CJLT RCAT
Canadian Journal of Learning and Technology
La Revue canadienne de l'apprentissage et de la technologie

Volume 38(3) Fall/automne 2012

Cognitive and Social Factors Affecting the Use of Wikipedia and Information Seeking

Les facteurs cognitifs et sociaux déterminant l'utilisation de Wikipedia et la recherche d'information

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Abstract

Wikipedia, the free online encyclopedia, is the preferred choice among resources used by college students to meet their research needs. However, Wikipedia has been criticized for its low information quality, lack of accountability, inconsistency, and vulnerability to vandalism. Despite the warnings and concerns voiced by academia, online learning tools such as Wikipedia will continue their rise as major learning resource in today's classroom. Using a sample of 184 college students, the study proposed theoretical models to test the effects of internal beliefs, motivations, and social influences on Wikipedia use and information-seeking, and further empirically tested those models. The findings of this study suggested that Wikipedia use is driven by internal belief and peer pressure, whereas information-seeking is influenced by belief, motivation, and subjective norms. The implications of the findings for the research and practice are discussed.

Résumé

Wikipédia, l'encyclopédie gratuite en ligne, est le choix préféré des étudiants ayant besoin de faire une recherche. Cependant, Wikipédia a été critiqué pour la faible qualité de ses informations, son manque d'imputabilité, son incohérence et sa vulnérabilité au vandalisme. En dépit des mises en garde et des inquiétudes exprimées par le milieu universitaire, l'importance en salle de classe des outils d'apprentissage en ligne tels que Wikipédia continuera de croître. Sur la base d'un échantillon de 184 étudiants de niveau collégial, l'étude a proposé des modèles théoriques pour tester les effets des croyances personnelles, des motivations et des influences sociales sur l'utilisation de Wikipédia et sur la recherche d'information. Ces modèles ont ensuite été testés empiriquement. Les résultats de cette étude suggèrent que l'utilisation de Wikipédia est motivée par les croyances personnelles et la pression exercée par les camarades, alors que la recherche d'information est influencée par les croyances, la motivation et des normes subjectives. L'article se termine par une discussion des implications de ces résultats pour la recherche et la pratique.

Keywords: Wikipedia, online learning tool, motivation, belief, social influences, information-seeking

Mots-clés: Wikipédia, outil d'apprentissage en ligne, motivation, croyance, influences sociales, recherche d'information.

Introduction

Among the vast range of resources available on the Internet, Wikipedia, "the free online encyclopedia that anyone can edit,"(Wikipedia, 2012) has become the most preferred research resource among Internet users (Garriga, 2006). According to a study by the Pew Research Center (Raine & Tancer, 2007), Wikipedia is ranked as the most popular site for educational references, drawing six times more traffic than Yahoo!Answers, the second most popular site. While these studies have reported on the use of Wikipedia among the general public, other studies have reported on the significant place Wikipedia has in college students' academic research. Powerset (2008) reported that 90% of students have used Wikipedia for assignments, and 74% of the students have used Wikipedia even though their professors had warned them against it. In a more recent study (Head & Eisenberg, 2010), 82% of college students reported frequently using Wikipedia to obtain background information on or a summary of topics for research assignments.

Despite its popularity, Wikipedia has been criticized for incompleteness, inaccuracy, lack of accountability and transparency, and vulnerability to vandalism (Denning, Norning, Parnas, & Weinstein, 2005; Johnson, 2006; Wallace & Van Fleet, 2005). Consequently, many journalists, academics, and scholars have expressed concern over the value of Wikipedia as a serious research source, and some professors have even banned the use of Wikipedia for research projects in colleges (Cativo, 2006; Clarissa, 2007; Cohen, 2007; Gladkova, 2008; Williams, 2007). Nonetheless, college students still frequently use Wikipedia, indicating a seeming disparity between educators' and students' perceptions of the quality and value of Wikipedia. Therefore, banning the use of Wikipedia would be only a temporary solution, since students are still convinced that Wikipedia is useful and would still continue to use it in the future.

Therefore, it is imperative for us to understand what underpins students' use of Wikipedia. This knowledge can help educators and society at large formulate a better approach to maximize the potential value of Wikipedia and other online learning tools. The ultimate aim for educators is not to ban online search tools, for information-seeking is essential for learning. Instead, the ultimate goal is to encourage students to explore while being able to discern the quality of information.

Therefore, this study has two aims: (1) to understand the factors behind Wikipedia use and (2) to understand the factors underlying information-seeking behavior. This study defines "information-seeking" as how extensively an individual uses online learning tools to obtain targeted information. To synthesize holistic theoretical models of the factors underlying Wikipedia use and information-seeking behavior among college students, this study examines internal beliefs about the learning tool (Davis, 1989), information-seeking motivations (Weiler,

2005), social influences (Fishbein & Ajzen, 1975; Fulk, Schmitz, & Steinfield, 1990; Miniard & Cohen, 1983), and usage. A survey of 184 college students was used to empirically test the proposed research models and provide theoretical explanations on relationships between the variables.

Literature Review

Technology Acceptance Model (TAM)

The technology acceptance model (TAM) provides an explanation of the determinants of computer acceptance and is generally "capable of explaining users' behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (Davis, Bagozzi, & Warshaw, 1989, p. 985). The TAM identifies two fundamental determinants of user acceptance of technological innovations, perceived usefulness (PU) and perceived ease of use (PEU), as key determinants of people's intention to use information technology.

Perceived usefulness is defined as the subjective probability that a prospective user's use of a specific application system will enhance his or her job performance (Davis, 1989). Several empirical studies have reported that perceived usefulness is a major determinant of behavior (Adams, Nelson, & Todd, 1992; Davis et al., 1989; Klopping & McKinney, 2004). Davis (1989) found that perceived usefulness exhibited a stronger and more consistent relationship with usage than other variables reported in the literature including attitudes, satisfaction, and perception measures. Other research findings also reported that perceived usefulness is positively associated with system usage (Lucas, 1978; Mathieson, 1991; Robey, 1979). Assessing the usefulness of information is a common task of information seekers on the Internet (Tombros, Ruthven, & Joemon, 2005). In the context of Wikipedia, Lim (2009) also found that utility had a significant effect on Wikipedia use among college students. The following prediction was therefore made:

H1: perceived usefulness is positively related to Wikipedia use.

An extensive body of empirical evidence gathered over the course of a decade shows that perceived ease of use—another construct central to the TAM—has a significant link to intention to use technology (Venkatesh & Davis, 1996). Perceived ease of use is defined as the degree to which a technology is perceived as difficult to understand and use. A number of studies in the fields of information processing (Petty & Cacioppo, 1986) and technology acceptance (Venkatesh, 2000) have demonstrated that individuals attempt to minimize their cognitive effort. Effort is a finite resource that individuals may allocate to the various activities for which they are responsible. To enhance their efficiency, individuals are therefore more likely to use systems they perceive to be easy to use. A recent study also found that convenience was the most important factor for individuals seeking science information (Rainie & Tancer, 2007).

Prior investigations have reported that college students place a higher value on the easiest and most convenient method of information-seeking (Valentine, 2001) and appreciate the timesaving characteristics of electronic resources and search engines (Becker, 2003; Dalgleish & Hall, 2000; Drabenstott, 2003; Rieh & Hilligoss, 2007). Furthermore, college students tend to stop looking for information when they find the required number of sources for an assignment (Prabha,

Connaway, Olszewski, & Jenkins, 2007). Therefore, convenience, speed, and ease of use are expected to boost Wikipedia use among college students. The second prediction is as follows:

H2: Perceived ease of use is positively related to Wikipedia use.

Motivation

Individuals become motivated for different reasons and act differently depending on the circumstances surrounding their decisions. Motivation has a significant effect on individuals' intention to engage in activities and the outcomes of such activities. Studies have reported a strong relationship between motivation and information-seeking behavior (Debowski, Wood, & Bandura, 2001). Individuals with a stronger interest in a subject tend to explore and expand their search.

Deci (1971) suggested that motivation can be separated into two dimensions such as intrinsic motivation (IM) and extrinsic motivation (EM). Intrinsic motivation drives individuals to engage in activities to obtain pleasure, interest, enjoyment, and satisfaction. Previous studies have found that intrinsic motivation has a strong effect on academic performance, school competence, and students' well-being (Boggiano, Flink, Shields, Seelbach, & Barrett, 1993; Levesque, Copeland, Pattie, & Deci, 2010; Levesque, Zuehlke, Stanek, & Ryan, 2004; Soenens & Vansteenkiste, 2005). In the context of information-seeking, David, Song, Hayes, and Fredin (2007) argued that intrinsic motivation encourages information-seeking in electronic environments as "the environment is more conducive for serendipitous discovery through increased interest, exploration and play" (p. 174). Therefore, individuals with high intrinsic motivation are likely to use Wikipedia to learn about the subject because they derive pleasure and satisfaction from the information-seeking process itself. These individuals will subsequently engage in extensive information-seeking behavior, as it is likely to provide them with more gratification. Hence, two following predictions were made:

H3a: Intrinsic motivation is positively correlated with Wikipedia use;

H3b: Intrinsic motivation is correlated with extensive information-seeking.

From an extrinsic motivational perspective, individual behavior is driven by the perceived value of the action and the anticipated rewards to be derived from it. Assuming individuals to be calculating, this perspective posits that an individual actor will choose the course of action that maximizes utility according to a given and stable set of preferences. Studies in the education literature have found that extrinsic motivation is positively associated with learning outcomes (Miserandino, 1996) and processes (Connell & Wellborn, 1991). For students, getting a good grade is a strong motivation (Van Etten, Pressley, Freebern, & Eschevarria, 1998), and working for high grades and avoiding low grades fosters learning (Covington, 1999). Students with higher extrinsic motivation are more likely to understand that Wikipedia alone cannot lead to higher grades. Since Wikipedia use is so prevalent, these students understand well that assignments that rely only on Wikipedia would look too similar to one another and thus would not be creative, original, or high quality. Therefore, these students would seek further information using various information sources.

In addition, they are likely to be more eager to comply with instructors because they see such compliance as instrumental to getting better grades. Given that instructors tend to denounce the

use of Wikipedia and encourage information-seeking, students with high extrinsic motivation are less likely to use Wikipedia and instead engage in extensive information-seeking using various research and learning tools available to them. The following relationships were therefore hypothesized:

> H4a: Extrinsic motivation is negatively correlated with Wikipedia use;
>
> H4b: Extrinsic motivation is positively correlated with extensive information-seeking behavior.

Social influences: Peer Influences and Subjective Norms

Social influences are described as "the process whereby people directly or indirectly influence the thoughts, feelings, and actions of others" (Vries, Backbier, Kok, & Dijkstra, 1995, p. 237) and are found to play an important role in the development of attitudes and behavior (Fulk, Schmitz, Steinfield, 1990; Turner, 1991). Research on social influences suggests "social norms focus less on the objective value of an innovation and more on the communication contexts and processes through which potential adopters learn about and develop attitudes toward it" (Kraut, Rice, Cool, & Fish, 1998, p. 439). Depending on the type of others influencing us, social influences can be divided into two categories: influence from general others and influence from specific others. General others are the majority around an individual and are not specifically identified by the individual. People tend to compare their own behavior to that of others surrounding themselves (Deutsch & Gerard, 1955). Fulk (1993) argued that favorable attitude of salient others toward technology use has a positive influence on one's own perceptions of usefulness. The verbal evaluation and behavior of general others are likely to have a significant influence on the decision to adopt any kind of behavior via the individual's perception of the costs and benefits of the object.

Adolescents and young adults are more susceptible to pressure to conform to their peers than adults, and their decisions are usually made in peer groups (Gardner & Steinberg, 2005). Students are constantly aware of and influenced by their peers and how their peers evaluate and use technology (Taylor & Todd, 1995). When students frequently hear their friends' comment on how useful and convenient Wikipedia is for their assignments, they are more likely to use Wikipedia. The following hypothesis was therefore formulated:

> H5: Peer influence has a positive influence on Wikipedia use.

The influences of specific others on behavioral intentions are also well recognized in the theory of reasoned action (Fishbein & Ajzen, 1975) and the theory of planned behavior (Ajzen, 1991). These theories posit that subjective norms—a major determinant of intentions—are a function of a person's beliefs that specific individuals or groups would approve or disapprove of a behavior in question. Serving as a point of reference to guide behavior, these individuals and groups are known as "referents." For many behaviors, the important referents include a person's parents, spouse, close friends, coworkers, supervisors, and (depending on the behavior involved) perhaps experts such as physicians or tax accountants (Ajzen, 1991).

Similarly, Hyman (1942) proposed the idea of reference groups to explain how people use the values and standards of other people (the reference group) as a comparative frame of reference through evaluation and self-appraisal processes. Reference groups exert influence because they

provide comparison standards for self-evaluation and valued outcomes. Ajzen (1991) argued that people will perceive social pressure to perform a behavior if they believe that most referents they are motivated to comply with think they should perform the behavior. On the other hand, people who believe that most referents would disapprove of their performing the behavior will avoid performing the behavior.

At school, the most salient referents are instructors because they control sanction and evaluation. Together with instructors, the faculty and the school can influence students' academic performance and school life through their power to prescribe rules and regulations governing student matters. In the case of Wikipedia use, for example, several US colleges have actually banned citing Wikipedia as a research source (Cohen, 2007), a decision that surely influences students' academic habits. Therefore, an awareness of referents' negative attitudes toward Wikipedia will discourage students from using Wikipedia and encourage them to engage in extensive information-seeking. That leads to the following hypotheses.

H6a: Subjective norms have a negative influence on Wikipedia use.

H6b: Subjective norms have a positive influence on information-seeking.

Perceived Information Quality of Wikipedia

Information quality is an important factor influencing decision-making performance, job effectiveness, and quality of work (Delone & McLean, 2003). Ranganathan and Ganapathy (2002) found that specific content quality and appearance quality were significantly correlated with consumers' attitudes towards websites. In the context of Wikipedia use, students' information-seeking is purposeful and outcome-driven; they have expectations about the quality of the information. Hence, information quality of the source is critical for students. This means that students who deem Wikipedia a high-quality information source are likely to use Wikipedia, whereas those who deem Wikipedia an inferior source are expected to widen their information search to obtain more satisfactory results. That leads to the following hypotheses:

H7a: Perceived information quality is positively correlated with Wikipedia use;

H7b: Perceived information quality is negatively correlated with information-seeking.

The current study proposed two research models: Wikipedia use (see Figure 1) and information-seeking (see Figure 2). The Wikipedia use model proposed 7 hypotheses and the information-seeking model 4 hypotheses. The two research models are drawn in diagram, with their variables.

Method

Data Collection and Sample

A web-based survey instrument was used to collect data from a sample of undergraduate students enrolled in social science classes at a university in Singapore. Twenty-five of the 209 survey responses returned were incomplete, leaving a sample of 184 completed surveys. Of the sample respondents, 32.6% (n = 60) were male and 67.4% (n = 124) were female. A majority were

freshmen (68.5%; *n* = 126), with the remaining respondents comprising sophomores (13.6%; *n* = 25), juniors (7.1%; *n* = 13), and seniors (10.9%, *n* = 20).

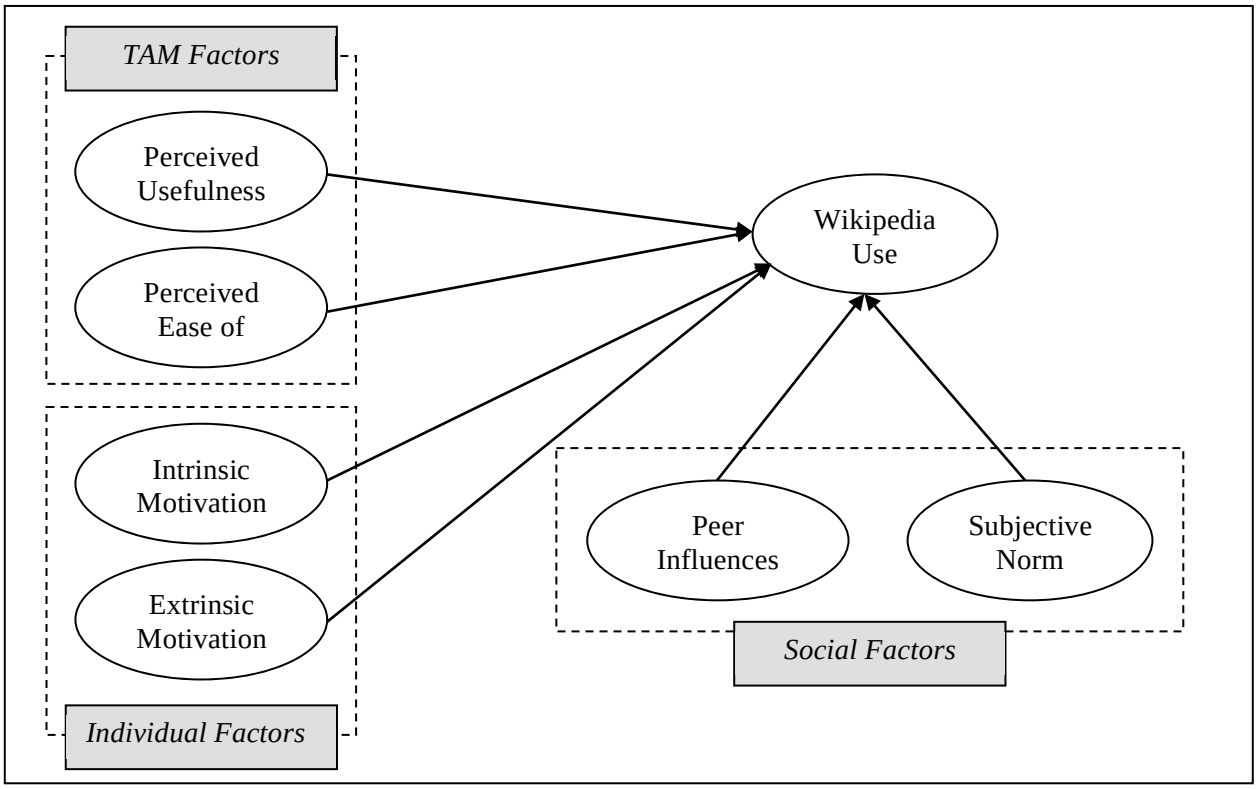

Figure 1: **Research Model for Wikipedia Use**

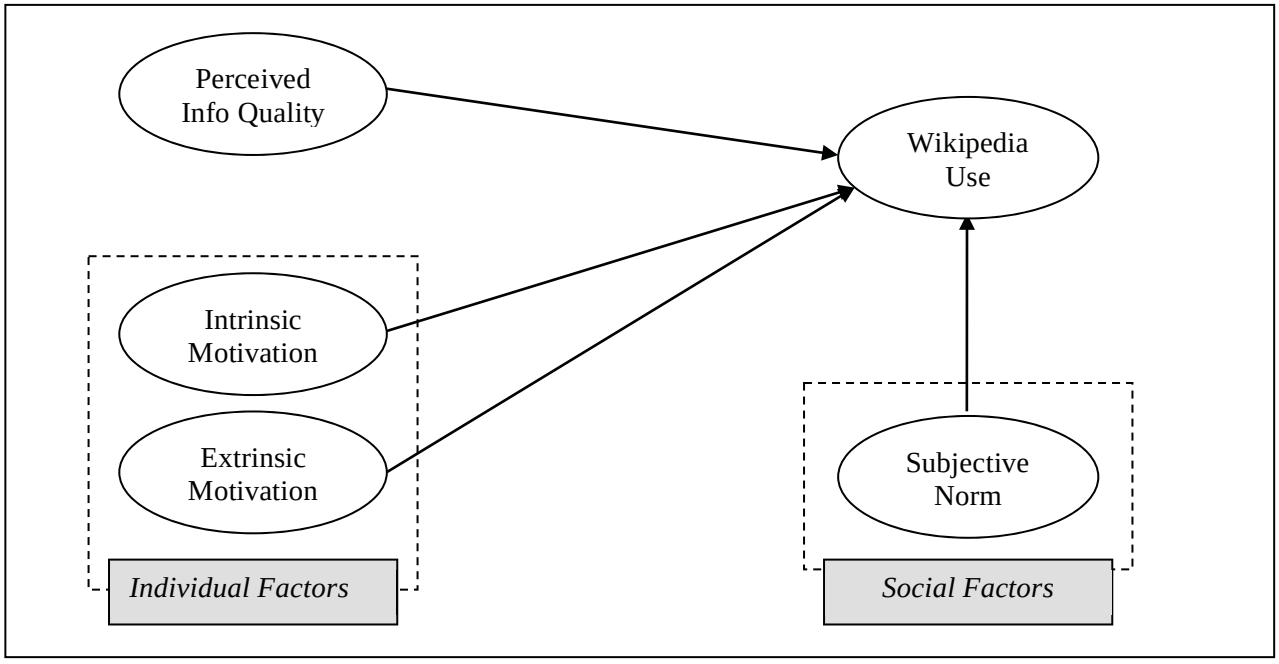

Figure 2: **Research Model for Information-seeking**

Measurements

The questionnaire contained a total of 85 questions on key variables and demographics. Most survey items were adapted from pre-validated research work to increase the construct validity of the survey items. A 7-point Likert scale was used to measure internal belief, perception, individual traits, and behavior in the context of Wikipedia usage and other central constructs.

Perceived usefulness (PU) was assessed with items adopted from previous studies (Davis et al., 1998; Venkatesh, 2000), with appropriate modifications being made to make them specifically relevant to the learning context. Respondents were asked to indicate the extent to which they agreed or disagreed with four statements concerning Wikipedia use. The items asked *whether using Wikipedia is "useful," "beneficial," "indispensable,"* and "*great for learning."*

Perceived ease of use (PEU) refers to the degree to which prospective users expect the technology to be free of effort. Three perceived ease of use items, adopted from the previous studies (Davis et al., 1989; Venkatesh, 2000) include *using Wikipedia is "convenient," "easy,"* and "*fast."*

Intrinsic motivation (IM), based on Deci and Ryan's (2000) taxonomy of human motivation, measures three attributes: interest, enjoyment, and inherent satisfaction. The sample questions for intrinsic motivations are *how much do you feel "pleasure," "interest,"* and *"enjoyment" when seeking information*. Extrinsic motivation (EM) was measured based on Harter's (1981) suggestion with two items: *I am very much interested in getting good grades* and *submitting high quality work is important to me*.

Peer influence (PI) scale was developed based on the previous studies (Gardner & Steinberg, 2005) to measure the individual's awareness of peer attitudes and behavior toward Wikipedia use with two items: one item for attitude (*Most of my friends think that using Wikipedia is beneficial*) and the other for behavior (*Most of my friends use Wikipedia for their projects and research).*

Subjective norms (SN) measure the individual's belief that specific individuals or groups would approve or disapprove of performing the behavior in question (Ajzen & Fishbein, 1980). This study identified instructors, department, and university as the referent groups that are expected to influence the students' use of Wikipedia. The sample questions asked *whether the students think that each referent group would approve their use of Wikipedia for projects or research.*

Perceived information quality (PIQ) of Wikipedia refers to how highly an individual assesses the quality of Wikipedia. Following DeLone and McLean's (2003) measurement of information quality in terms of accuracy, timeliness, completeness, relevance, and consistency, four survey questions asked *how much they think that the contents of Wikipedia are "trustworthy," "accurate," "complete," and "up-to-date."*

Information-seeking (IS) behavior measurement was developed to assess how extensively an individual uses various online learning tools besides Wikipedia for research. The online learning tools referred in the survey instrument included *library databases*, *Internet search engines (Google* and *Yahoo)*, and *scholarly online search engines (Google Scholar)*. Students were asked to indicate how frequently they use each information resource for school assignments.

Wikipedia use was measured by one item asking how frequently an individual uses Wikipedia for research. All the scales exhibited satisfactory levels of internal consistency with Cronbach's alpha values of all above 0.70. Table 1 summarizes the means, standard deviation, and reliability of scales.

Table 1: ***Means, Standard Deviations, and Reliability of Scales****

Scales	# Items	Mean	Standard Deviation	Reliability
Perceived Usefulness (PU)	4	4.96	1.26	0.87
Perceived Ease of Use (PEU)	3	6.01	1.10	0.89
Intrinsic Motivation (IM)	3	4.25	1.03	0.85
Extrinsic Motivation (EM)	2	6.15	0.98	0.85
Peer Influence (PI)	2	4.24	1.62	0.93
Subjective Norm (SN)	3	4.04	1.71	0.93
Perceived Information Quality (PIQ)	4	3.84	1.19	0.89
Information-Seeking (IS)	3	4.35	0.91	0.71

*All the scales reached satisfactory levels of reliability ($\alpha > 0.70$).

Results

Hypothesis Testing

This study proposed two models. The first model tested the effects of perceived usefulness (H1), perceived ease of use (H2), intrinsic motivation (H3a), extrinsic motivation (H4a), peer influence (H5), subjective norms (H6a), and perceived information quality (H7a) on Wikipedia use. The second model tested the effects of intrinsic motivation (H3b), extrinsic motivation (H4b), subjective norms (H6b), and perceived information quality (H7b) on information-seeking. Each model was analyzed with hierarchical regression analysis with gender and year in college as control variables.

The first model: Wikipedia use

Table 2 presents the results of the regression analysis. The first block included gender and year in college in the model. Only gender was significantly associated with Wikipedia use (β = -.169, $p < .05$), indicating that female students were more likely to use Wikipedia than male students. The adjusted R^2 for the first block was .019. In the second block, perceived usefulness, perceived ease of use, intrinsic motivation, extrinsic motivation, peer influence, subjective norms, and perceived information quality were added in the model. The results showed non-significant associations between all variables and Wikipedia use, except for between perceived usefulness (β = .426, $p < .01$) and peer influence (β = .378, $p < .01$). The model fit improved significantly (adjusted R^2 = .589, F change = 36.82, $p < .01$) with these variables added in the model.

The second model: Information-seeking

As in the first model, the second model included gender and year in college as control variables. Year in college was significantly associated with information-seeking (β = .215, $p < .01$), such that older students are more likely to engage in more active information-seeking. In the second

block, intrinsic motivation, extrinsic motivation, subjective norms, and perceived information quality were added. Table 3 shows the results of the second regression. Information-seeking was related to extrinsic motivation (β = .332, p < .01), intrinsic motivation (β = .298, p < .01), subjective norms (β = .204, p < .01), and perceived information quality (β = .203, p < .01). Adding these variables to the model significantly improved the model fit (adjusted R^2 = .313, F change = 18.87, p < .01).

Table 2: ***A regression analysis predicting determinants of Wikipedia use***

Block	**Variables**	**Standardized coefficients (β)**	***t*-value**	***p*-value**
1	Gender	-.169	-2.295	.023
	Year in College	.053	.722	.471
2	Gender	-.008	-.162	.872
	Year in College	-.034	-.635	.526
	Perceived Usefulness (PU)**	.426	5.420	.000
	Perceived Ease of Use (PEU)	.009	.135	.893
	Intrinsic Motivation (IM)	-.028	.559	.577
	Extrinsic Motivation (EM)	-.021	-.371	.711
	Peer Influence (PI)**	.378	6.334	.000
	Subjective Norm (SN)	-.057	-1.062	.290
	Perceived Information Quality (PIQ)	.099	1.614	.108
R^2 (Adj R^2)	Model 1	.029 (.019)	F Change	*p*-value
	Model 2	.609 (.589)	36.818	< .001

Table 3: ***A regression analysis predicting determinants of information-seeking***

Block	**Variables**	**Standardized coefficients (β)**	***t*-value**	***p*-value**
1	Gender	-.109	-1.496	.136
	Year in College	.215	2.954	.004
2	Gender	.004	.062	.951
	Year in College	.117	1.719	.087
	Intrinsic Motivation (IM)	.298	4.742	.000
	Extrinsic Motivation (EM)	.332	5.262	.000
	Subjective Norm (SN)	.204	2.952	.004
	Perceived Information Quality (PIQ)	.203	2.962	.003
R^2 (Adj R^2)	Model 1	.053 (.042)	F Change	*p*-value
	Model 2	.336 (.313)	18.87	< .001

Discussion

This study addressed two important questions: What factors are associated with students' Wikipedia use, and what factors are associated with their information-seeking behavior beyond Wikipedia? Several important findings and implications emerged as explained below.

The results of the first model revealed that Wikipedia use among students is related to self-reported calculative evaluation and normative influence. Perceived usefulness is a measure of whether the technology in question is useful in obtaining benefits and getting the task done. In the context of higher education, the usefulness of an online learning tool is determined by its effectiveness for student learning. The findings of this study demonstrate that students' use of Wikipedia was calculative and rational, based on their judgment of the advantages the tool provides. The results indicated that students believed Wikipedia improved their learning and that they appreciate its usefulness.

Unlike the premises of the TAM, however, this study did not find a significant role of perceived ease of use on Wikipedia use. This result contradicts other findings that the perceived ease of use—such as availability, accessibility, and speed of use—is an important factor in the use of online sources (Fallis, 2004; Julien & Michels, 2004; Savolainen, 2008). The insignificant role of perceived ease of use may be explained by the goals the students have and the situations their use takes place in. When students use Wikipedia, they have more specific goals and expectations about outcomes than ordinary people who search for information. Students are aware that their choice of resources will directly affect the quality of their research. Therefore, if they lacked confidence about the utility of a source, they would not use that source. In other words, in the context of learning, students choose a source for the utility it provides, rather than for the ease of use. This finding has an implication for developers of online resources: The content and quality of the resources should be prioritized over user-friendly design issues.

Another interesting finding of this study is the significance of peer influence on Wikipedia use. Students' decisions to use Wikipedia were related to the social influence of their peers. College students are still young and susceptible to peer pressure in various decision-making situations (Bosary & Carey, 2001; McCabe, 1992; Renn & Arnold, 2003). The finding of this study confirms the important role of peer pressure in the context of using an online learning tool.

Another normative factor, subjective norms, was not found to be significantly related to Wikipedia use. Previous research from the theory of reasoned action and the theory of planned behavior have reported significant, yet weak contributions of subjective norms on intentions. Specifically, when attitudes and subjective norms are both present in the model to predict intention, attitudes are usually found to be stronger than subjective norms (Ajzen & Fishbein, 1980; Miniard & Cohen, 1981; Sheeran & Orbell, 1998; Sheppard, Hartwick, & Warshaw, 1998). Some studies have even reported non-significant effects of subjective norms. For example, Davis and colleagues (1989) found that subjective norms did not have a significant relationship with technology acceptance behaviors and thus removed it from their TAM.

In their meta-analysis of 30 behaviors, Trafimow and Finlay (1996) found that most behaviors were driven by attitudes, while only a few behaviors were driven by subjective norms. They proposed that certain types of behaviors are attitudinally driven, while others are normatively driven. The non-significant effect of subjective norms in this study suggests that the acceptance

of Wikipedia for educational purposes is driven by the attitudinal component rather than the normative component. This may be because students' decision to use Wikipedia is created through a deliberative process about the benefits of Wikipedia. Therefore, their internalized belief about Wikipedia is firm and not easily swayed by their referents' negative attitudes or messages about Wikipedia. This finding explains why banning the use of Wikipedia in some universities has failed to deter students.

Neither intrinsic motivation nor extrinsic motivation was found to be significantly related to Wikipedia use. This may be because access to Wikipedia is effortless. Wikipedia contents are often ranked in the top ten search results on most Internet search engines (Goodwin, 2012; Googlecache, 2007). Regardless of their motivation levels, students have easy and fast access to Wikipedia for topics they are searching for.

In sum, the findings from the test of the first theoretical model suggest that Wikipedia use among college students is shaped by a cognitive process (perceived usefulness) and reinforced by a normative process (peer influence). The benefits users perceive in Wikipedia are the strongest determinant in their decision to use Wikipedia. The next strongest determinant is peer influence, reinforces use.

Results from the second theoretical model showed that information-seeking was related to extrinsic motivation, intrinsic motivation, subjective norms, and perceived information quality. The significant relationships between extrinsic motivation, intrinsic motivation, and information-seeking indicate that students with high motivation—either intrinsic or extrinsic—more often use various online learning tools, such as library databases, Internet search engines, and online scholarly search engines. This finding implies that students with high motivation use more tools, obtain more information, find more diverse information, and learn better than students with low motivation, which should result in a substantial discrepancy in learning outcomes in the two groups.

Specifically, the significant role of extrinsic motivation suggests that goal setting and expectations are important in information-seeking. Students with higher extrinsic motivation are driven by their goals and guided by careful planning to attain the goal (Reeve, 2009). Reeve (2009) pointed out that motivation—whether intrinsic or extrinsic—spurs people to set goals and plan to attain them. Once started, people with a clear goal go through a cyclical process of resuming and persisting, in spite of distraction and difficulties, to achieve the final goal. In the context of information-seeking, highly motivated students search for more and better information. In their search, they face distraction, such as entertainment, social networking sites, and other interesting but irrelevant information. They also encounter difficulties, such as cognitive stress or time constraints on sieving through the suitable information for their goal. However, their motivation lets them focus and persist through these obstacles, resulting in better outcomes from their information-seeking than students with low motivation.

The substantial effect of intrinsic motivation is especially relevant for developers of library databases. While browsing the web, users often encounter serendipitous findings (Foster & Ford, 2003), which motivate them to seek further information. However, even though the search results of library databases tend to be accurate (Brophy & Bawden, 2005), they are often too precise and narrow, leaving no room for serendipitous findings. Perhaps developers of library databases

could incorporate the gratification of serendipitous findings into the designs of databases, rendering library searches useful while still fortuitous.

This study found that subjective norms played a significant role in information-seeking. Interestingly, the test of the first model showed that subjective norms were not associated with Wikipedia use. This means that, while subjective norms cannot effectively deter Wikipedia use, they can encourage information-seeking. This implies that students may try to compensate for their unapproved use of Wikipedia by seeking more information. Despite the negative messages from instructors about Wikipedia, users simply do not want to abandon Wikipedia because they believe in its educational benefits. However, those who are well aware of the opinions of the referents will seek further information to show their compliance, to meet the expectations of the referents, or to avoid negative outcomes, such as lower grades or sanctions.

Lastly, perceived information quality was found to be significantly associated with information-seeking. Students who are not satisfied with the information quality of Wikipedia are likely to actively seek information, using various information tools, such as library databases or specialized search engines, such as Google Scholar. This finding is in line with the finding of the first test—that Wikipedia use is utility-driven. In the context of learning, information that will be used in research and projects should meet a certain standard set by the learner, depending on his or her goal. Hence, information-seeking can be promoted through the communication about the low quality of information on Wikipedia. Once students realize that Wikipedia alone is not sufficient for their research, they will search for more information. This communication should be more effective when made by lecturers and schools because they are appropriate referents in the context of learning.

As the most avid group of Internet users, students are reported to be very pragmatic (Metzger, Flanagin, & Zwarun, 2003) and to tend not to care about the quality of information so long as they feel it is enough. Educators are worried about this passive attitude toward information-seeking. However, the findings of this study show that when students are intrinsically or extrinsically motivated, they are not satisfied with using a low-quality source of information and will become active and voluntary information-seekers.

Taken together, these findings demonstrate that cognitive and normative components coexist in college students' decisions to use Wikipedia. They also demonstrate that motivation and subjective norms can foster active information-seeking. More importantly, this study found that different types of social influences shape different behaviors, Wikipedia use, and information-seeking. This calls for special attention from educators and researchers. Understanding the nature and processes of peer influence and subjective norms will help educators and researchers formulate a more effective approach to educate students about the strengths and weakness of online learning tools. It will help educators and researchers teach students to be active and resourceful information-seekers. This study contributes to communication research by providing two theoretical models and empirically testing them in order to deepen our understanding of acceptance of an online learning tool and information-seeking behavior among college students.

Limitations and Directions for Future Research

While this study provides insight into Wikipedia use and information-seeking behavior among college students, it is subject to certain limitations that suggest possible avenues for future

research. First, the participants were Singaporean, which may raise the problem of external validity. However, past studies have tested and validated TAM and social influence models extensively in diverse cultural settings (Schepers & Wetzels, 2007). More specifically, the theories this study adopted deal with psychological mechanisms that are not significantly affected by cultures or social systems of nations. Furthermore, Singapore is often selected as a test bed for new interactive media and services because it has both Western and Eastern characteristics (Tan, Wei, Watson, Clapper, & Mclean, 1998) in terms of education level, adoption of technology, and economic status. Therefore, the findings from this study might be applicable to different cultures. However, as noted earlier in the paper, the sample scored rather high on extrinsic motivation (M = 6.15), which may reflect the goal-oriented and competitive tendencies of Asian culture. Therefore, future studies should test the intercultural validity of the proposed models with samples from other countries.

Second, this study used a single item to measure the frequency of Wikipedia use. This item measured the perception of frequency, not actual frequency. A multi-item scale combined with behavioral measures—incorporating perception and actual usage—would be useful in the future.

Third, this study uses two current behaviors, Wikipedia use and information-seeking, as dependent variables. It is possible that students' perceptions and beliefs about Wikipedia have changed over time. Some prior studies have reported that perceived usefulness increases with actual usage (Davis et al., 1989; Karahanna et al., 1999). Before adoption, the perception of usefulness of a technology is based on mediated information from others. But more knowledge and control over the technology through actual use enables users to evaluate the technology clearly and confidently (Fazio & Zanna, 1981). Therefore, the strong relationship between perceived usefulness and Wikipedia use found in this study may have been amplified because the respondents were already the users.

Fourth, the study's findings are based on correlational analysis, which makes it impossible to establish causality. The sort of regression analysis used in this study to test hypotheses is often used to infer causation from association (Cox & Wermuth, 2004; Freedman, 2005). However, researchers should be cautious about trying to infer causality from correlation. For example, Box (1966) stressed the care needed in avoiding giving causal interpretations to regression equations fitted to observational data. Experimental designs and longitudinal studies are more helpful for researchers to further test the causal relationships implied in this study. For instance, using an experimental design, researchers could manipulate extrinsic/intrinsic motivations (with different types of rewards) or normative pressures and test the impact on Wikipedia use and information-seeking among students.

Conclusions

In conclusion, this study has contributed to the existing research on Wikipedia use and information-seeking among college students by proposing research models that specify theoretical intersections among key beliefs, normative influences, and motivational factors. Online learning tools such as Wikipedia are being continuously developed, introduced, and used by students. This study demonstrated that, in adopting such tools, students go through a calculative, cognitive process of assessing the educational values of the learning tool. Social contexts surrounding the use of technology also play a critical part. Peer influences are associated with Wikipedia use, and subjective norms with information-seeking, respectively. The

findings of this study recommend that researchers and educators pay attention not only to the students' beliefs about the utility of an online learning tool but also to the contexts in which social influences operate to shape the adoption.

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