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# Can the use patterns of social networks in university students predict the utility perceived in digital educational resources?

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## ABSTRACT

The emergence of social networks in the university context has contributed to modify students' behaviour, conditioning their academic performance and learning preferences. The objective is to analyse the influence of the patterns of use of social networks when predicting the usefulness that university students, give to different digital educational resources.

The study, adopting an exploratory and quantitative approach, involves students from four universities. Data collection is approached using a self-constructed questionnaire designed ad hoc by researchers. The information is analysed by means of: (a) exploratory factor analysis, (b) univariate association analysis, and (c) ordinal logistic regression. The results indicate associations between the patterns of use of social networks and the usefulness perceived by participants in digital resources. Nevertheless, the authors conclude that the patterns of use of social networks identified do not serve to predict significantly the usefulness given by the students to the observed digital educational resources.

## Introduction

Social networks are currently the most relevant communication channel among university students and occupy a prominent place when it comes to making queries, searching for information and taking references (Santoveña-Casal & Bernal-Bravo, 2019; Tejedor et al., 2018).

In Spain, 85% of Internet users aged 16–65 use social networks, which translates to more than 25.5 million people. Of these 85%, from all these users, 46% are studying at university. Therefore, they are constantly exposed to them. Facebook and Twitter continue to be the most mentioned networks, and Instagram is ranked as the third most present network for them (IAB Spain, 2018).

There has been a lot of research that shows the importance that university students attribute to social networks when interacting with other people, getting to know the latest news, looking for information or accessing leisure and entertainment content (Monge-Benito & Olabarri-Fernández, 2011; Tejedor et al., 2018; Valerio-Ureña & Serna-Valdivia, 2018). Interactivity, accessibility and simple structuring of information are undoubtedly key elements in the success of these media platforms.

## Social networks at university

Many studies highlight the impact and potential application of social networks in higher education (Espuny-Vidal et al., 2011; Falahah & Rosmala, 2012; Prendes-Espinosa et al., 2015). A revision of the literature carried out by authors shows that, although these platforms provide a wide variety of application alternatives within universities, there are two uses that stand out from the rest. On the one hand, their use as an institutional communication tool and, on the other, their use for pedagogical purposes or to support learning.

With regard to the use of social networks as a communication tool, their use plays a strategic role in promoting and enhancing the image of the university towards its audience. The existing literature gives good account of this in work that explores aspects such as: the dynamization of interactions between the institution and the educational community, the moments of publication to increase the engagement of students, the types of publications, or the management models that universities adopt in these platforms.

The study conducted by Guzmán-Duque et al. (2012) explores the use that 20 Latin American universities make of the social network Twitter to dynamize the interaction of the institution with its target groups, through the publication of information and news. On the other hand, Valerio-Ureña et al. (2014) in a sample of 28 Mexican universities, study how the hours and days of publication of contents in the social network Facebook affects the engagement between students and institution. Túnñez- López et al. (2015) examines, through a descriptive analysis of the metrics in the profiles of 17 Latin American universities, the activity and types of publications that these institutions make on Facebook and Twitter platforms. In the same way, Laaser et al. (2013), based on the analysis of institutional profiles in social networks such as Facebook, Twitter or LinkedIn, and interviewing communication managers, elaborate a comparative report between 5 universities in Spain, Argentina and Mexico in which the different modalities of management of this institutional communication tool are shown.

A study conducted by Cabero-Almenara and Marín-Díaz (2014) in the Primary and Infant education grades indicates that the use of social networks helps to foster group work. However, to be successful in group work, positive attitudes are essential. At the same time, it shows us that Facebook and Twitter are the most used among university students, as the maximum representatives of generalist networks, having a great lack of knowledge about professional social networks, such as LinkedIn, and their great potential for their professional career. Similarly, the research carried out by Santillán García et al. (2012), tries to find out how useful Facebook is in nursing related content. Although it is a fan page that is not limited to a specific audience, most of its users are students of nursing or related studies. They consider their page to be very popular, but with a number of drawbacks, almost half of the people who give like don't interact with it again. The study carried out by Marín and Tur (2014), on a sample of undergraduate students in education, reveals the positive attitude of the participants towards the use of the social network Twitter as an instrument to reinforce knowledge. Finally the research, on a sample of masters students, carried out by Santoveña-Casal and Bernal-Bravo (2019) highlights the use of Twitter as a motivational element for the student and an instrument to facilitate autonomous learning.

The potential of social networks, both for institutional communication and for pedagogical support, in the university context, is unquestionable. However, the use of these platforms also has negative effects. The study developed by Irwin et al. (2012) highlights the concerns of university students regarding the efficiency of the use of social networks in an academic context. Linne (2014), for his part, points out that these technologies contribute to introducing a certain dispersion and superficiality in the exchange of information between university students. Rodríguez-Gallego et al. (2017) show how students perceive that social networks introduce a distraction component in their training tasks. Likewise, Al-Dheleai and Tasir (2015) highlight students' concern about how these platforms affect their privacy in the academic context. Even Martelo et al. (2017) point out that the use of social networks can have a negative impact on student performance. These reports only confirm the negative attitude shown by many university students towards the use of certain technologies and the way in which they affect their academic activity.

The emergence of social networks in the field of higher education has had very positive effect in aspects such as institutional communication or pedagogical support, despite this, we can also identify certain negative implications. Be that as it may, it is undeniable that the transformations resulting from this phenomenon are of such magnitude that they have contributed to modifying the behaviour of university students (Ruano et al., 2016). The research carried out by Sánchez-Rodríguez et al. (2015) reveals that the use of social networks influences the academic activity of university students, contributing, for example, to a notable decrease in the use of conventional educational resources. The magnitude of this phenomenon means that knowing how the use of these platforms conditions the academic task and learning preferences of university students becomes an unavoidable need.

## Methodology

### *Objectives*

The aim of this paper is to explore the relationships between the patterns of use of social networks in students in the field of education sciences and the digital training resources most commonly used in the university environment. In the light of this, we might expect that certain patterns of use of social networks are related to the student's predisposition towards educational resources that have similarities with those patterns of use. For example, it might be thought that students who regularly use social networks to visualize and search for information may have a preference for educational resources such as video tutorials.

Many studies focus on the analysis of social networks at university; examples of this are the works of Monge-Benito and Olabarri-Fernández (2011), Sánchez-Rodríguez et al. (2015) or recently Al-Rahmi et al. (2020) and Gómez-García et al. (2020). Similarly, several studies focus their attention on the exploration of the digital training resources commonly used in the university; examples of this are the works of Quirós-Meneses (2009), Cacheiro (2011) and more recently Paskevicius and Hodgkinson-Williams (2018) or Matosas-López (2019).

However, the main difference between this research and the studies previously mentioned is that the current work explores simultaneously the existence of latent relationships between both topics; the use of social networks, on the one hand, and the use of digital training resources, on the other.

This research has a twofold objective. Firstly, the authors want to explore the existence of potential associations between the patterns of use of some of the reference social networks which are currently in use and the usefulness that students perceive in the digital learning resources commonly used in university teaching. Secondly, the researchers want to analyse the influence of the patterns of use of social networks when predicting the usefulness that university students give to these digital training resources.

Therefore, the authors propose two research questions, the first examines the existence, or not, of associations, the second the predictive power of the proposed models. The questions are formulated as follows:

Q1: Are there associations between patterns of use of social networks identified at university level and perceived usefulness in digital educational resources?

Q2: Do patterns of social network use identified in university students serve to predict perceived usefulness in digital educational resources?

### *Population and sample*

The research takes as object of study the population of university students of the field of educational sciences of four institutions: University of Granada (UGR), University of Malaga (UMA), Rey Juan Carlos University (URJC) and Autonomous University of Madrid (UAM). The authors, considering the enrolment data collected by the Ministry of Education and Vocational Training (MEFP, 2018), quantify the volume of the population at 16,360 students.

The researchers, assuming that  $P = Q = 50\%$ , set a confidence level of 95% (parameter  $Z = 1.96$ ), assuming a sampling error of 3.8%. These parameters indicate the need to collect a sample of 639 subjects. The individuals that constitute the sample are selected by non-probability incidental sampling (Mayorga-Fernández & Ruiz-Baeza, 2002).

Table 1. Distribution of population and sample.

University	Population	Sample	% Sample share of population
UGR	6736	264	3.92%
UMA	3703	143	3.85%
URJC	3162	125	3.95%
UAM	2759	108	3.90%
Total	16,360	639	3.91%

In order to guarantee an adequate representation of the four institutions, the researchers apply stratified sampling (Buendía, 1997). The distribution is made by affixing the sample in parts proportional to the population of each stratum or institution, being the sample distribution presented in Table 1.

Regarding the sociodemographic data of the sample, it should be noted that the average age of the participants is 19.95 ( $SD = 3.46$ ), with 64.64% of the subjects being female and 35.36% male.

## *Measurement*

Data collection is approached using a self-constructed questionnaire designed ad hoc by the researchers. The measuring instrument takes as independent variables several aspects related to the use that the university student makes of the reference social networks at the present time (Twitter, Facebook and Instagram) and as dependent variables the utility perceived in a list of educational resources of a digital nature (PowerPoint, Video tutorials, Forum, Podcast, PDF, Webinar, Self-assessable test, Blog, MOOC, Prezi Presentation, Wiki, Virtual Whiteboard, Video class and eBook).

The list of variables considered in the survey is drawn up on the basis of the literature review carried out by the researchers. An initial list of independent variables is constructed using as a reference the studies by Matosas-López and Romero-Luis (2019) and Monge-Benito and Olabarri-Fernández (2011) on the use of social networks among university students. In turn, the first list of dependent variables is made from the studies on categorization of digital educational resources of Quirós-Meneses (2009) and Cacheiro (2011).

In order to guarantee the adequacy of the questions for the purposes of the study, it is adjusted thanks to the evaluation of a group of judges who are experts in education (Escobar-Pérez & Cuervo-Martínez, 2008). The panel of judges in charge of validating the measuring instrument is made up of eight professors: two from the UGR, two from the UMA, two from the URJC and two from the UAM. After some reviews, the group of expert judges agreed on a final questionnaire with thirtytwo items. Eighteen items, categorical type, for independent variables, and fourteen items of ordinal qualitative type, presented by means of Likert scales (five degrees), for dependent variables.

## *Data collection and analysis method*

The research employs an exploratory and quantitative approach. Researchers collect data using an online form that is administered in person at the four universities considered in the study.

The analysis of the information collected is performed using the IBM SPSS V25 statistical analysis package, organizing the procedure into three phases: (a) exploratory factor analysis (EFA), (b) univariate analysis, and (c) ordinal logistic regression.

The EFA focuses on the group of independent variables with the purpose of identifying the representative factors of the patterns of use of social networks in the university sample. The univariate analysis, on the other hand, allows exploring the existence of relations between the representatives constructs of the independent variables identified during the EFA and the list of dependentvariables. This analysis also makes it possible to obtain an inclusive criteria for the predictor variables in the regression models that will be developed in the final phase of the work. Finally, ordinal logistic regression explores the power of representative constructs of independent variables to predict the behaviour of the dependent variables considered.

## Results

### *Exploratory factorial analysis (EFA)*

With the purpose of exploring the possible relationships between these variables, as well as their dimensional structure, an EFA is performed (Matosas-López & Romero-Luis, 2019). In order to check the suitability of the EFA, the measure of sample adequacy KMO and Bartlett's test are analysed beforehand. Both the value of KMO (.829) greater than .5 and the significance of Bartlett's statistic (.000) below .05 confirm the existence of sufficient correlations between the variables. This confirms the relevance of approaching factor analysis. The EFA is developed applying the method

of extraction of main components with Varimax rotation. Given the exploratory character of the analysis, the criteria for the extraction of factors is established as that of values greater than 1. A first analysis provides a matrix of rotated with five differentiated constructs. The 5 factors of this first solution explain 59.88% of the total variance of the original data.

The reliability analysis is then carried out by calculating Cronbach's Alpha statistic. The value

of this indicator (.807) shows a high degree of reliability. However, observing the values of the homogeneity indexes, on the one hand, and the reliability indexes by eliminating each item, on the other, suggests a reduction of elements in the analysis. According to Lacave-Rodero et al. (2015) we proceed to discard those items in which the homogeneity index presents values lower than .2 and in which the elimination of the item also contributes to substantially increasing the reliability expressed by Cronbach's Alpha. Only the item frequency of use of Facebook satisfies both criteria. Once deleted the item frequency of use of Facebook proceeds to perform EFA again.

After the exclusion of the mentioned item, the measure of sample adequacy KMO is .837, with the significance of Bartlett's statistic of .000. The saturations of the items in the final matrix of rotated components indicate the existence of four underlying factors in the set of independent variables (see Table 2). These four factors are capable of explaining 56.73% of the total variance.

Once the optimal dimensional structure is known, the overall reliability and in this case the final reliability of each one of the factors identified during the EFA are analysed again. The global Cronbach Alpha has a value of .834. The indicators presented in Table 2 confirm the absence of items with homogeneity values less than .2 or may suggest that after elimination they can significantly increase the overall Cronbach's Alpha. This proves the convenience of the four-factor dimensional structure obtained (Table 3).

The EFA described above allows us to consider four new constructs representative of the independent variables taken into account in the study:

- Factor 1. Construct which includes five items (importance given to view photos, importance given to the search for information, importance given to follow friends, importance given to watch videos, importance given to mentions to friends), explains 15.68% of the variance and shows a Cronbach Alpha reliability coefficient of .787. Factor to be called: VISUALIZE AND SEARCH CONTENT.
- Factor 2. Construct which contains three items (importance given to post photos, importance given to publishing personal reflections, importance given to post videos), explains 14.17% of the variance and presents a Cronbach's Alpha reliability coefficient of

.797. Factor which is renamed: PUBLISH CONTENT.

Table 2. Final matrix of rotated components.

Summarized items	Factors			
	1	2	3	4
Relevance given to see photos	.726	.394	.110	.120
Relevance given to follow friends	.725	-.076	.053	.209
Relevance given to the search for information	.673	.323	.189	-.169
Relevance given to watch videos	.637	.077	-.030	.418
Relevance given to friend's mentions	.536	.433	.347	.020
Relevance given to post photos	.329	.764	.156	.151
Relevance given to publishing personal reflections	.073	.695	.089	.449
Relevance given to post videos	.203	.660	.210	.256
Use of mentions	-.069	.258	.685	.073
Frequency of use of Twitter	.157	-.231	.604	.262
Use of hashtags	-.169	.258	.567	.246
Frequency of use of Instagram	.257	.099	.566	-.173
Relevance given to celebrities	.181	.089	.505	.333
Use of likes	.339	.209	.503	-.122
Relevance given to participation in debates	.040	.272	.037	.748
Relevance given to access to entertainment	.203	.081	.064	.744
Importance given to mentions of celebrities	.016	.348	.281	.552

- Factor 3. Construct which includes six items (use of mentions, frequency of use of Twitter, use of hashtags, frequency of use of Instagram, importance given to follow celebrities, use of likes), it explains 13.62% of the variance and shows a Cronbach's Alpha reliability coefficient of .609. Factor to be renamed: INTENSIVE IN TWITTER AND INSTAGRAM.
- Factor 4. Construct which contains three items (importance given to participate in debates, importance given to access to entertainment, importance given to mentions to celebrities), explains 13.29% of the variance and presents a Cronbach's Alpha reliability coefficient of .689. Factor that happens to be called: DEBATES AND ENTERTAINMENT

### *Univariate Analysis*

The univariate analysis has the purpose of examining the potential associations between the representative constructs of the independent variables, identified in the previous phase, and the list of dependent variables. In order to determine the inclusion of predictor variables in the ordinal regression model, an univariate analysis is carried out beforehand. This analysis makes it possible to identify possible associations between the independent variables and the variables to be studied.

According to the methodology presented by Rodríguez-Ayán (2005) the analysis of the associations between the representative factors of the set of independent variables and the different dependent variables is approached using the Kruskal–Wallis test. Table 4 shows the connections between the four constructs representing the predictor variables and the fourteen digital educational resources of interest. The results show the lack of associations between the predictor variables and four of the educational resources considered. Therefore, self-assessable test resources, blogs, MOOC's and Wikis are excluded from further regression. For the remaining ten educational resources, the variables considered for inclusion in the regression are those with a level of univariate significance of <.05.



Table 3. Final reliability statistical by item.

Summarized items	Homogeneity index	Cronbach's Alpha by removing that item
Frequency of use of Twitter	.308	.844
Frequency of use of Instagram	.326	.839
Use of mentions	.411	.827
Use of hashtags	.369	.829
Use of likes	.420	.827
Relevance given to follow friends	.452	.825
Relevance given to follow celebrities	.460	.825
Relevance given to friend's mentions	.608	.818
Relevance given to mentions of celebrities	.470	.824
Relevance given to watch videos	.438	.826
Relevance given to post videos	.586	.818
Relevance given to the search for information	.374	.829
Relevance given to see photos	.606	.818
Relevance given to post photos	.622	.816
Relevance given to publishing personal reflections	.544	.820
Relevance given to access to entertainment	.414	.827
Relevance given to participation in debates	.420	.827

### *Ordinal logistic regression*

Due to the ordinal nature of the observed dependent variables, the analysis of the predictive power of the representative constructs of the independent variables on the variables of interest is carried out using the ordinal logistic regression technique (Agresti, 1989).

Once the independent constructs that present associations with the variables under study have been defined, the development of the ordinal logistic regression is carried out, introducing into the model only those variables with an optimum level of significance. In order to simplify the analysis, the authors, following the methodology of Leguey-Galán et al. (2018) adopt a model in which the independent variables, considered as continuous, are integrated into the regression in the form of covariates. The proposed model applies the Logit function, using the maximum likelihood estimation method (see Table 5).

Wald coefficients are significant for the dependent variables PowerPoint, Video tutorials, Forums, PDF, Webinars, Prezi, Virtual Board and e-Books. In contrast, the Wald coefficient in two of the model's regressive variables for the Podcast variable and the one model's regressive variable for the Video classes variable are insignificant. Following the criteria of Rodríguez-Ayán (2005), regressive variables with less significance and Wald values lower than two are eliminated from the estimation models. After excluding all the regressive variables from the predictive model for both dependent variables (Podcast and Video classes), their respective models are discarded.

According to this same criterion the regressive variable VISUALIZE AND SEARCH CONTENT is deleted from the predictive model for the dependent variable e-Books. This reduces the estimation model for this resource to two regressive variables (PUBLISH CONTENT and INTENSIVE IN TWITTER AND INSTAGRAM) generating a more sparing model (see Table 6).

Once the significance of Wald's regressor coefficients has been verified, the evaluation of the proposed models is completed through the analysis of three statistical indicators: the goodness-of-fit Nagelkerke R<sup>2</sup>, parallel lines assumption and coincidence percentage between the forecast and the observed value. Data concerning the evaluation of the model are shown in Table 7.

The goodness-of-fit of the model is evaluated using Nagelkerke R<sup>2</sup> (Nagelkerke, 1991). This predictor displays values between .06 and .12 for the ten dependent variables under study. The test of parallel lines reflects significant values above .05 for the models of the dependent variables Power-Point and Video tutorials, consequently, the parallelism assumption is accepted validating the adequacy of both models. With regard to forecasting capacity, the models shown for the ten dependent variables show low percentages of correct forecasts, with values ranging from 37.70% to 49.50%.

Evaluations of the ten models indicate that, although a suitable predictive model can be found for the dependent variables PowerPoint and Video tutorials, there is not an optimal estimation model for the rest of the dependent variables analysed.

## Discussion

We found a great difficulty in finding studies that provide results on possible associations between patterns of use of social networks and the perceived usefulness of digital learning resources by students. The studies deal with the subject either from the point of view of patterns of use of social networks or just the usefulness of digital learning resources. But there are no preliminary studies that address the research on the relationship of both groups of variables jointly. That is why the authors structure the discussion based on studies that show separate results for each of the groups.

Starting with the variables concerning social network patterns, this paper notes the full integration of social networks into the lives of university students. The results derived from the EFA on the set of variables representative of the use of social networks confirm this, which had been noted in several previous studies (Dubey et al., 2018; Matosas-López & Romero-Luis, 2019; Sharma et al., 2016).

According to Folch and Castellano (2017) or Prendes-Espinosa et al. (2015) the findings suggest the importance of using social networks to follow other users, search for information or share content. This can be seen in the construct VISUALIZE AND SEARCH CONTENT. In the same direction is the study by García-Ruiz et al. (2018), which shows the usefulness of social networks in teaching to find and visualize academic topics.

The results also show the potential of these platforms to promote debate and the exchange of information (Abella-García & Delgado-Benito, 2015), as well as an entertainment tool (García-Ruiz et al., 2018). This can be seen in the identification of the constructs DEBATES AND ENTERTAINMENT. With regard to the perceived utility of digital resources for learning, the study agrees with Abella-García and Delgado-Benito (2015), whose model of perceived utility is understood as the extent to which a person believes that the use of a given digital resource can improve their performance, in this case, their learning. If the students perceive the tool as something useful in their training process, it seems logical that they should spend more time using it.

Perception of digital resources for learning, gets good ratings in most proposals, in line with studies such as Gutiérrez-Portlán and Serrano-Sánchez (2016). In contrast, Greene et al. (2014), and Guzmán-Simón et al. (2017) studies point out the difficulties in the informational competence of university students in education, who prefer to use paper rather than digital resources, which are undervalued.

Q1: Are there associations between patterns of use of social networks identified at university level and perceived usefulness in digital educational resources?

Table 4. Univariate analysis using Kruskal Wallis test.

		PowerPoint	Video Tutorials	Forums	Podcast	PDF	Webinars	Self- assessment test	Blogs	MOOCs	Prezi	Wikis	Virtual board	Video classes	e- Books
VISUALIZE AND SEARCH CONTENT	Coef.	28.02	14.98	10.39	17.22	37.11	6.05	6.73	3.24	7.54	44.03	6.95	17.05	8.63	12.82
	Sig.	.00	.00	.02	.00	.00	.20	.15	.52	.06	.00	.14	.00	.03	.01
PUBLISH CONTENT	Coef.	6.77	1.21	3.02	.79	10.69	1.09	4.47	2.44	4.96	19.66	.44	4.91	3.51	13.47
	Sig.	.08	.75	.39	.85	.01	.90	.35	.66	.17	.00	.98	.18	.32	.00
INTENSIVE IN TWITTER AND INSTAGRAM	Coef.	3.42	1.52	5.32	6.68	1.51	3.24	1.59	1.07	5.76	3.70	3.65	1.37	1.77	24.18
	Sig.	.33	.68	.15	.08	.68	.52	.81	.90	.12	.30	.46	.71	.62	.00
DEBATES AND ENTERTAINMENT	Coef.	4.15	4.05	9.46	16.08	3.88	12.73	8.93	2.10	7.17	3.46	5.54	3.70	2.62	5.37

Table 5. Initial Ordinal Logistic Regression Model.

	PowerPoint		Video tutorials		Forums		Podcast		PDF		Webinars		Prezi		Virtual Board		Video classes		e-Books	
	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.
VISUALIZE AND SEARCH CONTENT	21.54	.00	17.17	.00	4.34	.04	.44	.51	22.87	.00	-	-	25.94	.00	11.28	.00	1.98	.16	1.43	.23
PUBLISH CONTENT	-	-	-	-	-	-	-	-	9.27	.00	-	-	21.82	.00	-	-	-	-	4.41	.04
INTENSIVE IN TWITTER AND INSTAGRAM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.58	.00
DEBATES AND ENTERTAINMENT	-	-	-	-	2.08	.05	1.27	.26	-	-	5.22	.02	-	-	-	-	-	-	-	-

Table 6. Final Ordinal Logistic Regression Model.

	PowerPoint		Video tutorials		Forums		PDF		Webinars		Prezi		Virtual Board		e-Books	
	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.	Wald	Sig.
VISUALIZE AND SEARCH CONTENT	21.54	.00	17.17	.00	4.34	.04	22.89	.00	-	-	25.94	.00	11.28	.00	-	-
PUBLISH CONTENT	-	-	-	-	-	-	9.27	.00	-	-	21.82	.00	-	-	4.41	.04
INTENSIVE IN TWITTER AND INSTAGRAM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.58	.00
DEBATES AND ENTERTAINMENT	-	-	-	-	2.08	.05	-	-	5.22	.02	-	-	-	-	-	-

Table 7. Evaluation of the model.

	PowerPoint	Video tutorials	Forums	PDF	Webinars	Prezi	Virtual Board	e-Books
Pseudo $R^2$ (Nagelkerke)	.06	.04	.02	.08	.01	.12	.03	.06
Parallel Line test (Sig.)	.41	.73	.00	.04	.01	.00	.04	.00
Forecasted correct percentage	43.20%	42.00%	46.60%	42.30%	40.80%	49.50%	41.30%	37.70%
Optimum Model	Yes	Yes	No	No	No	No	No	No

With regard to the associations between the representative constructs of the patterns of use of social networks and the perceived usefulness in the training resources considered, the Kruskal–Wallis statistics show the existence of univariate associations between some of the constructs and various resources. The most significant findings are, perhaps, in the associations shown between the use pattern VISUALIZE AND SEARCH CONTENT and the resources Power-Point, Video tutorial, Forum, Podcast, PDF, Prezi Presentation, Virtual Board, Video class, Power-Point and e-Book.

It is the strongest association, and in some ways expected, due to the fact that many educational experiences through social networks are mostly mediated by the exchange of content (Svensson & Russmann, 2017) or the search and screening of it (Cornejo & Parra, 2016; Tur et al., 2017). But no research can be found that connects it to the use of specific digital tools.

Both the association between the PUBLISH CONTENT construct and the resources PDF, Prezi Presentation and e-Book, resources with a clear verbal load, and the association between the DEBATES AND ENTERTAINMENT construct and the Forum, Podcast and Webinar tools, show less associations in terms of the variables involved.

Finally, the associations between the construct INTENSIVE IN TWITTER AND INSTAGRAM and the variables of perceived utility is not significant in almost all cases. This contrasts with research such as Mayor Buzón et al. (2019), where it shows how basic digital competencies and their perception, are related to the intensity of use of social networks. Nor do Santoveña-Casal and Bernal-Bravo (2019) agree when they study practising teachers and observe that the use of Twitter is related to improving communication and interaction, facilitating social participation and increasing student satisfaction.

Q2: Do patterns of social network use identified in university students serve to predict perceived usefulness in digital educational resources?

Out of the fourteen digital resources observed, only in eight of them is it feasible to develop an ordinal logistic regression model. Of these eight predictive models, only two are optimal. These are the regression models that predict the perceived utility in digital educational resources: PowerPoint and Video tutorials. Both models relate the perceived usefulness of these resources to the pattern of social network use called VISUALIZE AND SEARCH CONTENT. However, both models yield meagre adjustment values, low percentages of correct prediction, and poor levels of significance.

Again, the research of Mayor Buzón et al. (2019), contrasts by presenting variables such as “the reasons for the use of social networks” as a predictor variable among education students, in this case the moderate level of digital competence.

At a time in which social networks are very popular, one might expect certain patterns of use on these platforms to be closely associated with the student's predisposition towards educational resources that have similarities to those patterns of use. This could be suggested

by studies carried out by García et al. (2016), which show the relationship between competence in the use of social networks in education and training preferences, or by Espuny-Vidal et al. (2011), which explains a direct relationship between knowledge of social networks and the pedagogical usefulness they provide. However, educational preferences behave differently from educational resources. The data produced by this study reveal that, although certain patterns of use of social networks may present associations with the perceived usefulness of some digital resources, these do not serve to predict which training resource the university student will find most attractive, at least not categorically.

## Conclusions

The authors, in the light of the results, give answers to the two research questions posed initially, concluding that: even when associations are identified between patterns of use and perceived usefulness, the patterns of use of social networks lack the power to predict the perceived usefulness of the observed digital educational resources. These findings, in the opinion of the authors, indicate that, although knowledge of the patterns of use in social networks can help to understand certain learning preferences, this information, a priori, is not crucial for the optimization of educational designs and teaching-learning processes in the university context.

In the light of the above, the authors conclude that this paper not only suggests a novel research topic, but also provides alternative ways of study in the educational field.

Some limitations exist in this research. The sample, although statically significant for the population under study, could be amplified in order to examine more deeply the observed phenomena. Our research comprises only participants from educational sciences; further research should involve students from other disciplines covering health sciences, experimental sciences, communication sciences or engineering, amongst others. The inclusion of participants from a broader variety of fields could provide different findings from those displayed in this study.

In addition, future research could also consider developing comparative studies among different countries. This approach will help the academic community to reveal in which extend the results presented here can be generalized or not.

Finally, another limiting factor has been, the lack studies that offer results on possible associations between patterns of use of social networks and the perceived usefulness of digital learning resources. This is not a widely studied topic, since the information found mainly refers either to patterns in social networks, or to the perceived usefulness of digital resources.

The issues aforementioned address new avenues of study in the area, confirming that further research is still needed to expand our understanding on the associations between the use patterns of social networks and the utility perceived in digital educational resources in the University context.

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For each tool and experience data was collected according to the code of ethics of the corresponding university. There are no potential conflicts of interest in the work.

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