

# Age influence in gender stereotypes related to Internet use in young people: a case study

Sonia Verdugo-Castro  
GRIAL Research Group,  
Research Institute for Educational  
Sciences, University of Salamanca  
37008, Salamanca, Spain  
soniavercas@usal.es

Alicia García-Holgado  
GRIAL Research Group,  
Research Institute for Educational  
Sciences, University of Salamanca  
37008, Salamanca, Spain  
aliciagh@usal.es

M<sup>a</sup> Cruz Sánchez-Gómez  
GRIAL Research Group,  
Research Institute for Educational  
Sciences, University of Salamanca  
37008, Salamanca, Spain  
mcsago@usal.es

## ABSTRACT

The existence of gender stereotypes in relation to the use of the Internet led to the need to carry out the present study, which approaches young people perception of the use of the Internet and technologies. Based on knowledge of the existence of gender stereotypes in relation to the use of the Internet, the objective of the study is to detect whether the age of young people, with some previous experience on the Internet, marks differences in relation to the use they make of the Internet; in other words, whether the use made of the world network and the existing stereotypes may or may not have some type of dependent relationship with the age of the subjects. The study was applied in a group of the University of Salamanca (Spain) during the academic year 2018/2019, after the previous realization of activities during four months of sensitization, under the European project WYRED (netWorked Youth Research for Empowerment in the Digital). The final sample was composed by 48 subjects. For this purpose, a questionnaire was applied with 40 final items, which collected different activities that can be carried out on the Internet in order to find out what trend of use they presented in relation to the Internet, in comparison to their age. The two groups consisted of 26 people aged 20 or younger, and 22 people aged 20 or older. By means of a descriptive analysis, and the application of normality tests and non-parametric tests, no dependent relationships were detected between the use of the Internet after carrying out the survey and the age group in which the subject belonged. For the future it would be of special interest to be able to repeat the study comparing the opinion and use of young people on the Internet

## KEYWORDS

Gender stereotypes, Internet, gender roles, inclusive digital society

## 1 Introduction

Gender stereotypes are sociologically one of the bases of differentiation from diversity. Thus it retracts in the stereotypes about the current Digital Society, the handling and technological development, and those stereotypes that are forged from the perception that is possessed in relation to the use of the technology, in function of the gender. Authors such as [23] maintain that with the beginning of the network it was thought that social and gender inequalities could cease to have a presence in virtual life, through the idea of control over oneself and one's virtual life, and the possibility of detaching oneself from conditions such as gender, ethnicity or race. However, the current reality on the Internet continues to show clear differences in relation to gender. As [18] indicate, the problem of the digital gender gap is a phenomenon that continues to exist, women and men are on the Internet, but not in the same way, or with the same visibility, or with the same aims.

Concern about students' perceptions of gender stereotypes towards Internet use is turned into studies. This is the case of the recent research carried out by [4], where a study was carried out on the access, experience, frequency and use made of both computers and the Internet by young people in Galicia (Spain). The results revealed that there are clear gender differences in the

activities they tend to do on the Internet. Men tend to spend more time playing online games, participating in forums, downloading programs, while women use the Internet to connect to social networks, chat, send emails and search for information of interest to the subject. On the other hand, women tend to use word processors, digital presentations and image editions to a greater extent than their male counterparts. Young men, on the other hand, tend to spend time calculating and processing data.

These results provide a glimpse of the gender differentiation studied in this paper, which seeks to respond to the stereotypes presented in relation to Internet consumption by young people. For the development of the research of the present work, the questionnaire of [18] has been applied from a quantitative perspective.

Finally, this work is presented in six sections. The second section delves into recent literature and studies in relation to existing gender stereotypes in the use of the Internet. This gives rise to the third section, which deals with the context in which the study has been carried out, described in section four, the research methodology. The analysis of the data and the results of the research give rise to section five. And finally, in the sixth section, the main conclusions of the study are summarized.

## 2 Stereotypes on the use of technologies and the internet

Nowadays, technology has taken on a special role in people's lives, for whom it has become an element in their daily lives. It is therefore desirable and expected an equal use and management of it. To this goal, the inclusion of social values can be a key, introducing the concepts of diversity and inclusion in technology, thus allowing equitable access and use [8]. The reason why the integration of these values is necessary is the still existing social inequality, both significant and lasting, in the context of the new information and communication technologies. ICT (*Information and Communication technology*) persist with a high gender component and at all levels, both socio-economic and educational [7]. Digital environments can be designed as a result of gender roles and biases, which implies the risk of reproducing the gender stereotyped culture within the technological and computational context [24].

However, when it comes to what young people use new technologies for and research is conducted to detect differences in use in relation to gender, few studies have followed this line of research. [17] carried out a study with the aim of ascertaining the media consumption habits of adolescents and young people in Spain in relation to their gender. To this aim, a quantitative study was implemented with adolescents from Barcelona (Spain) and some of the results that were concluded from the aforementioned research were that Internet consumption by young people is stereotyped by the condition of gender. Girls tend to consume mostly dramatic products, where the central focus is on interpersonal relationships, while on the other hand, boys tend to resort to products based on humor and video games. Along the same lines, the results of research [6] reveal that new information and communication technologies and their relationship with the

stereotyped view of gender affect the practices carried out by children and young people, among which are their decisions regarding possible educational and professional options.

This global reality is in turn combined with another issue of concern for decades for different systems, and it is the gender gap that exists around the STEM sector (*Science, Technology, Engineering and Mathematics*). An international concern is the low representation that minorities and women have in the field of technology, so [9] developed a study, which sought to represent the general view of the current context in Europe, and thus made a systematic mapping of projects related to the gender gap in STEM in the databases CORDIS, Erasmus + and KEEP. This type of initiatives are a fundamental piece to be able to continue advancing in the field, and to be able to know, among other purposes, the motivation and interests of people [22], since the intrinsic forces of the individual direct the direction and utility that he gives to his use and consumption of the Internet; and as researchers the knowledge of endogenous causes can lead to the proposal of new initiatives aimed at redirecting these forces.

Continuing with that, a relevant question would also be what young people are using online social networks for today. As it has been commented, technologies have become an everyday part of people's lives, and deepening the process of constructing gender identity is necessary to answer the question. In the study they carried out [20] they detected classic gender stereotypes in relation to the use of online social networks. These stereotypes clearly modulate the psychological well-being of users. Furthermore, as the authors also stress, the lack of studies in relation to Internet consumption and what surrounds it, in Spain, implies the importance of emerging studies.

As with online social networks, so do digital games involving young people. The games available through the network are resources where gender stereotypes can be identified, which condition the use of people who use them. The research of [15] explored a series of factors and their impact on stereotyped perceptions and attitudes towards female players, since although women are also active in the sector, the stereotyped vision is a phenomenon of analysis, due to the conditioning that the individual entails.

For its part, the study by [13] explored possible gender differences, in relation to Internet use habits, reasons for use and problematic behaviour and use of the Internet by young people. In addition, the study also approaches the role of parents in the above dynamics. The results obtained confirmed relevant gender differences in the reasons for their use, in social networks, the use of mobile phones and instant messaging.

The indicated effects of gender differentiation on media consumption, on social networks, on digital games, on the widespread use of the Internet, on technological devices, including on equitable representation in studies and professions in the technological field are rooted, among other issues such as gender roles, in the threat of stereotyping. This concept means the risk of confirming a negative stereotype about one's own social group [21]. The fear that some people, such as women and minorities, have of being classified as *nerds*, can lead to women

not developing and growing in the same way as their male counterparts in these contexts [21].

In order to respond to these situations, the recruitment of young people is considered, fundamentally those who are under-represented in the field, such as women and other minorities. This mechanism is particularly applicable in the field of education. And in this line [5] they investigated whether a gaming environment can be used to generate interest and commitment among young people. To achieve this, a group of young people were asked to design and develop a game. The result reflected the roles assumed, young women tended to aspire to jobs in health sciences, while young men sought a wider range of scientific careers.

Finally, and with a positive perspective, the most recent theories have been able to confirm the emergence of an empowered citizenship thanks to technology, which they use for the common good. Within this spectrum fostered in part by Internet activism, it is worth noting the gender difference in the use of technologies, where it is qualified that *"young women use the Internet in a way that contributes to social welfare"* [14].

### 3 Context

The initiative of the study presented in this paper was born from the project WYRED (netWorked Youth Research for Empowerment in the Digital). This project is funded through the Horizon 2020 programme and aims to give young people a voice in Digital Society issues [10, 11]. The main topic investigated in the project is the opinion on the influence of technology on the various aspects of young people lives. In addition, other related topics dealt with in the so-called conversations between young people held under the project, and maintained through the platform, are: gender stereotypes, self-image, fakes news, digital participation, and so on.

### 4 Methodology

The study carried out has been implemented from a quantitative perspective, through the application of an instrument that investigates gender stereotypes in relation to the use of the Internet. After the application of the instrument of [18] the tests of normality have been calculated to know the distribution of the samples, which has led to the later application of the non-parametric test of U of Mann-Whitney.

#### 4.1 Participants

The questionnaire was sent to 58 participants. These participants were part of the second group of Pedagogy Degree of the University of Salamanca in the academic year 2018/2019, which worked on the platform of the WYRED Project through the subject of Methodology of Qualitative Research. The group was composed of 55 women and 3 men, of different nationalities: Spanish, Belgian and Bulgarian, and all of them were born between 1991 and 1999.

### 4.2 Instrumentation

In delimiting the field of research and establishing the object of study as the deepening of the existence of gender stereotypes in relation to the use of the Internet, a deep and detailed analysis of instruments was carried out to deepen this matter. Some interesting instruments on stereotypes in the technology sector were those of [2, 3, 12, 16]: the IRIS-Q questionnaire, and the Sustainability and Gender in Engineering (SaGE) survey. However, these were aimed at finding out why there is a gender gap in the education sector in the fields of technology and science, and yet none of the instruments indicated approaches gender stereotypes on the Internet.

However, this analysis led to the investigation of the [18] questionnaire, which delved into gender differences in relation to Internet use. This led to the conclusion of the analysis with the application of the aforementioned instrument, since it made it possible to achieve the stated objective.

The tool can be found in the publication "Gender differences of the Internet-related stereotypes in Russia". The aim of the research in [18] was to reveal stereotypes and self-stereotypes concerning women and men, and related to the use of the Internet by people of both sexes. The target population was all those people who had or had had some experience in the use of the Internet. The research was carried out using the psycho-semantic technique of "multiple identification" [19].

The [18] study investigated the gender stereotypes that Russians have towards the Internet. For this purpose, a 45-item questionnaire was defined, by means of which different types of behaviour linked to the Internet were described. The questionnaire included 45 questions that included 45 different types of Internet-related activities. The items were organized in eight different scales: "Scale 1. Professional and business uses of the Internet", "Scale 2. Internet-based education of children", "Scale 3. Entertainments", "Scale 4. Competent Internet use in order to realize personal goals", "Scale 5. Compensatory Internet use", "Scale 6. Cognitive uses of the Internet", "Scale 7. Highly qualified use of the Internet", and "Scale 8. Internet-mediated communication". The number of final items used in the questionnaire was forty, out of the forty-five initial items raised in the original instrument. The items can be seen in Table 1.

**Table 1. Scales and items from the [18] instrument scale on gender stereotypes on the Internet.**

<b>SCALE 1. PROFESSIONAL AND BUSINESS USES OF THE INTERNET</b>
1. Be employed at a company supporting Internet-interactions between the employees
2. Use e-mail at the workplace to communicate with colleagues and clients
3. Search on the Internet information relevant for the current work
4. Organize web-presentations of one's professional activity or the activity of the company one is employed at
5. Use of the Internet to realize one's professional activity (e.g., distant trade, education, consulting service, etc.)

6. Search professional contacts with persons and organizations through the Internet
8. Recruit new employees using the Internet
9. Systematically visit educational web-sites
10. Whenever information is needed, prefer web encyclopedia over printed copies
11. Give preference to the Internet instead of visiting a library, whenever there is a need to find something out
12. Use the Internet to get access to media
13. Use educational web sources to enhance the level of one's education
17. Correspond with friends and personal acquaintances via e-mail
25. Read books on the web
29. Use the Internet for planning out a tour
<b>SCALE 2. INTERNET-BASED EDUCATION OF CHILDREN</b>
40. Use of the Internet to assist one's child in writing an essay, a control work, etc.
41. Train one's children to use the web-based educational resources
42. Train one's children to use the Internet to gain any information
43. Train one's children to use the Internet
<b>SCALE 3. ENTERTAINMENTS</b>
26. Read humorous web-pages
45. Use the Internet for entertainment
<b>SCALE 4. COMPETENT INTERNET USE IN ORDER TO REALIZE PERSONAL GOALS</b>
23. See movies on the Internet
24. Listen to music on the Internet
28. Use the Internet to make reservations for plane or train tickets.
<b>SCALE 5. COMPENSATORY INTERNET USE</b>
30. Use the Internet to overcome real-life deficiencies and to realize the needs which can hardly be realized in real life
31. Play various games on the Internet
35. Visit religious web-sites
36. Visit personal web pages of movie/show-business stars
<b>SCALE 6. COGNITIVE USES OF THE INTERNET</b>
15. Be a distant student in a licensed Web college, school, etc.
21. Visit museum web-sites
22. View pieces of art on the Internet
<b>SCALE 7. HIGHLY QUALIFIED USE OF THE INTERNET</b>
27. Go shopping over the Internet
33. Have one's own web-page
34. Track real events in sports, science, culture and politics, etc. over the Internet
37. Visit web-sites to update the software
44. Communicate over the Internet to the members of your own family living with you
<b>SCALE 8. INTERNET-MEDIATED COMMUNICATION</b>
16. Spend time chatting
18. Use the Internet to gain new acquaintances
19. Seek on the Internet the one to become your future spouse
32. Send out web cards

The odd scale used was defined as follows: 0 Never; 1 Very seldom; 2 Sometimes; 3 Occasionally; 4 Often; 5 Usually; 6 Always. In the survey of [18] the respondents were 95 volunteer university students in Moscow, 47 men and 48 women, with an average age of 22.9 years. Participants were asked to respond to the questionnaire imagining that they were responding in situations of different characters. This allowed the authors to carry out the analysis of the results, evaluating the results for the different characters requested from the Russian students.

The characters to be scaled by the respondents were the following: the self (each individual), the permanent Internet user (woman - man), the typical russian person (woman - man), his ideal person (woman - man). Most of these characters (e.g., the case of the self and the typical russian person both male and female) are common for research within the "multiple identification" paradigm. On the other hand, the role of ideals is also often counted on in order to be able to detect possible gender stereotypes related to the use of the Internet. And finally, behavioral specificities (permanent Internet users) are often included when respondents (myself) distance themselves from experts exclusively competent in the field.

The administration of the questionnaire that was carried out in the study of [18] was individual, rejecting a group administration or group work. In addition, the instrument was dispensed during breaks between classes or in a space where the person was alone. Before answering the questionnaire, they were given instructions, along with a resolution of doubts.

For data analysis and processing, confirmation factor analysis and non-linear multiple regression were implemented.

The use of non-linear regression makes it possible to reveal the effect of the interrelations of different independent factors on their influence on the variables it determines [1].

Each person surveyed in the study fills in his or her individual matrix and, therefore, the set of all responses represents a three-dimensional data cube [19]. The average response matrix leads to a reduction from a cube to a two-dimensional matrix, one dimension less. To avoid loss of information, respondent responses are analyzed by columns, separately for each character. Thus, in the study, as a result, seven different matrices were obtained corresponding to the ranks of those surveyed for each character.

The results of the [18] study showed that self-stereotypes and gender stereotypes of men and women are close, especially at higher levels of competence in Internet use.

### 4.3 Study design and data collection

The **object of the study** was the gender stereotyped view on the use of the Internet and technology.

The **objective of the study** was to detect if the age of the young people, with some previous experience in Internet, marked differences in relation to the use of Internet. The aim of the study was to detect whether or not there was a dependence between the opinion items of the questionnaire and the age group of people surveyed.

For the determined objective, the instrument already described was applied, with the forty items indicated and the valuation scale for the items was followed.

Prior to the application of the questionnaire, a dynamic was developed throughout the weeks in the second year of the Degree in Pedagogy of the subject of Methodology of Qualitative

Research of the University of Salamanca. This activity was supported by the European Project WYRED (netWorked Youth Research for Empowerment in the Digital); and was extended during the months of february, march, april and may 2019. The work was based on participation in the international conversations available on the project platform, through forums. The international conversations consisted in giving each young person his or her opinion freely on the subject raised, in an anonymous manner, guaranteeing his or her privacy. The forum was open to young people from different countries. In order to establish conversations where the different members of the forum understood each other, conversations were held in English. The thematic conversations in which the study group was involved were those from 25 February to 10 March 2019: "Exploration: gender stereotypes" and "How the way we use Internet or technology influence? ". Major themes approaches by the participants were: stereotypes about body image, stereotypes in sports, in the media, in children's stories/movies, stereotypes implanted through gender roles in childhood, stereotypes about different sexual orientations and entities, etc.

The interactions generated and the debates produced were subsequently analysed using qualitative methodology and phenomenological method. The analysis of the contents of different types (text, images and videos) was carried out from CAQDAS Nvivo 12. In this process of analysis and interpretation of the contents was integrated into the sample itself participant with the aim of promoting awareness of the reality studied. The involvement of students and their interaction in the platform gave rise to the study that concerns us.

For the implementation of the questionnaire, after the aforementioned practice, Google Forms were used in such a way as to allow the students to respond digitally. The questionnaire of [18] was answered by the sample anonymously and outside the classroom. The answer had to be individual and they were asked to previously perform a reflective exercise on their answer. They were given some guidelines for carrying out the questionnaire in a classroom, with the purpose of being able to answer and share any doubts they had.

Unlike the study of [18], in the application of this study the students were not asked to respond by putting themselves in the situation of the different characters that were explained in the application with the russian students. In this research the priority was to know the opinion of the subjects about themselves in relation to gender stereotypes and the use of the Internet, that is, their self-perception. The link to access the questionnaire was provided through the Studium Plus platform that the University of Salamanca puts at the service of the university community. They were told that their response was voluntary and that their responses would be treated in a completely anonymous manner, in accordance with the current Data Protection Law. Their access to the questionnaire was kept operational for four weeks in april, so that they could respond to the questionnaire calmly and in a moment of reflection. To encourage voluntary student participation, a first message was sent through the platform and two subsequent reminders.

#### 4.4 Sample

The final sample was 48 people, 45 women and 3 men. 54.2% of the sample was born in 1999, 12.5% in 1998, 12.5% in 1997 and 12.5% in 1996, 6.3% in 1995, and 2.1% of the sample in 1991. 95.8% of the participants were of spanish nationality, 2.1% belgian nationality and 2.1% bulgarian nationality. 95.8% of the participants spoke spanish, coinciding with the same figure of spanish nationality. 75% of the sample was studying and unemployed at the time of the study, 8.3%, in addition to carrying out their studies, were working for others and 10.4% were carrying out internships simultaneously with their studies.

#### 5 Results and analysis

The analysis was carried out using IBM SPSS Statistics version 25 data analysis software, calculating the descriptive statistics.

First, a descriptive statistical analysis of student responses to the study items grouped by the two main age groups:  $\leq 20$  years and  $> 20$  years (Table 2) was performed. In the  $\leq 20$  age group, a sample of 26 people was available, compared to 22 people in the  $> 20$  age group, constituting two homogeneous distribution groups. Means and standard deviation of responses were extracted.

Table 2. Descriptive statistics of the items studied.

	Statistics					
	$\leq 20$ years			$> 20$ years		
	n	Medium	Typ. dev.	n	Medium	Typ. dev.
Item 1	26	3,23	1,657	22	3,45	1,595
Item 2	26	3,54	1,985	22	3,77	1,824
Item 3	26	4,58	1,301	22	4,55	1,503
Item 4	26	3,35	1,810	22	3,73	1,932
Item 5	26	4,23	1,704	22	4,64	1,217
Item 6	26	3,35	2,171	22	3,73	1,907
Item 8	26	2,46	1,881	22	3,05	1,838
Item 9	26	3,69	1,289	22	4,09	1,411
Item 10	26	3,88	1,657	22	4,00	1,195
Item 11	26	3,69	1,644	22	3,86	1,424
Item 12	26	5,31	,788	22	4,86	,834
Item 13	26	3,73	1,282	22	4,23	1,193
Item 15	26	1,88	1,883	22	2,64	1,649
Item 16	26	4,88	1,211	22	4,77	1,066
Item 17	26	3,31	1,408	22	3,45	1,683
Item 18	26	2,92	1,623	22	2,45	1,819
Item 19	26	2,15	2,053	22	1,23	1,602
Item 21	26	1,96	1,509	22	2,77	1,824
Item 22	26	2,85	1,666	22	3,32	1,756
Item 23	26	5,19	,749	22	4,91	1,377
Item 24	26	5,77	,430	22	5,50	,512
Item 25	26	3,12	1,774	22	3,59	1,681
Item 26	26	3,31	1,784	22	3,64	1,891

Item 27	26	3,62	1,722	22	4,23	1,478
Item 28	26	4,04	2,200	22	5,27	,703
Item 29	26	4,15	1,891	22	5,14	,774
Item 30	26	2,65	1,468	22	2,86	1,583
Item 31	26	2,23	1,366	22	2,73	1,907
Item 32	26	1,88	1,818	22	1,77	1,602
Item 33	26	1,31	1,738	22	1,95	1,588
Item 34	26	4,04	1,732	22	3,82	1,402
Item 35	26	,69	1,123	22	,77	1,193
Item 36	26	3,38	1,675	22	2,77	1,688
Item 37	26	2,96	1,428	22	3,45	1,565
Item 40	26	2,23	1,751	22	2,64	1,840
Item 41	26	2,50	1,944	22	3,59	1,790
Item 42	26	2,38	2,002	22	3,27	1,907
Item 43	26	2,42	1,963	22	3,50	1,819
Item 44	26	3,27	1,733	22	3,73	1,695
Item 45	26	4,85	1,347	22	5,00	1,069

Once the standard deviation of the responses to the items had been identified, the nonparametric Kolmogorov-Smirnov test (Table 3), also known as the nonparametric K-S test, was applied to determine the goodness of fit of the two distributions of the age groups. The Shapiro-Wilk (Table 3) normality test was also calculated to know, as with the previous test, whether the population had a normal distribution.

The null hypothesis ( $H_0$ ) that the population had a normal distribution was taken as opposed to the alternative hypothesis ( $H_1$ ) that the distribution was not normal.

The p-value results in the Kolmogorov-Smirnov test showed <.05 results of significance, leading to rejection of  $H_0$  because the sample distribution was not normal. Only in one of the results was the null hypothesis accepted, due to the fact that in both distributions the p-value was >. 05. This was item 17.

Table 3. Results of the Kolmogorov-Smirnov and Shapiro Wilk normality tests.

Normality tests							
Subject's age		Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistics	g	Ne xt	Statistics	g	Ne xt
Item 1	≤20	,294	26	,000	,890	26	,010
	>20	,225	22	,005	,938	22	,183
Item 2	≤20	,284	26	,000	,823	26	,000
	>20	,186	22	,046	,918	22	,070
Item 3	≤20	,320	26	,000	,748	26	,000
	>20	,255	22	,001	,829	22	,001
Item 4	≤20	,218	26	,003	,912	26	,029
	>20	,238	22	,002	,887	22	,017

Item 5	≤20	,251	26	,000	,848	26	,001
	>20	,208	22	,014	,870	22	,008
Item 6	≤20	,238	26	,001	,848	26	,001
	>20	,248	22	,001	,892	22	,021
Item 8	≤20	,216	26	,003	,861	26	,002
	>20	,192	22	,035	,931	22	,126
Item 9	≤20	,248	26	,000	,919	26	,042
	>20	,292	22	,000	,860	22	,005
Item 10	≤20	,220	26	,002	,890	26	,009
	>20	,208	22	,014	,902	22	,033
Item 11	≤20	,156	26	,103	,913	26	,032
	>20	,197	22	,027	,918	22	,068
Item 12	≤20	,272	26	,000	,772	26	,000
	>20	,247	22	,001	,868	22	,007
Item 13	≤20	,199	26	,010	,918	26	,041
	>20	,166	22	,115	,909	22	,046
Item 15	≤20	,226	26	,001	,840	26	,001
	>20	,160	22	,151	,942	22	,216
Item 16	≤20	,230	26	,001	,823	26	,000
	>20	,221	22	,007	,874	22	,009
Item 17	≤20	,155	26	,112	,905	26	,020
	>20	,173	22	,087	,944	22	,239
Item 18	≤20	,208	26	,005	,927	26	,067
	>20	,144	22	,200*	,926	22	,102
Item 19	≤20	,199	26	,009	,873	26	,004
	>20	,278	22	,000	,777	22	,000
Item 21	≤20	,238	26	,001	,892	26	,011
	>20	,210	22	,013	,929	22	,116
Item 22	≤20	,194	26	,013	,898	26	,014
	>20	,151	22	,200*	,906	22	,039
Item 23	≤20	,244	26	,000	,800	26	,000
	>20	,299	22	,000	,765	22	,000
Item 24	≤20	,474	26	,000	,524	26	,000

	>20	,336	22	,000	,640	22	,000
Item 25	≤20	,229	26	,001	,916	26	,037
	>20	,187	22	,044	,925	22	,095
Item 26	≤20	,191	26	,015	,922	26	,050
	>20	,167	22	,112	,901	22	,031
Item 27	≤20	,212	26	,004	,895	26	,012
	>20	,212	22	,012	,883	22	,014
Item 28	≤20	,207	26	,005	,807	26	,000
	>20	,259	22	,000	,790	22	,000
Item 29	≤20	,237	26	,001	,845	26	,001
	>20	,231	22	,003	,806	22	,001
Item 30	≤20	,209	26	,005	,922	26	,050
	>20	,173	22	,087	,949	22	,303
Item 31	≤20	,221	26	,002	,924	26	,056
	>20	,202	22	,020	,915	22	,059
Item 32	≤20	,187	26	,020	,885	26	,007
	>20	,187	22	,043	,878	22	,011
Item 33	≤20	,313	26	,000	,769	26	,000
	>20	,164	22	,130	,905	22	,038
Item 34	≤20	,222	26	,002	,869	26	,003
	>20	,143	22	,200*	,945	22	,246
Item 35	≤20	,308	26	,000	,649	26	,000
	>20	,332	22	,000	,698	22	,000
Item 36	≤20	,220	26	,002	,910	26	,026
	>20	,190	22	,038	,922	22	,082
Item 37	≤20	,266	26	,000	,880	26	,006
	>20	,187	22	,043	,915	22	,060
Item 40	≤20	,182	26	,027	,899	26	,015
	>20	,124	22	,200*	,937	22	,173
Item 41	≤20	,280	26	,000	,810	26	,000
	>20	,272	22	,000	,885	22	,015
Item 42	≤20	,192	26	,015	,883	26	,007
	>20	,157	22	,170	,932	22	,137

Item 43	≤20	,161	26	,083	,863	26	,003
	>20	,245	22	,001	,909	22	,046
Item 44	≤20	,163	26	,072	,932	26	,087
	>20	,246	22	,001	,907	22	,042
Item 45	≤20	,276	26	,000	,803	26	,000
	>20	,234	22	,003	,816	22	,001

Thus, in order to detect possible dependencies between the students's opinion responses and the age group to which they belonged, the non-parametric Mann-Whitney U test was applied. In addition, for item 17 of the study, the parametric T test was applied to independent samples to check whether the means of the two samples differed from each other or not.

For the hypothesis contrast it was taken as null hypothesis ( $H_0$ ) that the opinion answers did not depend on the age group of belonging versus the alternative hypothesis ( $H_1$ ) that the opinion answers did depend on the age group of belonging.

As can be seen from the results of the Mann-Whitney U test (Table 4) for the p-value the asymptotic significance was  $> .05$ , so no significant dependency ratio was detected, and the  $H_0$  was accepted.

**Table 4. Results of the non-parametric Mann-Whitney U test.**

	U of Mann-Whitney	Z	Sig. asymptot. (bilateral)
Item 1	270,500	-,333	,739
Item 2	273,000	-,275	,784
Item 3	279,000	-,154	,878
Item 4	241,500	-,940	,347
Item 5	260,500	-,546	,585
Item 6	255,500	-,646	,518
Item 8	239,500	-,977	,329
Item 9	227,500	-1,272	,203
Item 10	280,000	-,128	,898
Item 11	268,500	-,369	,712
Item 12	197,500	-1,966	,049
Item 13	233,500	-1,119	,263
Item 15	218,000	-1,435	,151
Item 16	258,500	-,595	,552
Item 17	268,500	-,370	,712
Item 18	240,000	-,971	,331
Item 19	214,500	-1,543	,123
Item 21	210,000	-1,605	,108
Item 22	247,000	-,820	,412
Item 23	278,000	-,177	,859
Item 24	209,000	-1,923	,054
Item 25	249,500	-,776	,438

Item 26	256,000	-,630	,529
Item 27	235,500	-1,069	,285
Item 28	211,500	-1,616	,106
Item 29	209,000	-1,659	,097
Item 30	268,500	-,369	,712
Item 31	240,500	-,961	,337
Item 32	282,000	-,085	,932
Item 33	212,500	-1,588	,112
Item 34	244,000	-,888	,375
Item 35	283,500	-,058	,953
Item 36	220,000	-1,392	,164
Item 37	243,500	-,912	,362
Item 40	251,000	-,734	,463
Item 41	198,000	-1,892	,058
Item 42	213,000	-1,536	,125
Item 43	200,000	-1,806	,071
Item 44	246,000	-,844	,399
Item 45	277,000	-,196	,844

At the same time, as a result for the T test for independent samples carried out for item 17, it could be observed that no significance was detected that would lead us to think about the dependence between age and answers, since p-value for Levene's test was .311, and p-value for the T test was  $>.740$ ; therefore the  $H_0$  was also accepted for item 17, that is, the hypothesis of independence between the age group and the young people opinion.

## 6 Discussion and conclusions

As it was possible to conclude from the normality tests and the non-parametric Mann-Whitney U test, together with the T test for independent samples applied on item 17, no evidence was detected showing that in the investigation the age group and the opinion and responses in relation to the use of the Internet were dependent on each other, thus accepting the  $H_0$ .

On the other hand, the descriptive statistics carried out showed that, for the participants in the study, the young people of  $\leq 20$  years ( $n=26$ ;  $\bar{X}=5.77$ ;  $S=.430$ ) and  $>20$  years ( $n=22$ ;  $\bar{X}=5.50$ ;  $S=.512$ ) agree that what they use the Internet most is for item 24 (Listen to music on the Internet).

Then, in order of preference, both groups agree on the use of item 28 (Use the Internet to make reservations for plane or train tickets), the item 29 (Use the Internet for planning out a tour), the item 45 (Use the Internet for entertainment), the item 23 (See movies on the Internet), the item 12 (Use the Internet to get access to media), the item 16 (Spend time chatting), the item 5 (Use of the Internet to realize one's professional activity) and the item 3 (Search on the Internet information relevant for the current work).

Participants in the  $\leq 20$  years group also stand out positively in item 34 (Track real events in sports, science, culture and politics, etc. over the Internet). And those of the group  $>20$  years stand out in item 27 (Go shopping over the Internet), in item 13 (Use educational web sources to enhance the level of one's education),

in item 9 (Systematically visit educational web-sites) and in item 10 (Whenever information is needed, prefer web encyclopedia over printed copies).

On the other hand, both the group of  $\leq 20$  years ( $n=26$ ;  $\bar{X}=6.9$ ;  $S=1.123$ ) and the group of  $>20$  years ( $n=22$ ;  $\bar{X}=7.7$ ;  $S=1.193$ ) agree that the least they use the Internet for is item 35 (Visit religious web-sites). In addition, both agree that they make little use of the Internet for item 33 (Have one's own web-page) and for item 32 (Send out web cards).

Those of the  $\leq 20$  years group also make little use of the Internet for items 21 (Visit museum web-sites) and 15 (Be a distant student in a licensed Web college, school, etc.). Those of the group  $>20$  years old use little Internet for item 19 (Seek on the Internet the one to become your future spouse).

Although, from the sample of the study it wasn't possible to detect dependence between the age group and the opinion of the young people, as it is demonstrated from the literature, gender stereotypes can also be evidenced in digital environments and in the use of new technologies. In the virtual and device management environment and the Internet, young people invest a significant amount of their time.

Finally, it can be concluded that there is a need for further research on the subject, since, as has been shown, there is a clear differentiation by gender in the perceptions of technology and in the use of the Internet by young people. Starting from the scarce literature in the field, a socially important field of work is opened, on which to apply strategies that will be able to generate sociological and educational advances.

In relation to the constraints encountered in the study, the main one was the low equitable gender representation in the class group in which the study was applied. 94.8% of the total participants in the group were women. On the other hand, due to the limitations of the context of the class and of the subject, it was not possible to invest the necessary time involved in the application of the questionnaire as in its original study, with the answer depending on the different roles.

As a prospective, the ideal and expected for future studies will be to repeat the study with a representative and egalitarian sample of genders, and with a wider range of ages, in order to carry out a contrast of hypotheses considering the possible relationship between the opinion of young people and their use of new technologies and the Internet, and their gender, and wider age groups.

## ACKNOWLEDGMENTS

This research work has been carried out within the University of Salamanca PhD Programme on Education in the Knowledge Society scope (<http://knowledgesociety.usal.es>), with the support of the EU Horizon 2020 Programme in its "Europe in a changing world – inclusive, innovative and reflective Societies (HORIZON 2020: REV-INEQUAL-10-2016: Multi-stakeholder platform for enhancing youth digital opportunities)" Call. Project WYRED (netWorked Youth Research for Empowerment in the Digital society) (Grant agreement No 727066). The sole responsibility for the content of this webpage lies with the authors. It does not necessarily reflect the opinion of the European Union. The



European Commission is not responsible for any use that may be made of the information contained therein.

And this research was supported by the Spanish Ministerio de Ciencia, Innovación y Universidades under a FPU fellowship (FPU017/01252).

## REFERENCES

- [1] Aiken, L. and West, S. 1991. *Multiple Regression: Testing and Interpreting Interactions*. Sage.
- [2] Alonso, Á.V. and Mas, M.A.M. 2015. La elección de estudios superiores científico-técnicos: análisis de algunos factores determinantes en seis países. *Revista Eureka sobre enseñanza y divulgación de las ciencias*. 12, 2 (2015), 264–277.
- [3] Bøe, M.V. and Henriksen, E.K. 2013. Love It or Leave It: Norwegian Students' Motivations and Expectations for Postcompulsory Physics. *Science Education*. 97, 4 (2013), 550–573. DOI:<https://doi.org/10.1002/sc.21068>.
- [4] Castro Balsa, J. and Trigo, X. 2017. Los estereotipos de género y las TICs en estudiantes de secundaria. *Revista de Estudios e Investigación en Psicología y Educación*. (Dec. 2017), 144–148. DOI:<https://doi.org/10.17979/reipe.2017.0.13.2585>.
- [5] Dele-Ajayi, O. et al. 2018. Exploring digital careers, stereotypes and diversity with young people through game design and implementation. (2018), 712–719.
- [6] Ferreira, E. 2018. Gender and ict: School and gender stereotypes. (2018), 1–6.
- [7] Ferreira, E. 2017. The co-production of gender and ICT: Gender stereotypes in schools. *First Monday*. 22, 10 (2017). DOI:<https://doi.org/10.5210/fm.v22i10.7062>.
- [8] García-Holgado, A. et al. 2019. Actions to Promote Diversity in Engineering Studies: a Case Study in a Computer Science Degree. *2019 IEEE Global Engineering Education Conference (EDUCON)* (Apr. 2019), 793–800.
- [9] García-Holgado, A. et al. 2019. Trends in Studies Developed in Europe Focused on the Gender Gap in STEM. *Proceedings of the XX International Conference on Human Computer Interaction* (New York, NY, USA, 2019), 47:1–47:8.
- [10] García-Peñalvo, F.J. and García-Holgado, A. 2019. WYRED, a platform to give young people the voice on the influence of technology in today's society. A citizen science approach. *II Congreso Internacional de Tendencias e Innovación Educativa – CITIE 2018*. (2019), 14.
- [11] García-Peñalvo, F.J. and Kearney, N.A. 2016. Networked Youth Research for Empowerment in Digital Society: The WYRED Project. *Proceedings of the Fourth International Conference on Technological Ecosystems for Enhancing Multiculturality* (New York, NY, USA, 2016), 3–9.
- [12] Godwin, A. et al. 2013. The development of critical engineering agency, identity, and the impact on engineering career choices. (2013).
- [13] Golpe Ferreira, S. et al. 2017. DIFERENCIAS DE SEXO EN EL USO DE INTERNET EN ADOLESCENTES ESPAÑOLES. *Behavioral Psychology / Psicología Conductual*. 25, 1 (2017), 129–146.
- [14] Herrero-Diz, P. and Ramos-Serrano, M. 2018. Breaking stereotypes online: Young activists' use of the internet for social well-being. *Catalan Journal of Communication and Cultural Studies*. 10, 1 (2018), 99–114. DOI:[https://doi.org/10.1386/cjcs.10.1.99\\_1](https://doi.org/10.1386/cjcs.10.1.99_1).
- [15] Kaye, L.K. et al. 2017. Exploring Stereotypical Perceptions of Female Players in Digital Gaming Contexts. *Cyberpsychology, Behavior, and Social Networking*. 20, 12 (2017), 740–745. DOI:<https://doi.org/10.1089/cyber.2017.0294>.
- [16] Lehman, K.J. et al. 2017. Women planning to major in computer science: Who are they and what makes them unique? *Computer Science Education*. 26, 4 (2017), 277–298. DOI:<https://doi.org/10.1080/08993408.2016.1271536>.
- [17] Masanet, M.-J. 2016. Pervivencia de los estereotipos de género en los hábitos de consumo mediático de los adolescentes: Drama para las chicas y humor para los chicos. *Cuadernos.info*. 39 (Dec. 2016), 39–53. DOI:<https://doi.org/10.7764/cdi.39.1027>.
- [18] Mitina, O.V. and Voiskounsky, A.E. 2005. Gender differences of the Internet-related stereotypes in Russia. *Psychology Journal*. 3, 3 (2005), 243 – 264.
- [19] Petrenko, V.F. 1997. *Obschaya Psikhosemantika (General Psychosemantics)*. Moscow State University Publ.
- [20] Renau, V. et al. 2012. Redes sociales online, género y construcción del self. *RECERCAT (Dipòsit de la Recerca de Catalunya)*. (Dec. 2012).
- [21] Rheingans, P. et al. 2018. A model for increasing gender diversity in technology. (2018), 459–464.
- [22] Verdugo-Castro, S. et al. 2018. Gender gap in the STEM sector in pre and university studies of Europe associated with ethnic factors. *Proceedings of the 6th International Conference on Technological Ecosystems for Enhancing Multiculturality (TEEM 2018)*. (2018), 984–990. DOI:<https://doi.org/10.1145/3284179.3284348>.
- [23] Wajcman 2006. *El tecnofeminismo*. Ediciones Cátedra.
- [24] Yücel, Y. and Rızvanoğlu, K. 2019. Battling gender stereotypes: A user study of a code-learning game, "Code Combat," with middle school children. *Computers in Human Behavior*. 99, (2019), 352–365. DOI:<https://doi.org/10.1016/j.chb.2019.05.029>.

