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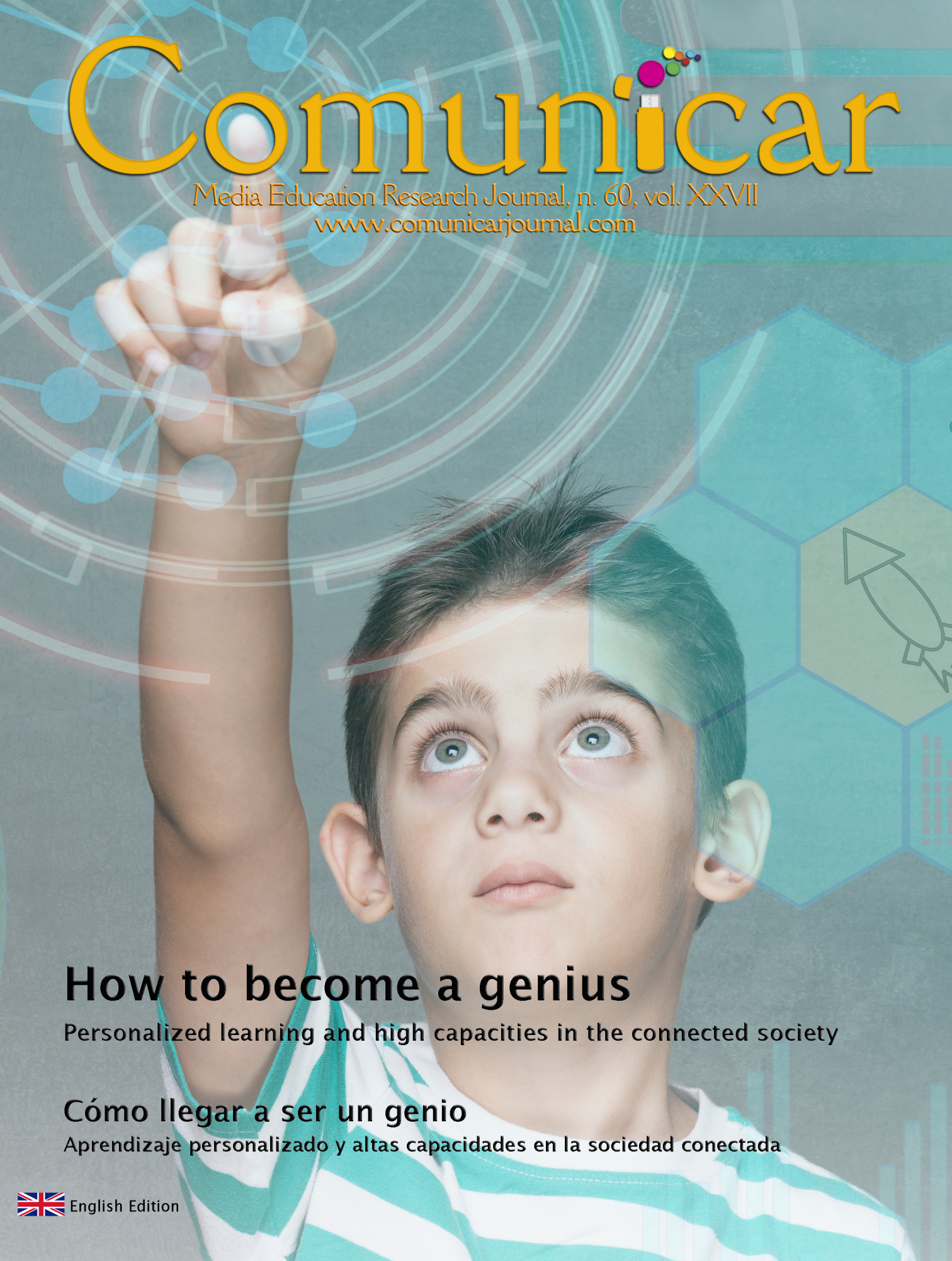

How to become a genius

Personalized learning and high capacities in the connected society

Cómo llegar a ser un genio

Aprendizaje personalizado y altas capacidades en la sociedad conectada

English Edition

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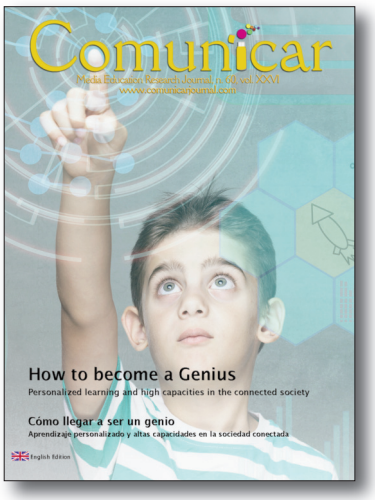

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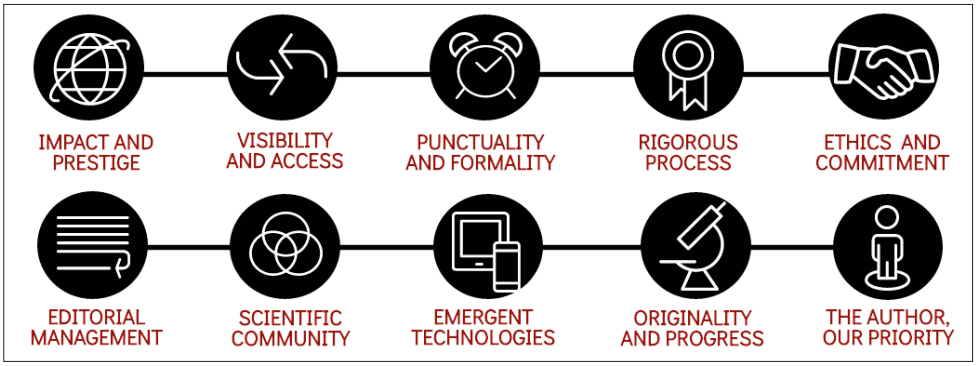

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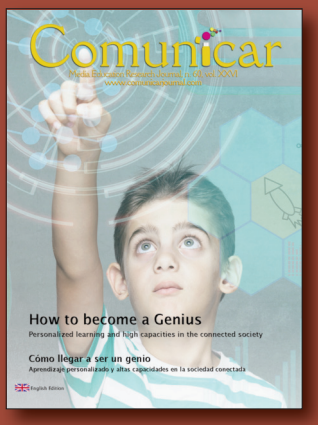

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Special Topic Issue

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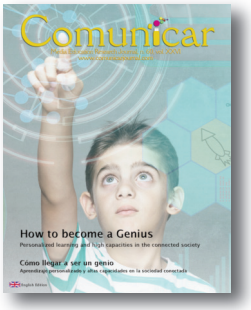

From high intellectual ability to genius: Profiles of perfectionism

Desde la alta capacidad intelectual hacia el genio: Perfiles de perfeccionismo

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ABSTRACT

The aim of the study was to understand the components associated with the types of perfectionism described as adaptive/healthy, maladaptive/unhealthy or non-perfectionism, which could offer positive or negative aspects to improve excellence and welfare, exploring the number and content of the latent perfectionism structure as a multidimensional construct in a sample of High Intellectual Abilities (HIA) students. Links with Positive and Negative perfectionism were also compared across perfectionism latent profiles. A total of n=137 HIA students, mean age 13.77 years (SD=1.99), participated in a survey. The Almost Perfect Scale Revised (APS-R) and Positive and Negative Perfectionism Scale-12 (PNPS-12) were used. Results obtained showed three latent classes (LC): 'Unhealthy' (LC1), 'Healthy' (LC2) and 'No perfectionism' (LC3). LC1 showed high scores on Discrepancy subscales but low in Order and High Standards. LC2 displayed higher scores on High Standards and Order. LC3 displayed lowest scores across all perfectionism facets. Statistically significant differences were found across latent profile in almost all perfectionism features. Different patterns of associations with Positive and Negative perfectionism were obtained across latent profiles. These findings address the latent structure of perfectionisms in HIA students and allow us to delimit, analyze, and understand the tentative latent profiles within the HIA arena

RESUMEN

El objetivo de este estudio fue comprender los componentes asociados a distintos tipos de perfeccionismo descrito como: adaptativo/sano, mal adaptativo/insano o no perfeccionismo que pueden tener efectos positivos o negativos para el logro de la excelencia. Se exploró el número y contenido de las estructuras latentes del perfeccionismo como constructo multidimensional en una muestra de n=137 estudiantes con Altas Capacidades Intelectuales (ACI) con una media de edad de 13,77 años (DT=1,99). La conexión con el perfeccionismo positivo y negativo se analizó sobre la base de los diferentes perfiles de perfeccionismo. Se utilizaron las escalas «Almost Perfect Scale Revised» (APS-R) y la «Positive and Negative Perfectionism Scale-12». Los resultados mostraron tres clases latentes de perfeccionismo: «No Sano» (CL1), «Sano» (CL2) y «No Perfeccionista» (CL3). La CL1 mostró puntuaciones más altas en las subescalas de Discrepancia y bajas en Orden y Altos Estándares. La CL2 reveló puntuaciones altas en Altos Estándares y Orden. La CL3 mostró bajas puntuaciones en todos los dominios de perfeccionismo. Las diferencias fueron estadísticamente significativas entre las clases latentes en los dominios del perfeccionismo. Asimismo, se encontraron diferentes patrones de asociaciones de las clases latentes con el perfeccionismo Positivo y Negativo. Los resultados encontrados permiten atender a las estructuras latentes de perfeccionismo en estudiantes con ACI, que posibilitan delimitar, analizar y entender posibles perfiles latentes.

KEYWORDS | PALABRAS CLAVE

High intellectual ability, gifted students, talented students, perfectionism, cognitive processes, mental development, excellence, digital era.

Alta capacidad intelectual, estudiantes superdotados, estudiantes talentosos, perfeccionismo, procesos cognitivos, desarrollo mental, excelencia, era digital.

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1. Introduction

High Intellectual Ability (HIA) is not a static attribute but the result of the expression of a neurobiological high potential for intellectual abilities, modulated by intra and interpersonal variables through the developmental trajectory, from infancy to adulthood (Olzewski-Kubilius, Subotnik, & Worrell, 2015). One of the intrapersonal variables that could influence the expression from the initial High potential to the adult eminence (or genius) is perfectionism.

Perfectionism is a multidimensional construct related to a cognitive control style with high standards of performance and different concerns about committing mistakes (Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991). The concept of perfectionism has moved from a unidimensional to a multidimensional approach (Leone & Wade, 2017; Shafran, Cooper, & Fairburn, 2002). Thus, the vision of perfectionism is, nowadays, characterized as composed of multiple dimensions with a variety of measures that need to be considered when analyzing the different profiles that can be observed (Flett & al., 2014).

Perfectionism could be considered as a healthy construct with positive outcomes, including higher performance and academic achievement (Damian & al., 2017; Damian, Stoeber, Negru, & B ban, 2014), but it could be associated with anxiety or depressive symptoms (Flett, Besser, & Hewitt, 2014; Roxborough & al., 2012). Hence, efforts are now devoted to gaining a deeper understanding of the many differences in the aspects that articulate each profile of perfectionism (Sastre-Riba, Pérez-Albéniz, & Fonseca-Pedrero, 2016).

Perfectionism is also considered to have a key role in the construction of personality traits and is considered a cognitive pattern. In addition, it has also been related to high intellectual ability as different potentialities that can lead to the achievement of excellence (Pyryt, 2007). Thus, perfectionism in HIA is interpreted as a cognitive style linked to the idea of excellence and performance in academic and different settings, (Damian, Stoeber, Negru-Subtirica, & B ban, 2017; Pyryt, 2007), and well-being.

The study of perfectionism in HIA children and adolescents has received increasing attention due to the fact that some HIA students have shown high standards for achievement, sometimes extreme and impossible to reach, as well as negative reactions to academic failure (Fletcher & Speirs-Neumeister, 2012). Nonetheless, the question about whether perfectionism is higher among children and adolescents with high intellectual abilities is, at this moment, in need of more empirical evidence (Baker, 1996; Parker, Portesová, & Stumpf, 2001) in order to provide better resources to parents, teachers and psychologists associated with the optimization of school performance and its role in the students' digital culture.

Previous studies have supported the idea of a multidimensional manifestation of perfectionism in HIA students with healthy/adaptive and unhealthy/maladaptive consequences (Fletcher & Speirs-Neumeister, 2012). For instance, the study by Parker (2002) revealed three different types of perfectionism in middle-school gifted students by means of the Frost and others' scale (Frost & al., 1990) with students in the healthy/adaptive group scoring lower on neuroticism and higher on extroversion and agreeableness, and students in the unhealthy/maladaptive group scoring higher on neurosis, lower on agreeableness, but also higher on openness to experience, and finally, a third group of non-perfectionists. Other studies have found similar results. (Dixon, Lapsley, & Hanchon, 2004; Hewitt & Flett, 1991; Parker & al., 2001; Rice & Richardson, 2014; Schuler, 2000; Sironic & Reeve, 2015; Slaney, Rice, Mobley, Trippi, & Ashby, 2001; Smith & Saklofske, 2017). For example, Dixon and others (2004), revealed analogous types of perfectionist students in a group of HIA adolescents, next to another group characterized by having negative perfectionism, that included high scores on organization, high standards, and concern for mistakes. This group was related with more psychological symptoms and dysfunctional coping.

Another study proposed three classes of perfectionism after controlling for neuroticism and conscientiousness, described as non-perfectionism, adaptive perfectionism and maladaptive perfectionism (Rice, Richardson, & Tueller, 2014). Recently, these three types of perfectionism were established in different samples of adolescents across the world, (Wang, Puri, Slaney, Methikalam, & Chadha, 2012; Wang, Yuen, & Slaney; Ortega, Wang, Slaney, & Morales, 2014). Other studies, however, propose a 6-class model after applying a latent class analysis of adolescents, where three of them were categorized as perfectionists and were labeled as adaptive perfectionism, non-perfectionism, externally motivated, maladaptive perfectionism, and mixed maladaptive perfectionism, whereas the other three represented non- perfectionism expressions (Sironic & Reeve, 2015).

It is worth noting that across most studies, healthy/adaptive perfectionism is linked with positive effects, excellence, and with higher levels of self-esteem, order and satisfaction in the relation with peers (Pyryt, 2007), On the contrary, unhealthy/maladaptive perfectionism is considered as negative, showing low levels of self-esteem, high levels of

anxiety or discrepancy, whereas levels of well-being of non-perfectionism seem to be in between the two other groups (Wang, Permyakova, & Sheveleva, 2016).

In sum, depending on its composition, perfectionism could have a positive or negative impact, facilitating or inhibiting relevant skills, for instance, problem solving, metacognitive regulation, and excellence. Thus, perfectionism could promote or limit the optimal expression of the initial high intellectual potential and the well-being of these students and, therefore, the scientific, technological, artistic, or social progress in today's digital world.

In order to establish appropriate interventions for the expression of talent, it is necessary to carry out an adequate evaluation of perfectionism in specific target groups, for instance HIA students. Thus, it may be interesting to analyze the typology of perfectionism using new methodological approaches to solve some limitations of previous cluster analyses in this area. With this regard, the latent class analysis (LCA) (dichotomous outcome) or the latent profile analysis (LPA) (continuous outcome) are relatively novel techniques that could enable a better understanding of the groups and profiles of perfectionism.

1.1. Objectives

The general objective was the understanding of the components associated with the types of perfectionism described as adaptive/healthy, maladaptive/unhealthy (Chan, 2007; Costa & al., 2016; Damian & al., 2017; Fletcher & Speirs-Neumeister, 2012; Parker, 2002), or non-perfectionism, which could offer the positive aspects to improve excellence and well-being, as research in HIA literature supports.

> Correlation analyses between the PNPS-R and the APS-R showed a significant and positive correlation between Order and High Standards with Positive Perfectionism; on the other hand, a high correlation was obtained between Discrepancy and Negative perfectionism, but not with Positive Perfectionism. In addition, Discrepancy showed a significant correlation with Unhealthy/maladaptive perfectionism, and with Healthy/adaptive perfectionism.

The specific objectives were: a) to capture the latent structure of perfectionism dimensions in HIA children and adolescents; b) to establish associations with Positive and Negative Perfectionism through latent profiles of perfectionism, trying to distinguish the more healthy/adaptive ones to promote the optimal expression of high intellectual potential as a challenge for the digital era.

2. Materials and methods

2.1. Participants

A total of n=137 students with a previous professional diagnosis of HIA participated (60.8% male, 39.2% female) in the study. The ages ranged between 12 and 16 years old (M=13.77 years old; SD=1.99). All of them belonged to the enrichment program at the University of La Rioja.

2.2. Instruments

The measure of perfectionism was obtained applying:

a) The Almost Perfect Scale-Revised (APS-R) (Slaney, Rice, Mobley, Trippi, & Ashby, 2001). The APS-R consists of 23 items to measure adaptive and maladaptive perfectionism. It contains the subscales: 1) High Standards (7 items) which assesses the high standards the individual establishes; 2) Discrepancy subscale (12 items) aims to measure perception of inadequacy about personal standards and achievements; and 3) Order (4 items), related to the preference for neatness and orderliness. A seven-point Likert scale was used (1='Strongly disagree', to 7='Strongly agree'). Previous studies have shown the adequate psychometric properties of the Spanish version with score reliability ranging from .67 (Standards) to .85 (Discrepancy) (Sastre-Riba & al., 2016).

b) The Positive and Negative Perfectionism Scale-12 (PNPS-12) (Chan, 2007; 2010). The PNPS consists of 12 items that intend to measure positive and negative perfectionism. There are two subscales: Positive (students'

realistic striving for excellence; 6 items), and Negative (students' rigid adherence to perfection as well as a preoccupation for avoiding mistakes; 6 items). The PNPS has a five-point Likert scale (1='Strongly disagree', and 5='Strongly agree'). The Spanish adaptation of the PNPS-12 was carried out according to the international regulation regarding test translation (Muñiz, Elosua, & Hambleton, 2013).

2.3. Procedure

A multidimensional intellectual measurement was administered to all HIA participants in the Enrichment program (Sastre-Riba, 2013), in order to amplify and standardize the intellectual profiles. Concretely: a) The Differential Aptitude Test (DAT) (Bennet, Seashore, & Wesman, 2000); and b) Torrance's Test of Creative Thinking (TTCT) (Torrance, 1974). The measurement instruments were administered to groups of no more than 10 students.

According to Castelló & Batlle (1998), participants scoring equal or over the 75th percentile in all the intellectual competencies were classified as gifted; participants with scores equal or above the 90th percentile in at least one or various convergent or divergent aptitudes (but not all) were considered as talented.

Informed written authorization was provided by parents or legal tutors. The confidentiality and the voluntary nature of the study was informed to all participants and parents. Participants did not receive any kind of incentive for their engagement. The researchers supervised the administration of the different tests and questionnaires. The study received the approval of the bioethics committee at the University of La Rioja and it was conducted in line with the principles of the Declaration of Helsinki.

2.4. Data analysis

Different steps were followed for data analysis:

1) Descriptive statistics for the measurements, and the correlation between APS-R and PNPS-12 by means of Pearson's coefficient.

2) Latent profile analysis (LPA) using APS-R subscales, transformed into z scores, was performed to analyse whether there were discrete groups (classes) showing similar profiles. LPA models had to be compared in order to establish the optimal number of classes (i.e., class numbering). First, a 1-class model had to be evaluated. Then latent classes were added till the most suitable class solution was found. Several adjustment indexes, including likelihood ratios were considered to establish the best model. The Akaike Information Criterion (AIC) (Akaike, 1987), the Bayesian Information Criterion (BIC) (Schwarz, 1978), and the sample-size adjusted BIC (ssaBIC) (Sciove, 1987) were analysed to have a better adjustment when lower values were reached. We attended to the Lo-Mendell-Rubin's likelihood ratio test (LRT) (Lo, Mendell, & Rubin, 2001).

The likelihood ratios of the k-1 and k class models examine the null hypothesis of no statistically significant difference. Therefore, a $p<0.05$ suggests that the k class model provides a more accepted solution model than the k 1 class model. In addition, values of statistical significance ($p>0.05$) indicate that the solution (k-1) should be favoured with regards to its precision in reflecting the data. Then, it is possible to assess if the number of classes selected is appropriate by means of the bootstrapped parametric likelihood ratio test.

We also tested for the standardized measure of entropy. This value ranges from 0 to 1 and it measures the relative accuracy in participants' classification. A higher value in this parameter reflects that the groups found are more separated (Ramaswamy, DeSarbo, Reibstein, & Robinson, 1993).

3) Calculation of the effect of latent class membership on the APS-R and PNPS-12 subscales by means of multivariate analysis of covariance (MANCOVA). Gender and age were used as covariates. Partial eta squared (2) indicated the effect size.

The statistical packages SPSS 22.0 (IBM Corp Released, 2013) and Mplus 7.4 (Muthén and Muthén, 1998-2015) were used.

3. Results

3.1. Descriptive statistics and Pearson correlations

Descriptive statistics of the measures are depicted on Table 1.

As reflected on Table 2, most correlations between APS-R subscales were statistically significant. The positive perfectionism subscale PNPS-12 was associated with Order. The Negative Perfectionism subscale (PNPS-12) was strongly associated with Discrepancy.

3.2. Identification of the latent profiles of perfectionism

Four latent profile solutions were analyzed. The goodness-of-fit values for the different perfectionism models computed are shown in Table 3. The entropy value was <0.90 for the different solutions. The LMR-A p index for the 2-class model revealed that, compared to the 1-class model, there was an improvement that was statistically significant. Then, the comparison between the 2-class and 3-class solutions revealed lower values of AIC, BIC, ssaBIC and, in addition, a marginal significant LMR-A-LRT p-value (0.054) in the case of the 3-class model, indicating, thus, that this solution should be prioritized. The 4-class solution revealed non-significant LMR-A p value and similar AIC, BIC and ssaBIC values than the 3-class model. Thus, we chose the 3-class model as the most suitable one. For class 1, class 2, and class 3, the different average class membership was as follows: 0.928, 0.936, 0.85, and 0.90. These values revealed adequate discrimination.

Table 1. Almost Perfect Scale Revised (APS-R) and Positive and Negative Perfectionism Scale-12 (PNPS-12). Descriptive statistics

Subscales	M	SD	Skewness	Kurtosis	Minimum	Maximum
APS-R Standards	36.28	6.434	-0.38	0.185	14	49
APS-R Order	19.29	6.101	-0.614	-0.251	4	28
APS-R Discrepancy	37.99	15.118	0.547	-0.068	12	83
PNPS Positive	23.68	3.579	-0.532	0.642	12	30
PNPS Negative	15.73	4.311	0.344	0.011	7	28

Note. M=Mean; SD=Standard deviation.

Following the 3-class model, a 14.59% (n=20) was included in class 1 (LC1), class 2 described (LC2) 44.52% (n=61), and class 3 (LC3) 40.87% (n=56) of the participants. Class 1, named 'Unhealthy perfectionism', revealed high scores on Discrepancy subscales and low in the rest. Participants in Class 2, identified as 'Healthy perfectionism', displayed higher scores on High Standards and Order. Participants in Class 3 denominated 'Non perfectionism', revealed low scores across all perfectionism components. Figure 1 depicts these three perfectionism profiles.

Table 2. Almost Perfect Scale Revised (APS-R) and Positive and Negative Perfectionism Scale-12 (PNPS-12) subscales. Pearson's correlations

Subscales	1	2	3	4	5
APS-R Standards (1)	1				
APS-R Order (2)	.402**	1			
APS-R Discrepancy (3)	.049	-.06	1		
PNPS Positive (4)	.385**	.609**	-.074	1	
PNPS Negative (5)	.325**	.241**	.383**	.215*	1

**p<.01.

3.3. Validation of the perfectionism latent profiles

The MANCOVA values indicated a significant effect for group latent profiles [Wilk´s =0.131, F(10, 256)=45.029; p<0.001]. The mean and standard deviation and the p-values and effect sizes for 3-latent profile solution are shown in Table 4.

Attending to the Discrepancy scores, no significant statistical differences across the latent profiles were found. Different configurations of associations with Positive and Negative perfectionism of the PNPS-12 were found. In particular, 'Healthy perfectionism' scored higher, when compared to other latent classes, in High Standards, Order, and Positive Perfectionism.

4. Discussion and conclusions

Perfectionism is a multidimensional construct related to the accomplishment of excellence and well-being. Perfectionism is expressed as a continuum (Chan, 2007; Fletcher & Speirs-Neumeister, 2012) of thoughts and behaviors with positive and negative aspects that are particularly relevant in high intellectual ability students, as they could modu-

Table 3. Latent profile indexes for the different models

Model	Log-likelihood	AIC	BIC	ssaBIC	Entropy	LMR-A	LMR-A p
1	-964.64	1941.29	1958.76	1939.78	-	-	-
2	-567.16	1154.34	1183.54	1151.90	.688	37.167	.029
3	-556.82	1141.64	1182.52	1138.23	.815	19.696	.054
4	-550.73	1147.45	1190.02	1133.07	.826	11.596	.442

Note. AIC=Akaike information criterion; BIC=Bayesian information criterion; ssaBIC=sample-size adjusted BIC; LMR-A=Lo-Mendell-Rubin-adjusted likelihood ratio test.

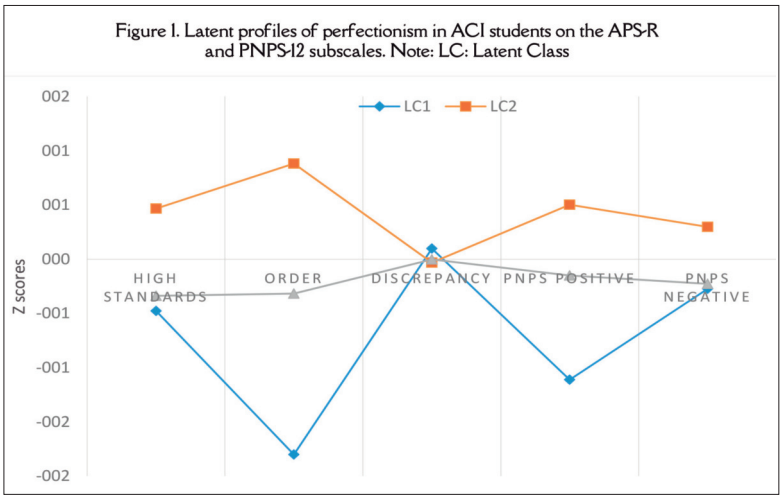

Figure I. Latent profiles of perfectionism in ACI students on the APS-R and PNPS-12 subscales. Note: LC: Latent Class

late the striving for excellence expected in them (Pyryt, 2007).

Beyond the pathological and clinical point of view (Costa, Hausenblas, Oliva, Cuzzocrea, & Larcan, 2016; Donahue, Reilly, Anderson, Scharmer, & Anderson, 2018), this study takes a perspective of perfectionism as a cognitive trait regarded as irrelevant in the high intellectual capacity, trying to differentiate the healthy/adaptive perfectionism from the unhealthy/maladaptive perfectionism. Considering the relationship between perfectionism, academic and personal achievement goals, and the fact that perfectionism is related to the inhibition or enhancement of different behaviors related to the consecution of these goals, detecting the different types of perfectionism and its components is indicated. This can lead to a better understanding of the student and enable the optimization of their motivation, efforts and executive regulation, preserving their well-being and providing a higher performance in academic settings. This is even more relevant in HIA individuals, where the existence of a high potential does not ensure the consecution of their goals.

Results obtained in the present study, by means of latent cluster analyses, performed applying the APS-R scale, found a three-cluster solution of perfectionism, similar to Frost's model (Frost & al., 1990) or the APS-R. This three-cluster solution is different to the 2 dimensional model (Healthy - Non Healthy) found by Stoeber (2018). Conversely, the results found are similar to Slaney's and others (2001) revealing a three-cluster structure: Cluster 1 (Unhealthy/Maladaptive perfectionism); Cluster 2 (Healthy/Adaptive perfectionism); and Cluster 3 (Non-

Table 4. Mean comparisons across perfectionism classes profiles

	LC1 (Unhealthy)		LC2 (Healthy)		LC3 (No perfectionism)					
	M	SD	M	SD	M	SD	F	p	Partial η^2	Post hoc comparisons
High Standards	-0.48	1.37	0.47	0.84	-0.34	0.78	11.361	<0.001	0.147	1<2, 2>3,2>1
Order	-1.80	0.42	0.88	0.36	-0.32	0.35	410.062	<0.001	0.861	1<2,1<3, 2>3
Discrepancy	0.10	0.86	-0.03	1.08	0.00	0.97	0.218	0.804	0.003	No differences
Positive PNPS	-1.11	1.07	0.50	0.74	-0.15	0.86	27.091	<0.001	0.291	1<2, 1<3, 2>3
Negative PNPS	-0.27	1.08	0.30	1.02	-0.23	0.87	5.801	0.004	0.081	1<2, 2>3,

Note. M=Mean; SD=Standard deviation.

Perfectionism). Contrary to Mofield and Parker-Peters (2015), the three clusters are validated, including Cluster 2.

Nevertheless, some differences regarding the scores of clusters' components arise. Cluster 1 (Unhealthy/Maladaptive perfectionism) was defined by high scores on Standards and Discrepancy, and low scores in Order (Parker, 2002; Speirs-Neumeister, 2007), but contrary to other studies (Chan, 2012; Mofield & others, 2015), which show high scores in all components. Cluster 2 (Healthy/Adaptive perfectionism) revealed high scores in Standards and Order but not on Discrepancy, corroborating the results of Chan (2012) and Parker (1997), suggesting that these students could be more adaptive than those of Cluster 1. Cluster 3 (Non perfectionism), similar to previous studies, (Chan, 2007; Chan, 2010) scored lower than the other two groups on all components except on Discrepancy where no statistically significant differences were found. Thus, and considering the absence of significant differences in Discrepancy, this component cannot be considered, attending to the results found in this study, as a differential element of Healthy/adaptive perfectionism or Unhealthy/non adaptive perfectionism, contrary to Chan (2012). Correlation analyses between the PNPS-R and the APS-R showed a significant and positive correlation between Order and High Standards with Positive Perfectionism; on the other hand, a high correlation was obtained between Discrepancy and Negative perfectionism, but not with Positive Perfectionism. In

addition, Discrepancy showed a significant correlation with Unhealthy/maladaptive perfectionism, and with Healthy/adaptive perfectionism.

The results found in the present study could provide relevant insight regarding the need to differentiate the positive from the negative perfectionism, as well as the Healthy/adaptive versus Unhealthy/maladaptive perfectionism in students with HIA (Chan, 2012). The early identification and guidance of HIA students with perfectionism could be essential in order to optimize the striving for excellence and achievement goals as a manifestation of their whole potential. In all, it is necessary to promote Healthy/ Adaptive perfectionism and adult eminence with exceptional products offered by what society calls genius. (Chan, 2012).

The results also enable a deeper understanding of the manifestation of perfectionism in HIA as one of its modulating variables to the expression of genius in adulthood. This could have a relevant impact in parents, educators, and psychologists at schools as the manifestation of perfectionism in HIA is heterogeneous. Some students reveal no perfectionism, others display healthy perfectionism, and, finally, others show an unhealthy manifestation of this psychological construct. Therefore, parents and professionals at school should promote activities and interventions in which the components of healthy perfectionism (high standards and order) can be enhanced. The digital era is generating a new scenario. Children and adolescents are surrounded by stimuli, devices, and activities that generate a new perspective in the development of cognitive skills and the way in which executive functions regulate their cognitive skills. Therefore, research must be done in order to better understand this phenomenon and this new context.

Finally, and considering the key role of motivation for the manifestation of high intellectual potential, more research about the relationship between motivation and perfectionism is needed, in order to promote an optimal expression of the intellectual potential and well-being of HIA students (Fletcher & Speirs-Neumeister, 2012). The consideration of all these aspects will enable better school intervention of HIA students that could lead to the implementation of educational interventions that take into consideration these and other relevant aspects such as digital culture.

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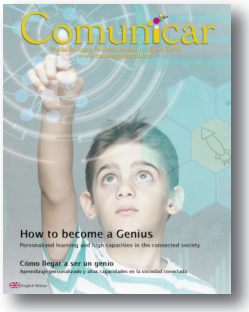

Educating the gifted student: Eagerness to achieve as a curricular competence

Educar y formar al alumno talentoso: El afán de logro como competencia curricular

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ABSTRACT

During the last decades, high intellectual abilities have been revealed as a decisive curricular factor that evidences the need to adapt content to students' characteristics. In Spain, various autonomous communities have designed programs that, through extraordinary activities, seek to respond to this demand and provide talented students with the appropriate context for the development and strengthening of their skills. In the case of Madrid, this proposal includes private involvement of an entrepreneurial nature that has demonstrated the possible connection between the two environments when considering the labor asset, fundamentally oriented to the resolution of projects by adolescent subjects with above average cognitive capacities. This research has examined, by means of a 180° questionnaire completed by 342 subjects (comprised of parents and skilled children, teachers and classmates) in seven Madrid schools, the possibility of identifying the 'eagerness to achieve' competence, considering that its early distinction enables its development in educational contexts and the training of students in order to promote individuals who focus their professional work towards the completion of assigned activities. The results obtained have also made it possible to draw up a generic profile of the talented student by combining his or her own assessments and those of his or her environment, and to recognize their most highly valued inherent aptitudes as well as those least valued.

RESUMEN

Durante las últimas décadas, las altas capacidades (AACC) se han desvelado como un determinante curricular que evidencia la necesidad de adaptar los contenidos a las características de los alumnos definidos por las mismas. En España, diversas comunidades autónomas han diseñado programas que, mediante actividades extraordinarias, persiguen responder a esta demanda y otorgar a los estudiantes talentosos el contexto propicio para el desarrollo y fortalecimiento de sus habilidades. En el caso de Madrid, esta propuesta presenta una participación privada de carácter empresarial que ha evidenciado la posible conjunción entre sendos entornos al considerar el activo laboral, fundamentalmente orientado a la resolución de proyectos, en el sujeto adolescente con AACC. Esta investigación ha examinado, mediante un cuestionario con naturaleza 180° cumplimentado por 342 personas (padres e hijos habilidosos, docentes y compañeros escolares) en siete centros madrileños, la posibilidad identificativa de la competencia afán de logro al considerar que su distinción prematura permite su trabajo en el contexto educativo y la formación del alumnado en aras a promover a un individuo que orientará su labor profesional hacia la finalización de las actividades asignadas. Los resultados obtenidos han permitido trazar, igualmente, un perfil genérico del estudiante talentoso mediante la combinación de sus propias apreciaciones y de las de su entorno y reconocer a las aptitudes inherentes mejor valoradas al igual que las calificadas de forma contraria.

KEYWORDS | PALABRAS CLAVE

Quantitative research, gifted students, secondary education, curricular adaptation, competence, talent, abilities, personalized learning. Investigación cuantitativa, altas capacidades, educación secundaria, adaptación curricular, competencia, talento, habilidades, educación personalizada.

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1. Introduction

Today giftedness has a relevant status in the Spanish educational legislative framework. Starting with Royal Decree 696/1995, of April 28, 1995, curricular adaptations were established for students with special needs (a set that includes, among others, talented students); since 2003, both the defense and the educational adaptations have followed in response to this typology. Among them, the Royal Decree of July 18 regulating the flexibility of the levels and lengths of instruction and its implementation for the region of Madrid, the geographical setting in which this research has been conducted, by means of Order 70/2005, of January 11. In this sense, this autonomous community has advocated for the development of a proposal for the complete and cross-sectional preparation of these students: the Educational Enrichment Program for Gifted Students. An initiative supported by the CEIM Foundation (Business Confederation of Madrid-CEOE), which contributes to the diversification and adaptation of curriculum contents through creation, experimentation and research. Alongside this project, the regulations in force, specifically Organic Law 8/2013, of 9 December, has determined the significance of curricular competencies as synonymous with the acquisition of knowledge corresponding to the educational, personal and working environments in an approach that integrates the European framework where the student is defined as a multidisciplinary and mostly practical individual. This orientation of the teaching-learning process towards the post-compulsory and higher education stages underlines the interest in equipping students with skills, abilities and knowledge that they can apply in professional settings in which the fulfilment of objectives becomes one of their essential actions (Steinbeck, 2011).

However, this contextual reality has hardly been addressed in the literature led by a study of students with high intellectual abilities. In the period starting in the 1950s, when giftedness became an object of study, and in the 1990s, when the leading variable became one of its defining characteristics, only a percentage below 3% of published research delved into the question of the manifesting and constructing union of talented students as individuals with this condition (Matthews, 2004). The 80's and 90's represented a certain conceptual consolidation, since, starting from the emergence of the term 'leadership', the relationship between talent and the corporate environment was established (Riley, Karnes, & McGinnis, 1996; Riley & Karnes, 1994; Chauvin & Karnes, 1983). Moreover, the beginning of the twenty-first century has involved a diversification of analytical perspectives, with results that have proposed a series of innate traits in the talented student: who not only possesses successful intelligence (Sternberg, Grigorenko, Ferrando, Hernández, Ferrándiz, & Bermejo, 2010; Chart, Grigorenko, & Sternberg, 2008); he/she is also motivated towards achievement and is socially gifted (Artola, Barraca, & Mosteiro, 2005) as well as capable of self-stimulation for problem solving and decision making (Pérez, González, & Díaz, 2006). However, in this profile underlying the leader's condition, emotional and social conditions coexist (assessment of the environment, self-knowledge, communicative abilities, personal and educational relationships) (Sastre-Riba, Pérez-Sánchez, & Bueno, 2018; Feldman, 2015; Freeman, 2015; Sastre-Riba, 2012) which can limit the exponential value of the eagerness to achieve, standardizing the talented individual. Consequently, their differential qualities and aptitudes could be partially projected into performance and work environments in breach of the longitudinal patterns established by the early cognitive theories (Freeman, 2015; Schiltz & Schiltz, 2007). Thus, the state of the art points to a proliferation of analytical methodologies and precepts in response to a general interest in understanding both the highly skilled individual and his or her specific status throughout compulsory schooling.

Within this framework, the understanding of the differential component that could explain the success of certain children and adolescents with high intellectual abilities with respect to both their peers and other subjects of the same age who do not share their defining abilities has become one of its fundamental objectives. On the contrary, the fact that there is no determinant theory that allows the unequivocal categorization of individuals with high intellectual abilities, gifted and talented, among other attributes (the use of these terms interchangeably is common and maintained throughout this study); neither a measurement system that provides fully reliable intelligence indices (Sastre-Riba, Castelló-Tarrida, & Fonseca-Pedrero, 2018; Jiménez, 2000) hinders the development of interconnected research that delves into the cognitive and environmental conditioning factors of the achievement of study subjects.

In this sense, and relative to this paper, the primary objective emerges from this contemporaneity of the examination by understanding that, in effect, highly talented pre-university students possess skills and abilities that, generically, lead them to success. The central research question raises the possibility of identifying the competence that promotes achievement during this educational period; whereas the primary hypothesis points to the validation of a study instrument designed for this analysis (the 180° questionnaire) that would enable an early distinction between these capabilities for the sake of their development and strengthening as well as their subsequent application in the work environment. Therefore, the analytical proposal presented in these pages is offered as a methodological resource

for future applications that maintain their examination focus on talented young people and wish to delve into the influences and effects that workers with these characteristics can exert on the results of their own professional activity.

2. Material and methods

2.1. Instrument

The measurement instrument used in this research was the 180° evaluation questionnaire, intentionally created in the absence of pre-existing models that examine both the general educational competencies included in the teaching-learning process of students with high intellectual abilities and their correlation with the work scenario. For this reason, the instrument is based on the so-called 360° questionnaire, which is frequently applied in the aforementioned setting, and which offers a stereoscopic view of the employee by associating the valuations offered by subordinates, equals and superiors. The reason for his choice was that, since the opinions of the subjects analysed coexist with those of people around them, the degree of distortion of reality and its consequent appreciation derived from self-description decreases.

Thus, the resulting questionnaire has been validated by 33 evaluators with academic (11), business (11) and mixed (the remaining 11) profiles and is comprised of 42 questions grouped into six thematic blocks (seven for each of them) that address the need to catalogue competency items considered essential for achieving success and covered under the concept of eagerness to achieve. It is worth noting that several of these tenets coincide, in their uniqueness, with capabilities that have been the subject of study in recent scientific publications. These highlight, on the one hand, the recognition of their value as generic constituents of the individual with high intellectual abilities and, on the other, the future towards which research seems to be aimed in the pre-adult stage. Thus, the following have been undertaken: 1) Achievement of objectives (Sastre-Riba, 2012), 2) Eagerness to overcome (own or externally established standards), 3) Practical sense (Cáceres & Conejeros, 2011; Sierra, Carpintero, & Pérez, 2010; Lokajícková, Zelenda, & Zelendová, 2008), 4) Perseverance (regardless of difficulties), 5) Creativity and innovation (Castelló, 2014; Sastre-Riba & Pascual-Sufrate, 2013) and 6) Demonstration of confidence (through self-confidence and the coherence, maturity and soundness of one' s actions). In turn, each of the questions has been answered following a Likert scale model, with a choice of five closed answers showing the lowest or highest degree of agreement with the statement (being 1=I completely or mostly disagree and 5=I completely or mostly agree).

> Students with high intellectual abilities have a series of competencies that can be self-identified or identified by people in their environment that, if properly analyzed and developed, would stimulate their eagerness to achieve in their academic and professional activity. Teachers can promote this adherence for the sake of training a well-rounded and multilevel employee, while addressing the individualities that define the highly skilled student body.

2.2. Participants and procedure

The research involved 38 adolescents (n_1) (24 boys and 14 girls) with high intellectual ability, aged between 12 and 16 and enrolled in seven educational centers (public, private and subsidized) in the Autonomous Community of Madrid. Given the age bracket, the different levels of Compulsory Secondary Education were represented as follows: 1st, 13 students (34.2% of the total); 2nd, 8 (21.1%); 3rd, 8 (21.1%) and 4th, 9 (23.7%). Due to the 180° nature of the questionnaire, each participant with high intellectual abilities was accompanied by eight others (the double parental figure –n_2–, three teachers –n_3– and three classmates –n_4–), resulting in a total sample (n) of 342 respondents who completed the study tool consecutively. This is an intentional non-probability segment defined by the selection of participants based on their diagnosis as talented students and/or their acceptance to participate in the study. In addition to geographic limitations, two determining factors restricted the analysis, since, in addition to the fact that many schools that had students with the required profile did not wish to participate, only 1% of these

subjects are recognized as such by the Spanish educational system (Hernández & Gutiérrez, 2014). For this reason, the results set out below, which are more than conclusive, are representative and indicative for the application of the questionnaire in other provinces or on a national scale, depending on the objectives. A partiality that is not exempt from reliability nor does it detract from the internal consistency of the instrument (measured through the Cronbach Alpha coefficient with a value of α=0.98 for the totality of the questionnaire and ranging between 0.87 and 0.97 points in the case of blocks). Likewise, and due to the characteristics of the instrument, various statistical techniques and tests have been used which have given the study the aforementioned reliability: the nonparametric Mann-Whitney U tests have been applied in the comparison between the results of the 38 adolescents because, since they are reduced samples based on sex, they could have hindered the verification of the associated distributions' normality. For their part, Student *t*-tests of paired samples have been used to contrast the valuation of each of the items by the 342 participants and the total results for each of the six blocks based on the four profiles of respondents, estimating the degrees of association between them using Pearson's correlation coefficients.

3. Analysis and interpretation of results

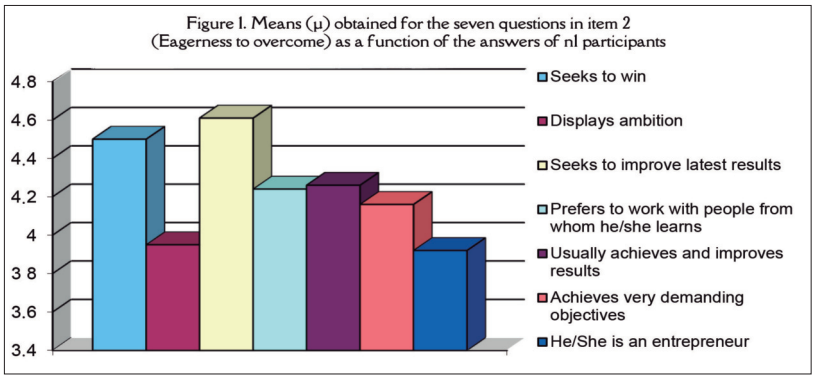
In general terms, the data obtained revealed that high intellectual ability adolescents enrolled in Compulsory Secondary Education have skills and aptitudes that point to the integrative competence of eagerness to achieve and, therefore, to an inherent employment value. The diversification of the competencies into six items and their corresponding evaluative statements also enabled these adolescents to describe their own profile: they define themselves as responsible and autonomous individuals, who are attracted by new challenges, who do their best in activities and are interested in completing the projects in which they are involved (even if this means overcoming obstacles) for those who prefer to collaborate with practical people. On the contrary, they are identified to a lesser extent with deadline compliance, entrepreneurship and ambition, practical and direct resolution of exercises, perseverance and innovation or originality. In the following paragraphs, the most relevant results derived from the completion of the questionnaires by the four participating groups are presented, taking as a comparative reference the group constituted by the subjects under study.

3.1. Competencies with higher degree of identification according to the students with high intellectual abilities and their parents

The responses of n_1 have shown that, of the six structural items, number 2) Eagerness to overcome, is the competence that most accurately classifies them, with the desire to improve their latest results as the precept that obtained the most significant evaluation of the total 42 for this participant profile (μ=4.61 with a 95% confidence interval, a statistical reference that is established as a constant for most cases). This inherence towards surpassing the pre-established standards is also reflected in the remaining six responses of the block: as shown in Figure 1, their respective averages (μ) are around four points, with entrepreneurship displaying a lower correspondence index (μ=3.92). In addition, differences according to gender were observed in the sense that responses by female students display a greater interest in collaborating with people who can act as a source of learning. On the other hand, the self-perception of talented students manifested in this block does not coincide with that of their parents (n_2, 76 participants) who decrease the appreciative value given to the desire to overcome (p-value=0.032).

Meanwhile, practicality (item 3) is perceived favorably by talented students who place a high value on the possibility of working with people who actively participate in the implementation and completion of projects (μ=4.58). Within the results obtained in this block and as shown in Figure 2, the statement relating to the transformation of ideas into real facts or concrete actions is the one that has obtained the lowest correspondence value (μ=3.87), perceiving a statistical significance (p-value=0.100) in the face of the participants' recognition that they take advantage of the opportunities presented to them by acting on them. Again, this data is compared with that obtained in the parental questionnaire, since, before μ=4.37 of the former, μ=3.88 of the latter (p-value=0.002) is presented, highlighting the scarce appreciative coincidence. Another piece of statistical data that has been glimpsed in the case of this item and for this same group of participants is that, although its value is lower than the previous one (p-value=0.076), it is assumed that, on a daily basis, the aim is to increase one's own productivity.

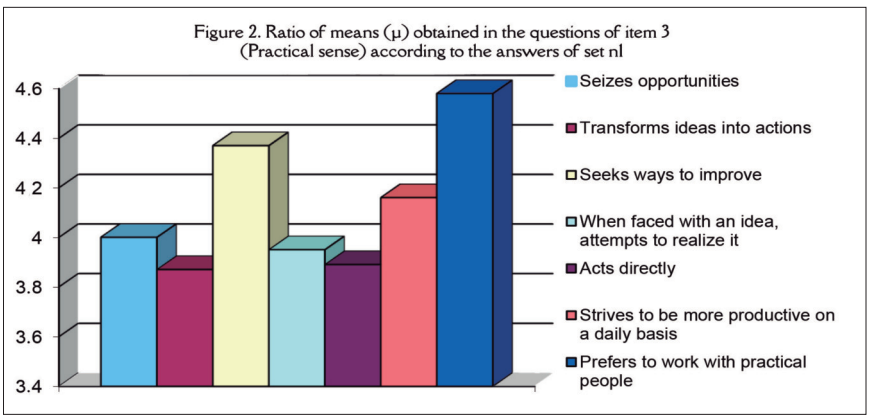
Item 6) Demonstration of confidence stands as the third best valued by talented students. According to their answers, represented by bars grouped in Figure 3, this competence is evidenced through autonomy (μ=4.55) and the defense of personal opinion in an educated and safe way towards people with authority (μ=4.47); skills and aptitudes that, in general, contribute to the configuration of the profile of the entrepreneurial and successful worker.



On this occasion and contrary to the previous ones, the gender distinction between surveyed students does not reveal significant differences, and appraisal equity is observed. The same happens when the responses of n_2 are contrasted, with only a significant statistical distance emerging (p-value=0.095) when analyzing the force factor indicators for overcoming situations, resulting in μ=4.13 in the case of students and μ=3.92 in the case of their parents.

The representative means of the six items (understood as the highest ones attributed to one or several of the seven precepts that make up each block), defined by differences that are not very relevant to each other, maintain their correspondence with the value 4 in the three remaining cases (1) Achievement of objectives, μ=4.42; 4) Constancy, μ=4.39 and 5) Creativity and innovation, μ=4.26) revealing a high degree of affirmative perception, as can be distinguished in Figure 4. In this sense, students with high intellectual abilities recognize that they assume responsibilities without delegating to others and act to achieve the objectives regardless of the effort and the obstacles they have to overcome. These aptitudes are related to those that show their commitment to the tasks assigned and their consequent responsibility, and are also linked to the recognition that the challenges they face are attractive to them.

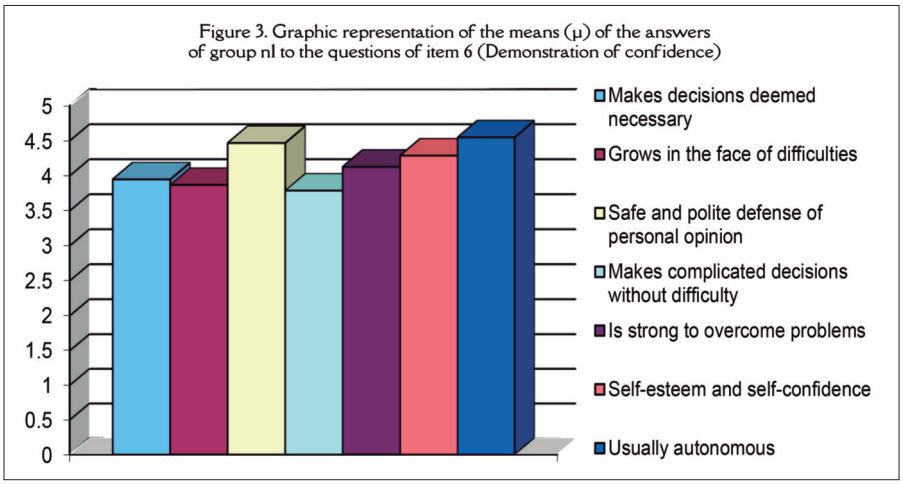
Opposite to the active and resolute identity that these affirmations reflect, the interpretation of the values obtained in these three blocks has also clarified data that point to a subject with high intellectual abilities that does not maintain a constant rhythm of work (μ=3.82) and with little interest in experimentation, while at the same time, is a denier of all routine (μ=3.32). Self-assessments that differ from those made by n_2 (p-value=0.072), which shows a greater degree of agreement with the statements presented in the block. However, faced with the identified tendency to associate the highest values with the female student sector of the sample, creativity and innovation are presented under the item that has the greatest interest for the opposite sex, especially given the attractiveness of new challenges (μ=4.42, $\overline{X}$=4 versus μ=4.00, $\overline{X}$=3) and the use of original alternatives for established activities (μ=3.83, $\overline{X}$=4 versus μ=3.63, $\overline{X}$=3).



3.2. Competencies with a greater degree of identification according to teachers and non-talented students

With regard to n_3 (114 respondents), it should be noted that the answers associated with items 3) Practical sense, 4) Perseverance and 6) Demonstration of confidence, all corresponded to averages with values between 4 and 5 points (100 percentage value); this has been interpreted as a double confirmation: not only do students with high intellectual abilities display the competencies examined, but these are also identifiable by teachers. At the same time, these three blocks and their accompanying precepts define a future employee in whom the concepts and attributes relating to resolution, proactivity and confidence both in oneself and in one's actions coexist.

For its part, n_4, also comprised of the 114 classmates of talented students, is the one that shows the greatest value heterogeneity when comparing its results with those of the other three participating profiles. If the blocks 1)



Achievement of objectives and 4) Perseverance, are similarly valued by the students object of study and the participants of the same age, the answers given to the statements of 2) Eagerness to overcome, pose a noticeable distance: opposite to n_1, n_2 and n_3, who have displayed a greater degree of agreement with the evaluated phrases, the members of n_4 have concentrated their answers in the intermediate values of the Likert scale (3=I agree and 4=I agree enough) reducing the level of coincidence. The same happens with competence 3) Practical sense, obtaining averages that oscillate between 3.63 and 3.93 points (representing 71.42% of the answers) with the exception of two that do so in the next higher spectrum (with values of 4.15 and 4.25 points and representing 28.57%).

This appreciative disjunction, established as a defining trait of regular students (those who do not display high intellectual abilities), was maintained for the most part in their evaluations, assigning lower values to most of the precepts and asserting, for example, that they do not consider their peers with high intellectual abilities to struggle to achieve their goals in such a resolute way (with a p-value=0.027 opposite μ=4.42 and μ=4.12), nor do they demonstrate an interest in success and improving their results, a desire to work with people from whom they can learn or an attraction to challenges (p-value=<0.001). These lower peer ratings reflect, given the instrument and its nature, the evaluative viewpoint of peers determining a series of numerical results that are relatively distant from the coincidences between parents and teachers.

3.3. Degrees of appreciative correlation of the competencies according to the participant groups

The value diversifications explained disappear when the unifying comparative criterion is applied; that is, when the results of all the questions posed for each of the six blocks are added together, maintaining the reference of a gradual scale based on the greater (value 35) or lesser (value 5) degree of agreement. As shown in Figure 5, the resulting μ for each of the constituent sets of n (in which n_1=students with high intellectual abilities, n_2=parents, n_3=teachers and n_4=classmates) are located in a numerical spectrum ranging from 25.5 to 30.2, reducing the separations that are evidenced when analyzing each of the participant groups individually or comparatively

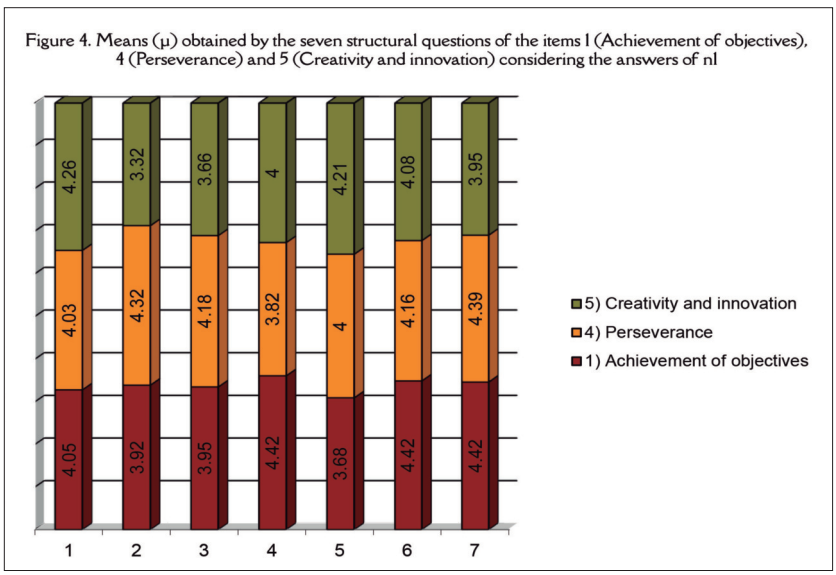


Table 1. Items 1, 4 y 5 accompanied by the seven questions that make up their blocks			
	1) Achievement of objectives	**4) Perseverance**	**5) Creativity and Innovation**
Question 1	Difficulties do not affect him/her	Adamant in the face of unforeseen events	Lure for new challenges
Question 2	Influences occurrences	Alternates when faced with difficulties	Routine scarcity
Question 3	Launches projects	Adamant when confronted with problems	Original alternatives
Question 4	Does not delegate	Constant pace of work	Changes to improve
Question 5	Applies deadlines	Self-esteem in the face of difficulties	Enjoyment of work well done
Question 6	Acts for achievement	Finishes projects	New ideas in the face of challenges
Question 7	Overcomes obstacles	Responsible and reliable	Positive impact in the context

by means of pairs and denoting an internal consistency reflected by a variance of 0.926 points and a mode=5.

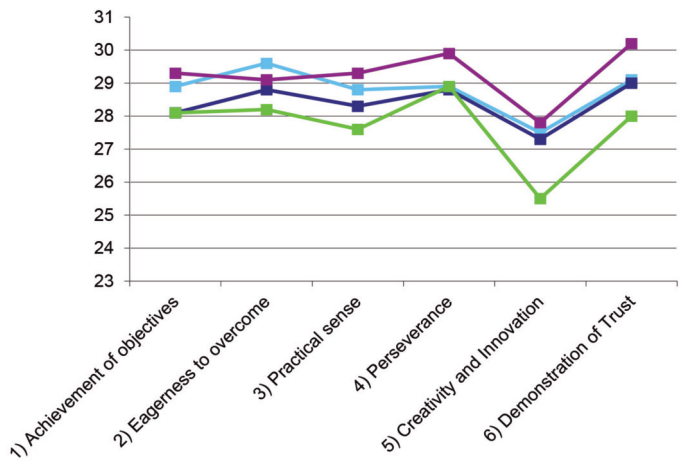
In turn, the figure reveals two assessment near-equities: the first, reflected by the line of set n_4 members that imitates in lower values that of n_3, emphasizing what we propose (the marked distinction and valuation of the competencies examined and the latent eagerness to achieve in the students with high intellectual abilities on the part of their teachers and their opposite evaluation by peers). And the second, that parents and children coincide almost univocally in their answers to the different questions that constitute the instrument employed. Similarly, Figure 5 clarifies what was presented in preceding paragraphs regarding the subject of study: the talented student is considered an individual with an eagerness to overcome that, conversely and when facing established tasks and undertaking innovative ones, lacks creativity.

4. Conclusions and discussion

Firstly, the study reveals the existence of a series of competencies that are understood as qualifiers of the student with high intellectual abilities, both by the members of this group, and by the people in their academic and personal environment. The fact that the questionnaire was based on six structured competence blocks, and seven questions, has made it possible to identify and delve into those skills and aptitudes that demonstrate the existence of the desire to achieve in talented students. The examined teenager acknowledges being responsible and autonomous, as well as practical in finalizing his/her projects and being drawn to new challenges. A series of qualities that define the productive profile required in the global work environment.

However, the life stage of set n_1 in which the study took place and for which we propose its application, involves considering possible factors that may alter both the recognition and the consequent development and reinforcement of these competencies: according to the results, the assessments by adult participants have been almost coincident in all cases, with the responses from same-age respondents differing in their level of concordance. In this sense, the assessment of the people in their environment influences the individual more than his/her own; the subject's own consciousness of the positive or negative assessment by peers can affect him/her at an emotional level, giving rise to certain actions and responses: the pursuit and maintenance of perfectionism and excellence (which can lead to depressive or suicidal tendencies) (Cross, Riedl, Mammadov, Ward, Speirs, & Andersen, 2018; Gaesser, 2018; Riedl & Cross, 2015; Christopher & Shewmaker, 2010) or the denial of differential capabilities and aptitudes as a search for standardized categorization. For this reason, the emotional factor should be included in future analytical schemes as it is considered to directly or causally affect several of the competencies presented (Ogurlu, Yalin, & Birben, 2018;

Figure 5. Average scores of the participating groups for each of the items in the questionnaire



Turanzas, Cordón, Choca, & Mestre, 2018), the process of cognitive, professional and personal evolution designed for each of the cases (Ramos, Herrera, & Ramírez, 2010), and even work skills.

The mapping of skills based on this 180º questionnaire reinforces the need to adapt curricula for the educational and training processes of talented students: in spite of the intra- and extracurricular work that is being done to strengthen and consolidate these competencies, there are still no sufficiently stable analytical and methodological approaches that would allow us to address and work with the qualifying uniqueness of the skilled student. The contemporary educational context, an incentive for transversally trained adolescents, points to the need to respond to specific needs by delving deeper into those abilities and competencies that, adhered to and reinforced through the teaching-learning process, will enable them to enter the workplace and effectively perform the tasks assigned to them.

Therefore, having confirmed this appreciative possibility in the educational context of compulsory schooling, although on a regional scale, it is helpful to know that it is not only possible to enhance and reinforce the skills and abilities examined in highly capable students (Sastre-Riba, 2014), but also, that this results in premature training of the successful worker. At the same time, this association between the teaching-learning environment and the professional, is detached from the self-assessments made by each of the participant sets with regard to the proposed competencies: the result is a student profile with high intellectual abilities that has a high desire to achieve and overcome, based on confidence levels both towards his/her own person and his/her activity. The interest in practicality, perseverance and challenges, among others, support them as individuals destined to face new situations applying knowledge and skills previously acquired. For this reason, the possibility of glimpsing these characteristics prematurely is understood as a collateral effect of the productivity that these students could manifest during their professional lives, as argued before, leaving the student exposed to a set of factors and influences that can alter their stated degree.

Related to this, the inclusion of the professional scenario as an analytical variable in future studies is considered appropriate because it allows the verification of the implementation of previously developed competencies and to discern their development and consequent evolution in the new context. This difference invites the design and subsequent application of a cross-sectional review based on an extended chronology (serving as an example the one carried out by Freeman, 2015) which, complementary to the one proposed, could revalidate the assertion that the eagerness to achieve is inherent in adolescents with high intellectual abilities acting as a motivating factor both, in the accomplishment of their academic activities, and in the completion of their professional projects. In this way, and by combining two analytical proposals, it would be ascertained whether their professional work is manifested through those items with which they have identified themselves to a greater degree (autonomy, trust, achievement of objectives, practicality, or overcoming, among others), while at the same time reviewing the influence that the factors commented on previously (such as execution time or competitiveness among workers) can exert on them, as they are specific to that other environment.

To conclude, the education of talented students towards notoriety in the workplace is presented as feasible, as well as conditioned by the identification and consequent deepening of the eagerness to achieve competence that underlies their capable identity. This student profile possesses a series of knowledge, abilities and attitudes that, generically, reinforce his/her condition as a labor asset possessing a multilevel competence and oriented to the attainment of objectives and achievements, as well as leadership. Therefore, and taking into account its inherence, the compulsory educational context proves to be suitable for the development of the process described, with teachers as the source of its implementation, due to their greater degree of objectivity when compared to parents, who, likewise, can promote this process in the family environment, favoring a teaching-learning process that is cross-sectional and not limited to the purely academic context.

However, it should also be borne in mind that each student with high intellectual abilities has an identifying autonomy and displays a series of acquisitive, cognitive and emotional features that require the individualization of their training, so that education of the proposed competencies, and more specifically the eagerness to achieve, corresponds with their own values and abilities, designing a progressive scheme of reinforcement and disposition for their establishment in the subsequent work scenario.

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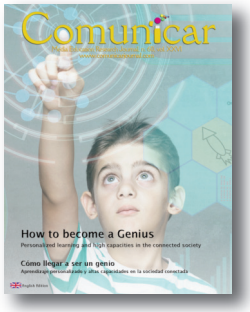

Children with grand Imaginaries: Bringing them closer to the world of science

Pequeños con grandes imaginarios: Cómo acercarlos al mundo de la ciencia

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ABSTRACT

Although at present there are academic strategies for scientific dissemination, it is still a challenge for the general population to access quality information that is reliable, easy to understand and motivational towards science. This article proposes an image-based educational scientific dissemination tool with the goal of bringing children closer to science, through the recognition of relevant characters and their contributions. The study was developed along three stages. The first and second were conducted through a qualitative analytical approach with an interpretative perspective, using a documental method, with a review and analysis technique. During the first stage, a review and selection of studies related to scientific dissemination for children was conducted. The second one focused on the identification and selection of scientific characters, through the establishment of categories and criteria. The third stage relates to the design of outstanding characters' biographical cards. The main contribution of this proposal is the assembly of a semantic network to portray a completed character profile, time context, place of origin, contributions, impacts, acknowledgements or prizes, as well as limitations or difficulties in context. Therefore, a mean of disclosure was devised through cards with a highly graphic and animated content regarding scientific characters sized in a gaming strategy called 'Sapiencia', a ludic and motivational learning tool.

RESUMEN

Actualmente existen estrategias académicas de divulgación científica, aunque sigue siendo un reto para la población en general acceder a información de calidad, fiable, fácil de entender y que genere motivación hacia la ciencia. Este artículo propone una herramienta educativa para la divulgación científica basada en imágenes con el objetivo de acercar a los niños a la ciencia, mediante el reconocimiento de personajes relevantes y sus contribuciones. Esta investigación se desarrolló en tres fases. La primera y segunda mediante un enfoque cualitativo de tipo analítico interpretativo, en donde el método es documental y las técnicas utilizadas son la revisión y el análisis de información. La primera fase corresponde a la revisión y selección de documentos relacionados con divulgación científica para niños. La segunda, se enfoca en la identificación y selección de personajes científicos mediante la construcción de categorías y criterios. La tercera corresponde al diseño de tarjetas biográficas acerca de personajes destacados del ámbito científico. Un aporte fundamental de este trabajo es la construcción de una red semántica para la caracterización del personaje según el perfil, el contexto de la época y del lugar de origen, sus aportes e impactos, reconocimientos o premios, barreras y limitaciones contextuales. A partir del cual se propuso una estrategia de divulgación mediante tarjetas biográficas con un alto contenido gráfico de personajes animados del ámbito científico y el juego «Sapiencia» como herramienta lúdica y motivacional.

KEYWORDS | PALABRAS CLAVE

Dissemination, education, science, children, games, learning, motivation, characters.
Divulgación, educación, ciencia, niños, juegos, aprendizaje, motivación, personajes.

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1. Introduction

Society is facing increasing challenges in terms of capacity-building in science, technology and innovation in the face of technological, economic, environmental, political and social change. Faced with this context, children must be encouraged to develop capacities that will enable them to recognize and become involved in the progress of the globalized world. The demands of a sustainable society, megatrends (Lay-Arellano, Salas, & al.., 2016), artificial intelligence and its contribution to Industry 4.0, geopolitical changes, among other aspects require citizens with new thought patterns, more sophisticated skills and abilities (Gidley, 2010) in different aspects, both scientific, technological, regulatory and business-related, among others (Jerman, Pejić-Bach, & Bertoncelj, 2018). They also need high levels of education and accessibility to information, allowing them to understand the use of resources and develop new approaches to change, i.e. a critical and participatory citizenship (Díez-Gutiérrez & Díaz-Nafría, 2018).

Within the trends that generate these new dynamics we can highlight how the knowledge economy has led to a need to create an innovative environment in countries with a knowledge-based economy (Olaya-Escobar, Berbegal-Mirabent, & Duarte, 2014). Thus, the strategies that enable the transformation, transfer and appropriation of knowledge and technology have focused on the articulation of the three actors that make up national innovation systems: universities, as knowledge generators; companies, which apply that knowledge to offer new and better solutions to society's needs; and finally the state, in charge of regulating and encouraging transfer policies (Etzkowitz & Leydesdorff, 2000).

Thus, the dissemination of science becomes a determining aspect to meet societal challenges in a context that is continually changing. In this setting, children are key to create new co-existence lessons because of their abilities, level of environmental awareness, creativity and ease of learning. Some authors recognize that generating learning spaces for children where there is interest in science, technology, research and innovation is fundamental in the context of 21st century education. Evidence suggests that the school stage is ideal for awakening and maintaining vocational interest in disciplines such as science, technology, engineering and mathematics (STEM) (Ocumpaugh, San Pedro, Lai, Baker, & Borgen, 2016).

Based on the previous context and the changes involved in strengthening the capacities and skills of citizens and specifically those of children to face and take advantage of current challenges, this article proposes an educational tool for scientific dissemination, based on visual communication to bring children closer to science. This work is organized in five parts: the first, aimed at the contextualization based on the literature and theoretical references related to strategies for science learning and motivation in children. The second, focused on the identification and selection of scientific characters, and the construction of a database to compile relevant information about each character and to identify labels, categories and criteria. The third part is dedicated to the design of an outreach strategy based on the creation of cards about outstanding figures in the scientific field. The fourth section covers the analysis of results, and the fifth and final part offers conclusions and recommendations.

1.1. Strategies for science education and motivation in the child population

At a global level, initiatives have been developed to encourage interest in science. In the United States, teachers have been urged to integrate scientific and engineering practices in science teaching, promoting learning in children and motivating them towards science activities (Guzey, Moore, Harwell, & Moreno, 2016). In Germany, the concept of 'Bildung' has been applied to refer to reflective actions, self-education, citizenship training and responsibility for the subject from a proposal of transformative learning around scientific knowledge (Sjoestroem, Frerichs, Zuin, & Eilks, 2017). From a different perspective, Bevan (2017) proposed 'Doing' as a productive way of teaching and learning science, directing it to the design of physical and virtual parts related to STEM areas (Science, Technology, Engineering & Mathematics), seeking to encourage creativity and design in science and engineering practices. Thus, experimentation, investigation, interpretation, discussion and evaluation in spaces of scientific training classes, allows schoolchildren to have a positive attitude towards STEM areas (Bogdan & Greca, 2016). Currently, the need to prepare primary students under the STEM approach is strong, and requires implementing technology in learning experiences; therefore, STEM-based pedagogical units are proposed, based on research that can be implemented in existing programs, addressing the creation of new didactic strategies that meet learning needs, where interactive designs and participation are essential (Schmidt & Fulton, 2016).

These 21st century learning strategies for children are developed taking into account technology, new media and information and the different ways of relating to each other. Allison and Goldston (2018) found in their research that scientific activities are enriched by multi-literacies and scientific practices. It is understood as a new literacy proposal

in which the use of language must be considered according to the different social and cultural situations, developed in technologies and the media, connecting them with an active participation on the part of the child in tying knowledge to the context. In addition, Roth and Lee (2004) propose a scientific literacy based on daily life, that is, an approach to the scientific world from the family, the community and its problems, with an emphasis on showing science as something close and with multiple possibilities outside of school.

Castro et al. (2015) argue that there should be an environment that promotes scientific literacy and fosters research, highlighting students' strengths and identifying needs that lead to the application of concepts to everyday life and the understanding of nature on the basis of science, thus achieving the promotion of transferable skills and management of technological tools through strategies related to games and social networks; particularly successful activities in young people who are not interested in STEM areas (Gilliam, Jagoda, Fabiyi, Lyman, Wilson, Hill, & Bouris, 2017).

In his 'the three rings 'model, Renzulli (1978) indicates that giftedness is a condition that can be developed if there is an appropriate interaction between the person, his/her environment or particular area of work. This model proposes 'the grouping of traits that characterize highly productive people' and identifies three interrelated traits that define a gifted individual. These are above average overall ability, high level of commitment and motivation, and high level of creativity.

> Images are important resources for the teaching-learning process because they facilitate the understanding of abstract contents, generate motivation and a desire to deepen knowledge, improve memory, aid in the acquisition of new knowledge and foster curiosity in dealing with scientific subjects.

Previous studies show that children's motivation towards scientific knowledge is important to develop their learning and critical spirit, so that they can explore the world around them through research (Campanario, 1999) and can think about and propose possible solutions to problems in their context, thus, stimulating the generation of ideas, creativity and the ability to propose solutions; these are key elements in learning, and fundamental elements to promote in children the traits that characterize highly productive people.

There are countless activities to generate motivation for science such as: thematic camps, which evidenced that 'students need to be exposed to diverse scientific experiences during their learning process, in formal or non-formal educational spaces, so that they can develop a more realistic and general image of scientists and understand their role and function in society' (Vendrasco, Gallardo, Guzmán, & Santibáñez, 2017: 1683). On the other hand, there is role-play, which has allowed students to advocate their positions within the dynamics of the game, discuss and reflect from the information provided (Agell, Soria, & Carrió, 2015). Another activity consists of didactic sequences in non-conventional spaces such as scientific and technological museums (Cardona-Vásquez, Correa-Magaña, Sánchez, & Ríos-Atehortúa, 2017). Within this set of activities, the work of Scogin (2016) stands out. Using an interactive platform, he managed to get science students to work on projects within their classrooms, in collaboration with scientific mentors from all over the world through the Internet. His study determined that student motivation is fundamental to the success of the program and this was achieved through scientific practice via experiments and contact with scientists who were in permanent interaction with them addressing concerns and encouraging them in the process. This set of experiences on the web has proven to be successful and has received international recognition (Scogin, 2016). Price et al. (2016), after involving play in science learning, showed an improvement in attitudes towards science, strengthening the ability to identify biological systems and their functioning, based on a methodology using educational charts as a learning tool; thus, demonstrating that these didactic strategies help improve student performance over traditional methods. The evaluation results of the educational card game showed that students consider the game in general very satisfactory as a complementary strategy to reinforce the knowledge and skills acquired (Gutierrez, 2014).

Within the strategies to bring children closer to science, there were also those based on the inspirational component achieved through life stories that can become a point of connection between the present and the past and a way to study and understand the changes and the people who have made it possible. Recognizing that there

are people who have made great contributions throughout history can be a great motivational reference. Within these experiences, the work of Hwang (2015) who analyzed motivation towards natural sciences, after working with the biography of nine scientists in this area, stands out. This research shows that students achieve greater motivation and attitudes towards learning science through activities that generate interaction, promote creativity and break with the traditional way of teaching. In this regard, one might think that 'if an individual is interested in science and has an enriched learning environment, he/she might be interested in science in the future' (Castro-Rojas, Acuna-Zuniga, & Fonseca-Ugalde, 2015: 722). However, within this context of experiences and strategies the use of images has been identified as a means to achieve: a) The comprehension of abstract contents that are difficult to interpret (Otero, & Greca, 2004); b) The motivation to learn and deepen with complementary readings (Alonso-Tapia, & Vergara, 2005); c) The presentation of new concepts; d) The promotion of the recollection of the contents learned and taught (Llorente-Cámara, 2000); e) The cultivation of authentic communication in the classroom and related to daily life; f) The stimulation of the imagination and expression of emotions; g) The activation of previous knowledge (Rigo, 2014); h) The curiosity to approach scientific subjects, which also helps in the understanding of areas such as astronomy (Lee & Feldman, 2015).

1.2. Purpose and objectives

The object of this work is the design of an educational tool for scientific dissemination, based on highly graphic biographical cards and a game as a tool to consolidate the motivational play strategy. The purpose is to bring children (7 to 10 years old) closer to science through the recognition of relevant characters and their contributions. This is achieved through the construction of a semantic network for the description of the character according to his/her profile, place of origin, time and context in which he/she lived, his/her contributions and impacts, recognitions or awards and contextual barriers and limitations to which he/she was exposed.

2. Materials and Method

This research was carried out in three phases. The first and second by means of an interpretative qualitative approach based on the analysis of content as a method. The first phase involves the review and selection of documents related to the topic of scientific dissemination for children. The second focuses on the identification and selection of scientific characters, which have been considered geniuses because their contributions have had universal impact and have been a reference point in the field of knowledge (Gardner, 1993). The third consisted of the strategy design based on the construction of biographical cards and the game 'Sapiencia' as a ludic and motivational tool.

2.1. Systematic literature review

The review and selection of documents related to the topic of scientific dissemination for children was carried out using Scopus and Web of Science as the main databases, using the keywords: 'scientific education', 'diffusion or appropriation of science', 'science for children', 'play and science', 'game and learn' and 'investigation for children'. From these, the search equation was proposed, which allowed the collection of 317 articles related to the design and practice of non-conventional science learning strategies. The organization and analysis of the documentation was conducted using the bibliographic reference manager Mendeley.

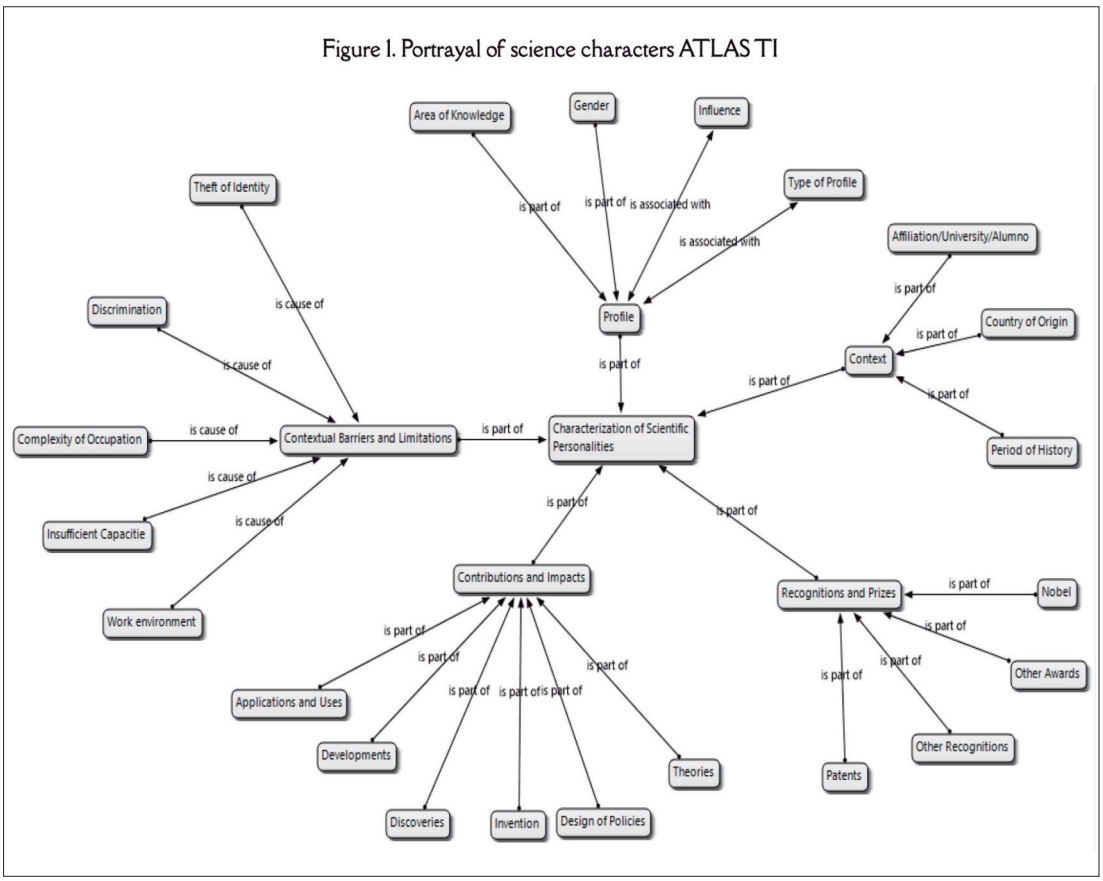
Among the unconventional dissemination strategies that seek to bring children closer to science through the recognition of scientists, we can highlight those related to collectible cards such as: a) 'Collectible cards'; the United States Patent and Trademark Office (USPTO) launched a series of collectible cartoon cards of inventors to recognize patent holders of various origins (https://bit.ly/2Sppx4O). There are also card games: b) 'Dones científiques, 30 segles de desigualtat' is a deck that pays tribute to science pioneers and makes their work visible (Roca, Moreno-Parejas, & Laporta, 2017); c) 'Top female scientists' is a card game that seeks to pay tribute to the work done by women in the field of science throughout history (Wakeford & Clark, 2018); d) 'Women in science' offers models for young people to encourage them to study science careers; through the game, you can learn about the contributions of female scientists (Charles & Fries, 2015).

2.2. Identification and selection of characters

For this phase, a database was built that compiled information on 374 characters and involved the assignment of labels, categories and criteria for their classification and subsequent selection. The information was collected through articles on the web oriented towards the recognition of scientific personalities such as: a) Women with

science, a blog about women scientists. This is part of the science dissemination activities of the Chair of Scientific Culture that seeks to promote scientific and technological knowledge in Basque society; b) The USPTO which has generated spaces for the dissemination of scientific and technological knowledge for children, young people, elementary and secondary school teachers; c) 'Lifeder', a site specialized in psychology, personal development and general health; d) Cognovisual which has a space called 'Invisible Women', made up of a sample of posters about the life, challenges and contributions of women who made valuable contributions to humanity's knowledge. Additionally, there are academic works, like the one by Gutiérrez (2017) who seeks to highlight the work of women who have been inventors in order to encourage them to consider engineering as their profession. In his book (2012),

Figure 1. Portrayal of science characters ATLAS TI



Claramunt compiles life stories of women dedicated to science emphasizing their contributions and the problems they faced. Roca and others (2017) present a proposal in which they emphasize the importance of learning by playing through a deck of cards with 52 characters, approached from pedagogy and didactics.

2.3. Card and game design as a ludic tool

The last stage was dedicated to the design of highly graphic cards about outstanding people in the scientific field, highlighting the following elements: the profile and context of the character, their contributions to knowledge and impacts on technological development, and recognitions or awards that were granted and contextual barriers or limitations that faced. From the cards, the game 'Sapiencia' was proposed as a ludic and motivational tool through the recognition of relevant characters and their respective contributions to science.

3. Results

With the documentation compiled, a qualitative information analysis was performed using ATLAS TI in order to conduct an exploratory analysis of contents and generate the semantic network, which made it possible to identify the labels that give rise to the categories and selection criteria. Figure 1 shows the semantic network generated and

Table 1. Categories for character classification		
Label	**Categories**	**Criteria**
Character profile	Gender	- Female - Male
	Field of knowledge (STEM)	- Biology - Physics - Math - Medicine - Chemistry - Technology
Context	Historical Period	- Ancient Age - Medieval Age - Modern Age - Contemporary Age
	Country of Origin	- Related to the character's country of origin

the categories and criteria, according to the terms of greatest relevance in the analyzed documents.

From the semantic network, five main labels were established, which in turn were divided into secondary labels (Figure 1). The first one relates to the character's profile; it has secondary labels such as gender, profile type, influence and area of knowledge. The second is related to the period of history in which he/she lived, country of origin and institution to which the character belonged. The third relates to the contributions or impacts generated by the character and it subdivides into: applications and uses, developments, theory and law proposal, discoveries, inventions and policy design. The fourth is related to awards and recognitions: Nobel Prize, patents received, Fields Medal, Letterstedt Prize, Davy Medal, Matteucci Medal, Willard Gibbs Prize, among others. The fifth and final one relates to barriers and limitations in complicated work environments, low regional scientific and technological conditions, work complexity, discrimination and misappropriation of work and/or recognitions.

Based on the labels from the semantic network determined through document analysis with ATLAS IT and recurrence of terms, the categories and scoring criteria were selected. Table 1 shows the selected categories which enable the characters to be classified and grouped by common characteristics. Taking into account the most relevant labels for the purpose of this work, four categories were determined: gender, STEM area of knowledge, country of origin and historical period.

On the other hand, Table 2 shows the criteria that enable each character to generate points. Three criteria were determined, assessed on a scale of 1 to 5, with 1 being the lowest and 5 the highest for each criterion. The first is related to the recognitions or awards granted to the character, the second is related to contributions and impacts, and the third is related to the contextual barriers or limitations faced by the character throughout his or her career (Table 2 for details). On the third column of Table 2, the evaluation criteria for assigning the score are listed.

Table 3 shows the proportion by category of the 32 characters selected to pilot test the bibliographic cards.

As shown in Table 3, the selection of characters was performed taking into account the categories identified. Initially the characters of STEM areas were selected from the 374 characters of the database, leaving 219 who belong to one of the professions related to these areas. The second factor that was considered was a date of death longer than

Table 2. Scoring Criteria		
Label	**Secondary Labels**	**Scoring Criteria**
Awards and Recognition	Nobel	1) Did not obtain awards or recognitions 2) At that time awards and recognitions were not granted 3) His or her award or recognition was misappropriated 4) Received an award or recognition 5) Received more than one award or recognition
	Patents	
	Other recognitions	
	Other awards	
Contribution and Impact	Applications and uses (innovation)	1) His/her contribution led to the theoretical, technological and/or innovation development of an area of knowledge 2) His/her contribution led to the theoretical, technological and/or innovation development of more than one area of knowledge 3) His/her contribution led to the development of an application with a global impact that is still in force 4) His/her contribution led to the development of more than one application with a global impact that is still in force 5) His/her contribution generated an impact (theoretical level, technological development, innovation) that changed the world and is still in force
	Development	
	Discoveries	
	Inventions	
	Laws, methods or theories	
Context barriers and limitations	Work environment	1) Difficulties inherent to his/her work 2) Complicated work environment 3) Low regional capacity in science, technology and innovation 4) Discrimination or misappropriation of work, awards or recognitions 5) Extreme actions for the sake of science (discredit, identity change, exile, assassination, declared a heretic, forced to commit suicide, martyr of science)
	Low regional, institutional and business capacity	
	Work Complexities (technical, financial, etc.)	
	Discrimination (gender, homophobia, xenophobia, other types of discrimination)	
	Misappropriation	

Table 3. Categories and criteria for character selection		
Categories	**Criteria**	**Nº**
Gender	Female	16
	Male	16
STEM Area	Biology	3
	Physics	5
	Mathematics	6
	Medicine	6
	Chemistry	7
	Technology	5
Place of Origin	Africa	4
	America	8
	Europe	20
Historical period	Ancient Age	3
	Medieval age	1
	Modern Age	7
	Contemporary Age	21

10 years, which reduced the sample to 120 characters. The third factor was the historical period to which the character belonged, while maintaining the proportion of men and women and lastly ensuring that there were representatives from different regions. Table 4 shows the list of characters selected according to their gender and historical period.

The last stage was the design of biographical cards for the characters. These were made using Adobe Photoshop, Indesign and Illustrator. Figure 2 shows the design of the card, with an example of one of the 32 cards, which corresponds to 'Hypatia of Alexandria'. The center shows the image of the character, her name, date of birth and death, a brief description and symbol of her work. Attached are symbols of the most representative uses and applications to which she contributed. The characters were portrayed by means of geometric figures, taking as a reference their main features to recreate their image in an animated and simple way; the color of the cards was used to identify the gender, green for male scientists and orange for female scientists. Regarding the category related to STEM areas, different color logos were designed with symbols alluding to the professions; these are presented in the upper right corner. On the other hand, in the lower right corner, there is a border of a different color with symbols of the historical period in which the character lived. The origin of the character is represented by each country's flag. Finally, the criteria were represented by star ratings and the number of awards or recognitions received by the character.

'Sapiencia' is a card game featuring scientists, details of their work, context and the period in which they lived. The protagonists of the cards belong to STEM areas. There are representatives from various regions, different historical periods and gender parity. The game is based on the categories defined in Table 1 in order to select a comparable element between characters and scoring criteria from Table 2 as a discard parameter. Details, game rules and cards can be downloaded from the 'Dissemination of Science' blog (https://bit.ly/2tJo3Za). The suggested age range for play is from 7 to 10 years of age.

4. Discussion and conclusions

Learning over time has been organized around the concept of sharing, similar to board games; however, new technologies have intervened in these spaces. The idea is to highlight the need to strengthen the spaces for interaction and interest in science on the part of children in order to provide them with the necessary tools to face a technological world based on the appropriation of science. It is therefore necessary to inspire children by acknowledging science-relevant characters and their contributions in a pleasant, easy and motivating way. The fundamental contribution of this work is the proposal of a semantic network for the portrayal of characters through their profile, their context in terms of the period and place in which they lived, along with their contribution and the impact of their work, recognitions or awards, plus barriers and contextual limitations. All this supported by the creation of a database with 374 characters.

As mentioned throughout the article, images are important resources for the teaching-learning process because they

Table 4. Selected Characters		
Historical Period	**Female Scientists**	**Male Scientists**
Ancient Age (4,500a.C-476 d.C)	- Hypatia of Alexandria - Metrodora	- Archimedes of Syracuse
Medieval Age (476- 1,453)		- Leonardo da Vinci
Modern Age (1,453- 1,789)	- Marie-Sophie Germain	- Benjamin Franklin - Johannes Kepler - Robert Hooke - Robert Boyle - Georgius Agricola - José Celestino Mutis
Contemporary Age (1,789-until today)	- Rosalind Elsie Franklin - Barbara McClintock - Lise Meitner - Marie Curie - Augusta Ada Byron - Hedy Lamarr - Rachel Louise Carlson - Grace Murray Hopper - Gertrude Belle Elion - Dorothy Mary Crowfoot Hodgkin - Tikvah Alper - Margaret Ellen Knight - Elisa Leonida Zamfirescu	- Alfred Bernhard Nobel - Charles Robert Darwin - Alexander Fleming - Louis Pasteur - Nikola Tesla - Alan Mathison Turing - Edward Norton Lorenz - René Gerónimo Favorolo

facilitate the understanding of abstract contents, generate motivation and a desire to deepen knowledge, improve memory, aid in the acquisition of new knowledge and foster curiosity in dealing with scientific subjects. As pointed out by several authors, educational images should be designed according to the objectives of the teaching-learning process. Aligned with this approach, this work proposes a visual communication strategy designed to raise awareness of outstanding figures considered geniuses in the world of science through didactic material. This material was designed with relevant information on the contributions of the characters and their recognitions through simple images that allow a quick association with their contributions. The contribution of this work is evident in two aspects: characterization of animated scientific characters highlighting them through allegorical details of their work, context and period in which they lived, as well as developments and postulates of their work. All this was done preserving criteria of pleasant, simple and colorful figures that allow children to identify with them. The other contribution focuses on the design of standardized biographical cards enriched with information about the characteristics of the character and designed with high graphic content that allows the assimilation of information in an easy and pleasant way. Academic discussions and debates focus on new technologies, but we should not leave out spaces for academic and social sharing, the proposal of collectible cards provides information in a very short reading time, so that children know, internalize and participate in scientific knowledge through play. Symbols, icons and graphic representations of the scientific world are the components with which scientific curiosity is to be motivated and generated.

Figure 2. Hypatia of Alexandria's card

Finally, the contribution at this point is a proposal for play with the 'Sapiencia' cards. The quantity and quality of information and the design of the cards generates great versatility, allowing children to invent their own games and teachers to use them as a support tool in workshops or other classroom activities.

This article is part of the first phase of the research project related to the dissemination and appropriation of knowledge, which focused on proposing educational dissemination strategies and tools to motivate children to take an interest in science; however, it would be important as future work to develop an empirical study to validate the effectiveness of the proposed strategies. Likewise, this methodological approach can be used to deal with didactic material on characters of interest from other areas of knowledge such as social sciences, arts, administrative sciences, among others. On the other hand, this work can be a reference for researchers interested in the impact of ludic strategies for the understanding of learning.

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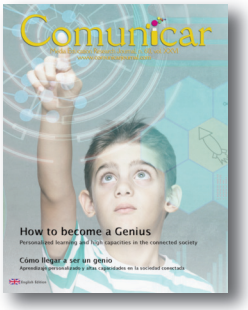

An enrichment program for students with high intellectual ability: Positive effects on school adaptation

Programa de enriquecimiento para alumnado con alta capacidad: Efectos positivos para el currículum

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ABSTRACT

This article notes the low rate of highly talented or gifted students formally identified in Spain compared to international benchmarks. These students are not properly identified, so a lack of specific educational responses for these highly talented students is also expected. Trying to counteract this trend, this article presents an enrichment program imparted to a group of students with high intellectual abilities during the academic year 2017/18 over three weekly sessions during school hours, where emerging technologies were an important key in how it was delivered. The experimental design included an experimental group of high ability students and two control groups, one consisting of students with high abilities who did not receive specific educational responses and another consisting of a group of regular schoolchildren in terms of abilities. The results showed that the implementation of specific educational responses improved children's levels of adaptation and in some cases, their school performance. These data are discussed in an attempt to recommend enrichment programs integrated into the classroom as an appropriate educational response to gifted or high ability students. Attention to diversity of all students in the classroom is possible, for example by resorting to ICT, increasing the educational inclusion of students with high intellectual capacity.

RESUMEN

Este trabajo apunta la reducida tasa de alumnado con características de superdotación o altas capacidades identificados formalmente en España tomando los referenciales internacionales. Este alumnado no es debidamente identificado, entonces también se anticipa la falta de respuestas educativas específicas para estos escolares con altas capacidades. Intentando contrariar esta tendencia, este artículo presenta un programa de enriquecimiento aplicado a un grupo de alumnos y alumnas con altas capacidades intelectuales durante el curso académico de 2017/18 a lo largo de tres sesiones semanales en horario escolar y donde las tecnologías emergentes tienen una importancia clave en el desarrollo del mismo. En el plano experimental, se tomó un grupo experimental de escolares con altas capacidades y dos grupos de control, uno conformado por alumnado con altas capacidades que no reciben respuestas educativas específicas y otro constituido por un grupo de escolares regulares en términos de capacidades. Los resultados muestran que la implementación de respuestas educativas específicas mejora los niveles de adaptación infantil y, en algunos casos, su rendimiento escolar. Se discuten estos datos en una tentativa de recomendación de programas de enriquecimiento integrados en las clases como respuesta educativa apropiada a los escolares con superdotación o altas capacidades. La atención a la diversidad de todo el alumnado en las aulas es posible, por ejemplo, recurriendo a las TIC, favoreciendo la inclusión educativa del alumnado con altas capacidades.

KEYWORDS | PALABRAS CLAVE

High ability, giftedness, educational equity, educational intervention, enrichment program, emerging technologies, adaptation, primary education.

Altas capacidades, superdotación, equidad educativa, intervención educativa, programa de enriquecimiento, tecnologías emergentes, adaptación, educación primaria.

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1. Introduction

Organic Law 8/2013, of the 9th of December, for the improvement of educational quality (LOMCE) in Spain includes the following types of students within the term Students With Specific Educational Support Needs (ACNEAE): Students with Special Educational Needs (ACNEE, including students with auditory, motor, intellectual or visual disabilities; general developmental disorders; and Serious behavioural or personality disorders); Students with specific learning difficulties; Students with Attention Deficit Hyperactivity Disorder (ADHD); Students with high intellectual abilities; Students joining the educational system late; and Students with needs due to personal conditions or school history (MECD, 2013). Pupils with high intellectual capacities form part of the SSESN, and they made up 4.23% of this group in school year 2016/17, the latest year with detailed data available for non-university teaching on the web site of the Ministry of Education and Professional Development. In contrast, gifted pupils make up 0.33% of the general, non-university school population (Ministerio de Educación y Formación Profesional, 2019). Various studies have indicated the percentage of highly able students at around 3% of the school population (Almeida & Oliveira, 2010; Castro, 2004; López, Beltrán, López, & Chicharro, 2000). This proportion in non-university education represents 27,133 pupils with high intellectual capacities in the various Autonomous Communities, 15,030 boys and 12,103 girls (Table 1).

Table 1. High intellectual abilities in Spain according to gender in the school year 2016/2017

Autonomous Communities School year 2016/2017	Students with high intellectual capabilities	%	Men		Women	
			n	%	n	%
Andalusia	11,582	0.72	5,942	51.30	5,640	48.70
Aragon	182	0.08	126	69.23	56	30.77
Asturias	804	0.59	484	60.20	320	39,80
Balearic Islands	831	0.46	473	56.92	358	43.08
Canary Islands	2,122	0.61	1,205	56.79	917	43.21
Cantabria	128	0.14	77	60.16	51	39.84
Castile and Leon	638	0.18	440	68.97	198	31.03
Castilla-La Mancha	411	0.11	267	64.96	144	35.04
Catalonia	417	0.03	235	56.35	182	43.65
Valencian Community	1,063	0.12	654	61.52	409	38.48
Extremadura	266	0.15	178	66.92	88	33.08
Galicia	1,590	0.40	991	62.33	599	37.67
Community of Madrid	2,190	0.19	1,426	65.11	764	34.89
Region of Murcia	3,698	1.27	1,760	47.59	1.938	52.41
Foral Community of Navarra	399	0.36	236	59.15	163	40.85
Basque Country	536	0.14	353	65.86	183	34.14
Rioja	274	0.50	182	66.42	92	33.58
Ceuta	2	0.01	1	50.00	1	50.00
Melilla	0	0.00	0	0.00	0	0
Spain	27,133	0.33	15,030	55.39	12,103	44.61

Department of Education and Vocational Training (2019).

Figure 1 shows the distribution of pupils with high cognitive skills along the different non-university educational stages: Early education (EE), Primary Education (PE), Compulsory Secondary Education (CSE), Baccalaureate (BAC): non-compulsory further education normally between 16 and 18 years of age), Basic Vocational Training (BVT), Intermediate Vocational Training (IVT), and Higher Vocational Training (HVT).

As Figure 1 shows, most students with high cognitive skills, 13,934 are found in primary education, followed by compulsory secondary education with 9,536 students. It is surprising to note the existence of 10 gifted students in basic vocational training as this type of schooling is aimed at trying to keep students in the educational system and to ensure they acquire basic skills in order to be able to enter the labour market. In other words, it is directed towards students with serious risks of leaving the education system early without any qualifications.

This Table and Figure give us part of the reasoning behind our study; the low prevalence of cases detected (0.33% in Spain as a whole), the small proportion of highly intellectually able students in comparison with the total SSESN (4.2% of the total), and the predominance of boys over girls in the national figures (55.4% versus 44.6%). In addition, primary education is the educational stage in which diagnostic processes are preferentially given, translating to rich periods of learning and development.

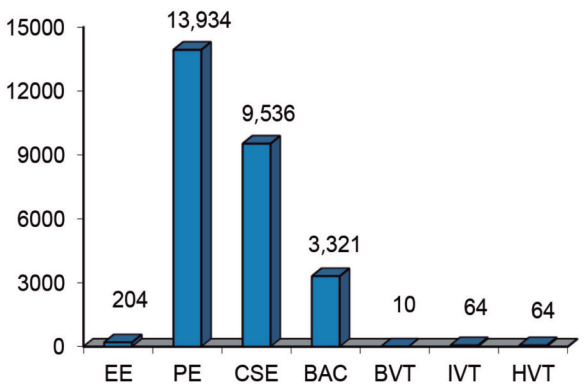
Along with that data, another reason for this article is the need to offer highly able students inclusive and multidimensional educational responses, including students with high intellectual abilities (Almeida & Oliveira, 2010; Callahan, 1998; Gagné, 2008; Gobierno de la Región de Murcia, 2018; Muñoz & Espiñeira, 2010; Prieto & Ferrando, 2016; Renzulli & Gaesser, 2015; Sastre, 2014; Tourón, 2010). It is essential to individualise their teaching and learning, requiring 'teaching, family and social support in order to draw out their abilities and thus

develop educational processes which are adapted to their needs, interests and motivations' (García, 2018: 133). The LOMCE considers that 'all students have talent, but the nature of this talent is different for different people. Consequently, the education system must have the necessary mechanisms to recognise and stimulate this talent. The recognition of this diversity of student abilities and expectations is the first step towards the development of an educational structure which addresses different trajectories' (MECD, 2013: 97858).

Because of that, planning modified educational responses for these students is vital, as is avoiding limitations when implementing it. These limitations sometimes come from the use of 'age' as grouping criteria for pupils, from the distribution of specific resources to schools with lower capacity students and students with learning difficulties. They may come from a lack of connection between diagnosis and educational intervention, from the scarcity of educational psychology resources currently in schools or poor teacher training about high intellectual abilities. They may also come from the use of general and specific methodologies, specific counselling with families, awareness on the part of educational authorities, or attitudes of rejection and prejudice towards this group (Jiménez, 2010; Jiménez & Baeza, 2012; Renzulli & Gaesser, 2015; Tourón, 2008; Veas & al., 2018). At times, there is also a gap in the foundation of current educational practice with these students, they are considered more of an extra rather than an extension, which is why it is essential to expand or to compact the study plans (García, 2018). At the same time, especially when identification rates are very low, it would be important to pay more attention to high ability students who do not achieve high levels of academic performance, which is what teachers value most. Some research has noted underachievement of gifted students as well as the difficulties teachers can have identifying giftedness when students also present some difficulties at a cognitive, emotional or behavioural level, or when they belong to disadvantaged social groups (Borland & Wright, 2000; Ecker-Lyster & Niileksela, 2017; Freeman, 1995; Peters, Grager-Loidl, & Supplee, 2000).

These aspects justify the development of educational responses for students with high intellectual abilities and in particular, enrichment programmes during school time. At the same time these programs must have an impact on students' personal and academic situations. In the words of San (2016), we find little research analysing the true benefits of these educational programs and they are centred on extracurricular enrichment programs (Sastre & al., 2015).

Figure 1. Students with high cognitive skills by educational stage (Department of Education and Vocational Training, 2019)



2. Materials y methods

2.1. Participants

The participants were students in the 2nd to the 6th years of primary education (PE), aged between 7 and 12 years old. They were divided into three subgroups: the Experimental Group (EG), made up of 9 highly intellectually able students in a single school in the province of Albacete who had been diagnosed by school counselling services; Control Group 1 (CG1), made up of 27 students, three students for each member of the experimental group from the same class, therefore classmates of the highly able students; and Control Group 2 (CG2), made up of 9 highly intellectually able students from different schools in the autonomous community of Castilla-La Mancha who had been diagnosed by school counselling services. The students in both control groups were selected using criteria such as being at the same educational level, sex, and similar school performance at the beginning of the year. Between them, they only differed in IQ scores, sex (due to sample availability issues), and in repeating a school year, as we were unable to find a student for control group 2 with high abilities, who had repeated a school year and who was in the 4th year of primary education. Students in both control groups did not participate in the enrichment program.

This research was conducted at a Spanish school in the province of Albacete (in Castilla-La Mancha). It is a public school in an urban environment with 622 students including the 9 students diagnosed as highly intellectually able. In the school 1.45% of the students have high intellectual abilities, which is higher than the mean of 0.11% for

Castilla-La Mancha and 0.33% for Spain (Ministerio de Educación y Formación Profesional, 2019). Seven of the 9 identified cases of high intellectual abilities were boys (77.8%).

2.2. Variables

The variables in this study were: 1) school year, from the 2nd to the 6th year of primary education, bearing in mind whether the student had repeated a school year; 2) student sex; 3) School performance; the Spanish system evaluates using a scale from 1 to 10. Scores of 1 to 4 are considered fails, a score of 5 is a pass, 5 & 6 are good, 7 & 8 are very good, and 9 & 10 are outstanding, initial evaluations were done at the beginning of the school year and at the end of the school year in June at the same time as students' final evaluations; and 4) Intelligence Quotient (IQ), established by administering one of the Weschler Intelligence Scales for Children (WISC-IV or WISC-V).

According to these variables the sample characteristics of each group was as follows: (i) Experimental Group (EG): 1 student in the 2nd year of primary education, 1 in the 3rd year, 3 in the 4th year, 1 in the 5th year and 3 in the 6th year; 7 boys and 2 girls; 1 student with a passing grade, 1 good, 3 very good and 4 outstanding; 1 out of the nine had repeated a school year; IQs ranged between 130 and 144. (ii) Control Group 1 (CG1): 3 students in the 2nd year, 3 in 3rd year, 9 in 4th year, 3 in 5th year and 9 in 6th year; 16 boys and 11 girls; 3 with passing grades, 3 good, 9 very good and 12 outstanding; 3 of the 27 had repeated a school year; IQs ranged between 84 and 125. These variables were selected proportional to the characteristics of the experimental group, with 3 students in the control group for every student in the experimental group. (iii) Control Group 2 (CG2): 1 student in 2nd year, 1 in 3rd year, 3 in 4th year, 1 in 5th year and 3 in 6th year; 7 boys and 2 girls; 1 student with a passing grade, 1 good, 3 very good and 4 outstanding; none of the students had repeated a school year; IQs ranged from 130 to 138. The characteristics were similar to the experimental group except that none of the students in CG2 had repeated a school year.

Our study examined child adaptation; 'the mix of factors that combine in the ability of an individual to integrate and function in their surroundings, taking into account the different characteristics of those surroundings and changing conditions that may occur requiring them to readjust to new circumstances' (García, 2018: 139). Some research has noted difficulties associated with, for example, speed in learning leading to dead time and demotivation, a rich, broad vocabulary that may trigger rejection by teachers or peers, boredom due to repetition and routine, high expectations for themselves and others, a taste for learning independently and alone, low tolerance for frustration, lack of acceptance when they take on a leadership role, preferring to interact with adults, disconcerting or persistent questions, concern about social topics that are not appropriate for their chronological age, excessive motor restlessness, asynchronous development, and a strong sense of justice (García, 2018; Jiménez, 2010; Sainz & al., 2015).

2.3. Instruments

Class record: this collects information related to the school year, sex, school performance, repetition of school years, and IQ scores.

TAMAI: Multifactorial Self-evaluation test of child adaptation: This test evaluates the following dimensions: general maladaptation, personal maladaptation, school maladaptation, social maladaptation, family dissatisfaction, dissatisfaction with siblings, parental educational qualifications, educational discrepancies, pro-image and contradictions (Hernández-Guanir, 2015). In this study we used General Maladaptation (GM) which looks at an individual's lack of adaptation both with themselves and with their surroundings. In the TAMAI this is produced from the total of the three other types of maladaptation, personal, school and social. Personal Maladaptation (PM) is defined as the level of maladjustment that an individual has with themselves as well as with their general surroundings, including individual difficulties accepting reality as it is; School Maladaptation (SM) looks at dissatisfaction and inappropriate or disruptive behaviour at school, and is related to personal and social maladaptation; and Social Maladaptation (SoM) which includes the level of difficulty and problems in social interactions due to reduced social relationships, lack of social control, not considering others or established norms, and attitudes of suspicion and social distrust. As these dimensions evaluate maladaptation, low scores mean better adaptation and high scores mean more maladaptation. It is worth noting the reliability of the results, with indices above .85 for Cronbach's alpha and the split-half method, along with appropriate indices of factorial validity (Hernández-Guanir, 2015).

Horizontal Enrichment Program for highly able students: this is a program carried out during school hours through three weekly sessions (two outside the class and one in the class group) throughout school year 2017/18. The activity areas are: linguistic, scientific, socio-emotional and artistic. The activities for each area are broad and

include a wide range of individual resources such as mentors and specialists in various knowledge areas, making use of school families' jobs. Materials principally include ITC and bibliographic resources with a breadth of reasoning for each of the activity areas. In terms of ITC, students use their own tablets through which they begin to use Web 2.0 tools (such as Padlet, Socrative, Edpuzzle, Kahoot! and Genially) and other programs which are valid for enrichment tasks (such as Geogebra and Pixton), but always in connection to the ordinary curriculum. The use of technological resources for teaching goals with highly able students is well supported (Besnoy, Dantzler, & Siders, 2012; Martínez, Sábada, & Serrano-Puche, 2018; Palomares, García, & Cebrián, 2017; Román, 2014; Sacristán, 2013), and demands specific teacher training in this field (Díez, 2012; González, 2016; Pereira, Fillol, & Moura, 2019; Rodríguez-García, Martínez, & Raso, 2017; Santoveña-Casal & Bernal-Bravo, 2019).

2.4. Procedures

The TAMAI was applied in September (pre-test) and June (post-test) during the 2017/18 school year to both the experimental and control groups. Between those two points in time the students in the experimental group participated in an enrichment program with three sessions a week. During the study, written authorisation was obtained from the Educational Inspection Service, the administrations in the participating schools and the families of students selected to participate. School performance was recorded at the two points in time and teachers of all three groups of students were asked to complete a record sheet on which they indicated each student's overall academic performance.

Table 2. Results for the 3 groups in student maladaptation at pre-test

Groups	Maladaptation type	Min.	Max.	M	SD
EG (n=9)	Personal	1	6	4.11	1.76
	School	2	7	3.89	1.96
	Social	1	7	4.00	2.29
	General	2	6	4.00	1.73
CG 1 (n=27)	Personal	1	6	2.96	1.34
	School	1	6	3.30	1.46
	Social	1	5	2.89	1.15
	General	1	5	3.15	1.06
CG 2: High ability (n=9)	Personal	2	6	4.22	1.30
	School	2	6	3.67	1.41
	Social	2	6	4.00	1.32
	General	2	6	4.00	1.32

3. Results

Table 2 shows the results in the maladaptation dimensions and general maladaptation for the three groups at pre-test. In addition to the mean and standard deviation, it gives the range (minimum and maximum).

The data in Table 2 shows higher pre-test means in the experimental group and control group 2 than in control group 1 in all dimensions, especially in personal, social and general maladaptation. Assessing the statistical significance of these differences (F-ANOVA), we found statistically significant differences in the PM dimension ($F(2,42)=3.86$, $p<.05$), but we did not find significance in the SoM dimension ($F(2,42)=3.09$, $p=.06$). No statistically significant differences were found in the SM dimension or in general maladaptation. In the PM dimension, following post hoc tests comparing the three groups (Bonferroni test) there were no significant values in comparisons between the groups.

Table 3 gives the results for the three groups of students for maladaptation dimensions in the post-test phase.

In Table 3 we see that the experimental group means were lower than both control groups, and lower than the mid-point of 4 on the 7-point scale used. The means of both control groups were notably higher than in the pre-test, especially in control group 2, with means of 5.11 in personal maladaptation, 4.67 in school maladaptation, 4.89 in social maladaptation, and 5.00 in general maladaptation. This suggests an increase in perceived maladaptation levels in students without any educational response modified for their strengths, interests and needs. Looking at the differences in means between the three groups (F-ANOVA), we found statistically significant differences in all of the maladaptation dimensions, as well as in general maladaptation scores. The values were: PM ($F(2,42)=10.50$. $p<.001$), SM ($F(2,42)=8.36$, $p<.001$), SoM ($F(2,42)=6.99$, $p<.001$) and General ($F(2,42)=16.17$, $p<.001$). Following the Bonferroni test for post hoc analysis we found a statistically significant difference between the experimental group and control group 2 in PM ($t=-2.44$, $p<.001$). In SM there were statistically significant differences between the experimental group and control group 1 ($t=-1.59$, $p<.05$), and control group 2 ($t=-2.56$, $p<.001$). In the SoM dimension we only found statistically significant differences between the experimental

group and control group 2 (t=–3.99, p<.001), while in the general dimension there were statistically significant differences between the experimental group and control group 1 (t=–1.57, p<.05) and control group 2 (t=–2.56, p<.001). There were also statistically significant differences between the two control groups in social maladaptation CG1<CG2 (t=–1.37, p<.05), and general maladaptation GC1<GC2 (t=–1.33, p<.01).

Table 3. Results for the 3 groups in student maladaptation at post-test

Groups	Maladaptation type	Min.	Max.	M	SD
EG (n=9)	Personal	1	4	2.67	1.12
	School	1	4	2.11	.93
	Social	1	5	2.89	1.62
	General	1	4	2.44	1.13
CG 1 (n=27)	Personal	2	6	3.70	1.20
	School	1	6	3.70	1.38
	Social	2	5	3.52	.89
	General	2	5	3.67	.87
CG 2: High ability (n=9)	Personal	4	6	5.11	.93
	School	3	7	4.67	1.58
	Social	3	7	4.89	1.45
	General	4	6	5.00	1.00

In order to see the differences between the three groups' results comparing pre-test and post-test, Table 4 shows the differences in scores between the two time-points (positive when pre-test scores are higher; high scores mean more maladaptation).

There are statistically significant differences between the three test groups after calculating the differences between the pre-test and the post-test scores Personal (F(2,42)=26.49, p<.001); School (F(2,42)=27.22, p<.001); Social (F(2,42)=19.27, p<.001) and General (F(2,42)=44.86, p<.001). Looking at the differences between groups, with the Bonferroni test, in the four dimensions there is a consistent pattern of statistically significant values; the experimental group always scores higher than the other two groups, indicating that they improve on negative evaluations at post-test. No statistically significant differences were found between control group 1 and control group 2, the highly able children without intervention. The results for each dimension are as follows Personal: EG>CG1 (t=2.19, p<.001 and EG>CG2 (t=2.33, p<.001); School: EG>CG1 (t=2.19, p<.001) and EG>CG2 (t=2.78, p<.001), Social: EG>CG1 (t=1.74, p<.001) and EG>CG2 (t=2.00. p<.001); General: EG>CG1 (t=2.07, p<.001) and EG>CG2 (t=2.56, p<.001). These differences and significance were replicated using repeated measures ANOVA and eta partial square ranged from .48 (Social) to .68 (General).

Figure 2 gives a graphic comparison using the means from the experimental and control groups for the maladaptation dimensions at the two time-points (1: pre-test, 2: post-test).

In Figure 2 it is especially interesting to see the significant fall in mean scores for each maladaptation area in the experimental group, falling below the means of the two control groups in the post-test. The values for control group 1 stayed more or less stable over the two time-points, however the scores for control group 2 increased from one time-point to the next. Finally, it is important to note changes in students' school performance. In the experimental group, 4 students exhibited improved performance (one from passing to good, another one from good to very good and two from very good to outstanding); none of the students in this group demonstrated worse performance at the second time-point. In control group 1, 3 students performed better at post-test than pre-test (one from very good to outstanding, the other 2 from good to very good), with no students demonstrating worse performance at the second time-point. In control group 2, none of the students improved their performance between pre- and post-test, while one student went from outstanding to very good.

Table 4. Differences between pre-test and post-test scores for the 3 student groups

Groups	Maladaptation type	Min.	Max.	M	SD
EG (n=9)	DifPersonal	.00	3.00	1.44	1.01
	DifSchool	.00	4.00	1.78	1.30
	DifSocial	.00	3.00	1.11	1.05
	DifGeneral	.00	3.00	1.56	.88
CG 1 (n=27)	DifPersonal	-3.00	.00	-.74	.81
	DifSchool	-2.00	1.00	-.41	.75
	DifSocial	-3.00	.00	-.63	.69
	DifGeneral	-2.00	.00	-.52	.58
CG 2: High ability (n=9)	DifPersonal	-2.00	.00	-.89	.60
	DifSchool	-2.00	.00	-1.00	.71
	DifSocial	-2.00	.00	-.89	.78
	DifGeneral	-2.00	.00	-1.00	.50

4. Discussion and conclusions

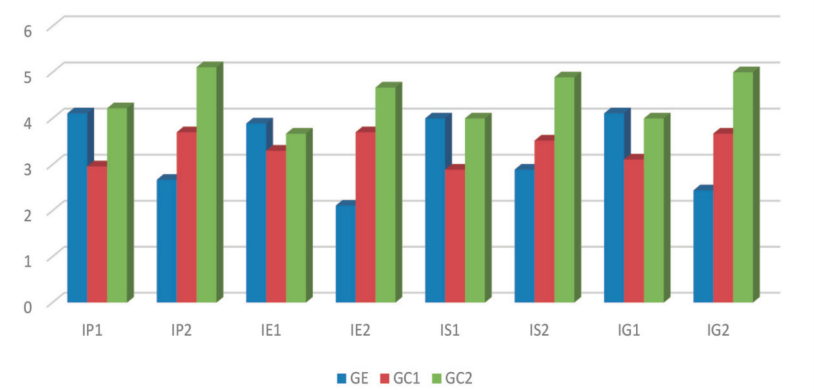
Educational processes must move away from homogeneous positions in which the same curriculum is transmitted to all students in the same conditions. The diversity in the classroom includes highly intellectually able students. This is a group of students with

visibility problems in the classroom, which is reflected in the rates of identification, 0.11% in Castilla-La Mancha and 0.33% nationally, which are very low compared to the supposed international rates which fall between 3% and 5% of students being highly intellectually able (Almeida & Oliveira, 2010; López, Beltrán, López, & Chicharro, 2000). These students 'are a natural part of human diversity and need to be educated in equitable schools with and for all, that can encourage excellence' (Jiménez & García, 2013, 22).

The educational intervention processes for these students usually happen outside school hours. Despite that, the inclusion of specific activities in school time is necessary for an integrated response that would help them make the most of their skills (Almeida & Oliveira, 2010; Hernández & Gutiérrez, 2014; Mandelman, Tan, Aljughaiman, & Grigorenko, 2010). In this study we have seen that the enrichment program for highly able students during school hours helped them improve their adaptation in general and on a personal, school and societal level, with some of the students even improving their school performance. We can conclude from our data that distinct educational attention, catering to the high intellectual abilities of some of these students, will encourage their adaptation and learning in school contexts, compared to their high-ability peers whose educational needs are not specifically addressed (García & Jiménez, 2016; Kim, 2016; Lee, Olszewski-Kubilius, & Peternel, 2010; Obergriesser & Stoeger, 2015; Renzulli, 2012; Sainz & al., 2015; Walsh & al., 2012; Wu, 2013).

Given the low rate of identification of gifted or highly able students it may be time to rethink how we identify them. Borland and Wright (2000) recommended that for students in disadvantaged groups, more use should be made of observational methodologies and portfolios of work rather than formal psychological tests. In these cases, it may be useful to work with computer and internet-based tools as some highly able students may not exhibit their capabilities in class or in their interactions with teachers, but rather in individual tasks or tasks outside the classroom (Marcos, 2014). Technology may also help students become motivated in their learning and school tasks which they often find repetitive, and it may also ease common communication difficulties with teachers (Freeman, 1995).

Figure 2. Means of the three student groups in maladaptation dimensions at both time-points



In short, work must be done on inclusion and academic success of highly able students in school (Veas & al., 2018). The data lead us to conclude that improving these students' inclusion and adaptation is possible and that diversity can and must be addressed during school hours, especially using emerging technologies as learning resources as that would provide individualised speeds, processes and content for learning (Besnoy, Dantzler, & Siders, 2012). Human potential is inherent in an individual and its realisation depends on the person's environment, bringing it out is an educational imperative.

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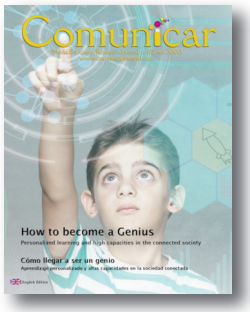

The role of knowledge structures in adult excellence. An approach from expert functioning

El papel de las estructuras de conocimiento en la excelencia adulta. Aproximación desde el funcionamiento experto

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ABSTRACT

Adult performance of high ability individuals has seldom been researched. Current results suggest that adult excellence occurs at lower rates than high ability individuals identified in their infancy or youth, with few cases of high intellectual abilities among adults that yield excellence products. This paper focuses on the analysis of the relative frequency of biographical traits that are associated with high ability as well as to the opportunities that allow building particular knowledge structures that are non-conventional and support innovation in people who excelled. A retrospective biographical analysis was performed on a sample of 120 individuals that generated renowned excellence products, in different fields, in the XXth century. Variables associated to high abilities were: precocity; learning problems; social problems in school; and academic excellence. And the variables associated with the generation of knowledge structures that support innovation were: academic-professional continuity; strong influence of particular individuals; and high productivity. Significant differences were found, showing a low presence of the first four variables and a higher presence of the last three. It follows that the trajectory towards excellence does not seem to correlate with a high level of intellectual resources but with a certain use of sufficient resources, whether cerebral or external technological support.

RESUMEN

El rendimiento adulto de personas con diagnóstico de alta capacidad es un campo que ha sido poco investigado. Los resultados existentes indican que la excelencia se presenta en proporciones mucho menores que los casos con alta capacidad detectados durante la infancia/juventud, siendo relativamente pocos los casos de alta capacidad entre las personas que han generado productos de excelencia. Este artículo plantea el análisis de la frecuencia relativa de variables biográficas asociadas a la alta capacidad y a la oportunidad de generación de estructuras de conocimiento particulares, adecuadas para soportar la innovación en personas que han demostrado excelencia. Se ha utilizado un análisis biográfico restrospectivo de una muestra de 120 personas que generaron reconocidos productos de excelencia en diferentes campos durante el siglo XX. Se evaluaron variables asociadas a las altas capacidades: precocidad, problemas de aprendizaje, problemas sociales en la escuela y excelencia académica. Y variables asociadas a la generación de estructuras de conocimiento innovadoras y no convencionales: continuidad académico-profesional, influencia de personas individuales y alta productividad. Se detectaron diferencias significativas que indican una baja presencia de las primeras cuatro variables y una elevada presencia de las tres últimas. De ello se deduce que la trayectoria hacia la excelencia no parece corresponderse con la disposición de un elevado nivel de recursos intelectuales sino con una determinada utilización de recursos suficientes, ya sean cerebrales o apoyos tecnológicos externos.

KEYWORDS | PALABRAS CLAVE

Excellence, expertise, knowledge structures, high ability, brain, technology, innate, adult.
Excelencia, experto, estructuras de conocimiento, alta capacidad, cerebro, tecnología, innatismo, adulto.

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1. Introduction

In adulthood, the concept of excellence is associated with the production of exceptional results, measured on an absolute scale. Excellence depends only on the results achieved or the products created and, in order to be considered excellent, the products must be marked by a high level of quality and an innovative or even revolutionary character (Campitelli & Gobet, 2008; Gobet, 2016).

In order to identify products of excellence, it is necessary to observe the degree of social recognition they obtain. This recognition is based upon the technical, conceptual, instrumental or practical value offered by the product in question. This notion of recognized value transcends the mere winning of awards or garnering of official titles. The product must exert a real and significant influence on others who, in turn, recognize its utility and importance. The Internet, for example, could be considered a product of excellence due to its widespread social acceptance, as it has been embraced by a broad range of people. Its technical effects have been revolutionary, and it has had a far-reaching influence on the progress of the field of computer science and the way we access information (Blyth, 2013; Salinas, 2003). It is a product's effects, then, that mark it as excellent.

Meanwhile, the conceptual value of scientific contributions lies in the influence these contributions have on the next generation of scientific approaches or technical applications. Thus, the scientific 'products' of Newton and Einstein can be considered to exhibit excellence in light of the heuristic impact they have had on generations of physicists and engineers (Simonton, 2016). The excellence is certified by this lasting effect, not by recognition in the form of titles (Newton's knighthood) or awards (Einstein's Nobel Prize, which in fact was not given for the scientist's most significant work).

Worth of special consideration is the degree to which a product of excellence is identified with the person (or people) who created it. The most common explanation for excellence is that it emerges from an intrinsic characteristic of the person who created the product that is often called 'intelligence' (Neubauer & Opriessnig, 2014). Although this connection between the characteristics of the product and this underlying capacity is somewhat intuitive, this link is subject to some fundamental confusions:

1) The explanation appeals to a construct defined by its own product: the capacity for excellence because it produces excellent products. There is no explanation of how intelligence has generated this product or what representations and cognitive resources were employed to create the product.

2) The product would have to be somehow fully contained in the individual's brain structures. In other words, biology would have had to anticipate the social and cultural context in which the product would make sense.

3) If it is true that this underlying capacity exists in an absolute form, then the person should be able to generate products of excellence in any field.

The tendency to attribute excellence to individual characteristics is aligned with a tradition that views intellectual functioning as innate. Thus, the structural elements of an individual (mainly his or her brain) are considered the determining factors that allow a product to be generated (Singh & O'Boyle, 2004). This perspective equates the quality of a product with that of the physical system that created it (Mrazik & Dombrowski, 2010).

This innatist approach seems to partly fit with what scientists now know about the brain-mind-product relationship. It is true that the brain must physically undertake the representations and operations necessary to generate any given product. This does not mean, however, that only the particular brain that generated a product is capable of undertaking these representations and operations. Contemporary knowledge also explains that a brain can be used in a number of different ways, which is what allows us to adjust to different cultural contexts (Richardson, 1993). In fact, there is no evidence to suggest that human brains that existed, for example, during the Roman Empire were any different from contemporary brains. However, the cultural conditions they were forced to contend with were very different, particularly when it comes to technology.

The alternative explanation to this equivalency between the underlying structure (the brain) and the product does not deny the existence of certain minimum conditions in terms of cognitive power. This perspective admits that not all brains are capable of undertaking certain representations and operations. Nonetheless, the existence of these cognitive resources is not sufficient. They must be expressed in the right way in order to lead to the creation of a product of excellence (Castelló, 2001). The aim of this paper is to investigate whether excellence is an intrinsic property of an individual or whether it emerges from an exploitation of their cognitive characteristics–from how they are used to represent and process. Hence, the physical structure (the brain) remains a necessary (although less definitive) condition, while the functional layer (the management and organization of knowledge) plays a key role in exploiting this physical foundation in the form of exceptional performance (Castelló, 2002).

1.1. Cognitive appendages

One of the most remarkable characteristics of the technological advances of the 21st century is that they often serve to support us in our own cognitive functions (Onrubia, 2016). The information age has been marked by the appearance of technology that is able to store and process information. While it is true that information storage already existed thanks to the advent of writing systems and other formats such as painting and photography, IT systems have brought with them an explosion in humans' capacity to store, access and process information.

These technological changes have meant that some parts of human cognition, such as memory, can function in conjunction with external technological 'appendages'. With fast enough access and reliable media, there is no reason not to use one's own brain and external resources simultaneously (Costa, Cuzzocrea, & Nuzzaci, 2014). These external resources can be defined as cognitive appendages, and they are not significantly different from traditional cognitive resources of individuals (or, if they are, they may in fact be better in some respects). This does not mean that they completely supplant mental functioning; they rathercomplement or enhance some cognitive functions. It is worth noting that external memory stores already existed in the form of books, for example. In the past, no one found it shocking when a person used a library rather than memorizing all the information he or she might need. Much like libraries before them, the advances in computing power of IT systems have driven huge improvements in functionality, completing the same sort of operations as a human brain, but doing them so much faster and with greater reliability. Thus, when a certain process requires millions of calculations, there is no shame in allowing them to be done by a computer rather than a human mind (Castelló, 2001).

> This recognition is based upon the technical, conceptual, instrumental or practical value offered by the product in question. This notion of recognized value transcends the mere winning of awards or garnering of official titles. The product must exert a real and significant influence on others who, in turn, recognize its utility and importance.

Taken as a whole, the existence of these cognitive appendages has meant that there are less demands placed on the human brain in terms of the representations a brain must undertake and the processing it must carry out. This frees up cognitive resources and energy that the brain can use to 'manage' the cognitive system, which in turn is assisted by a range of physical supports. Thus, it is possible to attain high levels of functioning in areas such as memory or calculation (among others) without needing to devote too much time or energy to these tasks. This time and energy can then be expended on functions that work to integrate one's cognitive resources with external resources. For example, some information might be stored in the brain, while the bulk of the details might be kept in external memory (Castelló, 2002), or the planning, undertaking and supervision of processes might be done by the brain itself, while the execution of mechanical computations is carried out by external devices.

In this context, the belief in the innate nature of intelligence is much harder to sustain. A perspective centered on the use of the brain and the construction of functions becomes much more powerful as an interpretive framework in these circumstances. It can show how one can benefit from newly available physical support mechanisms while at the same time maintaining the ability to coordinate these physical resources and apply them to useful functions. For instance, most people can now access the boundless information that is available on the Internet, but what sets one person apart from another is their ability to exploit this information. This represents a change in the way brains work. Carrying out mechanical operations is no longer as important as the ability to organize and supervise large processes, especially those that are not subject to being guided by algorithms (Klein, 1992).

1.2. An unfulfilled prophecy

Over the course of the 20th century, the tradition of research and explanations employing the sort of innatist approach that dates back to Galton (1869) became the dominant paradigm, and these approaches are still in widespread use today. According to this perspective, unusual skills or abilities are explained by biological traits corresponding to

the results obtained on certain tests (often IQ tests) (McLain & Pfeiffer, 2012). The underlying assumptions here include: 1) the existence of a construct called 'intelligence', defined as a person's general cerebral capacity and thought to determine his or her performance in all fields of life; 2) the possibility of measuring this construct via scores obtained on certain tests (such as IQ tests); 3) the stability of an individual's intelligence and his or her IQ over time, given that intelligence is viewed as a structural, biological trait; and 4) the existence of differences between individuals in terms of this construct that are reflected in the variations in the scores obtained on these tests.

Thus, there is an expectation that people who score highly on IQ tests (usually defined as those whose scores are two standard deviations or more above average) will be most likely to be able to perform at an exceptional level throughout their lives. However, this prediction is not borne out by the facts. Firstly, many more people have scored over 130 on IQ tests as children or adolescents than have achieved excellence as adults, as defined above. Secondly, most adults who perform excellently did not record such outstanding IQ scores as children.

These data alone would seem to provide overwhelming proof, but it is still worth taking a closer look at what might be behind these discrepancies between expectations and actual performance. One way of examining this issue would be to look at the longitudinal study in which Terman (1925) and his collaborators followed 1,624 California children until they reached adulthood (Terman & Oden, 1959). The participants were selected for the study because they had scored over 130 on the Stanford-Binet test that had been administered to all the 12-year-old students in the state. These high-scoring students were then compared to the rest of their peers and were found to be more physically mature at the age of 12, to display better academic results, to reach more advanced degrees, to have higher income levels and better health as adults, to have more marital stability and to produce more scientific articles. Terman and his colleagues believed the results to provide an empirical foundation for the theory that intelligence is innate by showing that the effects of greater biological gifts were felt in all areas of life.

> Experiential learning is not pre-structured, nor does it have to come in any specific representational format. The learner herself does the task of representation (in a way that is best suited to her resources) and detects or forms relationships between representations.

Subsequent researchers who reviewed this study (Simonton, 2014) pointed to alternative explanations for the data that are much more convincing. Chief among these critical arguments were: 1) the link between IQ and academic intelligence, given that performance in school was the variable most accurately predicted by this index; 2) the lack of weight given to the consequences of this greater academic ability, with better grades leading to more years of school completed and in turn to better-paid professions; 3) the neutralization of variables such as health or marital stability, justified by the higher income received by these individuals. The most important critiques, however, had to do with the productivity of the group studied. None of them was responsible for any exceptional accomplishments, while among the population of California of the same age were some very accomplished individuals who had not scored above 130 on the test, including William Shockley and Walter Alvarez, winners of the Nobel Prize for Physics (Simonton, 2016).

All of this would seem to point toward two conclusions. First, the theory of innate intelligence and the definition of intelligence via IQ seem to have some major weaknesses. Second, a high IQ as a child does not seem to be a necessary condition for excellent performance as an adult.

1.3. The foundations of adult performance and expert functioning

Research in this field published since the last two decades of the 20th century tends to use a different kind of interpretive framework, based on recent advances in neurology and cognitive science (Di-Rosa, Cieri, Antonucci, Stuppia, & Gatta, 2015). These advances have shed light on important aspects such as how cerebral resources are translated into brain functioning, the use of these functions to generate knowledge structures and the use of these structures as the basis of logical and creative functioning, as well as the integration of perceptive elements, decision making, and response in the consolidation of competences (Castelló, 2002).

The clearest example of these characteristics, confirmed by excellent performance, is the so-called 'expert model' (Simonton, 1999). It should be noted that this model refers to a specific way of using the available resources, aimed at the creation of solid knowledge structures which, in turn, form the basis for improved competences in terms of perception, reasoning and response. This model has nothing to do with the more commonplace use of the term 'expert', associated with people who are especially knowledgeable or experienced with regard to a given topic (Simonton, 2014).

The accumulation of experience and information is a necessary but not a sufficient condition in order to achieve expert competency. For this to happen, the experience and information must be organized in a particular way (Greene & Hunt, 2017; Shimizu & Okada, 2018). Specifically, the representations generated must employ the available resources of representation in the most efficient way for a given individual, thus allowing them to be processed in an efficient way. Meanwhile, the knowledge structures that are formed by these representations must have been reorganized on a number of occasions, thus establishing multiple connections among the elements that make them up. These connections will make it possible to notice undetected relationships or to form new ideas (Daly, Yilmaz, Christian, Seifert, & González, 2012; Yilmaz & Seifert, 2011).

It should be highlighted that the kinds of knowledge structures generated by education systems (at any level) do not meet these conditions due to both the medium in which the content is conveyed (usually verbal) and to a style of organization that is often addressed to generate logical, unconnected structures (Alonso-Tapia, 2002). Academic performance is not based on converting verbal format into other forms of representation that might be more effective for an individual, nor is it founded on modifying the organization of the contents. This means that those who are the best at absorbing contents in an academic setting will be able to apply what they have learned, but they will be unlikely to innovate. The education system tends to inhibit divergent or creative thought in favor of logic and conformity (Robinson & Aronica, 2015).

Unlike academic learning, experiential learning is not pre-structured, nor does it have to come in any specific representational format. The learner herself does the task of representation (in a way that is best suited to her resources) and detects or forms relationships between representations. The consequence is that the resulting knowledge structures are much better suited for use by the person who has generated them, even though they might be difficult to transmit to others with distinct representational characteristics (Castelló & Cladellas, 2013). That is why attempts to transfer the expert knowledge of people who have created products of excellence to non-experts have met with little success.

Obviously, very positive results cannot be achieved by a brain lacking in resources of representation, but it is not necessary to have exceptional resources either. At the core of this approach is the idea that each individual can succeed by using the most of the resources they have available, as long as they are sufficient, and by devoting a lot of time and effort to using these resources to reorganize knowledge. All of a person's cognitive activities, then, can benefit from 'customized' knowledge structures, which lead to improvements in perception and decision making and to greater complexity of knowledge. As these knowledge structures are generated seamlessly, they can smoothly and naturally expand via new experiences or they can be reorganized to accommodate new data (Castelló, 2002).

This kind of cognitive configuration also has advantages when it comes to the use of resources in the form of cognitive appendages. For example, efficient perception patterns make it easier to access information online and to select materials (new or otherwise) that are consistent with one's existing knowledge structures. These same structures also make it possible to understand and assess meaning from the information found online. Additionally, in a well-structured decision-making process an individual can use external resources to address the more mechanical steps and reserve his or her brain-mind for supervisory tasks and the integration of results.

Expertise is attained by people who are able to exploit the cognitive resources at their disposal in certain ways, as the result of a pattern of development, articulation and adjustment of capacities, not because of the presence of extraordinarily efficient capacities. The term 'deliberate practice', coined by Ericsson, Krampe, & Tesch-Römer (1993), is often associated with expertise. This sort of practice is useful when it can be applied to this kind of exploitation of resources and used to confirm the knowledge generated via feedback from other experts, bringing knowledge ever closer to the object represented. This kind of knowledge could not be further from the stagnant sort of knowledge that comes from instruction (Hambrick & al., 2014; Sala, Foley, & Gobet, 2017).

Despite the proven relationship between deliberate practice and expertise (especially when it comes to cognitive activities) it should be noted that practice in and of itself is not enough to become an expert in a field like chess or sports. Other factors (such as the age at which one started the activity, childhood experiences and other activities

apart from the area of expertise) play at least as important a role in the achievement of expertise (Gobet, 2016; Hambrick & al., 2014; Hodges, Kerr, Starkes, Weir, & Nananidou, 2004; Macnamara, Hambrick, & Oswals, 2014).

2. Material and method

2.1. A bibliographical analysis of excellence in performance

A number of researchers including Cox (1926) and Simonton (2009) have used the technique of bibliographical analysis to shed light on developmental processes. The greatest strength of this method is that it allows for the analysis of individuals who have created really exceptional products in a situated context. If one is to analyze the biography of Picasso, one might be completely certain of the exceptional nature of his artistic production, though one would be approaching the subject from a post-hoc perspective. Using such a method, the researcher might detect certain associations that suggest a causal relationship. A more quantitative approach that looks at a number of cases simultaneously makes it possible to gather more descriptive data and establish more solid associations, although it does not offer any certainty in terms of causality.

Table 1. Sample distribution by field

Field	Cases
Philosophy	11
Politics	28
Science	12
Sports	14
Visual arts	12
Music	22
Literature	21
Total	120

This limitation does not prevent such a methodology from being able to test certain specific hypotheses derived from theoretical explanations. The null and alternative hypotheses are as follows:

• H0. If the innatist theory of intelligence were accurate, one would expect to find that in most cases the individuals displayed high performance in childhood or adolescence (precociousness), as well as high IQs.

• H1. These traits appear in less than half of the sample, while a majority of the sample display indicators of the gradual construction of knowledge structures.

2.2. Sample

The random, non-stratified sample was selected using the Chambers Biographical Dictionary (1997). Random two-digit numbers were used to select pages of the volume, and the person described on the page was included in the sample, as long as his or her accomplishments during the 20th century. Otherwise, another random number was selected and added to the previous number. This procedure was repeated until the end of the dictionary and until a sample of 120 people had been chosen. The fields of the people's excellent accomplishments are detailed in Table 1.

2.3. Procedure

After the selection of the cases, the individuals' biographies were read in detail to seek out the following information about each person, which made up the list of variables to be assessed: 1) Precociousness: generation of excellent products in childhood; 2) Learning problems; 3) Social problems at school (conflicts with classmates or teachers) 4) Academic excellence: exceptional academic performance at any level of study; 5) Academic-professional continuity: professional activities related to the education received; 6) Intense influence from certain individuals 7) High productivity: generation of abundant products of excellence throughout life.

All the variables were binary and were assigned a value of 'Yes' when the biographical description made reference to the issue and 'No' if it did not. The value yes/no was assigned independently by three researchers, who were in complete agreement in 87.1% of the cases (627 of the 720 values). In the remaining 12.9% of cases, the value chosen by two of the three was used. The first four variables correspond to expectations that would exist according to an innatist model and, more specifically, according to the most common description of people with high IQs during childhood and adolescence. Variables 5, 6 and 7 correspond to descriptions associated with expert functioning.

3. Results

The occurrence of each of the variables is presented in Table 2. The Chi-squared statistical test was applied to compare the percentages of cases that displayed a certain trait with those that did not. The null hypothesis would suggest that the traits associated with the first four variables should be dominant and should display significant

differences. The alternative hypothesis, meanwhile, would be supported if there was a predominance of the characteristics described by the final three variables. Given that there were only two possible values for each variable, significant values nearing 50% should be interpreted with a great deal of caution. However, values for which one of the two percentages is at least twice the other percentage can be considered solid indicators, even with the 12.9% level of error presented in section 2.3.

As is clear from Table 2, all the variables display a high degree of significance. The first four variables show low or very low values, while the last three display high values. In all cases, beyond the statistical significance, the magnitude of the differences between the values meets the criteria that one of the percentages must be at least twice the corresponding opposite value.

Table 2. Percentages and statistical contrast of the different biographical traits

Biographical trait	Percentage	Chi-squared	p
Precociousness	20.6%	37.093	0.000
Learning problems	1.9%	99.150	0.000
Social problems at school	3.7%	92.593	0.000
Academic excellence	21.3%	35.593	0.000
Academic-professional continuity	95.4%	88.926	0.000
Intensive influence from certain individuals	92.6%	78.370	0.000
High productivity	68.5%	63.722	0.000

4. Discussion and conclusions

The results of the study somewhat echo those obtained by Simonton (1997) and contrast with those of Terman (1925). They indicate that most of the individuals in the sample did not show signs in childhood that would have made it possible to predict their performance as adults. Specifically, the percentages of precocity (20,6%) and academic excellence (21,3%), variables that tend to be most associated with high IQ, were present in only about one out of five cases. Meanwhile, learning and social difficulties, some of the stereotypical problems often attributed to highly gifted children and adolescents, appeared only in very small percentages, providing evidence that these phenomena are less associated with cognitive ability than with personality characteristics (McCrae, 1996; Overskeid, Grønnerød, & Simonton, 2012) or with passing circumstances.

The fact that academic-professional continuity is present in nearly all members of the sample would indicate that stability is a key factor in the development of solid knowledge structures in accordance with individual's specific resources. In contrast, precarious employment and professional instability can put individuals under strong economic pressure and leave them in jobs to which they are ill-suited. Both factors may undermine or erode the formation of personalized knowledge structures and encourage other more conventional structures, suited to meeting immediate needs.

The variable that examines the influence of individuals is also very revealing in that it shows that the people in the sample tended to develop more along personal than along institutional lines. This variable makes clear that the participants were able to exercise a critical capacity and to choose to follow the examples of certain respected individuals, rather than taking the established path set out by institutions (Ericsson & al., 1993). People who create exceptional things do not tend to follow established schools of thought or the latest trends. Instead, they seek out ideas and advice from outside the mainstream. This search for influences out of the mainstream also indicates a tendency for creativity. By definition, creative people tend to stray from the most common paths, which makes it possible for them to create innovative products.

Finally, many of the members of the sample are marked by high productivity, although the presence of this variable is less pronounced than others (68.5%). There are two explanations for the moderate prevalence of high productivity. First, the main efforts of people with expert functioning focus on the creation of efficient knowledge structures and their optimization before they being to create products. However, the tendency of these people to innovate means that many of them end up creating a lot of products as they experiment with different alternatives. Thus, the figure found for this variable represents a middle ground caused by the existence of cases where the creation of products is postponed until knowledge structures are consolidated and of cases where individuals explored multiple options in the exercise of their creativity (Henriksen, Mishra, & Fisser, 2016).

Overall, the results point to two main conclusions and a corollary. First, excellence in adulthood does not seem to be associated with the traditional profiles of gifted children, at the very least in the way they are assessed. High IQ predicts academic performance, and undoubtedly this performance is linked to both good training and to the

attainment of prestigious positions. However, people who develop along these lines tend to be conformists, and they tend to accept the mainstream. It stands to reason that following mainstream trends is not very compatible with innovation, and even less so with revolutionizing a given field. Nonetheless, the products they generate can still be valuable, as they are often linked to incremental improvements in knowledge, techniques or materials, all of which play an important role in the progress of a discipline. True innovation, however, is found elsewhere.

Secondly, the ability to exploit one's own cognitive resources along the lines of expert functioning and to build up strong and complex knowledge structures does not necessarily require extraordinary natural gifts. Instead, this kind of cognitive activity is focused on the effective use of moderately high levels of resources. The decision-making processes of these individuals, then, are based on the creation of highly elaborate knowledge structures, built thanks to their efforts to optimize representations and, more specifically, the connections between represented elements. It is true that the range of representational resources offered by a given brain (or by other kinds of technological supports) is important, but the key lies in how these resources are systematically employed to attain a kind of knowledge that is customized to a given individual. Thus, the amount of information stored is less important than the quality of its organization. Information should be kept so as to allow each individual to represent it in the way best suited to herself, and to ensure that the greatest possible number of connections are forged.

The corollary is that the road to excellence is not an easy one, as a number of obstacles can get in the way. The lure of immediate prestige, well-paid conventional jobs and society's lack of acceptance of innovative ideas are only a few of the stumbling blocks that can hinder a person on the path to excellence. Thus, it seems reasonable to conclude that only a moderate (or even a small) percentage of those capable of creating products of excellence actually manage to do so. In any case, the road to excellence does not necessarily emerge from extraordinary cerebral gifts, but rather from good management of sufficient cognitive resources.

Finally, in the field of excellence, like in any other, technological resources themselves are not as important as how they are used. Thus, technology in general and the Internet in particular should be seen as a means to an end rather than as an end in and of themselves.

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Taiwanese university students' smartphone use and the privacy paradox

Uso del teléfono inteligente en universitarios taiwaneses y la paradoja de la privacidad

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ABSTRACT

With the prevalence of smart devices and wireless Internet, privacy has become a pivotal matter in governmental, academic, and technological fields. Our study aims to understand Taiwanese university students' privacy concerns and protective behaviours in relation to online targeting ads and their habitual smartphone usage. Surveying 810 valid subjects, our results first propose that ad relevance has direct bearing on attention to ads. Second, ad relevance inversely correlates with privacy concerns (i.e. descending personal control and surging corporate power) and protective behaviours (self-filtering and ad evasion). Third and finally, neither privacy concerns nor protective behaviours have a negative bearing on habitual smartphone usage. Opposite to previous research, our study concludes that Taiwanese college students exhibit zero privacy paradox, owing to no signs of privacy concern incited by mobile targeting ads, no evidence of significant protective behaviours, and no decreasing habitual smartphone usage out of privacy concern and protection. Our findings indicate Taiwanese university students' shaky awareness of potential risks and crises from exposure to vulnerable online privacy management. To deal with this, we suggest educating youths' understandings of digital jeopardy by experts is urgently needed more so than just technical tutorials of privacy settings.

RESUMEN

Con la prevalencia de dispositivos inteligentes e Internet inalámbrico, la privacidad se ha convertido en un tema esencial en materias gubernamentales, académicas y tecnológicas. Nuestro estudio se dedica específicamente a entender las preocupaciones de los estudiantes universitarios taiwaneses en privacidad y comportamientos protectores en relación con la publicidad online y el uso habitual de teléfonos inteligentes. Con 810 muestras válidas encuestadas, nuestros resultados revelan que: 1) La relevancia de la publicidad tiene un efecto directo en su atención; 2) Está asociada inversamente a las preocupaciones de privacidad (por ejemplo, control personal descendiente y poder corporativo ascendiente) y comportamientos protectores (evasión de anuncios y autocensura); 3) La preocupación por ña privacidad ni los comportamientos protectores tuvieron efecto negativo en el uso habitual de los smartphones. Nuestro estudio concluye que no hay paradojas de la privacidad halladas en estos jóvenes taiwaneses debido a cambios en su preocupación por la privacidad, generada por la publicidad personalizada en su móvil. Ello evidencia un cambio significativo en los comportamientos protectores. En suma, estos universitarios taiwaneses tienen una débil apreciación de los riesgos potenciales y crisis a los que una vulnerable gestión de la privacidad online les podría exponer. Para abordarlo, una educación que cultive la comprensión de los peligros digitales para los jóvenes es muy recomendable y requiere urgentemente tutoriales técnicos sobre privacidad.

KEYWORDS | PALABRAS CLAVE

Privacy strategy, privacy paradox, privacy education, privacy concern, privacy protection, smartphone, targeting advertising, ad avoidance.

Estrategia de privacidad, paradoja de la privacidad, educación de la privacidad, preocupaciones por la privacidad, protección de la privacidad, teléfonos inteligentes, publicidad personalizada, evasión de anuncios.

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1. Introduction

Smartphones have become extraordinarily popular in Taiwan, with nearly 85% of Taiwanese people having at least one mobile phone and a 3G/4G user penetration rate of around 120% in 3Q 2017 (National Communications Commission, 2018). Such a high penetration rate has much to do with the rise of social media marketing, as over 90% of Taiwanese people have a social media profile (Miniwatts Marketing Group, 2017). With such a powerful social media marketing platform, smartphones are an indispensable tool to reach consumers. Social media are closely connected to smartphones, with almost all personal data synchronised for targeting ads such as contacts, accounts and passcodes, emails, purchase history, user preferences, and privacy settings. Govani and Pashley (2005) find that, even if careful users take full advantage of a platform's privacy settings and upload as little online critical information as possible, their personal details are still traceable through clues leaked by their social media contacts. One main reason for forced privacy leakage is that social media are primarily designed to serve marketing purposes. The default privacy settings on social media and mobile devices are usually very loose, and therefore only the most vigilant users would notice the necessity of tightening their settings, whereas most imprudent users accidentally publicise their data and connect themselves to everyone they know. Social media and mobile device firms are lazy about completing their privacy settings because more thorough privacy settings are adverse to their commercial interests. Target marketing relies upon vigorous personal information sharing to maintain its incredible accuracy. Loose privacy settings concur with their commercial interests. Users exposed to self-relevant ads can efficiently recall their themes and specialty, and the effect endures for weeks. By contrast, conventional advertising is barely memorable.

The advertising effect arises through 'perceived self-relevance'. According to the self-referencing theory, human cognition tends to absorb external environmental cues resonant with personal traits (e.g. race, life experience, education, cultures, class, personality) that people identify with, and hence they actively associate ad contents relevant to their conditions back upon themselves, thus generating power of persuasion (Ahn & Bailenson, 2011). Past studies have substantiated that the self-referencing effect manifests in three facets: first, when personalised ads hit social media users, they hold more friendly attitudes towards not merely the products, but also the brands; second, they are more capable of remembering ad details including scenes, colours, themes, lines, and characters; third, their purchases increase in terms of chance, frequency, and even amount (Curran & al., 2011).

An appropriate amount of ad relevance can indeed aggrandise users' attention, purchase intentions, and memories, yet over a certain limit it just arouses agitation and aversion (Okazaki, Li, & Hirose, 2009). With news reporting that more and more Facebook users are going dormant and fleeing to other social platforms due to overwhelming advertising and surging privacy agitation, Jung (2017) proposes that ad relevance effectively weakens privacy protection like ad avoidance, while conversely it escalates privacy concern that further intensifies privacy protection. However, the inverse association between ad relevance and ad avoidance is much stronger. High ad relevance would therefore be an ideal advertising strategy to undercut social media users' protective behaviours, albeit stimulating privacy concern.

1.1. Purposes

This research focuses on the following specific objectives: 1) Understanding college students' reasons for smartphone use; 2) Delineating their habitual smartphone use and reaction to social media's targeting advertising; 3) Analysing their privacy management in response to privacy concern over targeting advertising; 4) Identifying suitable pedagogies to improve their privacy awareness and management.

2. Literature review

2.1. Western and Eastern perceptions of privacy

Warren and Brandeis (1890) raise an early idea of privacy defined as the right to enjoy life and be left alone, and form the foundation for a variety of interpretations in the Western world since then. Petronio (2012) likens privacy to interpersonal boundaries by which individuals decide who can access their personal information and how to retain control. Privacy may be perceived disparately in Asia. Kitiyadisai (2005) points out the idea of privacy being extraneous. Asia's hierachicalism and collectivism are considered responsible for thwarting privacy (Cho & al., 2018). While privacy covers interpersonal boundaries in the Western world, in collectivist Asia, nation and family are valued above individuals who are taught and expected to serve both. Moreover, due to the hierarchies of seniority, education, profession, and wealth seen in Asia, it is especially difficult for those with little power to set up boundaries from those with power (Hong, 2018; Dincelli, 2018). Ozdemir and others (2016) apply Hofstede's multidimensional model of culture for predicting privacy protection and concerns. They compare the scores

Singapore, Sweden, and the U.S. got in the dimensions of power distance, individualism/collectivism, masculinity, and uncertainty avoidance (i.e. ambiguity aversion), finding that the U.S. and Singapore are at both ends of the spectrum in the dimensions of power distance, individualism/collectivism, and uncertainty avoidance - that is, the U.S. is the most individualist and uncertainty-avoidant and the least hierarchical, whereas Singapore is the opposite. By entering the scores into the regression analysis as independent variables, with privacy concerns and behaviour as dependent variables, the study indicates privacy protection is triggered by privacy concerns, and that privacy concerns are tempered by a high degree of the power distance index and the collectivism index, while stimulated by a higher degree of the uncertainty avoidance index. In short, different cultures have varying perceptions of privacy (Mathiyalakan & al., 2018; Mohammed & Tejay, 2017).

2.2. Mobile advertising and privacy

Advertising is 'any paid form of non-personal presentation and promotion of ideas, goods or services by an identified sponsor' (Kotler, 2003). With the growth of mobile devices like smartphones, laptops, and tablets, this channel has split off into mobile advertising.

Mobile advertising is now more personalised owing to the wireless Internet and smart devices. Personalised advertising helps ads perform more in accordance with consumers' needs and at the same time minimise their repellence, by using personal data from their devices in low-key manners. Tucker (2014) examines the effectiveness of personalised mobile advertising, by showing college students 'fabricated' personalised and inclusive ads through Facebook. For instance, ads were designed to personally address readers like 'As an Adele fan like you, we…' or 'As a member of Cambridge University, we…'; celebrity and institution names were changed in order to compare their effects. The results suggest that participants paid much more attention to personalised ads, on the condition that the celebrity and institution names indeed matched their interests or backgrounds; by contrast, ads not addressing readers with a specific celebrity or institution name received scarce attention. That study's findings also indicate that uniqueness is an influential factor. For example, certain celebrity and institutions were much more valued in one circle than in another. More vitally, the paper notes that as participants gravitated towards and noticed personalised ads, some started checking and intended to adjust their privacy settings.

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2.3. The privacy paradox

The privacy paradox is defined as the incongruence between users' worry about privacy infringement and a lack of actual behaviours to protect privacy (Lutz & al., 2018; Ooi & al., 2018). Taddicken (2014) provides causes for the paradox; the incongruence might stem from deficient awareness of privacy risk severity, deficient skills of protection (e.g. adjusting privacy settings, clearing log files, distinguishing fake websites), and deficient knowledge of shared information (e.g. being unconscious of how to check if information is being used for stated purposes) (Beam & al., 2018; Boyd & Hargittai, 2010; Millham & Atkin, 2018).

Lewis, Kaufman, and Christakis (2008) contend that another factor contributing to the incongruence between users' concern about privacy infringement and a lack of behaviours to protect privacy is the peculiar Internet culture, labeling it the dyadic effect. Virtual interaction proceeds on a basis of reciprocal self-disclosure; that is, 'you tell me and I tell you' (McCain & Campbell, 2018; Richey & al., 2018). This reciprocity builds up self-relevance and is how online relationships deepen. Based on the dyadic effect, Taddicken (2014) empirically inspects users' social media smartphone application (app) numbers and finds that people with a privacy concern might be selective of what apps to install, but still become active social media users (van Schaik & al., 2018; Han & al., 2018).

Lee and Rha (2016) prove that the key points as to whether consumers with a privacy concern take protective actions or not are perceived value and self-efficacy. Most participants they surveyed did express anxiety over online privacy insecurity, yet after weighing the pros and cons and ascertaining if the benefits overpower the downsides, they still leaned towards taking risks without any protective measures. Moreover, consumers with little self-efficacy tend to put up with privacy infringement, not because they accept it, but rather their poor skills in detecting problems and learning new computer techniques leave them no choice, but to allow it (Muhammad & al., 2018; Proudfoot & al., 2018).

Young and Quan-Haase (2013) present surveys of 77 subjects and interviews of 21 Canadian college students to see their protective strategies on social media, revealing that most young people are not ignorant of privacy risks; instead, they enjoy the convenience that social media bring to them while carefully managing any possible danger. Strategies commonly favoured include restricting relatives from accessing personal news updates, frequently adjusting content visibility, removing posts when they no longer matter, establishing sub-sets of friend lists corresponding to separate privacy settings, using private one-to-one messaging (e.g. Facebook chat, other instant messaging apps) in lieu of interacting in public via personal pages, removing profile pictures or displaying an uneasily recognizable one, falsifying sensitive personal information, punctiliously scrutinizing friending requests from unfamiliar contacts, and self-untagging (Marwick & Boyd, 2014). These strategies come about due to 'social privacy concerns' so as to decrease the chance of non-essential 'social life dramas' (Dey & al., 2012); conversely, more acute and aggressive institutional privacy concerns (e.g. corporations making unfair privacy agreements, governments allowing cross-departmental access to personal data without authorization, grey areas of secondary usage of purchase history) are given very little thought, implying a jeopardy of unsupervised institutional privacy intrusion (Malgieri & Custers, 2018). Based on this literature above, our first hypothesis goes as follows. H1) Ad relevance relates positively to (a) attention to ads and (b) privacy concern, yet inversely to (c) privacy protection.

Consumers perceive smartphones as delicate, portable, convenient, and relatively inexpensive, but also consider them physically fragile and relatively unreliable due to lower data storage security and capability of presenting complicated information.

2.4. Habitual smartphone usage

Chin and others (2012) report albeit smartphones have been fairly popularised, direct online shopping via them makes up merely 3% of total shopping revenues, because users feel uncomfortable toward leaving credit card and bank account password info on their phones. Matthews and others (2009) note that users oftentimes start tasks on their smartphones, but intentionally switch to computers to finish them, and that users might install a number of apps but only focus on using a small set of them owing to different amounts of trust they hold over the apps. By and large, consumers perceive smartphones as delicate, portable, convenient, and relatively inexpensive, but also consider them physically fragile and relatively unreliable due to lower data storage security and capability of presenting complicated information (Wiese & al., 2011). Out of all these concerns, consumers are apt to constrain their smartphone usage and turn to other devices for completing certain tasks. We thus present our research questions regarding whether Taiwanese people's habitual smartphone usage reflects their privacy concerns and protective behaviours.

- RQ1: To what degree does privacy concern relate to habitual smartphone usage?
- RQ2: To what degree does privacy protection relate to habitual smartphone usage?

3. Methods

3.1. Procedure

We targeted undergraduates and postgraduates in Taipei City (Taiwan's capital) as our subjects from 6 randomly selected universities: National Taipei University of Technology, National Taipei University of Education, Shih Hsin

University, National Taiwan Normal University, Chinese Culture University, and Ming Chuan University. Three classes with 50 or more students registered were randomly picked from each school, of which the majority were general education classes constituted by students of different years. With consent given by the lecturers and students in advance, we handed out the survey from November 17 to December 27, 2017.

3.2. Measurements

Our survey pertains to smartphone usage, motivations for smartphone usage, ad relevance, attention to ads, privacy concerns, and protective behaviours. Seven smartphone habitual usage items have a 5-point Likert scale from 'never' to 'always', where participants were queried about their frequency of using smartphones and social media apps; 3 other items allowed participants to provide the numbers of calls and messages on average that they sent and received every day.

The study had 21 items for participants to express their reasons for smartphone usage, including 'let friends/family know you are concerned about them', 'staying in touch with distant friends/relatives', 'enjoying conversations with people', etc., with a 5-point Likert scale from 'strongly disagree' to 'strongly agree'.

Three ad relevance items come from Jung's social media advertising study (2017), asking participants to evaluate how they felt social media ads met, personalised, and valued their needs, with a 5-point Likert scale from 'strongly disagree' to 'strongly agree'. We revised 3 items from Jung's construct of attention to ads (2017) inclusive of the amounts of interest, attention, and thought usually given to social media ads by users, on a 5-point Likert scale from 'not at all' to 'very much'.

We borrowed 10 items of privacy concerns from Jordaan and Van Heerden's research of Facebook usage and privacy issues (2017). On a 5-point Likert scale from 'strongly disagree' to 'strongly agree', the items enabled participants to assess how they felt in control over their personal data being shared, used, and collected; how much they were annoyed when websites required their personal info, if they tried to be meticulous before submitting personal info, etc.

We finally synthesised items (Jordaan & Van Heerden, 2017; Jung, 2017), developing a construct of protective behaviours comprising 8 items, with a 5-point Likert scale from 'strongly disagree' to 'strongly agree'. The items looked into participants' intention to avert social media ads, unsubscribe from marketing emails, remove cookies and browsing history, restrict undesired people (from contacting them), perform anti-spyware inspections, and act with caution over messages they have received.

We expect each hypothesis, apart from H1c, in the model (Figure 1: https://figshare.com/s/d297025d9803481c8435) to be positive. H1c might be uncertain, since Jung (2017) notes that high ad relevance either wins consumers' appreciation or inflames their repellence; the former scenario weakens their privacy defence, while the latter intensifies it. Table 1 illustrates the major items employed in this study (https://figshare.com/s/94a23ad476ce207be7d9).

4. Results

After coding 829 respondents' feedback, we removed 19 unqualified ones, for a total of 810 valid surveys. Unidentifiable answers such as too blurry or not given in the requested formats are coded as missing values.

Of the respondents, 265 are males (32.7%), 529 are females (65.3%); average age is 22 (youngest at 19; oldest at 32); 77 are postgraduates (9.5%); 726 (89.7%) are undergraduates (70 freshmen (8.6%), 310 sophomores (38.3%), 241 juniors (29.8%), 105 seniors (13.0%)); on average they made 1.87 calls (sd=5.17), received 2.77 calls (sd=20.5), sent 14.68 SMS texts (sd=120.2), and received 14.80 SMS texts (sd=72.28) per day; and the average number of years using a cell phone is eight (sd=2.86).

We conducted EFA and reliability tests to extract factors and to verify their validity. In Table 2 (https://figshare.com/s/43406dc8b297e91f5ec6), participants have 5 main reasons for smartphone usage: 1) interacting with family and friends; 2) obtaining new information; 3) relaxing and killing time; 4) discussing and planning activities; 5) staying in touch with distant contacts. We eliminate items 12, 20, and 23 due to insufficient loading values or cross-loading. Other attested factors are 6) smart feature usage (e.g. social media browsing, online messaging); 7) basic feature usage (e.g. SMS texting, telecom network-based calling); 8) ad relevance; 9) attention to ads; 10) self-filtering (of suspicious spyware, social media contacts, and websites); 11) ad avoidance (e.g. ticking off social media ads, unsubscribing from email advertising); 12) concern over ebbing personal control (of private data); 13) concern over growing corporate power. We then slightly revised the initial research model according to EFA and reliability test outcomes, as in Figure 1.

• H1: Ad relevance relates positively to (a) attention to ads and (b) privacy concern, yet inversely to (c) privacy protection.

The regression results denote ad relevance relates directly to attention to ads (β=.51***, adjusted R2=.26) and negatively to self-filtering (β=–.07*, adjusted R2=.004), ad avoidance (β=–.24***, adjusted R2=.06), falling personal control (β=–.17***, adjusted R2=.03), and growing corporate power (β=–.13***, adjusted R2=.02). Thus, H1a and H1c are supported, while H1b is refuted.

• RQ1: To what degree does privacy concern relate to habitual smartphone usage?

Privacy concern over ebbing personal control positively relates to both basic feature usage (β=.73*, adjusted R2=.004) and smart feature usage (β=.15***, adjusted R2=.02) of mobile phones. Concern over growing corporate power positively relates to smart feature usage (β=.11***, adjusted R2=.01) alone, while its association with basic feature usage is insignificant.

• RQ2: To what degree does privacy protection relate to habitual smartphone usage?

Self-filtering relates neither to basic feature usage (p=.75) nor to smart-feature usage (p=.17). Similarly, ad avoidance has no bearing on either basic (p=.58) or smart-feature usage (p=.66). Thus, there is no significant relationship between privacy protection and habitual smartphone usage.

Dummy codes were set up for gender (with women as the reference group) and grades (with postgraduates as the reference group), the demographic variables were input into the regression analysis on SPSS 21. Table 3 (https://figshare.com/s/c4505b6e5b948dd90f5d) shows that men have a greater tendency for privacy protection, self-filtering, and a disinclination towards basic smartphone features. Among all subjects, freshmen undergraduates alone are significantly less concerned about falling personal control and growing corporate power over their privacy. On the other hand, years 1-3 undergraduates tend to use smartphones' basic features, with no significance attached to seniors and postgraduates.

5. Discussion and conclusion

Our outcomes corroborate as well as contradict past studies arguing that ad relevance brings more consumer attention to ads, decreases ad evasion, and strengthens privacy concerns (Jung, 2017; Tucker, 2014). We find similar trends whereby higher ad relevance implies more attention to ads and weaker ad evasion. Nevertheless, our research also demonstrates that higher ad relevance coincides significantly with lower privacy anxiety (over both ebbing personal control and rising corporate power) and fewer self-filtering behaviours (e.g. checking spyware, blocking undesired contacts). Although past studies unanimously note that escalating ad relevance disturbs audiences and awakens their misgivings, this hardly explains our paper's heterodox phenomenon.

Cho, Rivera-Sánchez, and Lim (2009) argue that privacy concern is a cultural emotion. Subjects from individualist societies like Australia and the U.S., especially females, exhibit greater anxiety and higher defence upon feeling targeted online, while Koreans acted otherwise. Because Taiwan has similar socio-cultural backgrounds (e.g. collectivism, hierarchicalism, patriarchalism, ageism against the young) to South Korea's, it is likely that Taiwanese users lack an understanding of privacy as clear and firm as that of Western users in which privacy should be guarded and inviolable.

Age may also be a stimulus to weaken privacy concerns. In Table 3 (https://figshare.com/s/c4505b6e5b948dd90f5d), freshmen clearly cared less about privacy issues; yet, there is no sign of older students being more concerned about privacy issues, implying the amount of care Taiwanese college students give to privacy issues does not grow in proportion to age.

We also detect no privacy paradox, which usually appears when conspicuous anxiety over privacy accompanies the absence of protective behaviours, as users calculate benefits and risks, realise the former might overpower the latter, and consequently decide to take risks by curbing defensive reaction. Our findings do indicate low privacy concern and protection, neither of which lead to lower habitual smartphone usage (both smart- and basic-feature). The paucity of both privacy concern and protection discloses Taiwanese college students' incomprehension of the gravity and lurking danger from sensitive personal data being abused by institutions infringing upon their rights. In line with comparative studies, we further confirm that Taiwanese college students do not recognise privacy as inviolable and unequivocal boundaries like Western people do, and that their ignorance stems from scant comprehension of and little caution against institutional power that could be exercised with malignant intentions.

Several studies recommend enhancing privacy awareness via cooperation with social media by rolling out tips or nudges (Wisniewski & al., 2017; Martin & al., 2018; Wisniewski, Knijnenburg, & Lipford, 2016; Chugh & Ruhi, 2018; Haffner & al., 2018), but without accurately identifying causes of poor privacy management, generic

tips and education could barely help. Wisniewski and others (2017) categorise Facebook users based on whether they exhibit privacy concerns, concluding that tutorial tips such as how to adjust the visibility of posts, customise friend lists, and restrict chats on Facebook would be useful only when users have privacy concerns, but employ limited corresponding protective measures, because they are likely unaware of how to set them up (Alalwan, 2018; Rauschnabel, He, & Ro, 2018; Ketelaar & van Balen, 2018). Conversely, those who exhibit neither privacy concern nor protection urgently need warning tips on the risks and possible negative consequences of their current settings (Tsay-Vogel & al., 2018; Wang & al., 2014; Gerber & al., 2018). Judging by our findings, we suggest the Taiwanese government push for privacy education by cultivating an awareness of the risks that reckless online privacy management exposes users to versus just offering privacy setting tutorials.

This paper yields theoretical implications. Because the privacy concerns employed herein are based simultaneously on two major forces that smartphone users must be wary of in the near future - attenuating personal control and expanding corporate power –many studies focus on a relatively narrow spectrum of privacy concerns, thus curtailing the big picture of how individual users weigh the pros and cons and strategise their privacy behaviours. Our paper does not discuss habitual smartphone usage as uniform behaviour, but instead dissects it into basic and smart-feature usages. Our findings offer no signs of decreasing smartphone usage out of privacy concerns in either of the two dimensions, thus unveiling our other implication: while it is posited in international research on the privacy paradox that privacy concern is a natural emotion inevitably triggered by social media interaction and smart device utilization, our results question this assumption, owing to no clues of ascending privacy concern witnessed by the subjects, not to mention low protective behaviours. Therefore, we recommend future privacy paradox research to approach related issues through cultural and regional aspects and comparative analyses in order to characterise how privacy is perceived in individual societies and practiced in relation to power and boundaries.

> Our findings do indicate low privacy concern and protection, neither of which lead to lower habitual smartphone usage (both smart- and basic-feature). The paucity of both privacy concern and protection discloses Taiwanese college students' incomprehension of the gravity and lurking danger from sensitive personal data being abused by institutions infringing upon their rights.

Our study does have limitations, with the most crucial one likely being the methodology. Kokolakis (2017) notes that privacy research faces inconclusive debates over methodological effectiveness. In recalling how they normally react to privacy issues, our subjects probably forgot they had set up a certain level of cautionary settings in everyday life. The gap between subjective perceptions and unnoticed subconscious watchful behaviours could generate misleading biases. To tackle this technical difficulty and precisely delineate subjects' actual behaviours and trajectories of attitudinal variation, Dienlin and Trepte (2015) advise to measure the privacy paradox by surveys and observation-oriented experiments at the same time so that the gulf between cognition and subconsciousness can be appropriately captured and analysed.

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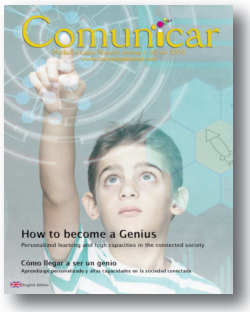

Online news recommendations credibility: The tie is mightier than the source

La credibilidad de las noticias digitales: El vínculo es más impactante que la fuente

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ABSTRACT

In this paper, we wish to examine the perceived credibility of news items shared through Social Networking Sites (SNS) – specifically, as a function of tie strength and perceived credibility of the media source from which the content originated. We utilized a between-subjects design. The Facebook account of each participant (N=217) was analyzed. Based on this analysis, our participants were shown a fictitious Facebook post that was presumably shared by one of their Facebook friends with whom they had either a strong social tie (experiment group), or a weak social tie (control group). All recipients were then asked about their perceptions regarding the news source (from which the item presumably originated), and their perception regarding the credibility of the presented item. Our findings indicate that the strength of the social tie between the sharer of the item and its recipient mediates the effect of the credibility perception regarding the news source, and the perceived item credibility, as well as the likelihood of searching for additional information regarding the topic presented in the shared item.

RESUMEN

Se examina en este trabajo la credibilidad percibida de las noticias compartidas a través de los sitios de redes sociales (RRSS), específicamente, en función de la fuerza de enlace y la credibilidad percibida de la fuente de los medios de la cual se originó el contenido. Utilizamos un diseño entre sujetos. Se analizó la cuenta de Facebook de cada participante (N=217). Sobre la base de este análisis, a nuestros participantes se les mostró una publicación ficticia de Facebook que supuestamente fue compartida por uno de sus amigos de Facebook con los que tenían un vínculo social fuerte (grupo experimental) o un vínculo social débil (grupo de control). Luego se les preguntó a todos los destinatarios acerca de sus percepciones con respecto a la fuente de noticias (de la cual se supone que se originó el artículo), y su percepción con respecto a la credibilidad del artículo presentado. Nuestros hallazgos indican que la fuerza del vínculo social entre el que comparte el elemento y su destinatario media el efecto de la percepción de credibilidad con respecto a la fuente de noticias, y la credibilidad percibida del elemento, así como la posibilidad de buscar información adicional sobre el tema presentado en el elemento compartido.

KEYWORDS | PALABRAS CLAVE

Credibility, social networking sites, social network analysis, news consumption, information search, experiment, quantitative analysis, influence.

Credibilidad, redes sociales, análisis de redes sociales, consumo de noticias, búsqueda de información, experimento, análisis cuantitativo, influencia.

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1. Introduction

The rise of online social networks has revolutionized the consumption of news. Indeed, a recent Pew Research Center survey identified that two thirds of those surveyed in the US receive their daily news from online social network ties. (Shearer & Gottfried, 2017). The most popular platform for receiving news recommendations is Facebook, with 45% of US adults reporting that they receive news specifically from their Facebook ties (Shearer & Gottfried, 2017). Clearly, when news is spread via SNS ties, a new factor is introduced into the process of credibility assessment as an interplay between the credibility of the social tie sending the news item and that of the original source of the news item comes into effect. The analysis of this interplay can shed light onto various situations and decisions made regularly by contemporary news readers on SNS. Most notably, it can illuminate how online SNS users judge the credibility of a news item when there is a clash between their trust in the news media source and that of the social tie sharing the news recommendation. The analysis of this type of situation can teach us a great deal about contemporary processes of news credibility evaluation.

Importantly, understanding SNS news credibility evaluation is timely in light of the growing awareness of the spread of questionable information on mobile devices and SNS (Bakir & McStay, 2018; Romero-Rodriguez, Torres-Toukoumidis, Perez-Rodriguez, & Aguaded, 2016). A recent study found that a great part of the news shared and recommended on SNS falls under the definition of fake news (Frier, 2017). Another recent study further showed that the average American adult saw several fake news stories around the time of the last election, with just over half of those who recalled seeing them indicating they believed them (Allcott & Gentzkow, 2017). Moreover, a study of the distribution of fake news found that rumors and lies are actually distributed faster than true news (Vosoughi, Roy, & Aral, 2018). In light of the increasing interest in the evaluation of fabricated items in the political realm, we designed an experiment analyzing the credibility assessment of news items –while specifically focusing on the effect the person sharing the content has over the perception of the credibility of the shared content.

Furthermore, the study aims to extend our understanding of the impact of the credibility assessment process on future actions and behavior. Thus, we also examined the participants' motivation to seek further information about the issue raised in the recommended news item. Such behavior would indicate that the issue raised participants' curiosity and might have even affected their beliefs. This part of the analysis contributes to the search for a link between information exposure and online behavior. It also sheds light on the interplay between information seeking and news credibility (Silverman & al., 2016).

2.1. The interplay between information sources and trust: from traditional media to SNS

Early studies of source credibility identified several features as playing an important role in determining source credibility. These include the sources' perceived expertise and trustworthiness (Hovland, Janis, & Kelley, 1953); journalists' knowledge, education, intelligence, social status, and professional achievement (McGuire, 1985); and perceived source motivation (Harmon & Coney, 1982).

In contrast, several studies have found that variables predicting credibility are more likely to be associated with the receiver rather than with source features. Gunther (1992) found that the strongest predictor for people's perception of a credible news item is when they receive it from a person or contact within their in-group, whether it is a political, religious or national group they deem themselves as belonging to (see also Salmon, 1986; Sherif & Hovland, 1961). Other studies have found that perceived source credibility is also mediated by the socio-demographics of the senders, including their level of education, gender and age (Gunther, 1992; Johnson & Kaye, 1998).

However, these sender versus receiver models are now being challenged with the addition of several other elements and mediators in the news spread process. In online social networks in particular, users are constantly exposed to news recommendations in their news feed (Amichai-Hamburger & Hayat, 2017). This new form of news reception and consumption (Garcia-Galera & Valdivia, 2014; Berrocal-Gonzalo, Campos-Dominguez, & Redondo-Garcia, 2014) often takes the form of routine news recommendations from the recipients' online social ties. These ties range from strong ties such as a close family member or friend to weak ties such as a distant work colleague or a distant family member. When assessing the items' credibility, the receivers can assess both the legitimacy of the news source, which is often part of the so-called old or traditional news media, as well as the extent to which he/she trusts the person sharing the content (Hayat & Hershkovitz, 2018; Hayat, Hershkovitz, & Samuel-Azran, 2018). Thus, studies suggest that credibility assessment of news items shared on SNS requires new research methods and approaches addressing not only the credibility of the traditional media source, but also the credibility of the SNS tie sharing the news item (e.g., Hayat, Hershkovitz, & Samuel-Azran, 2018; Johnson & Kaye, 2014).

This body of work has played a major part in the design of our study. Indeed, so far, the few studies addressing this call have provided several new insights on the importance of social ties in the news credibility assessment process. Turcotte, York, Irving, Scholl, & Pingree (2015) found that when the person sharing the news item is considered by the receiver as an opinion leader, the trustability level of the item is amplified, as is the desire to search for further information from the news organization that originally published the item. In 2013, Xu examined the issue of source credibility in the news aggregation platform Digg, and identified that the receipt of a news item via a social recommendation was the primary factor influencing its perceived credibility and likelihood that the receiver would click and open the news item. More recently, Anspach (2017) found that endorsements and discussions were consumed, shared and endorsed more significantly when they came from friends or family members (i.e., a strong social tie) in comparison to other contacts, and they were hardly shared or endorsed when received from unknown individuals.

Our study adds an important component to these analyses by focusing on the impact of tie strength (weak versus strong) on the perceived credibility of a news item. Particularly, it pays special attention to the impact of the interplay between the tie strength's credibility and the credibility assigned to the traditional news media source on the evaluation of the news recommendation.

> Studies suggest that credibility assessment of news items shared on SNS requires new research methods and approaches addressing not only the credibility of the traditional media source, but also the credibility of the SNS tie sharing the news item.

As early as 1973, Granovetter famously noted that social networks are comprised of a combination of weak ties, which should be thought of as 'acquaintances', and strong ties which can be regarded as 'friends'. The question of the interplay between weak/strong ties and source credibility perception is not trivial, as both types of ties contribute different types of information (Putnam, 2000). Notably, Putnam identified that weak ties primarily allow exposure to information that is not yet known and might broaden the receivers' horizons, whereas strong ties are associated with providing emotional and social support – thus highlighting the importance of information received by weak ties.

In contrast, though, more recent research has shown that weak ties are evaluated as dispensable and lacking value (Krämer, Rösner, Eimler, Winter, & Neubaum, 2014). Furthermore, another recent study found that SNS users are more likely to unfriend or unfollow weak ties than strong ties (John & Dvir-Gvirsman, 2015). Given this recent evidence, we may deduce that information gained from weak ties will be granted less attention and consideration compared to information provided by strong ties.

• H1: The stronger the social tie between the recipient and the person sharing the content, the higher the perceived credibility of the content.

Furthermore, we hypothesize that attitudes toward the traditional media source are less predictive of perceived credibility, when the content is shared by an individual with whom the recipient has a strong social tie. On the other hand, attitude toward the media is more predictive of perceived credibility, when the content is shared by an individual with whom the recipient has a weak social tie.

• H2: There will be an interaction between the strength of the social tie and the recipient's attitude toward the media source portraying the content and predicting the perceived credibility attributed to the presented content.

2.2. Information seeking and source credibility

As noted, following the source credibility evaluation analysis, we offer to examine the participants' motivation to search for further information as a result of the exposure to the shared news item. This segment of the research aims to contribute to analyses of the way source credibility assessments affect information behavior. This issue became relevant in the 1980s and 1990s with the decreasing trust in traditional news sources (Ladd, 2013).

In the SNS era, the analyses of the interplay between behavior and news trust shifted to other measures of analysis, such as online news consumption behavior (Hayat & Samuel-Azran, 2017; Hayat, Samuel-Azran, & Galily, 2016), and information seeking patterns. A notable analysis (Turcotte & al., 2015) found significant correlation between the perceived credibility of an opinion leader sharing an item and the recipient's tendency to search for

additional information from the news outlet from which the item was originated. The opposite effect was found amongst recipients who perceived the sharer of the content as a poor opinion leader.

• H3: The stronger the social tie with the person sharing the content, the more likely the recipient is to seek additional information regarding the topic presented.

Furthermore, we hypothesize that the attitude toward the traditional media source is less predictive of an individual's likelihood of searching for additional information when the content is shared by an individual with whom the recipient has a strong social tie. On the other hand, attitude toward the traditional media source is more predictive of an individual's likelihood of searching for additional information when the content is shared by an individual with whom the recipient has a weak social tie.

• H4: The interaction between the strength of the social tie with the person sharing the content, and the recipient's attitude toward the media source portraying the content will predict the likelihood of searches for additional information regarding the presented content.

2.3. AJE (Al Jazeera English) in Israel

As the study probed Israeli students' assessment of an Al Jazeera English item on the Boycott, Divestment and Sanctions (BDS), it is important to mention that Al Jazeera English has been broadcasting on Israeli satellite provider YES, one of Israel's two main television providers, since its November 2006 launch, illustrating that the channel is perceived as legitimate in Israel (Samuel-Azran, 2016; Samuel-Azran and Hayat, 2017). However, it is also important to mention that at the same time many Israeli viewers are highly suspicious of Al Jazeera, perceiving it as extremely pro-Palestinian and inherently anti-Israeli (Azran, Lavie-Dinur, & Karniel, 2012).

Next, the decision to design a mock article regarding an attempt of BDS activists to block Israeli student exchanges with a US university was aimed to raise interest amongst participants. This is an issue that is bound to interest Israeli students, and is most likely familiar to them, as it serves as a hotbed for pro and anti-Israel activists. BDS activists have had many successes in anti-Israel actions in the US in the last few years, such as influencing leading artists to cancel their concerts in Israel, protesting vociferously in academic institutions and frequently gaining headlines. Our mock article highlights the viability of BDS attempts to ban student exchange with Israeli institutions. Marquette University was selected due to the fact that it is relatively unknown in Israel, making it difficult for the participants to guess the item's credibility.

3. Methodology

3.1 Sample

Participants in this study were Israeli and international undergraduate students in a private college in the center of Israel (N=217), all of whom had an active Facebook account. Data collection was conducted during February 2017.

3.2. Procedure and manipulation

As part of the research questionnaire, participants were presented with a fictitious Facebook status, presumably shared by one of their actual Facebook friends, reporting a story related to BDS. The title of the item was: 'Student supporters of the BDS movement at Marquette University call to stop all student exchange programs with Israeli universities.

As part of the recruitment and preparation process for the experiment, participants were asked to become Facebook 'friends' with a dedicated study account. The participants became 'friends' of the account, and signed an online informed consent form. In this form, they were notified that any data collected from their Facebook profile, will be anonymized, and that no identifying information will be recorded in our database. They were further notified that the participation in this study is voluntary, and they can decide to stop their participation in the study at any point. Following their formal consent, we ran a script that collected data from the participants' Facebook profile. This script was designed specifically for this study, and for each participant and for each of the participants' Facebook friends, the script collected the number of mutual friends they both have, and selected one of the participants' friends with whom he/she had the highest number of mutual friends. This approach is inspired by the model presented by Gilbert and Karahalios (2009), using information that is available via the participants' Facebook profile. Additionally, our script chose for each participant another, random friend (from their Facebook friends list), defined as a 'random tie'.

Finally, the participants were randomly assigned into two groups. The only difference between the groups was in the tie strength of the person who presumably shared the content on Facebook (as presented on the research

questionnaire). The participants in the 'strongest tie' condition group (n=113) received a version of the questionnaire in which the sharer had the strongest tie strength with them (as calculated by our script); the participants in the second group (n=112) received a version of the questionnaire in which the sharer was a random Facebook friend of theirs.

3.3. Measurement

Perceived Item Credibility (dependent variable). Based on the work of Flanagin and Metzger (2007), this variable is comprised of five items: trustworthiness, believability, accuracy, completeness, and unbiasedness. Each item was measured using a 7 point Likert scale (Cronbach's α=0.86). The overall credibility score was calculated as the average of these items (M=2.68, SD=0.72, N=215).

Seek Additional Information (dependent variable). Based on Borah (2014), this variable is comprised of five items: Seek more information supporting your own side of the issue, seek more information supporting the other side of the issue, seek more information that offers a balanced view on the issue, seek more opinions supporting your own side of the issue, and Seek more opinions supporting the other side of the issue. Each item was measured using a 7 point Likert scale (Cronbach's α=0.75). The overall credibility score was calculated as the average of these items (M=2.12, SD=0.37, N=215).

Demographics (background variables). Age and gender were reported by all participants (N=217). The age range was 19-27 (M=22.12, SD=3.71). Overall, there were 152 females (70%) and 65 males (30%).

Tie Strength (independent variable). To measure the strength of tie between the information recipient (the participant) and the information sharer, we used the Inclusion of Other in Self Scale (Aron, Aron, & Smollan, 1992). This visual assessment tool presents participants with seven pictures, each of which includes two circles – representing the 'self' and 'the other'– that overlap at different levels, ranging from totally separated (1) to almost fully overlapping (7). The participants were asked to mark the picture that best describes their current relationship with the other person, giving the value for this variable (M=3.61, SD=1.64, N=217).

Perceived Channel Credibility (independent variable). Based on the work of Gaziano and McGrath (1986), this variable is comprised of 12 items: whether the media source is fair, unbiased, accurate, factual, tells the whole story, respects people's privacy, watches out after people's interests, is concerned about the community's well-being, separates fact and opinion, can be trusted, is concerned about the public interest, has well-trained reporters. Each item was measured using a 7 point Likert scale (Cronbach's α=0.81). The results were translated into a score by adding up the ratings of each of the 12 items (M=23.63, SD=7.53, N=217).

Table 1. Standardized variables included in regression model predicting perceived credibility (N= 217)

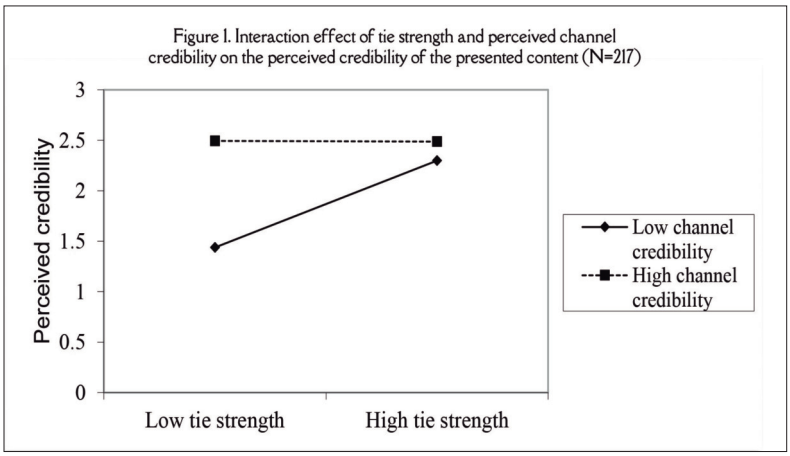
	Model 1			Model 2		
	β	SE	t	B	SE	t
Age (years)	.002	.000	1.243	.002	.000	1.682
Gender (Male=1)	.060	.049	1.861	.068	.050	2.364
Facebook activity	.266	.076	6.754	.243	.063	6.586
Perceived channel credibility	.233	.051	5.752*	.213	.048	5.513*
Tie strength	.328	.039	7.211*	.311	.032	7.071*
Perceived channel credibility X Tie strength				-.207	0.42	-6.397*
Adjusted R^2	.13			.17		

*p<.05, **p <.01. Note. Since all continuous variables were standardized, βs for continuous predictors correspond to standardized regression coefficients.

3.4. Data analysis

We used four regression models to test our hypotheses (Table 1). We first examined whether perceived tie strength and perceived channel credibility indeed predicted the perceived credibility of the presented item (Models 1). We then examined whether there was an interaction between perceived tie strength and perceived channel credibility in predicting the perceived credibility of the presented item (Model 2). We followed the same procedure to examine whether perceived tie strength, and perceived channel credibility indeed predicted the likelihood of searching for additional information regarding the topic presented (Models 3). We then examined whether there was an interaction between tie strength and perceived channel credibility in predicting the likelihood of searching for additional information regarding the topic presented (Model 4).

The Durbin-Watson statistic test was used to investigate the assumption of independence. Normal probability (P-P) plots were used to investigate the normality of error terms. Homoscedasticity was tested by observing the scatter



plot of the residuals and the predicted value. These checks identified no violations of regression assumptions. All statistical tests were one-tailed, and a significance level of $p<0.01$ was set for all analyses.

To facilitate the interpretation of the statistical interaction, all continuous variables used in our model were standardized (Dawson, 2014). To calculate the statistical power of this study to reject false null hypotheses, we conducted a post hoc statistical power test (Faul, Erdfelder, Buchner, & Lang, 2009). With six predictors in the regression analysis, an observed R2 of 0.17 (see Table 1), a sample size of 217 and alpha=.05, the test results indicated an observed power of 1.

Model 1 (Table 1) indicates that tie strength is positively correlated with the perceived credibility of the presented item $\beta=.33$, $t(207)=7.21$, $p<.05$. In other words, the strength of the tie our participants had with the friend who presumably shared the content positively affected their perception regarding the credibility of the shared content (a finding which supports H1). Furthermore, perceived channel credibility is also correlated with the perceived credibility of the presented item, $\beta=.23$, $t(207)=5.752$, $p<.05$. In other words, participants' perceptions regarding the credibility of the channel from which the presented message originated, positively affected their perception regarding the credibility of the shared content.

Model 2 examines whether there is an interaction between tie strength with the person sharing the content and perceived channel credibility. Interaction effects represent the combined effects of variables on the criterion or dependent measure (in our case, on perceived content credibility). When an interaction effect is present, the impact of one variable (in our case, tie strength) depends on the level of the other variable (in our case, perceived channel credibility). There is indeed significant support for interaction between tie strength and perceived channel credibility over the perceived credibility of the content, as we can see in Models 2: $\beta=-.207$, $t(207)=-6.4$, $p<.05$.

The interaction plot, depicted in Figure 1, suggests that high tie strength with the person sharing the content yielded higher perceived credibility when channel credibility was low. The effect of high tie strength was negligible when channel credibility was high. Both slopes were significant ($P<.05$). Thus, our second hypothesis was supported.

Model 3 (Table 2) indicates that tie strength is correlated with the likelihood of searching for additional information regarding the presented item, $\beta=.23$, $t(207)=7.24$, $p<.05$. In other words, the strength of the tie between participants and the friend who presumably shared the content positively affected the likelihood of their searching for additional information about the shared content. Thus, our third hypothesis was supported.

Furthermore, perceived channel credibility is also correlated with the likelihood of searching for additional information about the presented item, $\beta=.291$, $t(207)=5.64$, $p<.05$. In other words, our participants' perceptions regarding the credibility of the channel from which the presented message presumably originated positively affected the likelihood of their searching for additional information regarding the shared content.

Table 2. Standardized variables included in regression model predicting likelihood of searching for additional information (N= 217)

	Model 3			Model 4		
	β	SE	T	β	SE	t
Age (years)	.002	.000	1.741	.002	.000	1.442
Gender (Male=1)	.055	.000	1.751	.054	.000	1.968
Facebook activity	.213	.063	7.742	.216	.059	7.331
Perceived channel credibility	.291	.051	5.641*	.321	.038	5.924*
Tie strength	.228	.032	7.237*	.213	.032	7.041*
Perceived channel credibility X tie strength				-.115	0.21	-5.872*
Adjusted R^2	.09			.11		

*p<.05, **p <.01. Note. Since all continuous variables were standardized, βs for continuous predictors correspond to standardized regression coefficients.

Model 4 examines whether there is an

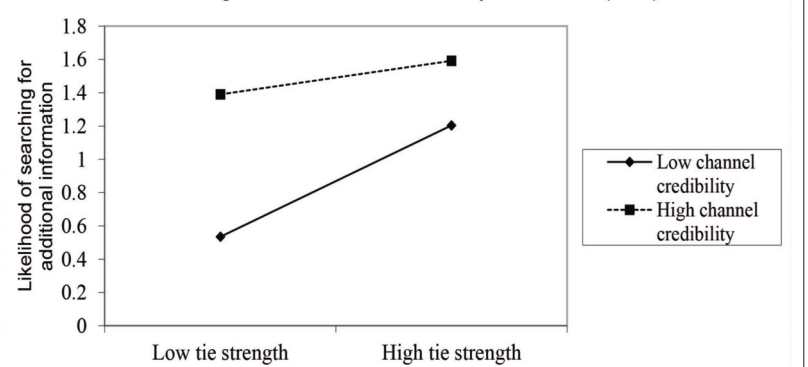
interaction between tie strength with the person sharing the content, and perceived channel (AJE) credibility. There is indeed significant support for interaction between tie strength and perceived channel credibility over the likelihood of searching for additional information as we can see in Models 4: β=–.115, t(207)=–5.872, p<.05.

The interaction plot, depicted in Figure 2, suggests that high tie strength with the person sharing the content yielded higher likelihood of searching for additional information when the channel credibility was low. The effect of high tie strength was negligible when channel credibility was high. Both slopes were significant (P<.05). Thus, our fourth hypothesis was supported.

4. Discussion

The study examined the interplay between the perceived credibility of a news source (with AJE serving as a case study) and that of sharers of a news recommendation item on Facebook, with special emphasis on the impact of strong versus weak ties within one's network. We designed an experiment in which participants evaluated the credibility of a news recommendation that seemed to emanate from the participants' actual Facebook ties, thus mimicking a real-life scenario. The analysis found that both attitude towards media and tie strengths predicted credibility assessment scores, with stronger trust in the news source (AJE) and stronger tie with the Facebook friend sharing the news recommendation leading to higher credibility assessments. This was true regardless of the participants' characteristics, such as gender, level of education and Facebook activity level.

Figure 2. Interaction effect of tie strength and perceived channel credibility on the likelihood of searching for additional information about the presented content (N=217)



However, a more interesting finding is that when the participants received the news recommendation from a strong tie within their network, their negative attitudes toward AJE were less predictive of their credibility assessment. This finding illustrates the superiority of strong ties over traditional media networks in credibility assessment of news shared on Facebook. Strong ties, between the recipient and the person sharing the news, have the potential of authenticating news, including fake news, by contributing to their perceived credibility.

These findings strengthen various former analyses revealing the dramatic power of recommendations by SNS members recommending news to validate and strengthen the credibility of news recommendations (Anspach, 2017; Turcotte & al., 2015). Our findings highlight that in addition to opinion leaders (Turcotte & al., 2015), strong ties can be highly instrumental in affecting the perceived credibility of a shared news item. Furthermore, our findings demonstrate the interplay between the credibility of the news organization who publishes the news story, and Facebook friends who share this content. This distinction is one of Facebook's special attributes, which in essence places both professional journalists and friends in the role of gatekeepers. This introduction of friends as gatekeepers is largely unexplored in the communication and education literature (Turcotte & al., 2015). Relatively few studies have explored the role social ties play in mediating content that originates from news organizations (Hayat, Hershkovitz, & Samuel-Azran, 2018). This question is especially complicated, given that within the mediated-interpersonal contexts credibility evaluation is a challenging process due to the diverse professional and lay sources the content can come from (Johnson & Kaye, 2014). Little has hitherto been known about the role played by individuals who share the content over the assessment of such content.

Recent studies have shown that SNS strongly incorporates connections that facilitate extensive interpersonal communication. Furthermore, the credibility assessment process of the content shared within these platforms is influenced by this interpersonal communication (Flanagin, 2017; Kim & Hollingshead, 2015). Indeed, the credibility assessment process was shown to be associated with interpersonal communication mediated through SNS (Metzger, Flanagin, & Medders, 2010; Winter, Brückner, & Krämer, 2015). As these platforms are heavily based

on social connections, tie strength (between information sharer and information receiver) should definitely play a role in the credibility assessment process (Turcotte & al., 2015). Our findings show that not only do these ties play a role in the credibility assessment process, but also the influence of strong ties is in fact more important in the evaluation of an item's credibility than that of the traditional news source portraying the item.

The findings have relevance for source credibility studies and media studies in general, indicating the further decline in credibility and status of traditional news sources. In an age when so many people receive their news via friends, tie strength is more meaningful than the credibility perception of the traditional media source. From a wider perspective, these findings add to the mounting evidence regarding the decreasing credibility of traditional media sources in the last three decades (Ladd, 2013). While Ladd identified that the 1970s marked a peak in media trust, and the 1990s marked a sharp decline in public trust in the media, our analysis identifies another layer of deterioration in the trust in traditional media: The reputation of a strong tie surmounts the reputation of a media channel (despite its various gatekeepers, including editors and reporters, a global spread and endless resources to verify and authenticate news) and plays a more central role in credibility evaluation. These findings are worrying for news media managers evaluating their contemporary reputation, and simultaneously highlighting the potency of peer-to-peer communication.

The study also contributes to contemporary analyses of fake news credibility evaluation, demonstrating the ability of interested bodies to deliver and spread fake news in SNS with high potency. The findings indicate that a viral item shared by many Facebook members is highly likely to gain credibility due to the possibility it will be shared by at least some strong ties. These findings thus offer a partial explanation for the high success of fake news in SNSs (Silverman & al., 2016).

For information studies, the analysis also illustrates that SNS-shared content that is considered credible can guide behavior, specifically the search for further information about the issue. In this respect, our findings support the findings of Turcotte and others (2015), one of the only former analyses examining the link between news trust on SNS and the tendency for information-seeking behavior. The scholars found that news perceived credible (following submission by opinion leaders) leads to more information searches for content originating from the same media outlet that portrayed the message. Turcotte and others (2015) and our study's combined findings indicate that trusted SNS members can be highly potent in guiding behavior and mobilizing other SNS members.

Like any study, our analysis also suffers from its own limitations. Specifically, it suffers from the following three main limitations. First, the Facebook friends did not actually share the content. Furthermore, the presumably shared item was fabricated. Although various studies examining evaluations of online content and more specifically studies which examine users' tendency to evaluate content credibility and the tendency to search for further information of the issue use fabricated items (Turcotte & al., 2015), we recommend that future studies will complement their analyses with other approaches such as qualitative methods (e.g., interviews) to further validate the interplay between the various constructs. Second, while we conducted a paper-based survey, we recommend that future analyses will conduct the survey on a computer screen. This will allow to present the online shared content to the participants in a manner that better resembles the content they saw during the course of the study. Lastly, the topic of the fabricated content was very specific (BDS-related content, relating to a specific university in the US). Future studies should aim at examining the relevance of our findings within the context of additional knowledge domains.

Given the availability of large scopes of online data, future studies might consider validating the findings using unobtrusive behavior measures that are indicative of credibility assessment (e.g., the opening of links provided in the shared message), and searching patterns (thus providing a stronger measure of participants' active choices to read more about the topic at hand). This type of research will enable the validation of the findings regarding the effect of tie strength and channel credibility, on credibility assessment and the likelihood of further information-seeking in real-world settings.

5. Conclusions

Scholars have acknowledged the great importance of the perceived credibility of the channel from which a message has originated (Harmon & Coney, 1982). Recent work has shown that when being exposed to online content, online readers' most trusted source of information was 'a person like myself' (Harris & Dennis, 2011). We believe that those findings, combined with our findings, can be leveraged to supplement our understanding regarding the importance of the interplay between social tie strength and perceived source credibility. These valuable determinants can be instrumental when examining both perceived credibility of the examined content and likelihood of searching for additional information. Furthermore, Perceptions of credibility of SNS based content, have been studied in

recent years; however, the effect of social variables on this process have been largely overlooked, hence its importance. With social media being a major source of information for many learners at all age levels, our study sheds light on learning-related processes that have so far been understudied. Consequently, our results can serve as a basis for a future development of educational intervention program that will assist learners to better judge online content. In that context, an important contribution of our results is the testing of the association between tie strength, and the perceived credibility of the content. In other words, while the tie strength between the recipient and the content sharer has nothing to do with the actual credibility of the content, our findings shows that the tie strength biases the recipient perception regarding the shared content. This bias should be addressed in future educational intervention, in order to foster more accurate perception of the credibility of content shared through SNS. As such, this study offers one of the first empirical evidence for the important role played by social tie strength in the rapidly growing realm of contemporary news consumption.

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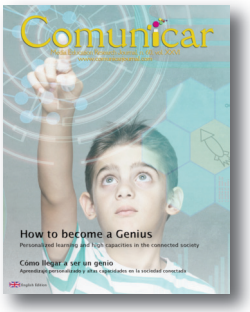

Systematic review of the current state of research on Online Social Networks: Taxonomy on experience of use

Revisión sistemática del panorama de la investigación sobre redes sociales: Taxonomía sobre experiencias de uso

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ABSTRACT
The widespread use of online social networks (OSN) among young people has been accompanied by an increase of publications about them and their effects on the psychosocial development of users. Previous panoramic reviews on OSN research are now outdated and do not provide a comprehensive view of the complexity of the user experience. The aims of this systematic review were three: to identify quantitative studies on OSN; to build a taxonomy about the user experience; and to classify studied variables in the topics and subtopics. The literature search and review according to PICoS strategy led to 546 identified publications that met the eligibility criteria. The taxonomy included nine major topics: overall use; activities and types of use; perceptions and attitudes OSN; the social network of online contacts; needs and motives for use; profile and privacy management; social processes; identity processes; and cognitive-emotional processes related to use of OSN. The three most studied topics were: overall use; activities and types of use; and social processes related to use of OSN. Classification and quantification of the different variables studied about the users' experience is detailed. Several theoretical perspectives are discussed, as well as the gaps and challenges in OSN research. The proposed taxonomy could be useful for researchers to better delineate the aims of future studies.

RESUMEN
La generalización del uso de redes sociales en jóvenes ha supuesto un incremento notable de las publicaciones sobre ellas y sobre sus efectos en el desarrollo psicosocial de los usuarios. Las tentativas previas de revisión panorámica sobre redes quedaron desfasadas y no aportan una visión comprehensiva de la complejidad de la experiencia de uso. Los objetivos de esta revisión sistemática actualizada fueron: identificar estudios cuantitativos sobre redes; construir una taxonomía sobre la experiencia de uso; y clasificar las variables estudiadas en temas y subtemas. La búsqueda y revisión de literatura siguiendo la estrategia PICoS identificó 546 estudios que cumplían los criterios de inclusión. La taxonomía incluyó nueve grandes temáticas investigadas: descripción y cuantificación del uso; actividades y tipos de uso; percepción y actitudes influyentes en el uso; red social de contactos; necesidades y motivos de uso; gestión del perfil y privacidad; procesos sociales; procesos identitarios; y procesos cognitivos-emocionales. Los tres temas más estudiados fueron: la descripción y cuantificación del uso; las actividades y tipos de uso; y los procesos sociales relacionados con el uso. Se detalla la clasificación, cuantificación e integración de las diversas variables estudiadas sobre la experiencia de uso. Las diferentes tradiciones de estudio, así como las lagunas, problemas y retos de la investigación sobre redes son discutidas. Dicha taxonomía será de utilidad para que investigadores puedan encuadrar mejor los objetivos de futuros estudios.

KEYWORDS | PALABRAS CLAVE
Review, social networks, taxonomy, identity, emotions, social relationships, privacy, motivations.
Revisión, redes sociales, taxonomía, identidad, emociones, relaciones sociales, privacidad, motivaciones.

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1. Introduction

The pervasive use of online social networks (OSN) has been accompanied by a growing interest in researching them and the effects of use, resulting in a significant increase in scientific publications over the last decade. In this study, we have considered those OSN that are open and have specific characteristics that make them a unique research topic: an individual profile, a public list of searchable contacts, and a constant exchange of visible content that allows interaction amongst users (Boyd & Ellison, 2008). Examples of the most widespread OSN of this type are Facebook, Instagram, Twitter, and Snapchat.

The use of OSN amongst youth is a normative experience constituting a new virtual platform that can potentially affect their psychological and social development. Studying this user experience is a complex matter and goes beyond evaluating the total time of use, given that the motives for using OSN are varied: maintaining contact with friends, making new friends, or simply passing the time (Krasnova, Veltri, Eling, & Buxmann, 2017). The activities they are used for are also diverse: uploading photos, making videos, writing personal things, or simply browsing what others post (Junco, 2012). Users even manage privacy differently, ranging from simply deciding to adopt a private profile to controlling the audience level for each post (Lankton, McKnigh, & Tripp, 2017).

The rise in OSN research calls for a multidisciplinary, exhaustive, and updated thematic review to assess the current state of research. There are prior reviews from a particular perspective, for instance, the review by Cao, Basoglu, Sheng, & Lowry (2015) is a relevant study in the field of marketing and information systems. Systematic reviews on specific topics also exist (Verduyn, Jonide, & Kross, 2017 or Kokolakis, 2017); however only two systematic panoramic reviews on the main OSN research areas have been found. Firstly, Richter, Riemer, & Vom-Brocke (2011) identified 297 studies up to 2009 on OSN in general, classifying them in four large topics: user personal information disclosure and privacy; nature of links and the role of the personal social network; self-presentation and impression management; and motivations for adopting and using OSN. Secondly, we highlight the systematic review of studies on Facebook in social sciences by Wilson, Gosling, & Graham (2012), who identified 412 articles up to 2011. However, they also included purely descriptive studies. The authors proposed five main research topics: descriptive analysis of users; motives for use; presentation and identity; the role of Facebook in social interactions; and privacy and disclosure of personal information. These reviews have become outdated and lack a taxonomy that clarifies the overall user experience of OSN. This taxonomy could serve as a starting point for a more precise evaluation of the relationships between the experience of OSN use and the psychosocial development of users.

The general objective of this research is to conduct an updated review of studies up to 2017 that have researched the normalized OSN user experience. This consists of three specific objectives: 1) To identify prior studies addressing this experience; 2) To develop a detailed taxonomy of proposed topics, subtopics, variables, and constructs in this research area; and 3) To offer a quantitative assessment, or 'state of the art', after classifying and quantifying the identified studies based on the taxonomy.

2. Method

A systematic literature review of studies on the normalized OSN user experience was conducted following the PRISMA standards for methodological design: protocol, searching process, selection, and synthesis of results (Moher, Liberati, Tetzlaff, Altman, & The PRISMA group, 2009). The methodological decisions were compiled in a previously designed protocol.

2.1. Search strategy

Given the multidisciplinary nature of OSN research, a search of publications up to 2017 was conducted in specialized databases in the fields of psychology, health and medicine, education, sociology, and communication sciences (Web of Science, Scopus, Proquest, EBSCO, Annual Reviews, PsycINFO, Proquest Psychology Journals, PubMed, Medline, ERIC, ABI, ACM, Blackwell, JSTOR, SAGE Journals, Psicodoc, CSIC, and Dialnet).

The main research topics on OSN user experience were first established in order to define the search words. Next, a preliminary literature search was performed to locate key words in the title, abstract, and index terms of those publications considered relevant within each topic. Afterwards, a list of descriptors that included a combination of free terms, subject headings, and thesaurus terms in relation to two questions: social networks in general (i.e., 'Online Social Network', 'Social Networking Sites', 'Internet Social Networks', etc.) and broad research topics within these (i.e., 'time of use', 'SNS activities', 'type of use', 'uses and gratifications', 'emotions', 'attitudes', 'identity', 'online

communication', 'online interactions', 'social relationships', etc.) was elaborated. The model search equation can be provided upon request.

2.2 Eligibility criteria

The PICoS strategy (Population, Phenomena of Interest, Context, and Study Design) was used to define eligibility criteria.

• Population: Studies that included adolescents and/or adults selected in normative contexts (non-clinical) were taken into account. Studies that only analyzed online posts without specifying their sample of participants were excluded.

• Phenomena of Interest: The normalized experience of OSN users. Papers with an exclusive focus on problems related to OSN use such as 'cyberbullying', 'sexting', addictive use, or others, were not taken into account. Those that only used OSN as a means to recruit participants, to administer instruments, or as an intervention context without analyzing aspects related to use, were also discarded.

> The use of OSN amongst youth is a normative experience constituting a new virtual platform that can potentially affect their psychological and social development. Studying this user experience is a complex matter and goes beyond evaluating the total time of use, given that the motives for using OSN are varied: maintaining contact with friends, making new friends, or simply passing the time.

• Context: Studies about open OSN such as 'Facebook', 'Qzone', etc., whether they were used internationally or were specific to a country or region, were included. Studies focused on instant messaging apps, although they had a profile like 'WhatsApp', were excluded. Those focused exclusively on internet and mobile phone use, without analyzing OSN use, were also eliminated.

• Study design: The relevant publications were peer-reviewed quantitative studies with a cross-sectional, transversal, longitudinal or experimental design, either in English or Spanish. The grey literature (communications in conferences, summaries of conferences, or doctoral theses) was not initially considered; however, it was later included when their results were cited in some of the identified systematic reviews or relevant publications for each topic. Qualitative research, single-case studies, theoretical publications, or literature reviews were not taken into account.

2.3. Selection process

The reference management software Mendeley was used in order to easily identify duplicates within the search results. Publication selection was realized through double screening using inclusion/exclusion criteria. A selection sheet was designed to ensure accuracy when applying the selection criteria. In phase one, the studies' relevance was determined by revising the title, abstract, and key words. In phase two, the full texts of potentially eligible studies were obtained and analyzed by two independent reviewers. Any discrepancy regarding publication eligibility was resolved through the collaboration of a third reviewer.

2.4. Data extraction

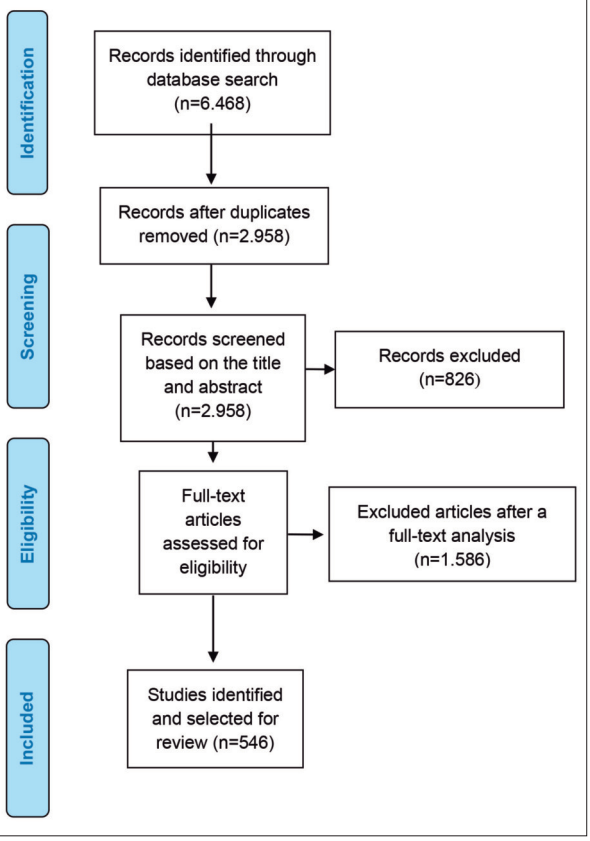
A standardized protocol, previously piloted by the authors, was used to extract the following data from the included publications: authors, publication date, studied OSN, study design, country, and age of the sample, instrument administration procedure, and study objectives and variables.

2.5. Data analysis and synthesis

Based on expert opinion, nine broad research topics regarding normalized OSN use were established. Information on the study variables was extracted from the selected publications to conduct a thematic analysis and

classify them according to these nine topics (Cherry, Perkins, Dickson, & Boland, 2014). Next, in periodic team meetings a conceptual hierarchy map was agreed upon, establishing the different subtopics within each topic, as well as discussing the differences or similarities between the different constructs included in each subtopic so that their final quantification would allow for a quantitative assessment.

Figure 1. Flow diagram of the review process



3. Results

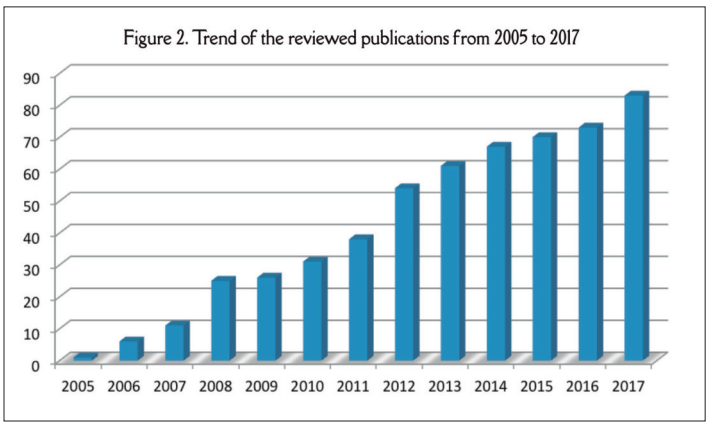
3.1. Identification of selected publications

Figure 1 summarizes the search strategy and review process. The initial search resulted in 6,468 publications, of which 3,510 were duplicates. After screening the title and abstract, 826 publications (non-empirical studies, studies with clinical samples, or those focused on intervention) were discarded because they did not meet the inclusion criteria. The full texts of the remaining papers were assessed to determine if they included study variables within the proposed taxonomy. This review resulted 1,586 discarded studies, mainly for their exclusive focus on OSN use-related problems or for not specifying their sample of participants. The literature review finally allowed 546 studies to be identified that met the eligibility criteria (they can be consulted at https://doi.org/10.6084/m9.figshare.6809216). As can be observed in Figure 2, there has been a dramatic increase in the number of publications on normalized OSN use since 2005.

3.2. Description of the included publications

Our search results indicated that 'Facebook' was the most researched OSN (n=337). There were few studies on Twitter (n=15), since many were excluded for not specifying their sample. Studies up to 2013 were found on the now extinct 'MySpace' (n=14). Some studies since 2014 have been found on OSN currently used amongst youth such as 'Instagram' (n=10), 'Snapchat' (n=8) or 'Tinder' (n=2), but they are still understudied. Others were found on OSN specific to Asia: 'Cyworld' (n=6), 'Wechat' (n=6), 'QZone' (n=5), 'Kakao' (n=5), 'Renren' (n=3), 'Weibo' (n=2) and 'Mixi' (n=2). Lastly, we found studies on OSN in Europe: 'StudiVZ' (n=2), 'CU2' (n=1), 'Hyves' (n=1) or the extinct 'Tuenti' (n=1). The remaining publications studied OSN in general (n=141).

Figure 2. Trend of the reviewed publications from 2005 to 2017



Regarding study design, more than 80% were cross-sectional (n=431), whereas longitudinal (n=54) and experimental studies (n=54), despite their increasing prevalence, were less frequent. Lastly, 15 publications were mixed studies. With respect to the

geographic location of the populations studied, almost half of the publications (n=262) included North American samples, principally from the USA (n=252). Studies conducted with European (n=124) and Asian (n=125) populations were frequent, whereas those with samples from Australia (n=17), Africa (n=4) and South America (n=2) were fewer.

Regarding the age range of the samples, young adults (18-29 years old) were the main population of study in two-thirds of the publications (n=312). Research on adolescents (12-18 years old) was much less frequent (n=54). In other cases, the sample included adolescents and young adults (n=16) or young adults and adults above 30 years old (n=62). Studies exclusively on adults were the minority (n=22). Lastly, other studies were found that included wide samples ranging from adolescents to adulthood (n=80).

Finally, there were more studies that administered instruments online (n=305) than in-person (n=233) or via other means such as telephone surveys (n=8).

3.3. Literature review based on the proposed taxonomy

The thematic analysis resulted in the following taxonomy of OSN use (see Table 1).

A first main topic is the description and quantification of OSN overall use. The most analyzed descriptive variable is user history or the length of time since becoming a user, normally employed as a control variable. There are few studies analyzing differences in certain relevant variables related to user or non-user status or being a single-user or multi-user. Self-reported time is the most frequently used variable to quantify use, normally calculated as the average daily use. Frequency of logins is the second most studied variable, measured either directly or using an ad hoc ordinal scale. Intensity of use is also frequently evaluated thanks to the popularization of the scale by Ellison, Steinfeld, & Lampe (2007), compared to other measures such as the general degree of use or the habit or routine of use.

Another topic that has been studied even more is the frequency of user activities.

Table 1. Taxonomy of topics, subtopics, and variables regarding OSN use

Topic 1. Overall use: description and quantification of use (n=248)
Descriptive variables of users: account, active or inactive, time using OSN, number of OSN used (n=66)
Frequency of logins (n=76)
Degree, habit, and intensity of use (n=69)
Time spent on OSN (n=188)
Topic 2. Individual activity and types of use (n=275)
2.1. General analysis of activity (n=46)
Number of posts (n=31)
Analysis of post quality and content (n=23)
2.2. Frequency of activities (n=214)
General social browsing (n=28)
Social searching (n=20)
'One-click' activities to keep in touch ('likes', etc.) (n=21)
Private communication: chat or messages (n=15)
One-to-one public communication (i.e., comments) (n=42)
Broadcasting (n=97)
Profile configuration and revision (n=20)
Sending and accepting 'friend requests' (n=4)
Editing posts (n=4)
Reactive activities: un-tagging, deleting posts, account, etc. (n=7)
Other activities, such as games and apps (n=13)
2.3. Types of use (n=74)
Active use (n=42)
General active use (n=21)
Subtype interactive-communicative (n=23)
Subtype productive (n=16)
Passive use (n=36)
General passive use (n=27)
Subtype general social browsing (n=6)
Subtype social searching (n=4)
Topic 3. Analysis of the social network of contacts (n=193)
3.1. Structure of the online social network (n=156)
Size of the network (n=128)
Composition of the network (n=61)
Diversity or homogeneity of the network (n=8)
Number and type of group affiliations (n=18)
Overlap of online and offline networks (n=30)
3.2. Dynamic and functioning of the social network (n=68)
Analysis of the feedback received (n=24)
Analysis of the usual audience (n=12)
Analysis of the strength of ties (n=23)
Analysis of the degree of interactivity (n=17)
Analysis of the relationship changes in the offline network after using OSN (n=6)
Topic 4. Profile and privacy management (n=116)
4.1. Profile analysis and configuration (n=64)
Analysis of characteristics of the profile photo (n=16)
Analysis of the informative items associated with the profile (n=47)
Overall evaluation of the profile: accuracy, attractiveness, status, etc. (n=18)
4.2. Perceptions and management of privacy (n=76)
Perceptions about privacy concerns and control (n=62)
Privacy management behaviors and strategies (n=34)

The activities carried out on OSN can be very diverse, classifying into 11 specific online behaviors. The most studied are those involving an active use such as broadcasting or one-to-many posts, followed at a distance by directed communication such as commenting on other's posts. Activities involving a passive use, both in the sense of general social browsing (i.e., surfing the News Feed page in general) and social searching with specific interest in others, as well as activities used to keep in touch (i.e., 'liking'), have been studied to a lesser degree.

According to the frequency of activities, researchers have typically conducted factorial analyses in order to differentiate between individuals isolating different types of use. Two clearly identified differentiated forms were active and passive use. In turn, subtypes have been identified within active use: the type of interactive-communicative use that happens between specific users (i.e., 'likes' and commenting on others' posts), or the type of productive use focused on content posting directed to a broad audience (i.e., status updates). However, passive use has been studied in general terms. Rarely have researchers taken into account the distinction between the use focused on passive social browsing and passive social searching with an interest on specific users.

Regarding the social network of contacts, the most studied aspects (size, composition, and overlap of online and offline network) have more to do with the characterization of their structure than with their dynamics or functioning. The fact that dynamics are more difficult to analyze could justify the fewer number of studies focused on aspects such as feedback quantity and quality, the strength of ties with contacts, and the degree of online interactivity.

In terms of profile and privacy management, the user profile –especially the amount of personal information revealed– is extensively analyzed. Certain studies also analyze the profile photo or make a general profile evaluation based on criteria such as accuracy, status, attractiveness, etc. Different constructs have also been proposed regarding the perception of online privacy: privacy concerns, the controllability of personal information, and even general beliefs on online trust or perceived risk in OSN. Privacy concerns, whether in general or for specific risks (i.e. undesired third-party access) are some of the most studied variables. Lastly, there are few studies on privacy management behaviors, which include not only the typical basic decision on whether to have a public or private profile, but also less frequent behaviors such as controlling the size and type of audience of the posts.

The second part of the taxonomy on OSN user experience is presented below (Table 2).

Research on both the different perceptions of OSN as well as the activities that influence use are normally included together in explanatory models of continuance intention. On one hand, different perceptions considered to be potential facilitators of higher OSN use, for example easy use, entertainment, or usefulness, have been studied. Research has also been conducted on aspects related to the perception and social representation of the OSN as well as the influence of the social presence of the peer group in its use. Both the general trust in the OSN and their members, as well as certain external or structural characteristics of the OSN that make it more appealing, such as prestige, attractive format, possible interactivity, or compatibility, have been studied. On the other hand, the continuance intention is the most studied construct regarding user attitudes towards OSN. Analyses have also been conducted on positive attitude towards use, satisfaction, engagement and commitment to use, and even identification and pride with the OSN expressed through recommending it to others. All of them are positive attitudes with different subtleties, different from research on fatigue or the intention to switch-off and 'FOMO' or fear of missing out.

The motives for use constitute another main topic. Given the social nature of OSN, it should come as no surprise that social needs motives such as maintaining social contact, establishing new relationships, or looking for social recognition, have generated the most interest. Regarding individual needs, hedonistic and mood regulation needs stand out, with seeking positive sensations, whether to pass the time or as entertainment, being frequently studied. Information access is in third place, especially the motives for seeking information: either curiosity about what happens in general or about specific people. In fourth place, motives related to personal identity development are less frequently studied. Most of them include either motives of self-validation (with the purpose of impressing others and seeking approval or reinforcement), or the self-expression of feelings or opinions.

Research typically considers processes related to user experience, albeit social, personal or cognitive-emotional, as possible mediators between OSN use and their effects on users. The social processes have been addressed the most. Four aspects stand out and have been proposed as possible benefits: the perceived online social support, the sense of online social connectedness, the quality of online relationships, and online social impact and popularity. Identity processes in OSN have sparked a notable interest. On one hand, there are studies that address the degree and aspects of online self-disclosure: extent, depth, or emotional valence. On the other hand, different online self-presentation strategies are analyzed: idealized presentation in order to impress others more than other strategies based on honesty and authenticity. Lastly, the cognitive-emotional processes, typically studied as mediators between

use and its possible effects on subjective wellbeing, have been addressed the least. Online social comparison is the most researched process due to its relationship with envy, criticism, self-devaluation, etc. Lastly, post-use emotions have been studied, paying closer attention to negative rather than positive feelings.

4. Discussion and conclusions

This review has offered a wide perspective on research regarding normalized OSN use as well as an assessment of the presence of different research topics thanks to the proposed taxonomy.

The quantification of use is a central topic in order to answer fundamental questions such as possible user effects on subjective wellbeing and social development. The fact that the measures used are so diverse raises the issue of their operationalization and validity, since most studies are based on self-reported information and therefore introduce a certain retrospective bias. In order to preserve variability, Junco (2012) recommends that user information be collected directly and not through interval scales. Seabrook, Kern, & Richard (2016) propose using other data collection methods such as daily sampling of user experience. In the end, an accurate measure of amount of use is infrequent except in the context of a controlled experiment, which would question the validity of the results from the research on time spent on OSN.

There are different proposals of both inventories of activities (Junco, 2012) and scales about the type of OSN use based on the activities (Gerson, Plagnol, & Corr, 2017). Some studies have evaluated the type of active use according to the record of real OSN activities in the network (Burke, 2011); however, this does not allow passive use to be evaluated, which in reality is what users do most of the time. In addition, we believe it is necessary to consider different types of use, at least discriminating between more communicative and interactive use from more productive use, as well as contemplate the possible differential benefits regarding loneliness,

Table 2. Taxonomy of topics, subtopics, and variables regarding the experience of OSN use

Topic 5. Perception and attitudes towards OSN and its use (n=157)
5.1. Perception of OSN (n=92)
Trust and perceived risk (n=17)
Perception of external network features that potentially encourage use: prestige, attractive format, editability, etc. (n=26)
Perception of social presence and influence, as well as the peer group regarding use of the OSN (n=33)
Perception of characteristics related to user experience: ease of use, entertainment, usefulness, etc. (n=57)
5.2. Attitudes towards OSN use (n=102)
Positive attitude towards use (n=30)
Satisfaction with use (n=29)
Identification-pride with the OSN (n=8)
Engagement and commitment to use (n=19)
Continuance intention (n=42)
Fatigue from use (n=3)
Fear of missing out 'FOMO' (n=10)
Topic 6. Needs and motives related to OSN use (n=183)
6.1. The need for informative competence (n=60)
Information access motives (n=48)
Motives of usefulness and gaining information: ideas, resources, document organization, social, etc. (n=22)
Motives with an informational purpose related to certain contexts: academic, professional, etc. (n=18)
6.2. Hedonistic and mood regulation needs (n=78)
Motives of seeking positive sensations: to pass the time, entertainment, etc. (n=62)
Motives of seeking relaxation: escape, escapism, etc. (n=14)
Motives of seeking pleasure: enjoyment, flow, etc. (n=17)
6.3. Personal identity development (n=43)
Motives of exploration and clarification of personal identity (n=3)
Motives of self-expression: expression of emotions, opinions, etc. (n=23)
Motives of self-validation: seeking approval, popularity, to impress others, etc. (n=27)
6.4. The need to relate (n=98)
Motives of maintaining social contact (n=71)
Motives of establishing new relationships (n=26)
Motives of sense of belonging to a virtual community (n=19)
Motives of social rating and recognition (n=46)
Topic 7. Cognitive-emotional processes related to OSN use (n=63)
Processes related to online social comparison: lurking, envy, criticism, self-devaluation, etc. (n=41)
Processes related to consciousness of the public image: awareness of self-image, embarrassment, regret, rejection, etc. (n=23)
Processes related to different emotions stemming from the user experience: positive emotions of enjoyment and flow, or post-use negative emotions (n=34)
Topic 8. Identity processes related to OSN use (n=126)
Online self-disclosure: degree and possible aspects such as depth, valence, etc. (n=77)
Online self-presentation strategies (n=73)
Topic 9. Social processes related to OSN use (n=231)
Online social support (n=89)
Sense of online social connectedness (n=80)
Quality of online social relationships (n=80)
Online social impact and popularity (n=68)
Preference for online communication (n=30)

social connectedness, or social support. The same occurs with passive use, which has been associated with a decline in user's subjective wellbeing (Verduyn & al., 2017). However, the differential effects between passive and unspecific browsing of the news section and the searching of the specific users (Wise, Alhabash, & Park, 2010) have hardly been explored.

Research on OSN has aroused significant sociological interest (Ellison, Vitak, Gray, & Lampe, 2014). Much attention has been paid to structural aspects such as network size and composition in order to clarify the possible overlap between online and offline social networks. The size of the network has commonly been considered to be another index of quantitative and active use, whereas in reality, having a higher number of contacts is not always seen as positive (Tong, Van Der Heide, Langwell, & Walther, 2008). The network composition is sometimes described in great detail (Ellison & al., 2007), analyzing the possible relationship between the percentage of real friendships and virtual friendships or strangers (Antheunis, Valkenburg, & Peter, 2012). Understanding the structure of the OSN allows us to capture a specific moment in time; however, evaluation of the internal dynamic and interaction is more difficult. Although aspects such as feedback, audience, and the strength of ties established with each contact have been evaluated, tools should be developed in order to evaluate the communicative exchange across time and, for example, to examine the different immersion experiences in OSN use and post-use relationship changes.

The processes related to user experience, albeit social, identitary or cognitive-emotional, have generated interest as possible mediators between OSN use and their effects on users. Firstly, the identitary processes are protagonist in calculating how much personal disclosure is opportune for developing or reinforcing online links.

Research on profile and privacy management have evolved within the Privacy Calculus model (James, Warkentin, & Colignon, 2015), which argues that aspects such as photo choice, type of profile, or associated information, respond to a tradeoff between privacy costs and possible benefits of online self-disclosure. Another key aspect demonstrated by research is that a general concern for privacy is not necessarily consistent with adopting OSN privacy behaviors in the network. Little research has been conducted on privacy management strategies (Lankton & al., 2017), which range from strict privacy control based on sharing as little as possible to more permissive control strategies such as sharing everything.

Research on perceptions and attitudes towards OSN is related to applying the Technology Acceptance Models to the use of social networks (Rauniar, Rawski, Yang, & Johnson, 2014). These studies almost always have an underlying positive bias, assuming the user's predisposition towards certain positive expectations associated with use (attractive format, easy use, or entertainment, etc.). Thereby, if certain expectations are met, the cycle is self-fulfilling. This contrasts with the lesser-studied phenomena of what happens when the user's expectations are unfulfilled time and time again, and if this may lead to perceptions and attitudes related to fatigue and the intention of disconnecting. Another issue only recently addressed is if compulsive use amongst the youngest users could be partially explained as a consequence of social pressure towards use and involves attitudes such as 'FOMO' or the fear of missing out (Oberst, Wegmann, Stodt, Brand, & Chamarro, 2017).

Research on motives for OSN use has been bolstered through the Uses and Gratifications Theory (Krasnova & al., 2017), but it has a huge interest for its relationship to the fundamental psychological needs of autonomy, relatedness and competence. Until now, research has typically focused on gender and personality differences behind these motives but rarely the possible relationships between these motives and relevant issues such as emotional wellbeing or addiction. It should be noted that the studies focus primarily on the motives for using Facebook, making it necessary to examine the use motives of certain recent and extensively used OSN amongst youth, e.g., Instagram (Sheldon & Bryant, 2016). Motives of non-use have also been neglected in research, which could be a form of distinction from others in the context of widespread use.

Lastly, the processes related to user experience, albeit social, identitary or cognitive-emotional, have generated interest as possible mediators between OSN use and their effects on users. Firstly, the identitary processes are

protagonist in calculating how much personal disclosure is opportune for developing or reinforcing online links (Bazarova & Choi, 2014). On the other hand, little research has focused on whether, despite the overall tendency of idealized and positive online self-presentation, other more honest and authentic forms of presentation are possible and adequate. We believe that a more exhaustive study of the different self-presentation strategies is in order (Michikyam, Dennis, & Subrahmanyam, 2014). Secondly, in the case of cognitive-emotional processes, Seabrook & al. (2016) consider that the literature partially demonstrates both a positive path of the social processes and a negative path of OSN use. That is to say, it seems to be fundamentally sustained that active use could lead to more social interaction and possible social benefits, such as an increase in perceived social support, the feeling of social connection, or a decrease in loneliness, especially in subjects with social anxiety who would make a compensatory use. It has also been argued that since most OSN use is passive, this could favor negative social comparison with others' lives, leading to a decrease in emotional wellbeing (Verduyn & al., 2017).

In conclusion, some of this study's limitations inherent to decision making should be addressed. Our review is not completely panoramic since an important number of studies were eliminated due to their exclusive focus on the problematic use of OSN. Constraints on the length of the present paper hinder us from further elaborating the discussion section regarding the research topics or on the necessary integration of diverse constructs proposed in the different research areas. We believe that the proposed taxonomy could help orient researchers interested in the OSN use both in the fields of communication as well as education. One must bear in mind that this is a dynamic phenomenon in continual evolution that should be socially observed and informed (Sádaba & Bringué, 2011). On the other hand, the quantitative assessment of the research conducted to date can also indicate which thematic areas have been less studied and require more research. More specific literature reviews on each of the presented topics are needed in order to further delimit the taxonomy.

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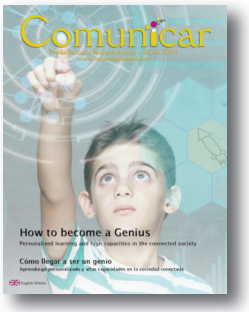

Participatory audiences in the European public service media: Content production and copyright

Audiencias participativas en el servicio audiovisual público europeo: Producción de contenidos y derechos de autor

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ABSTRACT

The interactivity and participation of the public in the media is not a novelty, but has increased significantly with the adaptation to the digital convergence process. The possibility for audiences to share content through social platforms or generating its own is raising new ethical and legal issues. In this context, the public service audiovisual media must be pioneer both in the introduction of new participatory experiences and in the debate on the behaviour of the media regarding the interaction with its users. The objective of this article is twofold: on the one hand, to approach the current scenario of participatory mechanisms present in the European public service audiovisual media; on the other hand, to determine how this media is solving the new problems generated by the increase in user interaction. The research on participatory mechanisms offered by public service media shows that social networks, blogs, and comment sections are the main tools for discursive participation, while the field of creative participation requires the exploitation of new innovation strategies. The main challenge arising from this situation is how to control the legality of user-generated content and how to manage the ownership of copyright according to social values represented in public service media.

RESUMEN

La interactividad y participación del público en los medios de comunicación no supone una novedad, pero se ha incrementado notablemente con la adaptación al proceso de convergencia digital. La posibilidad de las audiencias de compartir a través de plataformas sociales o de generar contenido propio está planteando nuevas problemáticas éticas y jurídicas. En este contexto, los medios audiovisuales de servicio público deben ser pioneros tanto en la introducción de nuevas experiencias participativas como en el debate sobre el comportamiento de los medios en la relación con sus usuarios. El objetivo de este artículo es doble: por un lado, hacer una aproximación al panorama actual de los mecanismos de participación con los que cuenta el servicio audiovisual público europeo; por otro, conocer cómo estos medios están resolviendo las nuevas problemáticas generadas por el incremento en las relaciones con los usuarios. La exploración de los mecanismos de participación ofrecidos por los medios de comunicación públicos demuestra que las redes sociales, los blogs y las secciones de comentarios son los instrumentos de participación discursiva predominantes, mientras que en la esfera de la participación creativa es necesario explotar nuevas estrategias de innovación. Como principal reto a abordar, se plantea cómo controlar la legalidad del contenido generado por los usuarios y gestionar la titularidad de los derechos de autor conforme a los valores sociales representados en los medios públicos.

KEYWORDS | PALABRAS CLAVE

Participation, interactivity, audience, digital convergence, intellectual property, copyright, public service audiovisual media, audiovisual policies.

Participación, interactividad, audiencias, convergencia digital, propiedad intelectual, derechos de autor, servicio audiovisual público, políticas audiovisuales.

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1. Introduction and research questions

The reshaping of the European public service media has intensified due to digital transformations and changes in consumer habits. Public service media must take advantage of the current media scenario to act as a driving force in pursuing new participatory mechanisms while redefining its social mission (Medina & Ojer, 2011). Some forms of participation connect with the mission of public audio-visual services to the extent that they need to be at the forefront of the new cultural modes (Moe, 2008; Azurmendi, 2018). Vanhaeght and Donders (2015) identify five values or principles for the public service media that could be fostered through audience involvement: universality, creativity, social cohesion, participation, and diversity. This last objective is also highlighted by Aslama-Horowitz and Napoli (2014), considering the opportunities offered by audience participation to foster diversity.

For this reason, the interest of public media on the new forms of consumption and the users' approach should be increasing. European Union broadcasters have spread their presence on digital platforms and social networks (Fernández-Lombao, 2015), although in certain cases they were criticised for their lack of a two-way relationship (Azurmendi, Llorens, López-Vidales, & Bas-Portero, 2015).

Adaptation to online technologies has implied a transformation in the media and the audiences (Rodríguez-Martínez, Codina, & Pedraza-Jiménez, 2012; Díaz-Noci, 2010) and under the 'conditions of the modern media ecology' (Scolari, Winocur, Pereira, & Barreneche, 2018).

Web 2.0 tools, alongside current communication strategies, are based on collaborative project proposals arising from social media in the so-called prosumer and intercreativity era (Fernández-Castrillo, 2014). The forms of consumption change through new technologies and mobile devices anywhere and anytime (González-Molina, 2012). The media puts new formats and narratives in place, many of them meeting the requirements of consumption through mobile devices and new online technologies (Varona-Aramburu, Sánchez-Martín, & Arrocha, 2017).

The possibilities for interaction are becoming increasingly extensive. Díaz-Noci and Tous-Rovirosa (2012) highlight the multiplatform distribution of current issues, the contributions to the construction of news discourses or, in the fiction field, the story continuation in multiple ways. Besides, the 'participatory turn' (Bonini, 2017) may (and should) lead to structural participation, which refers to the development of strategies placing civil society or the 'implied audience' (Horz, 2016) at the centre of the decision-making process on public media.

Innovation is a key element for public service media, but it constitutes a challenge which raises new conflicts. A major concern for the media is the possibility that its content, protected under copyright (common or continental law), may be shared through social or personal networks, blogs, or other interactive mechanisms. Web 2.0 has overcome copyright regulation (Cebrián-Herreros, 2008), as well as its control and management (Ribes, 2007). Additionally, there is a need to regulate user-generated content legality and ethics.

2. Material and methods

The purpose of this research was to conduct a descriptive approach of the participatory offers provided by European public media, and to analyse the regulation on copyright, legality, and ownership of such participatory offers. The study comprises all the European Union public media[1] by accessing their websites.

This paper shows the results arising from research on the main participatory mechanisms provided to users by the European public media. Due to the broadness of the concept 'participation'[2] (Carpentier, 2011; Azurmendi & Muñoz-Saldaña, 2016), a decision was made to analyse the concept within the content, by designing a datasheet, based on a dual dimension:

1) Discursive participation, emerging from comments in news, blogs, forums, and other digital tools allowing users to express their opinion. This kind of participation, which could be equated with the 'catch-all' model cited by Masip and Suau (2014), did not imply any engagement by users from a content creation point of view. The analysed elements within this dimension were the following: social networks, blogs, comments, forums, chats, complaint boxes, forms, polls, and debates.

2) Creative participation, especially channelled through activities requiring the audience´s active engagement and leading to user-generated content. In this case, there was a direct link both to the model of collaborative networks from Masip and Suau (2014) and the indicators corresponding to the content productivity parameter arising from the approach of Rodríguez-Martínez, Codina and Pedraza-Jiménez (2012). Creative participation included the analysis of the following elements: text, video, image, and audio production, as well as 'fan fiction' and 'fan art'.

The design of the datasheet corresponding to this first phase of the analysis process (discursive and creative participation) was executed considering a series of studies that focus on the development of methodological proposals

which allow for the assessment of the different levels of the user's online participation (Rost, 2010; Rodríguez-Martínez, Codina, & Pedraza-Jiménez, 2012; Limia-Fernández, Toural-Bran, & López-García, 2013; Masip & Suau, 2014; López-López, Puentes-Rivera, & Rúas-Araujo, 2017), but adapting them to the scope of this study. The research timing during this first phase was divided into two parts: The first part consisted of the analysis of the corporations' websites in order to gather, through comparative tables, the availability of interactive tools in the two participatory models above mentioned. This allowed us to identify the online platforms created by each public corporation for user's participation, the accessibility to these platforms, and the requirements for using them (registration). Once the participatory tools from each corporation's website were identified, the second part consisted of a second analysis which allowed us to see which tools obtained a higher level of participation (number of followers and comments; image, text, and audio transfers; level of discussion among users, etc.), which content was shared by both public broadcasters and their users by means of these tools, and also an assessment of feedback levels from the corporations towards their audience (answers to questions, comments or complaints from users, doubt clarifications, acknowledgements, content or opinion delivery), and which proposals are included on their websites for the users' creative involvement.

> Innovation is a key element for public service media, but it constitutes a challenge which raises new conflicts. A major concern for the media is the possibility that its content, protected under copyright (common or continental law), may be shared through social or personal networks, blogs, or other interactive mechanisms.

This study concludes with the analysis of the websites' terms and conditions of use, with the aim of identifying the main effects of participatory mechanisms regarding the European public broadcasters' regulation. For that purpose, a review of these texts was conducted[3] (terms and conditions of use, legal notices, etc.), gathering them from the target public media websites, searching a series of keywords: shared content, user-generated content, copyright, content control, ownership, and legality. An assumption was made in terms of the increasing forms of participation as a cause for a rise in control and standardisation measures, especially in the field of intellectual property rights and legality control.

The novelty of this study lies in providing a double perspective of the current situation and state of play concerning users' participation in public audiovisual media, both from the point of view of the main collaborative tools and the subsequent regulatory effects and changes. There are numerous studies on audience participation in audiovisual media, some examples being Scolari (2008), García-Avilés (2012), Quintas-Froufe and González-Neira (2014). Regarding public television, there are studies carried out by Debrett (2014), Hutchinson (2015), Azurmendi and Muñoz-Saldaña (2016), Rodríguez-Fernández, Sánchez-Amboage and Toural-Bran (2018), or Stollfuß (2018). There is less research on copyright and media, with studies conducted by Díaz-Noci (2003; 2010; 2014) or Díaz-Noci and Tous-Rovirosa (2012) worth noting. However, none of these authors addresses the scope of this research (state of play, difficulties, and copyright) within the European Union public audiovisual scenario.

3. Results. Participation in public service media

3.1. Discursive participation analysis

Public European broadcasters begin to understand the undeniable advantages of actively involving their audience. This is why, even though many of the broadcasters are still more focused on the display than on participation, others seek to provoke the audience's reaction to their content.

• Social networks. The analysis of discursive participation in public European broadcasters shows that social networks have become the main interactive tool used by these bodies. Every public broadcaster opts to be present through various accounts on existing social platforms[4]. Facebook and Twitter have a greater presence on broadcasters' websites and generally reach a greater number of followers. In this sense, the British broadcaster BBC and the Spanish RTVE are the ones obtaining higher levels of acceptance thanks to their 'social media' strategy. YouTube is the other large social network that is managed by the majority of European broadcasters. The BBC is the broadcaster

with the largest number of users in this platform, with more than five and a half million followers and a high level of activity. On the other side, there are entities such as the Bulgarian public broadcaster BNT, reaching less than 10,000 followers and having no activity for the last four years, or the Cypriot CyBC, having shared only one video and barely holding five hundred supporters. Instagram and LinkedIn are also widely used among many of the European broadcasters.

• Blogs. Blogs are also an online platform used by many of the European public broadcasters, although not all of these corporations use them in the same way. The BBC has a corporate blog that explains how that business group works. SVT (Sweden) continues along these lines, using this logbook for different area managers to tackle topics related to the corporation. Other bodies (RTVE in Spain, RAI in Italy, YLE in Finland, MTVA in Hungary and again the British BBC) include in their websites a section allotted to blogs addressing fun facts and various subjects (cooking, politics, music, poetry, etc.). BNT (Bulgaria), RTP (Portugal) and RTÉ (Ireland) have a section for blogs that focus mainly on current and political affairs.

> Public European broadcasters begin to understand the undeniable advantages of actively involving their audience. This is why, even though many of the broadcasters are still more focused on the display than on participation, others seek to provoke the audience's reaction to their content.

Comments. Most European public broadcasters allow the user to comment their content, even though they offer different spaces for that. In this regard, some corporations enable comments without needing a pre-registration on the web section (ARD, ORF, BBC, RAI, RTVE, DR, TVR or SVT), while in other cases it is mandatory for the user to register (Česka Televize, LRT, RTVSLO, ERR, France Télévisions, Latvijas Televizija, RTL or RTP). Besides, there are some broadcasters that only allow users to comment on demand platforms (such is the case for the Belgian RTBF and VRT).

• Forums. Only five out of all the broadcasters analysed have a section dedicated to forums. ARD, in Germany, includes some forums related to specific shows from its main TV channel, Das Erste. SVT (Sweden) has a number of active forums focused on social issues. By means of the section 'Take part in DR', the Danish corporation provides the audiences with a forum for talking about their interests in the functioning of the corporation. Finally, RTVSLO (Slovenia) and RTVE (Spain) have open forums to participation on various topics (culture, sports, leisure, etc.).

• Chats. The main German TV channel, Das Erste, joins a 'Live-Chat' to its live broadcast on the website. Similarly, the NPO Radio 1 in The Netherlands has an online chat as well. Regarding the Spanish RTVE, it only activates this service when it comes to prime-time shows, for example 'The Operación Triunfo Chat', related to the Spanish reality television talent show 'Operación Triunfo'. The Portuguese RTP is also among the few public broadcasters providing this kind of service, although on this occasion it appears only on the online channel RTP Arena, focused on 'eSports'. The Slovenian RTVSLO offers its registered users the opportunity to participate on chats, making conversations open to everyone.

• Complaint box. Many of the analysed broadcasters provide some sort of complaint box, usually related to the concept of the audience ombudsman, which makes the sending of complaints and/or suggestions much easier.

• Web forms. They appear in many of the analysed broadcasters. Most of them are simple, since they only request some information about the user. Forms are also used to tackle issues related to the payment of the broadcaster contribution (RTVSLO in Slovenia, or BBC in the United Kingdom) or to develop games or contests (ORF in Austria, or VRT in Belgium).

• Polls. Polls are not widely used among the European Union public broadcasters. RTÉ (Ireland) employs polls to select the candidates for the 'RTÉ Radio 1 Folk Awards'. France Télévisions (France) uses them on specific situations as a game. The Dutch NPO is the public media network that most frequently uses polls, featuring a section dedicated to them, #POLL. Other corporations like RTVE (Spain) or DR (Denmark) have a different approach. The online platform from the Spanish broadcaster assesses the interest of users in a given subject by means of polls. For its part, DR in Denmark, through the 'Panel of DR', involves 10,000 users who publish their answers with the aim of improving the services provided by the Danish broadcaster.

• Debates. ORF (Austria) has the only debate section identified during the analysis of the sample: 'ORF Debatte', where discussions are held on several current issues.

3.2. Creative participation analysis

The analysis of the creative participation shows a certain degree of openness by the analysed broadcasters to actively involve audience in content production.

• Text, video, and image production. From the production perspective, the main contribution of users to European public broadcasters is related to the users' input on the different information sections existing on the broadcasters' websites. It is common for text, image and video requests to be jointly sent from the same section. Examples include BBC (United Kingdom), RTBF (Belgium), RTÉ (Ireland), DR (Denmark), LRT (Lithuania), PBS (Malta), RTVLSO (Slovenia) and RTL (Luxembourg).

A different way of involving users is through proposals made by corporations as RTVE (Spain), BBC (United Kingdom), YLE (Finland) and SVT (Sweden). RTVE recently activated the project 'En la brecha' on its digital platform 'Playz'. This interactive documentary on the gender gap in the working environment gives every woman the opportunity to participate and tell her story. 'BBC Travels' also allows for participation by presenting attractive and emotional stories addressed to editors, writers, and photographers. YLE has a section where users can send proposals on potential content for the corporation and SVT calls for proposals for 'SVT Documentary'.

When it comes to textual participation only, we found different cases from the ones already stated above. RTVE, through its public radio service Radio Nacional de España, organised a tale contest called 'Relatos Escritos' for people over sixty. The Bulgarian public corporation BNT is another representative example, since it promoted the campaign 'A window to the country', an essay contest addressed to Bulgarian students.

We also found the opinion section of RTL from Luxembourg, and the web space 'My World' from the Slovenian RTVSLO. In the first case, there is a section devoted to the readers' letters and, as for the second case, a space for sending short texts, as a kind of tweets.

Concerning France Télévisions, we found a form of participation that is halfway between text production and the use of web forms. The programme 'Allô Docteurs' gives the users the option of sending their questions regarding the topics to be discussed during the following programmes.

Besides, we also frequently found photo gallery sections in the case of the digital platforms from the analysed broadcasters, inviting the audience to participate only with images. The most remarkable examples are RTVE (Spain), YLE (Finland), ORF (Austria), DR (Denmark), RTÉ (Ireland), SVT (Sweden) and ERR (Estonia). There are also opportunities for participation in the case of child audiences. The Portuguese RTP, through its channel 'Zigzag', provides a section where drawings made by children are published.

• Audio production. The options to send audio files are very limited. Only the British BBC and the Danish DR allow the audience to send audio files in the news section, while RTVSLO (Slovenia) makes it possible through the space 'My Web'.

• 'Fan fiction' and 'fan art'. The only identified case belongs to the RTVE series 'El Ministerio del Tiempo', which has led to the reconstruction of the original text and to the production of artwork from users.

4. Results. Regulation of audience participation

4.1. Shared content

In reaction to the emergence of new participatory mechanisms, the European public audiovisual services have faced the need to regulate the ways of sharing their content. Suffering damage to their reputation, infringing copyright or using content for commercial purposes are the main concerns of public corporations, with little difference between the Anglo-Saxon and the continental models (Miró-Llinares, 2007), except for specific issues. We emphasise those conditions identifying this element in a more comprehensive manner.

The British BBC transparently regulates how its content is shared, using a number of recommendations (British Broadcasting Corporation, 2018): 1) It makes it possible for users to share some content through the most popular social networks; 2) It recommends users to always share the latest version, to add a credit to shows that they share from the BBC, and to add a hyperlink to the shareable's original location; 3) It advises users not to exaggerate their relationship with the BBC, and it states that content should not be used for advertising or harmful purposes.

The Portuguese RTP points out that, unless authorised by the broadcaster, hyperlinks may only be posted on the main page of its digital web services; hyperlinks must be complete and they are not authorised if they come from websites hosting illicit content or undermining third-party rights (Rádio e Televisão de Portugal, n.d.).

In Spain, RTVE bans users to copy its web content to unlawful websites. Furthermore, there are a number of minimum determinants that, in case they are not fulfilled, could lead to a financial compensation to the public corporation. These determinants could be summarised as follows: 1) The informative content from the corporation may only be hosted on users' online platforms if the message 'Information provided by rtve.es' is displayed, as well as a link to the RTVE website; 2) Users may not commercially exploit content from rtve.es; 3) The original content may not be modified; 4) Associating content to political ideologies, advertising materials or illegal websites is not permitted (Radiotelevisión Española, n.d.).

4.2. User-generated content. Copyright, ownership, and legality

The trend of some public broadcasters is nowadays to include clauses on the free and unlimited transfer of copyright from user-generated content.

The model carried out by the BBC, apart from including the free and unlimited transfer of copyright, adds clauses related to moral rights. The British broadcaster emphasises that, 'when users upload a creation, they give up their moral rights to it'. This implies that the broadcaster can 'use the creation without identifying the user as the creator', and thus modifying it without permission (British Broadcasting Corporation, 2018). In the case of RTÉ (Ireland), it reserves the right to 'use, edit, move, moderate, copy, disclose to third parties and make the content or any part of it available' (Raidió Teilifís Éireann, n.d.).

VRT (Belgium) reminds users that, in the event they make a contribution, the corporation is granted the unrestricted right to fully or partly exploit the content, through any means and in any way, without any compensation (Vlaamse Radio, in Televisieomroeporganisatie, n.d.). RTP (Portugal) clearly states that the broadcaster reserves the right to use the ideas, concepts, and techniques created by the user, but it also refers to the 'development, production or commercialisation of products based on such information' (Rádio e Televisão de Portugal, n.d.). The Danish DR indicates that the content provided by users may be used on any media platform from the broadcaster (Danmarks Radio, 2016), while NPO (The Netherlands) points out that the user gives the right to publish and copy the content (Nederlandse Publieke Omroep, n.d.). Besides, some of the analysed public corporations, for example the French or the German ZDF, stress that copyright transfer from users is not exclusive (France Télévisions, n.d.) (Zweites Deutsches Fernsehen, n.d.).

When it comes to legality and ownership control of intellectual property, most of the public audiovisual media considers in a comprehensive manner a number of clauses stating that the user is accountable for the content provided to the broadcaster. In addition to this, some of the corporations include a regulation process, either from the broadcaster itself or from the other users:

- The regulation system implemented by the British corporation BBC (British Broadcasting Corporation, 2018) establishes a double check every time a user adds a comment (pre-moderation), and when the comment is reported by someone else or by an automatic moderation filter (reactive-moderation).
- Radio Télévision Belge Francophone (n.d.) in Belgium, Zweites Deutsches Fernsehen (n.d.) in Germany, and France Télévisions (n.d.) in France ask for cooperation from users in reporting content identified as illicit or contrary to copyright. Concerning Radiotelevisione italiana (n.d.), the broadcaster even considers reporting to the competent authorities.
- A third group refers to the responsibility of users when it comes to the content they publish, reserving the right to remove content or close accounts if the content is illegal. RTÉ (Ireland) or NPO (The Netherlands) are examples of such cases.

5. Discussion and conclusions

This study shows an interest of the European public media in participatory mechanisms, even though there is still much progress to be made. The analysis of the discursive participation proves that social networks, blogs, and comments are the main tools chosen by the European public broadcasters. However, depending on the 'social media' strategy, the degree of participation varies considerably from one corporation to another. The users' feedback usually comes in the form of comments or opinions that rarely receive a reply from the corporation. Furthermore, the use of mechanisms such as forums, chats, polls, or debates were tried and tested experience only in some of the analysed media. Even though the main indicator regarding the interactive tools is the amount of followers, it is necessary to generate impact strategies that help increase the users' participation in order to get to know them better and adapt the service supply to the audience demands in accordance with their needs. Similarly, it is crucial for

these tools, which essentially allow for the discursive participation, not to only act as channels for content distribution, but to fully exploit their potential so as to receive real feedback from users.

With regard to creative participation, certain openness by some of the analysed broadcasters is observed towards actively involving their audience in content production, but only in terms of text, video, and image production, using noteworthy methods. In most cases, the submitted content is subject to editing before disseminating it through the website. Some of the proposals are created in the form of a contest in order to increase participation rates. The chances of sending audio files are limited and the experiences with 'fan fiction' and 'fan art' almost non-existent. Thus, the analysed corporations, in their role of public service, should try to accomplish their mission of innovating and, by means of the numerous interactive tools, exploiting the role of user assistant for producing and broadcasting content that helps increase the success of the broadcasting formats.

In the field of regulation, the analysed participatory models led the European public broadcasters to regulate the content provided by users, given the ethical and legal problems these may cause, especially their legality controls and their copyright ownership. In the first scenario, a number of regulatory mechanisms are included either from the broadcaster itself or from the other users. Concerning intellectual property, a certain trend to harmonise the Anglo-Saxon and continental models is observed in the analysed cases. It should be pointed out that, while public media reserves its copyright, user-generated content is usually treated differently. This model is contrary to the one presented by other media, as 'O Globo' in Brazil, where, in the event of profiting from the content generated by users, they could get a part of the profits (Díaz-Noci & Tous-Rovirosa, 2012). Although public audiovisual media policies are legal, a debate has emerged about whether they are ethical according to the social values represented by these media policies. If the objective is to promote participation, innovation, and creation, it may be necessary to foster European policies which are in favour of upholding the moral and economic rights of the users' intellectual property. The European Union is discussing reforms on copyright (López-Tarruella, 2016), and it has already approved the reform of the Audiovisual Media Services Directive (2018/1808) in favour of a greater protection of users against content inciting hate, discrimination, or terrorism and, especially, in favour of minors, including under its regulation the system of video sharing through a web platform.

The proposal for a directive on copyright in the Digital Single Market considers the possibility that certain service providers foster agreements with rightholders. The debate on such practices is open to private media, political powers, and, certainly, to public broadcasting services providers, which should take advantage of the options offered by today's technologies to review the concept of public service.

Notes

[1] EU broadcasters from: Germany (ARD and ZDF), Austria (ORF), Belgium (BRF, RTBF, VRT), Bulgaria (BNT), Cyprus (CyBC), Croatia (HRT), Denmark (DR), Slovakia (RTVS), Slovenia (RTVSLO), Spain (RTVE), Estonia (ERR), Finland (YLE), France (France Télévisions), Greece (EPT), Hungary (MTVA), Ireland (RTÉ), Italy (RAI), Latvia (LTV), Lithuania (LRT), Luxembourg (RTL), Malta (PBS), The Netherlands (NPO), Poland (TVP), Portugal (RTP), United Kingdom (BBC), Czech Republic (eska Televize), Romania (TVR), and Sweden (SVT).

[2] A broad concept of media participation embraces various dimensions. Azurmendi and Muñoz Saldaña (2016) include the classification from Carpentier (2011): in the production of media and in the organisational decision-making; through the media: self-representation or media representation.

[3] Even though only the legal texts appearing directly in this article are indicated, we have consulted all legal documents found on the websites subject to study, based on the analysis methodology.

[4] Only the corporations' official accounts have been considered.

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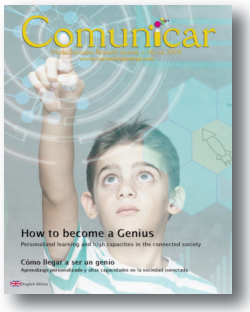

Teenagers, smartphones and digital audio consumption in the age of Spotify

Adolescentes, smartphones y consumo de audio digital en la era de Spotify

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ABSTRACT

The consolidation of smartphones as dominant devices for access to digital information and entertainment has redefined the processes of production and commercialization of cultural communication industries. The nature of these screens, which prioritize the visual content over the sound, decisively influences distribution strategies in the audio market: radio operators, streaming music platforms and podcast creators need to adapt their value chains to the habits derived from this mediation, especially in the younger audience. This research identifies the practices of mobile use as an audio receiver among adolescents in Colombia, Spain and Mexico –the most representative countries of Spanish-speaking digital sound consumption– based on a descriptive study on a thousand subjects from 13 to 19 years of age. The results confirm the overwhelming dominance in this music menu in the face of low penetration of radio and podcast word content. The selection is based on personal criteria, with little margin for the prescription of family or friends. There is evidence of the roots of individual listening, linked to the brand and the visibility of audio providers, who are obliged to develop diffusion logics based not only on thematic or genre preferences, but also on the user experience.

RESUMEN

La consolidación de los smartphones como dispositivos dominantes de acceso a la información y el ocio digital ha redefinido los procesos de producción y comercialización de las industrias culturales de la comunicación. La naturaleza de estas pantallas, que priorizan el contenido visual sobre el sonoro, determina hoy las estrategias de distribución y comercialización en el mercado del audio: operadores de radio, servicios de música en streaming y creadores de podcasts necesitan adecuar sus cadenas de valor a los hábitos derivados de esta mediatización, sobre todo en la audiencia más joven. Esta investigación identifica las prácticas de uso del móvil como receptor de audio entre los adolescentes de Colombia, España y México –los países más representativos del consumo digital sonoro hispanohablante– a partir de un estudio descriptivo sobre 1.004 sujetos de 13 a 19 años. Los resultados revelan el abrumador dominio de la música en este menú frente a la baja aceptación de los contenidos de palabra de radio y podcast. Su selección se asienta sobre criterios personales, con poco margen para la prescripción de familiares o amigos. Se constata el arraigo de una escucha individual, ligada a la marca y la visibilidad de los oferentes de audio, obligados a desarrollar lógicas de difusión basadas no sólo en preferencias de temas o géneros, sino también en las asociadas a la experiencia de usuario en estos terminales.

KEYWORDS | PALABRAS CLAVE

Audio, smartphone, radio, music, podcast, digital consumption, user experience, streaming.
Audio, smartphone, radio, música, podcast, consumo digital, experiencia de usuario, streaming.

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1. Introduction

The standardization of the internet has made global access to information and audiovisual entertainment more versatile, interactive and personalized. However, the polarity of stakeholders and consumption choices in the context of digital convergence has blurred the concept of the audience and its relation with traditional mass media (Jarvis, 2015). Listeners and viewers have become users who take part in intense exchanges with traditional and emerging media using devices and channels that are ever more a part of their personal spaces which, just as easily, transfer this intimacy to increasingly mainstream interaction settings. The words media, mediations and mediators tend to become redefined and their areas of activity become merged, making it vital to investigate the effects of these new relations.

The widespread and irreversible strengthening of the Network Society (Castells, 2006) and its exponential availability through mobile devices (Google, 2018) have turned the audience into a fragmented group of individuals immersed in visual and multimedia culture, who base their consumption actions on display devices (Díaz-Nosty, 2017). This framework promotes the hybridization of local and international formulas, which is described by media ecology as a new way of sharing a world view (Scolari, 2015) and which, through the influence of the four tech giants –Apple, Amazon, Facebook and Google– leads to the adoption of habits which are increasingly directed and homogenized (Galloway, 2017).

As a result of this process, communication industries have been driven to redefine their creation and production logics, distribution strategies and even their language and narratives. The scope of this change has been more significant in the areas of cinema and television (Neira, 2015). However, for analogue and digital radio operators –of which the latter is referred to by various sources as cyber radio (Cebrian-Herreros, 2009), post-radio (Ortiz-Sobrino, 2012), web-r@dio (Barrios-Rubio & Gutiérrez García, 2017) or digital sonosphere (Perona-Páez, Barbeito-Veloso, & Fajula-Payet, 2014)– it is essential to recognize and address the patterns of interaction, mediatization and appropriation established in the context of contemporary consumption (Starkey, 2013).

Soon to celebrate its first centenary, thanks to the online world, the Hertzian media has lost its monopoly over the distribution and marketing of audio. This is the business objective of music streaming platforms –a market which, in the first half year of 2018, had 229.5 million subscribers worldwide raising 3,500 million dollars (IFPI, 2018)– and of podcast creators and aggregators– an industry that, in 2017, earned 314 million dollars in the US, 86% more than the previous year (IAB & PwC, 2018)– and audiobooks, whose sales grew 22.7% globally in 2017, reaching 2.5 billion dollars (Canal Éxito, 2018).

The coexistence of these stakeholders in the current audio ecosystem has given way to a myriad of content that seeks to capture the attention of the listener-user through hybrid communication products (with text, audio, videos, infographics, etc.), which support synchronous or asynchronous personalization of the sound offer (Canavilhas, 2009; Bull, 2010) regardless of time, space or the connection method (Siemens, 2008). The design of consumption methods is therefore in line with the action, visualization and interpretation dynamics of the access sequences to interactive screens which include links to interconnected and hierarchized text, graphics, video sequences, sound, animations and even music (Martínez-Costa & Prata, 2017).

Despite having centered its actions on the antenna and the unidirectionality of the message (Ramos-del-Cano, 2014; Pinseler, 2015; Ribes, Monclús, & Gutiérrez, 2015; Barrios-Rubio & Gutiérrez-García, 2016), the radio industry is now attempting to boost mechanisms and tactics to bring together the expectations of the broadcaster and the audience (Gutiérrez & al., 2014) to address the new specificities of the market (Batista-Bacallado, 2004) and reinvent behavior, generating competitive and quality content. The explosion of digital followers (Salaverría, 2010) enjoyed by radio –web-radio, app-radio and radio accounts on social media– (Barrios-Rubio & Gutiérrez-García, 2017) requires structuring content by using the technical and cultural knowledge of the user to ensure maximum connection and effective communication at a time when the media industry continues to act as a pillar of social construction (Banegas-Michay & Rivera-Rogel, 2012).

Radio operators assume that, among the younger members of their audience, traditional habits and consumption interests have been reconfigured (Herrera-Damas & Ferreras-Rodríguez, 2015; Barrios-Rubio, 2016), and that the convergence of media and platforms has led to new languages (Pavlik, 2004; Salaverría & García, 2008; Ramos-del-Cano, 2014; Pedrero-Esteban & Herrera-Damas, 2017), experimentation with new business models (Martí & al., 2015) and the reconfiguration of productive routines (Bonet & Fernandez, 2006; Gutierrez & Pacheco, 2011; Martínez-Costa, 2015). Nowadays, sound communication products are no longer listened to using analogue receivers but using mobile devices with screens: smartphones, smart watches, tablets, iPods, MP3, MP4, etc. (Ribes

& al., 2017), and, for this reason, general interest and specialized channels outline strategies to consolidate a digital community (García-Avilés, Martínez-Costa, & Sádaba, 2016; Pérez-Alaejos, Pedrero-Esteban, & Leoz-Aizpuru, 2018). This is a tactical interaction scenario (Bonini & Monclús, 2015) where the industry attempts to capture the attention of a young audience that is very detached from sound media. The action basis of this relationship is cross-media dissemination and trans-radio narratives (Martínez-Costa, 2015), in which users acquire a leading role in content construction (Franquet, Villa-Montoya, & Bergillos-García, 2013) and product expansion.

Smartphones therefore become vital devices in the consumption of sound products, whether independently or combined with other narratives, or through direct streaming or on demand through podcasts, and this mediatization leads to a functional, and even operative, redesign of radio (Barrios-Rubio & Gutiérrez-García, 2016). Immersed in their display devices, audiences conform to new consumption patterns and reshape listening on the go. Smart mobile terminals therefore represent an essential way to connect with audio consumers prior to the emergence of specific audio-based technology –devices with voice interfaces such as speakers and connected devices– which will force creators and distributors to redesign their strategies, determining the solvency of the sound industry and the visibility and acceptance of its brands.

> The use of the smartphone as an audio consumption device among teenagers has relegated radio to a second place in favor of music. Consumers access music contents through streaming services and video platforms, which catches their attention through their eyes and not their ears due to the visual features of the screens.

This communication seeks to identify and systematize the uses and trends in terms of audio content consumption by young and teenage populations by observing the process from the perspective of the recipient since, as highlighted, the behavior of the audience –and each of the individuals included in it– plays a more important role than ever in this challenging transition process.

2. Material and methodology

2.1. Objectives of the study

The objectives of this research into the use of smartphones as receivers of audio consumption among teenagers aged 13 to 19 years in Colombia, Spain and Mexico focus on two areas of work: They seek to provide empirical evidence in a new and emerging field of study where few studies have been carried out –the perception and acceptance by young people of an increasingly broad and diverse digital sound offer, which is of enormous economic importance to the communication industries associated with it: radio, music, podcasts and audiobooks. Firstly, a descriptive assessment was carried out on the habits profiled among the subjects of the study, which were considered collectively, and, secondly, the paper assessed whether there is any significant difference between the samples taken from different international contexts.

With regards to the representativeness of the selected countries, Colombia, Spain and Mexico are three of the most indicative Spanish-speaking countries in terms of digital audio consumption due to the significant presence of the internet in their media ecosystems. Internet penetration in Colombia is 85% (Ibope, 2017), in Spain it is 82% (AIMC, 2017), and in Mexico it is 86% (INEGI, 2017), which equates to approximately 30.3, 46.3 and 71.3 million internet users respectively. The three countries also exceed the global average in mobile and fixed broadband speed (16.9 Mbps): 18.42 Mbps in Colombia, 29.75 Mbps in Spain and 23.35 Mbps in Mexico (OpenSignal, 2018). Using the 'Global Mobile Market Report 2018' as a basis, these three countries are among those that demonstrate the highest use of smartphone devices: the penetration rate in Spain was 72.5% with 33,631,000 users, in Mexico it was 45.6% with 59,597,000 users, and in Colombia it was 39.8% with 19,669,000 users (Newzoo, 2018). Lastly, it must be mentioned that, in 2017, Spain was ranked as the country with most devices per individual (88%) according to the 'Digital In 2017 Global Overview' report (We Are Social, 2018) and, in the same year, Mexico was the world leader in online music consumption: 75% of the population accessed audio streaming services (IFPI, 2018).

2.2. Instrument

The evaluation instrument was built «ad hoc» and its final design was the result of two processes: a) a previous explorative study with 600 students -the study served as groundwork to define the final study variables– and b) a validation of the instrument in the three countries with a 100-student sample for each case –Mexico (Cronbach's α .78), Spain (Cronbach's α .81), Colombia (Cronbach's α .79)–, allowing to confirm the reliability of the instrument in different contexts. This psychometric validation proved both, the consistency of the tool, and the studied indicators, which were specified in four independent predictive variables (age, gender, grade, educational institution/city) and a total of 38 variables grouped in four constructs of study: social networks, radio, music and podcast (Table 1).

Table 1. Analysis variables

CATEGORY	WHAT IS BEING ASKED	WHAT IS BEING DETERMINED
Research Subjects	Age, gender, grade and educational institution	Characterization of the study subjects
Social networks	SN (Social networking) usage and tenure	Relation of the subjects with SN (social networking)
Radio usage	Time spent listening, device, providers, contents, prescribers and consumption pattern	Listening to the radio habits
Music/podcast usage		Music/podcast listening habits

2.3. Sample

The manuscript presents a descriptive study for which a quantitative methodology has been used. It allows inferring qualitative elements susceptible to analysis in future research. The sample comprised a total of 1.004 participants between the ages of 13 and 19 (M= 15.46; DT= 1.43) from Colombia (34.7%), Spain (35.1%) and Mexico (35.1%) from different educational establishments, all of them attending high school, secondary school or equivalent studies. The distribution by gender and age is shown in Table 2, where Spain shows n=354; M=15.60, DT=0.98; Mexico n=300; M=16.25 and DT=1.56; the sample in Colombia was n=350; M=15.86 and DT=1.22. The instrument was applied in paper during the month of May 2018 in the presence of the researchers.

3. Analysis and Results

In accordance with the objectives defined for this research, the analysis of the results is presented in two sections: 1) the basic descriptive statistical data for the diagnose of habits and practices profiled among the teenagers and youngsters subject of study (analysis of frequency, dominant contents and listening mode); and 2) verification of coincidences and divergences among the selected samples in each of the three countries.

3.1. Main indicators on audio consumption in smartphones

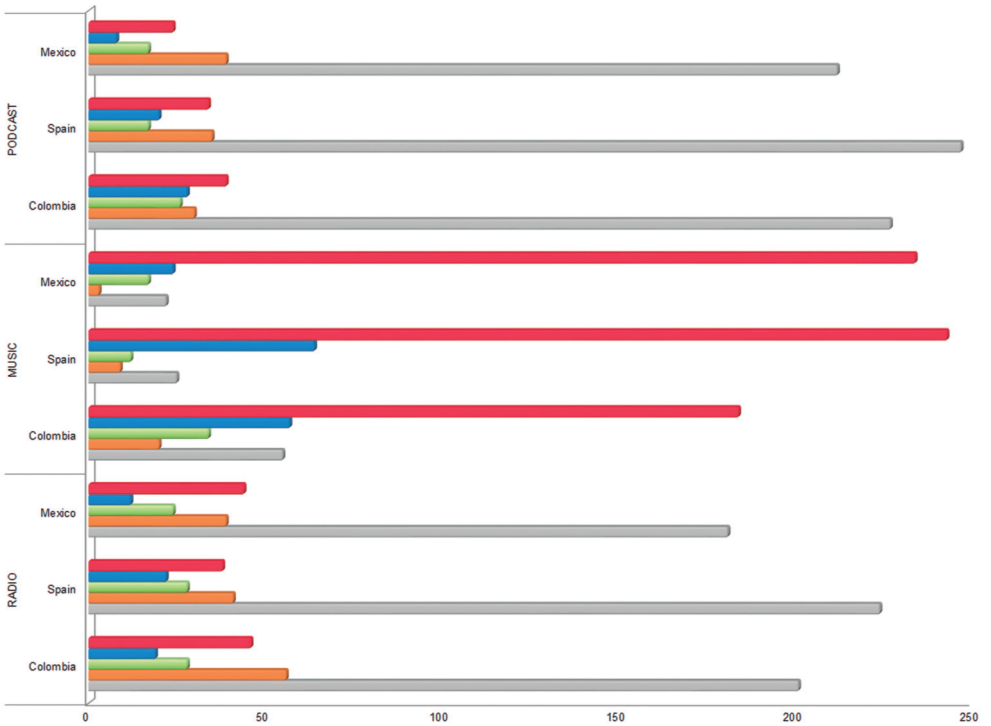
As shown in Graphic 1, music is the sound content of greatest demand from mobiles, listened by more than two thirds of the surveyed teenagers; in total 661 youngsters (65.8%) chose this option, which reaches the highest penetration in an age group between 15 and 17 (44.8 % of the sample). In second place, there are those who enjoy songs once or several times a week (14%), while the least extended frequency is that of sporadic consumption, being only once in a month (3.1%). Lastly, one of every ten students (10.1%) between 13 and 19 affirms not listening to music at all.

As discussed above, it is essential for the majority of market players to know the source of music younger audiences listen to on their mobile devices: nearly half (44.6%) of the sample group select their media on streaming platforms; amongst them the most widely used is Spotify, followed closely by YouTube, Apple Music, and, at a lower percentage, SoundCloud and Deezer. It was noted the way Google Videos has expanded its services to smartphones as a provider of songs for younger

Table 2. Sample Characterization of the sample according to age and gender [H = man, M = woman]

	COLOMBIA			MEXICO			SPAIN			
AGE	**H**	**M**	**N**	**H**	**M**	**N**	**H**	**M**	**N**	**TOTAL**
13-14	98	54	152	32	30	62	8	11	19	233
15-16	124	45	169	49	37	86	142	135	287	528
17-18	23	6	29	75	77	152	45	13	58	253
N	245	105	350	156	144	300	195	159	354	1.004
% Total			34.7			30.2			35.1	100

Figure 1. Indicators of audio consumption on smartphones: podcasts, music and radio



	RADIO			MUSIC			PODCAST		
	Colombia	Spain	Mexico	Colombia	Spain	Mexico	Colombia	Spain	Mexico
1 or several times a day	46	38	44	184	243	234	39	34	24
1 or several times a week	19	22	12	57	64	24	28	20	8
1 or several times a month	28	28	24	34	12	17	26	17	17
Once a month	56	41	39	20	9	3	30	35	39
Never	201	224	181	55	25	22	227	247	212

1 or several times a day | 1 or several times a week | 1 or several times a month | Once a month | Never

audiences, a service it already offered on computers and Smart TVs:64% of North American teens' first choice in 2012 was YouTube over the other 56%, whose first choice was radio (Music 360°, Nielsen). Another finding of the research shows that music listening habits are related to selection criteria: what are the main influencers of teenagers' choices? According to the survey, almost half (45%) of respondents choose the soundtracks they listen to on their mobile devices by themselves, a fourth part (27.6%) of this demographic responded that their friends' opinions determine their choice, and only 12% say they are influenced by what they see and read on social networks (despite the fact that virtually all of the respondents said they have had active profiles on these social networks for more than two years).

For its part, radio and –above all–podcasts are shown to be less demanded by young listeners: 60% do not listen to radio on their phones (although they do listen to the radio through other analog receivers, particularly, in the car) against 12.7% who tune in on a daily basis or 5.2% who tune in once or several times a week. In contrast to music, interest in radio shows to be occasional, as observed through the participants responses regarding usage frequency

Figure 2. Criteria to select music on smartphones

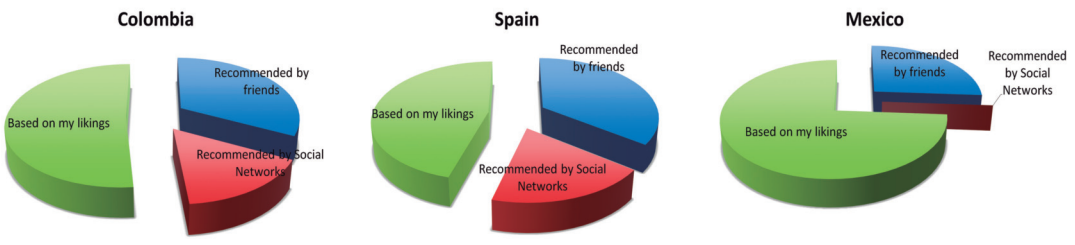
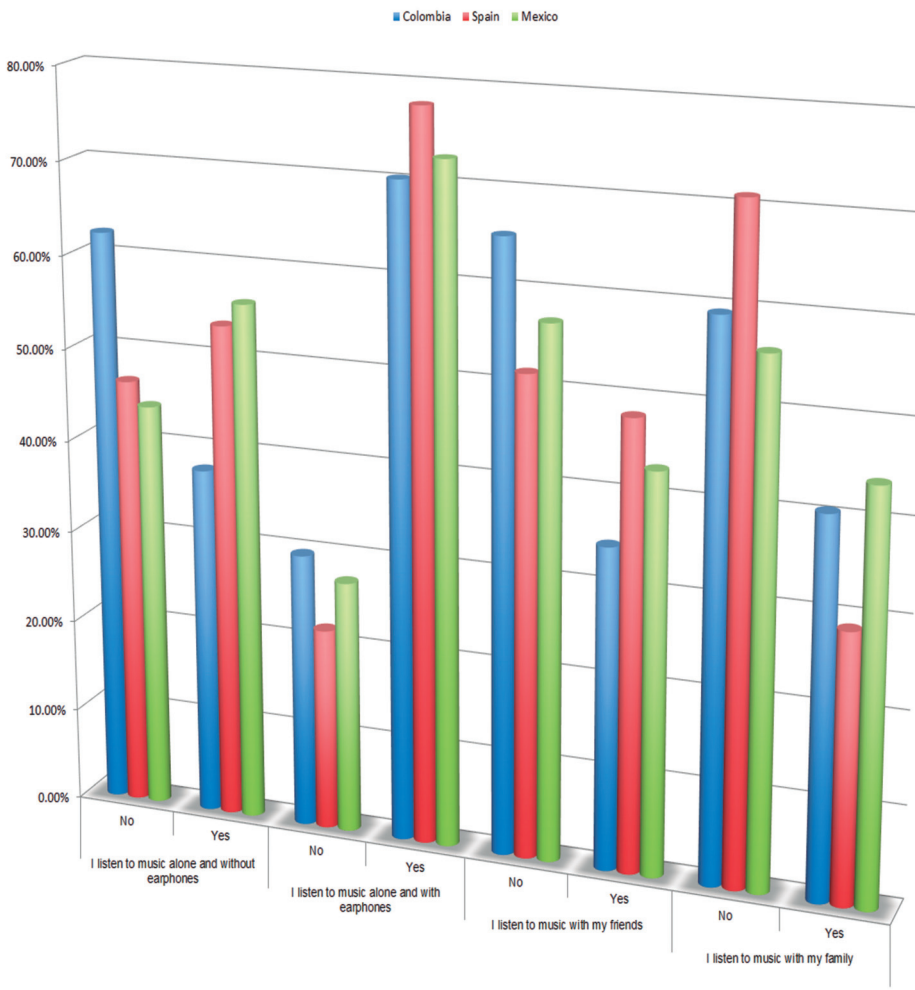


Figure 3. Audio consumption mode on smartphones



	I listen to music alone and without earphones		I listen to music alone and with earphones		I listen to music with my friends		I listen to music with my family	
	No	Yes	No	Yes	No	Yes	No	Yes
Colombia	62.30%	37.70%	29.70%	70.30%	65.40%	34.60%	59.40%	40.60%
Spain	46.50%	53.50%	21.80%	77.90%	51.60%	48.20%	71.10%	28.90%
Mexico	44.00%	56.00%	27.30%	72.70%	57.00%	43.00%	56.00%	44.00%

being «once a month» (13.5%) the second response given right below «never». This is a common consumption habit among teen demographics in Colombia, Mexico and Spain.

Low podcast consumption can be explained by the fact that it is relatively new as a digital audio format and that a large teenage population are not familiar with it. Unlike radio, podcasts can only be accessed through devices with an internet connection. Nearly seven out of ten teenagers (686; 68.3%) said they have never listened to a podcast. This is another common behavior in the three countries of the study. Only 9% consume this media daily, especially those aged 14 and 15, which accounts for 75% of teenagers who typically listen to this audio format. In this sense, market penetration of podcasts proves to be lower among youngsters aged 18 and 19 than among those aged 13 and 16.

In addition to a low quantitative penetration of podcast, there is a relative uniformity on the type of content listened to by those who do select this media format on their mobile phones. In other words, respondents who listen to podcasts every day opt equally for content related to fiction (2%), sports (2.8%) and other themes –a category that statistically speaking encompasses the diverse and increasingly more segmented variables of this product– (3.7%).

As with radio, the percentage of teenagers who access this media through their mobile devices increases as

consumption frequency decreases: 4 % of adolescents consume fiction podcasts on a weekly basis and 8% on a monthly basis; percentages are very similar (4.5 and 8.7) corresponding to sports themes and slightly change in regards to mixed themes (4.9% and 6.4%).

In terms of the type of content listened to in the radio, music is at the top of teenage preference: 37.6% of those who daily access a radio station on their mobile devices do it to listen to songs, less than 10% get information and 9% enjoy sport programs and broadcasts. Although both genre –news and sports– are the daily repertoire of radio content listened to on their smartphones, the frequency of use is clearly lower. Thus, sports on the radio are listened to by 13% of adolescents on a weekly basis and 15% on a monthly basis, while news programs are listened to once a week with 14% and 17.7% once a month.

Regarding music, 45.5% of teenagers never tune in to news radio programs on their mobile phones and for approximately half (49.8%) of respondents sports broadcasting is not an option. Lastly, concerning how participants listen to music, the survey queried whether they listened to music on their mobile devices alone –specifying if headphones were used– or with someone else, making it clear whether they listened to music with family members or with friends. As shown in figure 3, the highest percentage is for listening to music while alone and using headphones, accounting for 73.7% of adolescents (in Spain, this figure is 77.9%); on the contrary, listening to audio content with someone else is not as usual: only 37.5% said they listened to music with their families and 41.9% with their friends.

3.2. Similarities and differences in mobile audio consumption by country and content

The second objective of this research is to verify whether smartphone user habits are coincidental among the three countries subject of the study or, otherwise, a certain particularity is observed in the variables analyzed. It is worth nothing that, in general, audio consumption habits among Colombian teenagers aged 13 to 19 are very similar in Colombia, Spain and Mexico, both in terms of higher music consumption compared to radio and podcast and a higher rate of headphones usage to listen to music in all age segments.

Nevertheless, there are significant differences worth mentioning. For instance, consumption in Colombian younger audiences is not as high as that of their contemporaries in Spain and Mexico; 52% percent listen to music daily (an average of 65.8%), far from reaching the 68% of Spanish listeners and 78% of Mexican listeners (as mentioned above, Mexico is the country with the highest penetration rate on music streaming worldwide). In contrast, 15% of Colombian youngsters report that music is not part of the audio selection on their mobile phones, a figure which contrasts with 7% of Spanish respondents and 78% of Mexican respondents.

Table 3. Analysis of audio content listened to on the radio through smartphones per country

Audio content by country		Media	Desv. Tip.	Never (%)	Once a month (%)	Once or several times a month (%)	Once or several times a week (%)	Once or several times a day (%)	N
Colombia	News	1.51	1.44	36.3	19.1	14.6	17.1	12.9	350
	Sports	1.53	1.47	38.3	16	13.4	19.4	12.9	350
	Music	2.57	1.45	15.4	10	13.7	24.3	36.6	350
	Other	0.57	1.14	74.6	9.4	5.4	5.4	5.1	350
Spain	News	0.88	1.30	62.3	10.8	9.9	10.8	6.2	353
	Sports	1.06	1.42	56.9	11.3	10.5	11	10.2	353
	Music	2.49	1.56	21	7.9	11.3	20.7	39.1	353
	Others	0.29	0.86	86.7	6.2	1.7	2.3	3.1	353
Mexico	News	1.4	1.39	36.4	24.2	13.9	14.2	11.3	300
	Sports	0.87	1.17	55	20.5	11.9	7.9	4.6	300
	Music	2.53	1.47	15.2	13.2	12.6	21.5	37.4	300
	Other	0.26	0.78	87.4	5	4.3	1	2.3	300

Conversely, by segmenting the contents chosen on the radio through mobile phones, consumption of news information and sport programs among Colombian population shows to be much higher, especially, in comparison to Spanish statistics both in listening and frequency consumption practices: 12.9% of Colombians prefer daily news whereas only 6.2% of Spanish do so.

Finally, it is worth mentioning the role influencers play when teenagers choose music on their smartphones: as seen in Figure 2, the influence of friends and social networks is greater among Spanish and Colombian teenagers; whereas in Mexico only 14% admit to take into account their friends' recommendation and none of them take into account social networks. Data analysis reveals a new scenario of competition between social media and music

platforms. This scenario isolates radio programs: radio is no longer the center of music consumption; instead, Spotify has become the place where youngsters find and discover most of the audio content they consume.

4. Discussion and conclusions

Research evince that the use of the smartphone as an audio consumption device has overshadowed the presence of the radio in the menu of digital sound of teenagers and youngsters by favoring music, which benefits the visual nature of screens, and where attention is fixed through the eyes and not the inner ear.

The music diet of this audience shows a low approximation to spoken content (news and sports), and even listening to music through automated services is preferred over other services, making disc jockeys less indispensable.

As other works have revealed (Barrios-Rubio & Gutiérrez-García, 2016; Bonini, & Monclus, 2015; Pérez-Maíllo, Sánchez-Serrano, & Pedrero Esteban, 2018), radio media faces a growing disaffection among the youngest, due to its slowness in addressing the digital transformation processes and the habits derived from communicative convergence, in which asynchronous, personalized demands supported by interaction and visualization impose.

The usage and adoption of sound content indicate being linked to users' everyday activities (action flow in the educational institution, displacement time periods, time spent with family and friends…). Such demands are currently being properly addressed by automated platforms, which demonstrate higher digital competence and articulate over codes and strategies (menus, alerts, algorithms…) closer to the language of youngsters, as evince the works of Banegas-Michay & Rivera-Rogel (2012), Canavilhas (2009) y López-Vidales and others (2014).

Content consumption of audio through applications for smartphones converges the sound perception with visual and iconographic elements that contribute to a stronger link with the product. A relevant conclusion of this study, which is in line with other research papers in this field (Barrios-Rubio & Gutiérrez-García, 2017; Pérez-Maíllo & al., 2018), is that in order to capture young audiences, it is necessary to design short and agile communicative products that could explore new structures, as well as formats linked to virtual communities in interaction platforms (Fernández-de-Arroyabe & al., 2018). Teenagers have not yet incorporated podcast to their consumption agenda, in spite of the growing relevance of this format in the sound industry, perhaps because they associate the spoken component of the radio with a synchronic consumption and the timeless characteristic of podcasts, makes it senseless.

The need of applying a broader outreach of this new format and of a higher bet for visualization in the mobile is perceived. In this regard, the strategy of some operators such as BBC is to integrate audio to their menu through music streaming platforms such as Spotify, which turned into new distribution networks thanks to their popularity among the public object of this study: cooperation versus competition.

The analysis allows us to state that the selection of sound content among youngsters responds to personal criteria (whatever each person wants) more than to suggestions from friends or relatives, even when it comes to music services.

An individualistic attitude is revealed in such a way that, on one hand, it collides with the public interaction that these teenagers have in social networks (Silva-Rodríguez, López-García, & Toural-Bran, 2017), but on the other hand, equates the video consumption habits normalized in platforms such as Netflix or HBO (Storytel, 2018). This autonomous consumption is endorsed by confirming that most teenagers use headphones, meaning, they withdraw from their surroundings, with a conscious and active attitude, evincing that an actual listening habit has been consolidated.

In any case, and given the fact that audio is a stable part of the world of digital leisure that smartphones provide to teenagers, the challenge for content developers (radio and podcast) focuses on designing proposals related to their individual and social interests and identifying their interactions with the display: even if users only listen passively, they have to touch the device to open an app and move their finger to adjust the volume or to skip certain parts of a song or podcast. The tactile dimension of digital listening offers new and relevant opportunities to adapt the sound product to listeners, in particular, to an audience profile with greater propensity towards tactile gestures (Gazi & Bonini, 2018).

In the contemporary digital sound supply, the antenna radio is a companion; web-radio is where images accompany the audio to meet listener-user demand; social media is the interaction platform between operators and followers; and the smartphone is the connection that guides the audience to using media and platforms. The sound industry should occupy a unique space in this ecosystem and identify the most suitable product for each public and device: its profitability and present and future viability depend on its ability to adapt to the habits of teenagers and young people.

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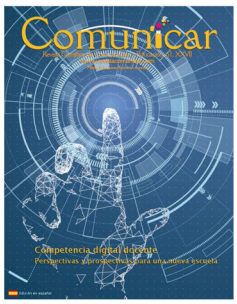

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