Factors That Influence the Teaching Use of Wikipedia in Higher Education

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A key impact the Internet is having on university teaching involves the new choices being provided because of open educational content. Wikipedia is a clear example of these new options. It is a gigantic open repository of knowledge, and it can also be considered a platform that facilitates collaboration in knowledge creation and dissemination. Our research objective is to understand what the main factors are that influence the teaching uses of Wikipedia among university faculty. Based on a technology acceptance model, and using data from a survey sent to all faculty members of the Universitat Oberta de Catalunya, we analyze the relationships within the internal and external constructs of the model. We found that both the perception of colleagues' opinions about Wikipedia and the perceived quality of the information in Wikipedia play a central role. These two constructs have a significant direct impact on the perceived usefulness of Wikipedia. This perceived usefulness affects, mediated by the behavioral intention of using Wikipedia, the effective use behavior of the encyclopedia. The degree to which an individual considers it is important to participate in open collaborative environments and the Web 2.0 profile of the faculty members also play an important role in our model.

Introduction

The so-called movement for open educational resources originated in 2001 when MIT launched its OpenCourseWare (OCW) project. In a few years, this initiative spurred many other universities to contribute to the movement by making course materials, study guides, collections of exercises, and so on, fully accessible to everybody on the network. The vast availability of open educational content is, without question, one of the greatest impacts the Internet is having on university education.

Received May 27, 2014; revised November 28, 2014; accepted December 1, 2014

 DOI: 10.1002/asi.23488

On the other hand, the emergence of Web 2.0 has also opened up a wide range of new possibilities that could end up decisively influencing learning processes. Wikipedia represents the junction where these two trends converge. From one perspective, it can be depicted as a vast open virtual repository for knowledge and information, with great potential for use in learning processes. And, from another, it has become a prime example of the collective construction of knowledge, through a virtual platform that facilitates collaboration on an unprecedented scale.

Nevertheless, although it is widely known that Wikipedia is one of the most employed resources by students, who use it regularly as a reference tool to carry out different assignments and tasks (Wannemacher & Schulenburg, 2010), the attitude of university faculty does not seem so positive (Dooley, 2010). It is true that an increasing number of professors from many universities around the world are using Wikipedia as a teaching tool (often involving students in editing or creating articles), but they are still a clear minority within university faculty. The aim of our research is to understand what the main factors are that influence the teaching uses of Wikipedia among university faculty. For that purpose we conducted an online survey delivered to all faculty members of the Universitat Oberta de Catalunya.

The paper is structured as follows. First, we present our analytical model and all the variables used. Next, we introduce our research hypotheses and their link to previous studies. Then the research method is presented, and the analysis of the results obtained from the model estimation is shown and commented on. Finally, we summarize the main conclusions of this paper.

Conceptual Model

Many theoretical models have come about because of research on the adoption of information technologies (Venkatesh, Morris, Davis, & Davis, 2003). As Bagozzi,

Davis, and Warshaw (1992) note, TAM (technology acceptance model) is an information systems theory that is widely used for studies into how users (faculty members in this case) adopt and use a particular technology (Wikipedia). And as this paper explores the factors that influence the teaching use of Wikipedia in higher education, we use TAM in our analysis, as we consider Wikipedia to be a technological platform for knowledge creation and sharing. We are keen to study the relationship (from a utilitarian perspective) between Wikipedia's perceived ease of use and Wikipedia's perceived usefulness. This is with respect to (a) the behavioral intention to use it and, by extension, (b) the behavior of actual Wikipedia use.

Today, TAM is one of the most influential research models that is regularly employed to predict an individual's "intention to use" and "acceptance of new information systems and technologies." Utilizing TAM has helped understanding and explanations of use behavior in information systems' implementation in many areas. In addition, it has provided several guidelines within the design of interventions and interfaces that can impact and sway opinion about determinants of use (King & He, 2006; Lee, Kozar, & Larsen, 2003).

Because of the ever-increasing complexity of information systems and technologies, TAM has garnered extensive attention from information systems' researchers. As a consequence, many studies have suggested that TAM should be enhanced to produce a more inclusive model. It is likely that those studies with a focus on the integration of TAM with technology readiness (Godoe & Johansen, 2012; Lin, Shih, & Sher, 2007) and TAM with the theory of planned behavior (Chen, Chen, & Chen, 2009; Lee, 2009) have the most appeal. Because of this, the TAM model has been customized and tweaked for specific cases. Numerous researchers have taken the basis of TAM and added new variables and constructs. Other authors have taken this a step further and have tailored the definitions for "subjective norms," "job relevance," "image," and "output quality" to reflect the context of higher education institutions. Specific variables have also been created by them to identify situational and individual features.

Out of all major upgrades of TAM, we focus on the so-called TAM3 model, where special attention is paid to the external factors that influence the acceptance of a particular technology (Venkatesh & Bala, 2008). With this approach we are able to study (a) how faculty make a decision about the adoption and use of Wikipedia, and (b) what the external variables and prior factors are that can lead to greater acceptance and effective utilization of Wikipedia.

We selected TAM3 because this extended version is based on a more comprehensive vision, an element that facilitates our research objectives. A key attraction of TAM3 is its integration of the determinants of perceived usefulness and perceived ease of use. But it does not encompass crossover effect assumptions. This allowed us to improve the understanding of individual teacher reactions toward Wikipedia in the work environment. And the model lets us consider that experience might affect behavioral intention and the perceived ease of use. TAM3 is exceptionally suitable because of our interest in looking into the effects of prior experience on use behavior.

The external factors are related to personal characteristics and environmental stimulus. As far as beliefs and attitudes are instrumental in promoting user acceptance of new information technologies, both types of external variables (individual factors and interpersonal influences) are critical with respect to the process of adopting these innovations. Therefore, we consider both the indirect and the direct effects of these external variables on user's behavior intention.

From the initial set of external variables described in TAM3, we consider the following six factors for the purpose of our research. The definitions, adapted from Chuttur (2009), are shown next to each factor:

- **Job relevance:** The degree to which an individual perceives the existence of institutional support initiatives that promote the use of open collaborative environments.
- **Sharing attitude:** The degree to which an individual considers it important to participate in open collaborative environments.
- **Social image:** Individual perception of the colleagues' opinion about Wikipedia.
- **Profile 2.0:** Characterization of an individual as a user of 2.0 tools.
- **Quality of Wikipedia:** Perceived quality of the information in Wikipedia.
- **Perceived enjoyment:** Perception of Wikipedia as a resource of information that can be enjoyed in its own right, aside from any performance consequences resulting from its usage.

Selecting these six constructs allows us to capture the effect of cognitive instruments processes and social influence over behavioral intention and perceived usefulness.

Research Hypotheses

The research hypotheses considered in this paper are exhibited next and drawn in Figure 1. These hypotheses are strongly related to the conceptual model assumed in this research and focus on the possible relationship within the internal constructs of the TAM model (perceived ease of use of Wikipedia, perceived usefulness of Wikipedia, behavioral intention to use Wikipedia, and Wikipedia use behavior), and between those internal factors and the external latent variables listed in the previous section.

Our first hypothesis has to do with the possible influence of the behavioral intention to use Wikipedia in the effective Wikipedia use behavior. This is a common assumption in the TAM model, and it is considered in most papers dealing with this approach (Venkatesh & Bala, 2008).

H1: *The use behavior of Wikipedia by teachers is determined by their behavioral intention to use it.*

DOI: 10.1002/asi

A common assumption in previous studies on faculty use of Wikipedia is that quality, accuracy, and reliability are very often the main concerns for most scholars. The overall skeptical view of Wikipedia as a legitimate source of information, usually attributed to faculty members, is thus explained by a negative assessment of its quality. Jaschik (2007), for instance, mentions the lack of a clear and identifiable authorship and, thus, the difficulty of verifying articles' content are the main reasons for not citing Wikipedia in scholarly papers. Another study based on a survey of faculty members with 105 respondents (Dooley, 2010) finds two main causes of their negative attitude and the very low rate of frequent users: a widespread perception of inaccuracy of Wikipedia's content and also its potential for discouraging students from using other more reliable sources of information.

Contrary to this view, our hypothesis states that the behavioral intention to use Wikipedia in teaching is mostly determined by faculty attitudes towards publishing open resources and getting students to be familiar with collaborative environments (something we have called "sharing attitude"), by the social image of Wikipedia among colleagues, and by their perceived usefulness as a learning resource (both by improving the learning process and by fostering new skills for students).

H2: *The behavioral intention of using Wikipedia by teachers is directly influenced by their sharing attitude* ***(H2a)****, by their perception about the social image of Wikipedia* ***(H2b)****, and by the perceived usefulness of Wikipedia* ***(H2c)****.*

Since, as stated in the previous hypothesis, the perceived usefulness of Wikipedia for learning purposes is one of the main determinants of its teaching use, we may also ask which factors influence, in turn, that perception. Wikipedia is, above all, a source of information, so quality should be one of the main elements to take into account. This is also a common result in previous literature. Lack of credibility is identified by H.-L. Chen (2010) as a university faculty's main concern about Wikipedia. The possibility of anonymous editing, the absence of formal prepublication peer review, and the blurred authorship of entries are also highlighted by Knight and Pryke (2012) as factors contributing to faculty's negative perception of its usefulness as a teaching tool.

However, our hypothesis adds three other features that have not been considered to be as important in past studies. As in hypothesis 2, we expect the perceived opinions and practices of colleagues to be very relevant. Familiarity with Web 2.0 applications is another key element, because wikis are paradigmatic examples of user-generated content sites. Finally, we also posit the perceived ease of use as a fourth determinant.

H3: *The perceived quality of Wikipedia* ***(H3a)*** *and its perceived social image* ***(H3b)****, together with the teachers'*

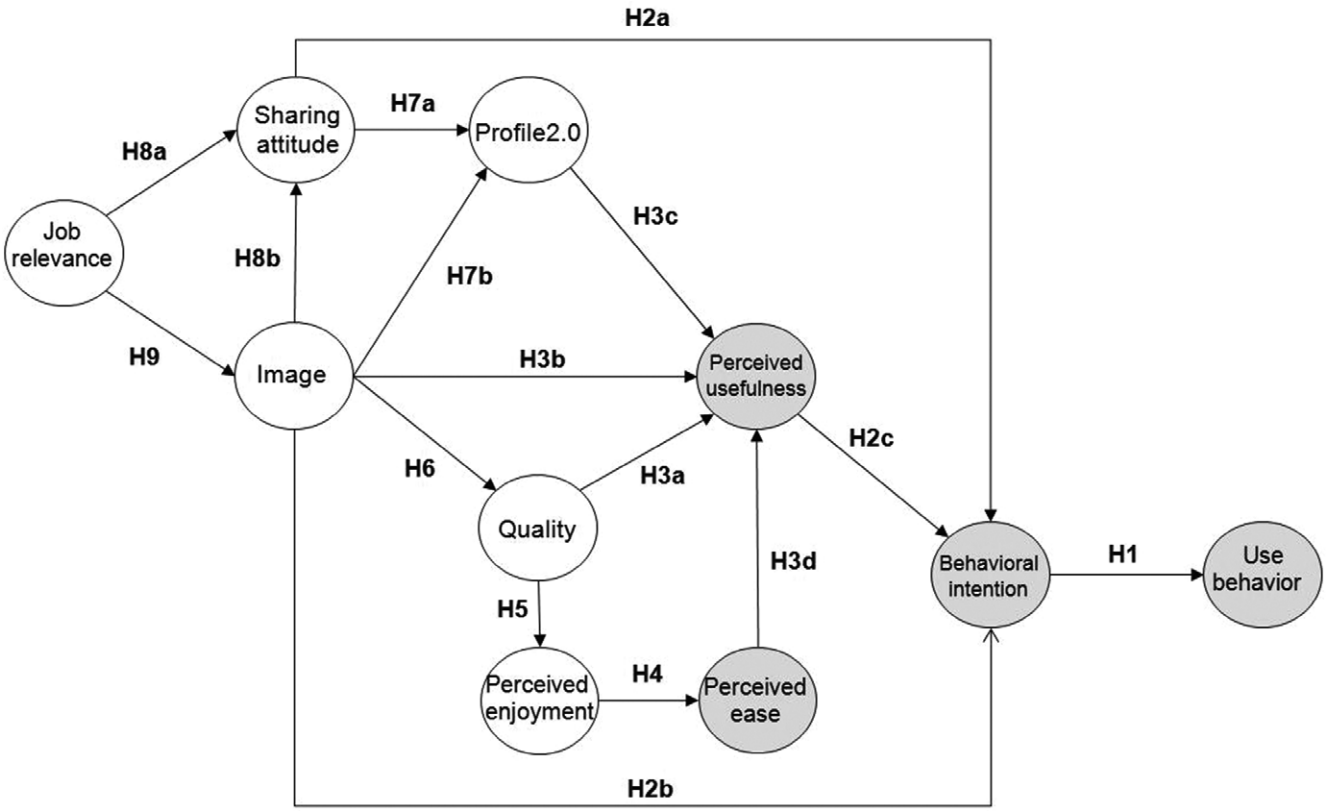

FIG. 1. Model graph and hypotheses.

DOI: 10.1002/asi

profile 2.0 ***(H3c)*** *and the perceived ease of use* ***(H3d)****, define the perception of usefulness of Wikipedia.*

Based on a survey of 14 university instructors, An and Williams (2010) identified both educational benefits and major barriers of using 2.0 tools. One of the benefits they mention is the ease of use. In fact, the intensive use of Wikipedia by students (Brox, 2012; Knight & Pryke, 2012) is not only due to the quality of its articles but also easy access to its content, the hypertext structure that facilitates navigation, and the abundance of references and sources, according to Alonso and García (2013) and Lim (2009).

In our survey, ease of use has been decomposed into three questions asking about the general usability of the resource, the ease of finding the information sought, and the ease of modifying articles. Our hypothesis suggests that there is a causal connection between that utilitarian view and a hedonistic feeling of enjoyment, understood as seeing Wikipedia as an entertaining website as well as a resource that encourages curiosity.

H4: *The perceived enjoyment of Wikipedia determines its perceived ease of use.*

Our next hypothesis establishes that quality is not only determining the perceived usefulness of the resource, a link we could count as trivial, but also the way users see it as entertaining. This hypothesis implies that the perceived enjoyment of using Wikipedia is influenced by its quality perception.

H5: *The perceived quality of Wikipedia affects the perceived enjoyment of the free encyclopedia.*

Although most of the studies we have referred to tend to highlight quality as the main issue in explaining faculty attitudes and practices toward Wikipedia, few of them explore how the perception of quality is actually formed, implicitly assuming an individual process of accuracy and reliability assessment. Our hypothesis, however, is that quality perception is highly influenced by the social environment. In particular, we expect that two elements play an important role in shaping a scholar's view of Wikipedia quality: what colleagues are seen to think and do about it and the way the academic environment is perceived to encourage or discourage the open sharing of teaching resources.

This hypothesis is related to those studies that, beyond specific accuracy and credibility concerns, detect a more fundamental conflict on epistemological and cultural grounds between Wikipedia and academia (Black, 2008; S.-L. Chen, 2010; Eijkman, 2010).

H6: *The social image of Wikipedia is directly connected with its perceived quality.*

Because the use of other 2.0 tools is taken as influencing the perceived usefulness of Wikipedia as a teaching resource (H3), we expect that the willingness to use Web 2.0 tools is determined by the social environment, as defined in H6, and by a more fundamental inclination to share academic resources in open media (including publishing research outputs in sites other than standard scientific journals).

H7: *The teachers that have a 2.0 profile are those who have a positive sharing attitude* ***(H7a)*** *and a positive perception of the social image of Wikipedia* ***(H7b)****.*

We expect the sharing attitude of faculty (as explained above) to be influenced both by the social environment within academia (understood mainly as colleagues' opinions and practices regarding Wikipedia) and also by the institutional recognition and support they receive from their university, when working in open platforms like Wikipedia. This support was conceived in our survey as the promotion of open collaborative tools and the recognition of its use as a teaching merit. Along these lines, Bayliss (2013), in searching for the causes of faculty's negative view of Wikipedia, mentions a widespread unenthusiastic attitude toward collaborative knowledge production in academic institutions.

H8: *The perception that the university promotes the use of open collaborative environments* ***(H8a)****, considering this use as a benefit, and the perception of the social image of Wikipedia* ***(H8b)*** *define the sharing attitude of the teacher.*

Our final hypothesis suggests that institutional support is also conditioning faculty perception of colleagues' uses and opinions of Wikipedia: the more they think their own university promotes and acknowledges the use of open collaborative environments, the more they think their colleagues use Wikipedia and the more they consider its use to be appropriate as a teaching tool.

H9: *The perceived social image of Wikipedia is directly influenced by the perceived relevance the university ascribes to the open collaborative environments.*

Research Method

Data Collection

Data from faculty at the Universitat Oberta de Catalunya (UOC) were used to test the conceptual model. The university uses a full online learning approach, where the use of teaching resources in the virtual classroom plays a central role. Data were collected through an online survey sent to all full-time and part-time professors (2,128 people) at the university at the end of 2012. We obtained 800 valid responses, which implies an acceptable sampling error of 2.74% (for $p = q = 0.5$, and $\alpha = 0.05$). The questionnaire contained 41 questions.

A first analysis of the characteristics of the respondents shows that 57.3% were men and their average age was 42.2. They come from different knowledge areas: arts and humanities (20.8%), science (5.3%), health sciences (7.0%), engineering and architecture (15.4%), law (11.8%), and social sciences (39.6%); and 43.4% of them have a PhD. The faculty in the sample averaged 10.4 years of university teaching experience.

DOI: 10.1002/asi

TABLE 1. Construct measures.

Construct	Items
Job relevance	(JR1) My university promotes the use of open collaborative environments in the Internet
	(JR2) My university considers the use of open collaborative environments in the Internet as a teaching merit
Sharing attitude	(SA1) It is important to share academic content in open platforms
	(SA2) It is important to publish research results in other media than academic journals or books
	(SA3) It is important that students become familiar with online collaborative environments
Social image	(IM1) The use of Wikipedia is well considered among colleagues
	(IM2) My colleagues use Wikipedia
Profile 2.0	(PF1) I contribute to blogs
	(PF2) I actively participate in social networks
	(PF3) I publish academic content in open platforms
Quality	(QU1) Articles in Wikipedia are reliable
	(QU2) Articles in Wikipedia are updated
	(QU3) Articles in Wikipedia are comprehensive
Perceived enjoyment	(ENJ1) The use of Wikipedia stimulates curiosity
	(ENJ2) The use of Wikipedia is entertaining
Perceived usefulness	(PU1) The use of Wikipedia makes it easier for students to develop new skills
	(PU2) The use of Wikipedia improves student's learning
	(PU3) Wikipedia is useful for teaching
Perceived ease of use	(PEOU1) Wikipedia is user-friendly
	(PEOU2) It is easy to find in Wikipedia the information you seek
Behavioral intention	(BI1) In the future I will recommend the use of Wikipedia to my colleagues and students
	(BI2) In the future I will use Wikipedia in my teaching activity
Use behavior	(USE1) I use Wikipedia to develop my teaching materials
	(USE2) I use Wikipedia as a platform to develop educational activities with students
	(USE3) I recommend my students to use Wikipedia
	(USE4) I recommend my colleagues to use Wikipedia

Measurement

The constructs in the model were measured by using different items selected from relevant academic bibliographies (Venkatesh & Bala, 2008). These items were adapted to the particular framework of our research: the use of Wikipedia in a virtual education environment. All items had a 5-point Likert-type scale, ranging from *strongly disagree* to *strongly agree* (level of agreement) or from *never* to *very often* (frequency). Table 1 shows the items associated with each construct.

Results

The model was studied through structural equation modeling (SEM), and the estimation was implemented considering maximum likelihood. After checking the reliability and validity of the research instruments, we tested the initial hypothesis (Figure 1) by conducting a SEM analysis.

Measurement Model

The internal reliability of the constructs in the model was checked using Cronbach's α and item-to-total correlations. Table 2 shows that all the Cronbach's α values for all constructs are above the minimum value of 0.7 (Cronbach, 1947), except in the case of the construct "Perceived ease of use." Nevertheless, taking into account that it is very close to the lower bound, we can consider it acceptable. Concerning the item-to-total correlation, we have the same situation. Although all values are above 0.60, the recommended level for field studies (Ahn, Ryu, & Han, 2007), we have several constructs where some of the items have the item-to-total correlation lower than this value. Again, taking into account that they are very close to the requested bound, and the fact that this is a field study, we will consider that, from the internal point of view, the constructs can be considered adequate.

Regarding convergent validity, factor loadings exceed the recommended value of 0.60 (Ahn et al., 2007). By performing a confirmatory factor analysis (CFA) involving all constructs of the model, we obtained the composite reliability (CR) and the average variance extracted (AVE). It can be checked in Table 2 that CR is greater than the recommended value of 0.70 in all cases (Hair, Black, Babin, & Anderson, 2010), except in the case of the construct "Perceived ease of use." Nevertheless, taking into account that it is very close to the lower bound, we can consider it acceptable. Concerning AVE, we have a similar situation. It is greater than the recommended lower bound of 0.50 (Hair et al., 2010) in all cases except one: the construct "Perceived ease of use." Nevertheless, since its value is pretty close to this bound, we accept that convergent validity is also accomplished in this case. Besides, in all cases (including "Perceived ease of use") the condition is satisfied that CR is greater than AVE, which in turn is another desirable condition regarding convergent validity (Hair et al., 2010).

The comparison between the maximum shared squared variance (MSV) and the average shared squared variance (ASV) of a construct (with respect to all the other constructs) with the corresponding AVE shows the discriminant validity of the constructs (Hair et al., 2010). In most cases, AVE is clearly greater than MSV and ASV (Table 2). Although the constructs "Perceived ease of use" and "Use behavior" do not satisfy this condition, we see that the values are quite similar. Hence, taking into account the importance of these constructs in the theoretical model we have built, we also accept their discriminant validity.

Structural Model

Because the research measures are reliable and valid, we can proceed to check the goodness of fit of our path model (Table 3). Initially, the χ^2 test indicates that our model does

DOI: 10.1002/asi

TABLE 2. Internal reliability, convergent validity, and discriminant validity of the constructs.

		Internal reliability		Convergent validity			Discriminant validity	
Construct	Variable	Cronbach's alpha	Item-total correlation	Factor loading	CR	AVE	MSV	ASV
Job relevance	JR1	0.776	0.634	0.904	0.778	0.638	0.099	0.053
	JR2		0.634	0.894				
Sharing attitude	SA1	0.838	0.714	0.877	0.842	0.639	0.263	0.133
	SA2		0.694	0.864				
	SA3		0.706	0.873				
Social image	IM1	0.735	0.581	0.889	0.736	0.583	0.440	0.203
	IM2		0.581	0.811				
Profile 2.0	PF1	0.794	0.645	0.847	0.795	0.563	0.180	0.081
	PF2		0.642	0.845				
	PF3		0.621	0.832				
Quality	QU1	0.842	0.740	0.892	0.845	0.646	0.376	0.207
	QU2		0.735	0.889				
	QU3		0.648	0.835				
Perceived enjoyment	ENJ1	0.732	0.581	0.890	0.736	0.582	0.518	0.208
	ENJ2		0.581	0.919				
Perceived usefulness	PU1	0.864	0.756	0.895	0.864	0.680	0.546	0.286
	PU2		0.756	0.895				
	PU3		0.714	0.871				
Perceived ease of use	PEOU1	0.653	0.566	0.856	0.683	0.469	0.518	0.152
	PEOU2		0.566	0.844				
Behavioral intention	BI1	0.916	0.845	0.961	0.916	0.845	0.679	0.289
	BI2		0.845	0.902				
Use behavior	USE1	0.865	0.701	0.833	0.867	0.627	0.679	0.261
	USE2		0.596	0.753				
	USE3		0.801	0.902				
	USE4		0.770	0.882				

not have a good fit ($p = .000$). But we have to bear in mind that the χ^2 statistic heavily depends on the sample size, and in the case of large samples the test almost always tends to dismiss the model (Bentler & Bonett, 1980; Jöreskog & Sörbom, 1993). Because our sample size is 8 times the minimum recommended sample size of 100 (Gorsuch, 1983; Kline, 1979), we have to consider other fit indexes. For example, the χ^2/d.f. fit index shows a good fit of the model since it is lower than the upper bound of 5.00 (Marsh & Hocevar, 1985), as shown in Table 3.

The goodness of fit index (GFI) is greater than the recommended value of 0.80 (Subhash, 1996). We find that 89.50% of the variance is explained by the model. If we adjust this fit index to the number of parameters in the model (AGFI) and to the number of paths in the model (PGFI), we also obtain two good fit measures since they are greater than the minimum acceptable values of 0.90 (Subhash, 1996) and 0.50 (Mulaik et al., 1989), respectively.

Continuing with the absolute fit measures of the model, we have that the standardized root mean square residual (SRMR) is lower than the recommended upper bound of 0.08 (Byrne, 1998; Diamantopoulos & Siguaw, 2000). Furthermore, the root mean square error of approximation (RMSEA) shows that the model explains the population's covariance matrix very well. It is clearly lower than the recommended cutoff value of 0.08 (MacCallum, Browne, & Sugawara, 1996).

TABLE 3. Fit indexes of the structural model.

Fit index	Value	Recommended cutoff values
Absolute fit measures		
Minimum fit function chi-square (χ^2)	1164.594	The lower the better
Degrees of freedom (d.f.)	283	
p-value	0.000	>0.050
χ^2/d.f.	4.115	<5.000
Goodness-of-fit index (GFI)	0.895	>0.800
Standardized root mean square residual (SRMR)	0.075	<0.080
Root mean square error of approximation (RMSEA)	0.062	<0.080
Incremental fit measures		
Adjusted goodness-of-fit index (AGFI)	0.870	>0.800
Tucker-Lewis index (TLI) or (NNFI)	0.910	>0.900
Normed fit index (NFI)	0.899	>0.900
Comparative fit index (CFI)	0.921	>0.900
Parsimonious fit measures		
Parsimonious goodness of fit index (PGFI)	0.722	>0.500
Parsimonious normed fit index (PNFI)	0.783	>0.500
Parsimonious comparative fit index (PCFI)	0.802	>0.500

DOI: 10.1002/asi

TABLE 4. Hypothesis and structural model path coefficients.

Hypothesis				Estimate	S.E.	C.R.	*p*
H1	Behavioral_intention	→	Use_behavior	0.683	0.033	20.455	0.000
H2a	Sharing_attitude	→	Behavioral_intention	0.128	0.040	3.214	0.001
H2b	Social image	→	Behavioral_intention	0.416	0.060	6.885	0.000
H2c	Perceived_usefulness	→	Behavioral_intention	0.601	0.048	12.604	0.000
H3a	Quality	→	Perceived_usefulness	0.353	0.055	6.422	0.000
H3b	Social image	→	Perceived_usefulness	0.427	0.058	7.347	0.000
H3c	Profile2.0	→	Perceived_usefulness	0.105	0.030	3.461	0.000
H3d	Perceived_ease	→	Perceived_usefulness	0.436	0.073	5.944	0.000
H4	Perceived_enjoyment	→	Perceived_ease	0.534	0.047	11.395	0.000
H5	Quality	→	Perceived_enjoyment	0.516	0.043	11.907	0.000
H6	Social image	→	Quality	0.554	0.047	11.714	0.000
H7a	Sharing_attitude	→	Profile2.0	0.405	0.064	6.290	0.000
H7b	Social image	→	Profile2.0	0.292	0.065	4.523	0.000
H8a	Job_relevance	→	Sharing_attitude	0.210	0.037	5.729	0.000
H8b	Social image	→	Sharing_attitude	0.229	0.045	5.131	0.000
H9	Job_relevance	→	Social image	0.257	0.039	6.561	0.000

To compare our proposed model with the null model, where there are no links between variables, we have to analyze some incremental fit measures. The normed fit index (NFI), which measures the difference between the χ^2 of the null model and the estimated model, does not exceed the minimum required value of 0.90 (Hu & Jen, 2005). Although its value is just 0.001 below, we consider it an acceptable fit result. Additionally, two other incremental fit measures, the Tucker-Lewis index (TLI) and the comparative fit index (CFI), are both greater than the acceptable lower bound of 0.90 (Hu & Jen, 2005, and Bentler, 1990, respectively).

Finally, there are two additional parsimonious fit measures worth noting. Both the parsimonious normed fit index (PNFI) and parsimonious comparative fit index (PCFI) indicate a good fit of the model since they are greater than 0.50 (Mulaik et al., 1989).

Because the great majority of fit indexes are good, we consider that our proposed structural model is adequate to explain the relationships between variables and to test the associated hypotheses. The analysis of the parameters estimation will allow us to validate the statements in those hypotheses. Table 4 shows that the values of the regression weights between constructs are positive and significantly different from zero ($\alpha = 0.05$). Consequently, all the hypothesized links established in this research work are supported: "Job relevance" has a positive and significant impact on "Social image" ($\beta = 0.26$, $p < .01$); likewise, "Social image" has a direct effect on "Quality of Wikipedia" ($\beta = 0.55$, $p < .01$), "Sharing attitude" ($\beta = 0.23$, $p < .01$), "Profile 2.0" ($\beta = 0.29$, $p < .01$), "Perceived usefulness" ($\beta = 0.43$, $p < .01$), and "Behavioral intention of use" ($\beta = 0.42$, $p < .01$); and "Quality of Wikipedia" positively influences "Perceived enjoyment" ($\beta = 0.52$, $p < .01$) and "Perceived usefulness" ($\beta = 0.35$, $p < .01$). Consistent with our hypotheses, "Job relevance" has a positive and significant impact on "Sharing attitude" ($\beta = 0.21$, $p < .01$). "Sharing attitude" influences "Profile 2.0" ($\beta = 0.41$, $p < .01$) and "Behavioral intention of use" ($\beta = 0.13$, $p < .01$). Besides, "Perceived enjoyment" positively affects "Perceived ease of use" ($\beta = 0.53$, $p < .01$). It is also influenced by "Profile 2.0" ($\beta = 0.11$, $p < .01$). For its part, "Perceived ease of use" has a direct impact on "Perceived usefulness" ($\beta = 0.44$, $p < .01$). Finally, "Perceived usefulness" has a significant impact on "Behavioral intention of use" ($\beta = 0.60$, $p < .01$), and this in turn positively affects "Use behavior" ($\beta = 0.68$, $p < .01$).

Discussion

As our model shows in the results of the estimation, all hypothesized links are active within the internal factors of the model. Behavioral intention to use Wikipedia: (H1) influences Wikipedia's effective use behavior; (H2c) perceived usefulness of Wikipedia affects behavioral intention to use Wikipedia; and (H3d) perceived ease of use of Wikipedia has a positive impact on the perceived usefulness of Wikipedia. These relationships are unsurprising, as they have been studied in Venkatesh and Bala (2008), but our paper offers proof that the relationships have additional validity within the Wikipedia framework and its academic use in higher education.

We find a strong positive perception of Wikipedia's quality among faculty members that is not found in earlier studies such as Jaschik (2007) and Dooley (2010). In principle, at the very least, this favorable perspective should spur the use of Wikipedia for academia purposes. Our results highlight that quality perception positively influences perceived enjoyment (H5) and the perceived use of Wikipedia (H3a). So, the perception of quality has an indirect impact on the eventual decision to make use of Wikipedia as part of the teaching process.

"Quality" is presented in academic literature as the main issue that explains faculty attitudes and practices towards

DOI: 10.1002/asi

Wikipedia (Chen, 2010). But we have found other external factors that are key in explaining Wikipedia's use for teaching purposes. These factors come back to Wikipedia's social image within academia, and faculty attitudes toward (a) publishing open resources and (b) encouraging students to familiarize themselves with collaborative environments. Both of these external factors have a direct effect on behavioral intention to use Wikipedia (H2a and H2b). In addition, as many as 5 of the 10 constructs in our model are influenced by the social environment (H2b, H3b, H6, H7b, and H8b)—and our proof of the social environment's direct effect on the perception of quality (H6) is of specific importance. This was unexpected. But few studies analyze how the perception of quality is specifically built. Consequently, it is an important contribution to the existing literature.

With respect to the remaining (external) factors, we need to mention the significant influence of the institutional recognition and support that faculty receive from their university when open platforms like Wikipedia are employed. As Bayliss (2013) has shown, we demonstrate that academic use of Wikipedia will be facilitated by more positive institutional support toward collaborative knowledge production in academic settings. All of the other variables in the model are indirectly affected by this construct, and two important factors—"Sharing attitude" and "Image" (H8a and H9)—are directly affected.

Conclusions

In this paper we describe the main factors influencing the teaching uses of Wikipedia among university faculty, and the direct effects between them. Based on the extended TAM model, we consider two types of factors. On one hand, we introduced the internal constructs of the TAM model (perceived ease of use of Wikipedia, perceived usefulness of Wikipedia, behavioral intention to use Wikipedia, and Wikipedia use behavior) into our model. On the other hand, we consider the following six external factors, which can be considered as antecedents of the four internal factors: job relevance, sharing attitude, social image, profile 2.0, quality of Wikipedia, and perceived enjoyment.

We studied the model through SEM, using data from an online survey of all faculty members of the Universitat Oberta de Catalunya. After checking the reliability and the validity of the research instruments, we estimated the model and found that all initial hypotheses were supported.

The results analyzed in the Discussion section indicate that the perception of colleagues' opinion about Wikipedia and the perceived quality of the information on Wikipedia play a central role in our model. Although previous studies emphasized quality concerns as one of the main determinants for faculty practices and attitudes about Wikipedia, colleagues' views were not considered particularly important. Our model demonstrates the significant influence of colleagues' perceived opinion on the quality assessment of Wikipedia articles: The more one thinks colleagues share a positive view, the more articles are perceived to be of better quality and the more Wikipedia is found to be useful. Usefulness is in fact directly conditioned both by quality perception and by the social image it is believed to have. Finally, colleagues' opinions are also directly affecting the intention to use Wikipedia for teaching purposes. All in all, colleagues seem to act as strong role models for most faculty members on this issue, which may be a consequence of the resilient peer culture within academia and science.

The existence of institutional support initiatives concerning the use of open collaborative environments is also another important factor in our model. It has a significant directed impact on the perceived usefulness of Wikipedia, which, in turn, affects the behavioral intention of using Wikipedia. The lack of formal incentives might also explain the low amount of active contributions to Wikipedia editing by faculty members, because most standard systems for research assessment do not take publications in open platforms like this into account.

Nevertheless, despite the lack of institutional support and acknowledgment, a growing number of academics think it is very useful and desirable to publish research results or intermediate data in open repositories. In that sense our model also highlights both the degree to which an individual considers it is important to participate in open collaborative environments and his/her profile 2.0, as two other crucial factors. What we have called the "sharing attitude" has a direct effect on profile 2.0 and on the behavioral intention of using Wikipedia for teaching purposes.

All of these findings may be used to suggest some practical recommendations, both for academic institutions and for individual faculty members. For universities and other academic institutions willing to encourage (for teaching purposes) the use of collaborative environments among their members, it will be useful to explicitly acknowledge these kinds of practices as an important element in assessing teaching skills and innovation. It would be particularly valuable to recognize in a more formal manner the efforts of those faculty members who use these collaborative platforms combined with open resources of information, like Wikipedia.

Second, although specific training courses organized by instructional designers might indeed be useful, our results show that faculty members are particularly sensitive to their colleagues' own experiences and insights. Therefore, what could be more effective are training materials that gather actual best practices or training sessions delivered by other faculty members with some previous expertise in the matter. Training sessions or specific courses might include teaching uses of Wikipedia within broader issues on collaborative environments, other Web 2.0 tools, and open educational resources, because these factors were found to be very influential in our study.

For those faculty members already using Wikipedia as a learning tool, we think it would have greater impact if they publically acknowledged their practices more, especially to their close colleagues, and explained their own teaching

DOI: 10.1002/asi

experiences as well as the effects it has had on students' academic performance. Documenting these practices (in academic papers, reports, or presentations) is also another laudable strategy that would serve the same purpose.

Although respondents came from a variety of backgrounds and disciplines, data were collected at only one institution. Further research should include the perceptions of faculty members from a wide range of universities, across blended and pure-online models.

Acknowledgments

The authors thank the Universitat Oberta de Catalunya for the kind permission to conduct the survey for all their faculty members. This research was funded by a grant from the Recercaixa Programme 2011 (Associació Catalana d'Universitats Públiques-LaCaixa).

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DOI: 10.1002/asi