact (Leung and Wei, 2000), as well as covering different needs and motivations (Lin, 1996).

Still, more research is needed, and further research will need to analyse the differences between teens and young adults, as well as examining possible gender differences. Also, we will need to relate our findings to the overall Internet behavior of young people.

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## Appendix 1

**Voice usage**

## Voice usage

	Online survey	Off-line interviews
Many times a day	63%	39%
Almost every day	27%	39%
Once a week	5%	9%
Around twice a month	2%	4%
Once a month	1%	2%
Never or almost never	1%	4%
No response	1%	3%

**Chisquare** **36.42**  
**p** **2.2876E-06\*\***

## SMS usage

	Online survey	Off-line interviews
Many times every day	63%	39%
Almost every day	27%	39%
More than two messages per week	5%	9%
More than two messages per week	2%	4%
One message per week	1%	2%
Never or almost never	1%	4%
No response	1%	3%

**Chi-square** **36.42**  
**p** **2.288E-06\*\***

## Games usage

	Online survey	Off-line interviews
Many times a day	15%	15%
Almost every day	17%	15%
Once a week	15%	14%
Around twice a month	10%	7%
Once a month	9%	7%
Never or almost never	30%	34%
No response	4%	9%

**Chi-square** **9.06**  
**p** **0.17 (non-significant)**

## Appendix 1 (continued)

## News via SMS

	Online survey	Off-line interviews
Many times a day	12%	16%
Almost every day	11%	7%
Once a week	8%	10%
Around twice a month	10%	5%
Once a month	8%	9%
Never or almost never	45%	43%
No response	7%	9%

**Chi-square****7.9****p****0.245 (non-significant)**

## Calendar usage

	Online survey	Off-line interviews
Many times a day	42%	23%
Almost every day	21%	22%
Once a week	9%	11%
Around twice a month	4%	4%
Once a month	3%	7%
Never or almost never	16%	23%
No response	5%	10%

**Chi-square****28.07****p****9.1153E-05**

## Use of Mobile Internet

	Online survey	Off-line interviews
Many times a day	7%	7%
Almost every day	7%	2%
Once a week	4%	4%
Around twice a month	5%	5%
Once a month	7%	12%
Never or almost never	57%	51%
No response	13%	19%

**Chi-square****12.2****p****0.058 +**

## Appendix 2

## Voice Calls

	High	Average	Low
Many times a day	34%	26%	25%
Almost every day	32%	33%	24%
Once a week	18%	21%	20%
About twice a month	8%	12%	11%
Once a month	4%	3%	9%
Never or almost never	2%	4%	7%
No response	2%	2%	3%

**Chi-square** 26.663  
**p** 0.0213 +

## Use of SMS

	High	Average	Low
Many times a day	66%	63%	52%
Almost every day	26%	28%	30%
Once a week	4%	5%	5%
About twice a month	2%	1%	2%
Once a month	0%	1%	3%
Never or almost never	0%	1%	5%
No response	2%	1%	3%

**Chi-square** 33.668  
**p** 0.0023 \*\*

## Use of Games

	High	Average	Low
Many times a day	17%	14%	13%
Almost every day	14%	19%	13%
Once a week	18%	13%	14%
About twice a month	11%	10%	3%
Once a month	9%	9%	10%
Never or almost never	28%	29%	40%
No response	3%	5%	7%

**Chi-square** 21.261  
**p** 0.0951 \*\*

## Appendix 2 (continued)

## News by SMS

	High	Average	Low
Many times a day	14%	10%	10%
Almost every day	12%	10%	9%
Once a week	10%	8%	6%
About twice a month	11%	9%	7%
Once a month	9%	7%	6%
Never or almost never	39%	48%	53%
No response	5%	8%	9%

**Chi-square** 19.441  
**p** 0.1488 +

## Calendar

	High	Average	Low
Many times a day	46%	40%	32%
Almost every day	20%	23%	16%
Once a week	9%	9%	10%
About twice a month	5%	4%	2%
Once a month	2%	3%	3%
Never or almost never	14%	15%	26%
No response	3%	6%	9%

**Chi-square** 22.179  
**p** 0.075 \*

## Mobile Internet

	High	Average	Low
Many times a day	8%	7%	5%
Almost every day	6%	8%	2%
Once a week	5%	4%	6%
About twice a month	7%	3%	5%
Once a month	10%	6%	2%
Never or almost never	53%	60%	64%
No response	11%	14%	16%

**Chi-square** 32.874  
**p** 0.003 \*