What leads students to adopt information from Wikipedia? An empirical investigation into the role of trust and information usefulness

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Abstract

With the prevalence of the Internet, it has become increasingly easy and common for students to seek information from various online sources. Wikipedia is one of the largest and most popular reference websites that university students may heavily rely on in completing their assignments and other course-related projects. Based on the information adoption model, this study empirically examines the effects of trust and information usefulness on Hong Kong students' information adoption from Wikipedia. We conducted an online survey and analysed the responses using partial least squares. Overall, the model explained 69.4% of the variance in information adoption, 59.1% of the variance in trust and 62.7% of the variance in information usefulness. Interestingly, deviating significantly from the information adoption model, trust played a major role in determining information adoption and fully mediated the relationship between information usefulness and information adoption. The implications of this study will provide important insights to both researchers and practitioners.

Introduction

Wikipedia is the world's largest web-based free-content encyclopaedia project, with more than 100 000 regularly active contributors working on more than 20 000 000 papers in more than 283 languages, attracting more than 400 000 000 unique visitors monthly as of January 2012. In particular, Wikipedia is very popular among young students (Judd and Kennedy, 2011), and nearly 46% of those aged above 18 who are currently full- or part-time students in the USA have used Wikipedia to seek information (Rainie and Tancer, 2007). In this nationwide survey, Rainie and Tancer (2007) have also reported that Wikipedia attracted six times more traffic than the next closest site in the Educational and Reference Websites category. The popularity and widespread acceptance of Wikipedia among students also received much attention by information scientists. As to the reasons why university students use Wikipedia, prior studies have placed greater emphasis on practice-oriented analysis, and the findings showed that students use Wikipedia for a variety of reasons, including a mixture of coverage, currency, convenience and comprehensibility (Head and Eisenberg, 2010).

Practitioner Notes

What is already known about this topic

- Current controversy is perpetuated by the use of Wikipedia in academic work, although it is heavily utilised by university students.
- Information adoption is solely determined by information usefulness as proposed in Sussman and Siegal's information adoption model.
- Prior studies on trust in online information environment primarily focused on issues such as security, technical reliability or e-commerce.

What this paper adds

- This study provides preliminary empirical evidence regarding university students' motivations behind the use of Wikipedia.
- Trust towards Wikipedia mediates the relationship between information usefulness and information adoption.
- Completeness and format of online information determine university students' perceptions of information usefulness.

Implications for practice and/or policy

- Educators should provide university students with more training on evaluating online information and instruct them to be critical learners.
- Academic institutions should not simply prohibit the use of Wikipedia but instead incorporate it into the curriculum to develop students' digital literacy.
- The administrators of online educational reference websites should create a reputation system and increase the completeness and format of information.

Since the accuracy and credibility of entries in Wikipedia is an ongoing controversy (Lichtenstein and Parker, 2009) and students often lack the ability to discern if information is trustworthy or not, some academicians have banned the use of online encyclopaedia in academic work. However, other scholars disagreed with this point of view because the epistemic virtues of Wikipedia are visible (Fallis, 2008), and therefore, it is suggested that educators and librarians should provide better guidelines to students for using Wikipedia in academic studies, instead of prohibiting Wikipedia use altogether (Lim, 2009). In this regard, it is also necessary to help students engage in critical thinking online (Chiu, 2009) so that they can rigorously evaluate the information obtained from Wikipedia. The major research questions of this study include: how students evaluate and use Wikipedia for academic purposes and what factors predict their intentions to adopt information from Wikipedia. Answer to these questions may provide some useful insights to assist educators, academic institutions and the administrators of online educational reference websites in instructing students make effective use of online information sources, such as Wikipedia.

Prior studies have used the information adoption model (Sussman and Siegal, 2003) to explain how individuals are influenced to adopt information that they obtain online (Cheung, Lee and Rabjohn, 2008). In this model, information adoption is determined by information usefulness, which, in turn, is predicted by both argument quality and source credibility. Although it provides a parsimonious and theoretically meaningful explanation of online information adoption, the information adoption model places a great emphasis on the instrumental perspective that focuses more on information usefulness and its antecedents. Some recent studies on students' use of Wikipedia found that except for the cognitive consideration, users' positive affection towards

Wikipedia were also related to their use of it (Judd and Kennedy, 2011; Lim, 2009). Built on the information adoption model and early findings in this field, this study tries to provide a theoretically grounded view of this important phenomenon and investigates the effect of trust, which is often regarded as a psychological state based upon positive expectations of behaviour of another (Rousseau, Sitkin, Burt and Camerer, 1998), in students' information adoption from Wikipedia.

The remainder of this paper is organised as follows. First, we provide a review of the theoretical background of this study. In particular, we focus on the information adoption model and the trust literature. We then describe the research model and the research method, followed by the results of data analysis. Finally, we conclude with a discussion of our findings and the implications for both researchers and practitioners.

Theoretical background

A recent study has reported that approximately one-third of the university students adopted Wikipedia for academic purposes (Lim, 2009). Although Wikipedia is one of the most popular online information sources for university students, our theoretical understanding of their information adoption is limited. With more and more students starting to rely on Wikipedia in course-related projects, some recent studies in educational research started to investigate this issue with various topics (Hahn, 2010; Head and Eisenberg, 2010; Judd and Kennedy, 2011; Lim, 2009). In this section, we first review the literature on the information adoption model and then discuss prior studies on the concept of trust, especially with a focus on trust in websites.

Information adoption model

For decades, adoption theories have been widely used to explain the process through which people progress in making the decision to perform an activity. Empirical tests of adoption theories have consistently found that the instrumental motives largely determine adoption intention (Venkatesh, Morris, Davis and Davis, 2003). Based on the Technology Acceptance Model (TAM) and the Dual Process Model, Sussman and Siegal (2003) have further developed the information adoption model.

As shown in Figure 1, the information adoption model identifies the antecedents of information usefulness under different processing conditions. In particular, the degree to which receivers elaborate on the information leads to different influence processes. A central route persuasion occurs when recipients carefully consider the arguments and evidence contained in the message itself, whereas a peripheral route persuasion occurs when recipients make less cognitive efforts to evaluate the message. In this regard, under a low level of elaboration (peripheral route), information recipients are influenced by some simple decision rules, such as the credibility of a message source, with the rule that advices from experts should be useful. On the contrary, under a high level of elaboration (central route), information recipients are influenced by carefully
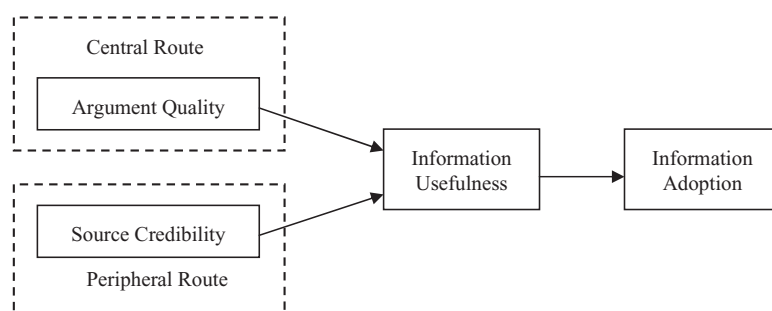

Figure 1: Information adoption model

analysing the quality of information and arguments. In the information adoption model, information usefulness serves a mediating role between the influence processes and information adoption. Source credibility, which represents the peripheral route, and argument quality, which captures the central route, have been regarded as the two most important predictors of information usefulness (Sussman and Siegal, 2003). Some prior studies also have used different components of information quality to measure argument quality (Cheung *et al*, 2008). In this study, we adopt the four dimensions proposed by Wixom and Todd (2005), which are also the most widely recognised and commonly used components of information quality. In particular, information quality is measured by four dimensions, namely completeness, accuracy, currency and format (Wixom and Todd, 2005). Completeness refers to the degree to which the information source provides all necessary content; accuracy represents users' perceptions that the information is correct, currency represents users' perceptions of the degree to which the information is up-to-date and timely and format refers to users' perceptions of how well the information is presented.

Trust in websites

Trust is defined as "a willingness to rely on an exchange partner in whom one has confidence" (Moorman, Deshpande and Zaltman, 1993). The concept of trust has been extensively investigated under various contexts over the years, and recently, information science researchers demonstrated that trust is applicable to information sources such as websites and further mediates the relationship between information quality and information usage (Kelton, Fleischmann and Wallace, 2008). Trust in Wikipedia is important because information in online collaborative repositories change rapidly and end users may have difficulties in evaluating the extent to which they can rely on the retrieved information. Trust, thus, is often viewed as "an implicit feature of the environment" (McGuinness *et al*, 2006).

Trust in collaborative information repositories is different from information reliability because reliability solely focuses on "qualities of the information, without addressing the means by which a person's perceptions affect interpretation of the information and intention to act upon it" (Kelton *et al*, 2008). In this regard, trust goes beyond information reliability and better captures the perceptions of people who are using information and also the reason why they go about it. Trust is also different from the concept of source credibility because credibility relies more on "believability," and trust is defined as "dependability" (Tseng and Fogg, 1999). In this study, given the fact that information in online encyclopaedias comes from multiple unknown sources and that the lack of publishing and quality controls may result in uncertainty (Kelton *et al*, 2008), trust in Wikipedia, thus, is crucial and necessary for people to interact with such an environment (McGuinness *et al*, 2006).

Research model and hypotheses

This study aims at examining the reasons why university students adopt information from Wikipedia. Figure 2 depicts the research framework, which integrates trust in Wikipedia with the original information adoption model. The constructs and their relationships are discussed as follows.

The information adoption model describes the processes by which people can be influenced to adopt the information that they receive. People often use the peripheral cues, such as source's attractiveness, likeability and credibility, to assess the content when they are unable or unwilling to cognitively elaborate on the content itself. In particular, source credibility is defined as a recipient's perception of the believability of an information source. In the context of Wikipedia, the entries can be provided and edited by anyone, and this may result in incorrect or misleading information. Source credibility in this regard is a particular concern for people who seek for
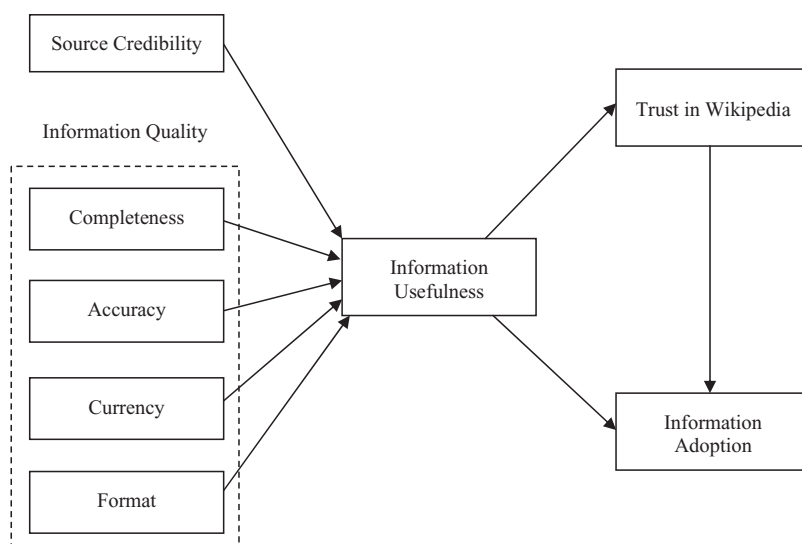
Figure 2: Research model

information there. Due to the close and consistent association between high-credibility sources and the favourable outcomes (Cheung *et al*, 2008; Sussman and Siegal, 2003), if students believe that most of the information in Wikipedia is written and edited by a group of leading experts, or the contributors of a particular page, whom can be retrieved from page history, have sufficient experience on that given topic, they will be more likely to have a high perception of the usefulness of the information. Therefore, we have the following hypothesis:

Hypothesis 1: the higher the perceived credibility of contributors in Wikipedia, the more useful the information will be perceived to be.

On the other hand, people tend to use the central route to assess the content when they are able and willing to cognitively elaborate on the obtained information. The perceived quality of the received information has often been identified as the critical determinant of informational influence under the condition of high elaboration likelihood (Petty and Cacioppo, 1986). Recent studies have also demonstrated that information with higher quality will be considered as more useful in computer-mediated communication (Cheung *et al*, 2008; Saeed and Abdinnour-Helm, 2008). In the current investigation context, there are millions of papers in Wikipedia and they may vary significantly across different levels of information quality. In this regard, students will be more likely to have a high perception of the usefulness of the information obtained from Wikipedia if they perceive that the information is rich enough to provide all necessary details, accurate enough to avoid confusion and misunderstanding, timely enough to cover some current issues and well presented in a clear format. Therefore, we have the following hypotheses:

Hypothesis 2: The higher the perceived completeness of the information in Wikipedia, the more useful the information will be perceived to be.

Hypothesis 3: The higher the perceived accuracy of the information in Wikipedia, the more useful the information will be perceived to be.

Hypothesis 4: The higher the perceived currency of the information in Wikipedia, the more useful the information will be perceived to be.

Hypothesis 5: The clearer the perceived format of the information in Wikipedia, the more useful the information will be perceived to be.

According to the information adoption model, information adoption is determined by the extent to which people perceive the information is useful. The correlation between usefulness and adoption was repeatedly highlighted in prior TAM-based studies (Davis, 1989; Venkatesh *et al*, 2003). A recent study on college students' use of Wikipedia also reported that information utility is the only variable affecting Wikipedia use when all seven variables, including vicarious experience, verbal persuasion, past experience, emotional state, disposition to believe information, outcome expectation and information utility, were considered (Lim, 2009). Based on these observations, we believe that if students think the information in Wikipedia is useful for their academic work, they will be more likely to adopt the information. Therefore,

Hypothesis 6: The higher the perceived usefulness of the information in Wikipedia, the more likely students will adopt the information.

There are three possible reasons that information usefulness affects users' trust towards a website. First, greater information usefulness refers to perceived usability of the information that people obtain from the website. This would increase the future positive outcome expectations and further improve users' trust in the website. Second, information usefulness enhances users' confidence in the information production process. Through the same process, other useful information thus can be derived. Confidence in the information production process would improve users' trust towards the website (Flavián, Guinalíu and Gurrea, 2006). Third, trust is a three-party relation, which can be expressed in terms of "I trust the website to satisfy some particular objectives" (Hardin, 2001). In this sense, information usefulness implies the satisfaction of users' objectives and provides "the context in which the trust is embedded" (Kelton *et al*, 2008). Based on the discussion earlier, we believe that if students perceive the usefulness of the information obtained from Wikipedia, they will be more likely to expect similar useful information from future retrieval in this website, build a strong confidence regarding the information production process and further develop a trust towards Wikipedia, especially when they adopt and use Wikipedia to achieve some similar objectives. Therefore,

Hypothesis 7: The higher the perceived usefulness of the information in Wikipedia, the more likely students will develop a trust in Wikipedia.

A number of studies have demonstrated that if relationships are high in trust, people will be more likely to engage in a desired behaviour (Nahapiet and Ghoshal, 1998). This is because trust reduces ambiguity and uncertainty related to that behaviour. Today, information explosion occurring in the digital environment results in a significant amount of uncertainty and potential harms (Kelton *et al*, 2008). In this regard, trust towards a reference website will help people easily judge the quality of existing information and avoid the possible negative consequences. In the current study, although information obtained in Wikipedia is contributed by a wide variety of users, university students may simply adopt the information just because they believe Wikipedia is trustworthy enough in providing them with desired high-quality information. Therefore, we have the following hypothesis:

Hypothesis 8: The higher the level of trust in Wikipedia, the more likely students will adopt the information in Wikipedia.

Research method
A number of hypotheses have been proposed and need to be further empirically examined. As such, a quantitative survey research strategy appears appropriate in conducting this research. In particular, details about survey measures, data collection method and sample characteristics are reported in this section.

Measures
All the constructs in this study were measured by multi-item scales drawn from pre-validated measures (as shown in Appendix). Minor changes in the wording were made so as to fit the

Table 1: Operationalisation of constructs

Constructs	Operational definitions
Source Credibility	Students' perception of the credibility of the contributors who write papers in Wikipedia.
Completeness	Students' perception of the degree to which Wikipedia provides all necessary information.
Accuracy	Students' perception of the degree to which information in Wikipedia is correct.
Currency	Students' perception of the degree to which information in Wikipedia is up-to-date.
Format	Students' perception of the degree to which information in Wikipedia is well-presented.
Information usefulness	The extent to which students believe that adopting the information in Wikipedia will enhance academic performance.
Trust in Wikipedia	A willingness to rely on Wikipedia in which students has confidence.
Information adoption	The extent to which students purposefully engage in adopting and using information from Wikipedia.

current investigation context of Wikipedia. We adapted items for source credibility, information usefulness and information adoption from Sussman and Siegal (2003), items for completeness, accuracy, currency and format from Wixom and Todd (2005) and items for trust in Wikipedia from Cheung and Lee (2006). Measurements for all the constructs were phrased on 7-point Likert scales anchored between "1 = *strongly disagree*" and "7 = *strongly agree*." Table 1 provides the operational definitions of all the constructs. In addition, a pilot test was also conducted to refine the questionnaire wordings, assess logical consistencies, judge ease of understanding and identify areas for improvement. Overall, the questionnaire was regarded as concise and easy to complete.

Data collection
An online survey was employed and invitation messages with a URL to the online questionnaire were posted on several popular student online forums in Hong Kong. In addition, a screen question, "Have you ever visited an online encyclopaedia called Wikipedia?" was asked to identify the respondents who have prior experience with Wikipedia. A convenience sample was used for this study and a total of 170 respondents completed the self-reported questionnaire. To ensure data quality, we have further removed 38 responses checked on the same column for a whole block of items. Finally, we kept a total of 132 responses in the final sample.

Participants
The target respondents of this study are university students who have used Wikipedia to obtain information for course-related academic projects. Participation in this study was voluntary yet motivated by a lucky draw among the successful respondents. Among the 132 respondents, more than half (51.5%) were male and a large majority of them (77.3%) were aged between 19 and 25.

Wikipedia usage
More than half of the respondents visited Wikipedia 11 times or more per month. Compared with other information sources (such as Internet sites, university library, reference books, scholarly journals, etc.), more than a quarter of the respondents (27.3%) regarded online encyclopaedia as the main tool for information searching when they work on class assignments and term projects. In addition, most of the respondents believed that Wikipedia outperforms other online encyclopaedias in the aspects of completeness, currency, layout, easy to access and accuracy. The design features of Wikipedia are perceived as user-friendly, clear and well organised. The present survey

Characteristics	Frequency (n = 132) (%)
Gender	
Male	68 (51.5)
Female	64 (48.5)
Visiting frequency	
1–5 times/month	43 (32.6)
6–10 times/month	20 (15.2)
11–15 times/month	30 (22.6)
16–20 times/month	15 (11.4)
> 20 times/month	24 (18.2)
Faculty	
School of Arts	43 (32.6)
School of Business	44 (33.3)
School of Science	21 (15.9)
Others	24 (18.2)
Age	
<19	3 (2.3)
19–25	102 (77.3)
>25	27 (20.4)
College	
City University of Hong Kong	14 (10.6)
Hong Kong Baptist University	34 (25.8)
Hong Kong Shue Yan University	9 (6.8)
Lingnan University	8 (6.1)
The Chinese University of Hong Kong	12 (9.1)
The Hong Kong Institute of Education	11 (8.3)
The Hong Kong Polytechnic University	12 (9.1)
The Hong Kong University of Science and Technology	10 (7.6)
The University of Hong Kong	10 (7.6)
Others	12 (9.1)

also showed that university students tended to visit Wikipedia for collecting more background information on a specific topic. Non-response bias was further examined by comparing the early respondents and the late respondents, no significant differences were found. Table 2 provides an overview of the demographic characteristics of the respondents.

Data analysis and results

Partial Least Squares (PLS) Graph version 3.00 (Soft Modeling Inc., Houston, Texas, USA) was used to test the proposed research model. The PLS procedure (Wold, 1989) is a second-generation multivariate technique that can assess the measurement model and the structural model simultaneously in one operation. Following the two-step analytical procedures (Hair, Anderson, Tatham and Black, 2006), we first examine the measurement model and then the structural model.

Measurement model

Convergent validity indicates the extent to which the items of a scale that are theoretically related should be related in reality. It can be demonstrated when each of the measurement items loads significantly on its theorised latent construct (Gefen and Straub, 2005). Convergent validity is usually assessed by examining the composite reliability and the average variance extracted of the measures (Hair *et al*, 2006). A composite reliability of 0.70 or above and an average variance extracted of more than 0.50 are deemed acceptable (Fornell & Larcker, 1981). Table 3 summarises loadings, the associated *t*-value, composite reliability and average variance extracted of the

Table 3: Psychometric properties of measures

Constructs	Items	Loading	t-Value	Mean	SD
Source credibility (SC)	SC1	0.88	35.38	5.27	1.15
CR = 0.95, AVE = 0.84	SC2	0.93	77.61	4.98	1.38
	SC3	0.94	77.57	4.97	1.33
	SC4	0.92	67.49	5.08	1.24
Completeness (CO)	CO1	0.94	108.73	4.96	1.44
CR = 0.94, AVE = 0.84	CO2	0.93	68.84	5.14	1.31
	CO3	0.88	31.21	5.04	1.43
Accuracy (AC)	AC1	0.92	74.72	5.10	1.22
CR = 0.90, AVE = 0.76	AC2	0.76	10.51	4.96	1.44
	AC3	0.93	81.08	5.00	1.25
Currency (CU)	CU1	0.93	61.98	5.14	1.33
CR = 0.96, AVE = 0.88	CU2	0.95	78.90	5.18	1.26
	CU3	0.93	103.10	5.06	1.26
Format (FO)	FO1	0.92	42.90	5.21	1.28
CR = 0.93, AVE = 0.82	FO2	0.93	53.49	5.11	1.29
	FO3	0.86	24.25	5.41	1.07
Information usefulness (IU)	IU1	0.93	45.67	5.33	1.22
CR = 0.95, AVE = 0.87	IU2	0.94	59.74	5.50	1.14
	IU3	0.93	61.36	5.55	1.19
Trust (TR)	TR1	0.92	73.18	5.20	1.16
CR = 0.95, AVE = 0.86	TR2	0.94	72.74	5.11	1.29
	TR3	0.91	63.61	5.00	1.30
Information adoption (IA)	IA1	0.94	89.85	5.20	1.13
CR = 0.93, AVE = 0.87	IA2	0.92	37.95	5.18	1.45

CR, composite reliability; AVE, average variance extracted.

measures. All the items load significantly on their anticipated constructs and all the measures exceed the recommended thresholds, with the composite reliability ranges from 0.90 to 0.96 and the average variance extracted ranges from 0.76 to 0.88.

Discriminant validity indicates the extent to which a given construct is different from other constructs. Gefen and Straub (2005) suggested two procedures for assessing discriminant validity. First, the loadings of the measurement items on latent variables should be examined. Second, the shared variances between constructs and the average variance extracted for each construct should be compared. To demonstrate acceptable discriminant validity of the constructs, the measurement items should load highly on their theoretically assigned factor and not highly on other latent variables, and the square root of the average variance extracted for each construct should be greater than the correlations between that construct and all other constructs (Fornell & Larcker, 1981). Table 4 shows the loadings and cross-loadings of all measures and Table 5 presents the correlation matrix of the constructs and the square root of the average variance extracted for each construct. Finally, the results demonstrate satisfactory discriminant validity of the measurements.

In addition, we also checked multi-collinearity due to high correlations among some independent variables. A general rule of thumb is that serious multi-collinearity exists if variance inflation factors (VIF) of all independent variables are higher than 10 and tolerance values are less than 0.1 (Mason and Perreault, 1991). The results showed that all the VIF and the tolerance values are acceptable, thus multi-collinearity did not appear to be a significant problem in this study.

Table 4: Loadings and cross-loadings for measures

	SC	CO	AC	CU	FO	IU	TR	IA
SC1	*0.87*	0.60	0.67	0.55	0.60	0.69	0.64	0.66
SC2	*0.93*	0.75	0.75	0.70	0.68	0.67	0.77	0.77
SC3	*0.94*	0.74	0.81	0.71	0.70	0.66	0.83	0.75
SC4	*0.92*	0.74	0.83	0.68	0.70	0.67	0.81	0.75
CO1	0.76	*0.94*	0.78	0.80	0.67	0.66	0.83	0.76
CO2	0.77	*0.93*	0.79	0.74	0.69	0.68	0.79	0.76
CO3	0.58	*0.88*	0.65	0.69	0.65	0.60	0.73	0.68
AC1	0.80	0.83	*0.92*	0.68	0.67	0.67	0.84	0.75
AC2	0.54	0.49	*0.76*	0.53	0.56	0.38	0.51	0.43
AC3	0.79	0.74	*0.93*	0.73	0.67	0.64	0.77	0.72
CU1	0.62	0.73	0.68	*0.93*	0.65	0.51	0.68	0.55
CU2	0.71	0.76	0.73	*0.95*	0.68	0.58	0.75	0.64
CU3	0.68	0.78	0.69	*0.93*	0.72	0.59	0.76	0.68
FO1	0.72	0.71	0.69	0.71	*0.92*	0.65	0.72	0.70
FO2	0.70	0.70	0.69	0.71	*0.93*	0.60	0.74	0.70
FO3	0.57	0.58	0.60	0.58	*0.86*	0.65	0.62	0.52
IU1	0.70	0.71	0.67	0.60	0.73	*0.93*	0.74	0.69
IU2	0.68	0.66	0.60	0.54	0.66	*0.94*	0.71	0.69
IU3	0.68	0.62	0.60	0.54	0.58	*0.93*	0.71	0.60
TR1	0.78	0.75	0.77	0.69	0.70	0.77	*0.92*	0.72
TR2	0.79	0.79	0.77	0.75	0.69	0.67	*0.94*	0.77
TR3	0.75	0.83	0.76	0.73	0.74	0.69	*0.91*	0.80
IA1	0.78	0.80	0.76	0.70	0.74	0.69	0.83	*0.94*
IA2	0.71	0.68	0.64	0.53	0.56	0.63	0.69	*0.92*

AC, accuracy; CO, completeness, CU, currency; FO, format; IA, information adoption; IU, information usefulness; SC, source credibility; TR, trust in Wikipedia.

Table 5: Correlation matrix of the constructs

	TR	IU	SC	CO	AC	CU	FO	IA
TR	*0.93*							
IU	0.77	*0.93*						
SC	0.83	0.74	*0.92*					
CO	0.85	0.71	0.77	*0.92*				
AC	0.84	0.67	0.83	0.81	*0.87*			
CU	0.78	0.60	0.72	0.81	0.75	*0.94*		
FO	0.77	0.70	0.73	0.73	0.73	0.73	*0.91*	
IA	0.82	0.71	0.80	0.80	0.76	0.67	0.71	*0.93*

Note: The italicized numbers in the diagonal row are square roots of the average variance extracted.
AC, accuracy; CO, completeness, CU, currency; FO, format; IA, information adoption; IU, information usefulness; SC, source credibility; TR, trust in Wikipedia.

Structural model

The results of the analysis are depicted in Figure 3, which presents the overall explanatory power, the estimated path coefficients (all significant paths are indicated with asterisks) and the associated *t*-value of the paths. Test of significance of all paths were performed using the bootstrap re-sampling procedure.

The model accounts for 69.4% of the variance in information adoption, 59.1% of the variance in trust and 62.7% of the variance in information usefulness. The results demonstrated that source
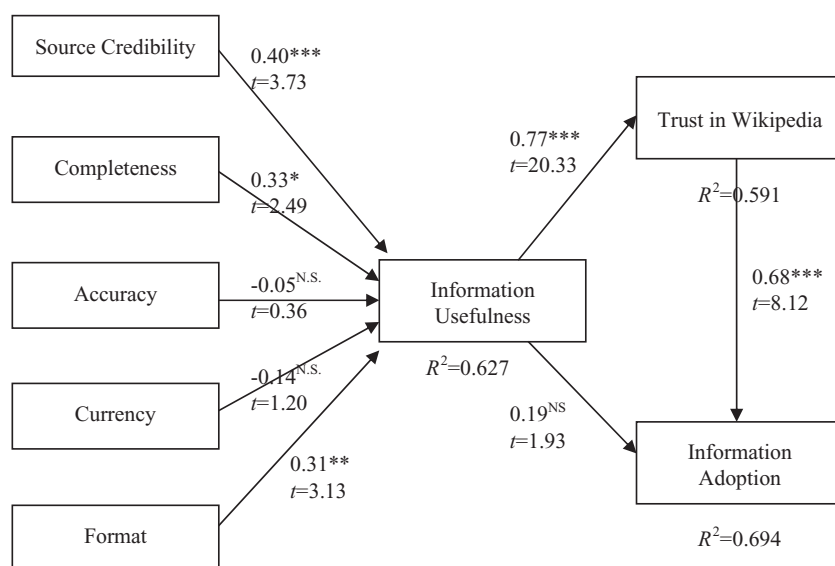
*Figure 3: Results of partial least squares analysis. Note: *p < 0.05, **p < 0.01, ***p < 0.001, NS, not significant*

credibility exerts the strongest impact on information usefulness, with a path coefficient of 0.40 (hypothesis 1 is supported), followed by completeness and format, with path coefficients of 0.33 and 0.31 respectively (hypotheses 2 and 5 are supported). However, the statistical paths from accuracy and currency to information usefulness were not significant (hypotheses 3 and 4 are not supported). It is also worth noting that information usefulness was not found to be significant in determining information adoption (hypothesis 6 is not supported). Instead, information usefulness significantly predicts trust in Wikipedia (hypothesis 7 is supported), which, in turn, has a statistically significant impact on information adoption, with a path coefficient of 0.68 (hypothesis 8 is supported).

Analysis of key findings
Surprisingly, deviating from the information adoption model, information usefulness did not exert a direct statistically significant effect on information adoption. Instead, it influenced information adoption indirectly through university students' trust towards Wikipedia. This finding further suggests the critical and central role of trust in determining students' online information adoption. The significance of trust in Wikipedia was also reflected through respondents' frequent visit to the website and demonstrated in prior studies that have identified trust as a major issue when people actually interact with system and environment containing information from multiple, unknown sources (Kelton *et al*, 2008; McGuinness *et al*, 2006).

As suggested by Sussman and Siegal (2003), the results of this study also provided empirical evidence that source credibility and information quality were important predictors of information usefulness. Among the four dimensions of information quality, only completeness and format exhibited significant effects on information usefulness. Accuracy and currency, however, were not significant in determining information usefulness in the current study. One possible explanation for the insignificance of accuracy in the current study is that college students' "confidence in evaluating Wikipedia's information quality was, at most, moderate" (Lim, 2009) and especially "Asian students are under different levels of influence from the Confucian Heritage Culture," which prevents students from developing critical thinking skills in examining "the

accuracy of supportive evidence" (Chiu, 2009). Therefore, students may be unable to judge the accuracy of the information from Wikipedia and be more inclined to adopt information without cautious confirmation. The insignificance of currency is not surprising in this study because course-related topics are not as time-sensitive as other topics. The results of our survey also demonstrated that university students were inclined to use Wikipedia to collect background information on a special topic. In the educational context, well-developed concepts are more often used for teaching, and therefore, currency was not a big issue for students to search information from Wikipedia.

Discussion, limitations and implications

The objective of this study is to explore how students evaluate Wikipedia and which factors lead to the intention to adopt information from Wikipedia. With incorporating the concept of trust into the information adoption model, this study proposed that information usefulness and trust in Wikipedia are the two most important factors predicting online information adoption. The measurement model is confirmed with adequate convergent and discriminant validity for all the measures. The results also provided supports for most of the hypotheses.

Limitations

Before highlighting the implications of this study, we first discuss the limitations that could be addressed in future research. First of all, due to time and budget constraints, convenience sample was used in this study, and the sample size was relatively small. Second, the respondents of this study are university students who have sought information from Wikipedia for class-related works. Therefore, generalisation of our findings to other sample populations or other virtual communities should be made with caution. Third, a self-reported questionnaire was administered, and therefore, information adoption here reflects university students' subjective perceptions towards their tendency to adopt information from Wikipedia. In this regard, an objective or direct measure of information adoption is strongly urged in future research. Fourth, prior studies have demonstrated that trust may affect people differently under different cultures. Since this study was conducted with university students from a collectivist culture, future cross-cultural comparison, thus, is highly recommended to examine the robustness of our findings.

Implications for research

As a response to Kelton *et al*'s (2008) claims that "to date there has been a relative dearth of research on trust in the field of information science," this study is one of the few attempts to investigate the role of trust in university students' information adoption from online encyclopaedia. Specifically, it contributes to the existing literature in four ways.

First, in addition to the instrumental perspective used in the information adoption model, trust has been included in our research framework. The concept of trust is important in the current study because it reduces uncertainty of the obtained information and search costs related to information retrieval. Contrary to the original information adoption model, we have found that information usefulness does not affect information adoption directly but rather through the mediating effect of trust in Wikipedia. Future research thus is highly suggested to re-examine this interesting finding and evaluate the robustness of our model in other research contexts.

Second, we have found that the four dimensions of information quality may play different roles in determining information usefulness given the different nature of the desired information. Thus, future additional research could be conducted to further explore under which situations the different dimensions of information quality are significant. A contingency approach to information quality is also recommended in future investigations.

Third, this study contributes to the existing literature by demonstrating that information usefulness can lead to students' trust towards online reference websites. Following this line of research, future research could further investigate the role of information usefulness in determining users' different types of trusting beliefs towards information websites.

Fourth, this study also contributes to the existing e-learning research by investigating university students' adoption and use of online public information. The survey results showed that more than one-fourth of the respondents regarded online encyclopaedia as the main tool for information searching compared with other information sources, including Internet sites, university library, reference books, scholarly journals, etc. In this sense, it is useful and interesting to compare the different influencing mechanisms of information adoption in these online information sources. In addition, Wikipedia outperforms other online encyclopaedias in many aspects. Future research thus is encouraged to evaluate the potential facilitators and barriers of using Wikipedia in student-centred active learning.

Implications for practice
While this study leads to several interesting implications for research, it also provides important insights to educators and academic institutions. According to the results of this study, accuracy is not a major concern for university students who have adopted information from Wikipedia because they may not carefully check the reliability of these papers. Instead, they simply regard Wikipedia as trustworthy and therefore seek course-related information there. From an educator's perspective, another important implication of this study is that educators should provide students with more training on assessing online information and better guidelines for using Wikipedia in academic work. In particular, they should instruct students to pay more attention to the accuracy of the information in Wikipedia and to be critical learners.

Academic institutions also can learn from this study. The findings showed that more than half of the respondents frequently visited Wikipedia and compared with other information sources, the online encyclopaedia was viewed as the most popular tool for university student to search various kinds of information for academic purposes. In this sense, an outright prohibition of Wikipedia may not be a good idea. Instead, it is useful and necessary to incorporate Wikipedia into the academic curriculum, and this will further provide students with the unique opportunity to develop digital literacy. Digital literacy education will connect learning with real life, encourage students to effectively find and critically evaluate information while using digital technologies, increase students' ability to create and communicate their ideas and help them to be wise consumers in the digital age.

We also expect the findings of this study can offer some useful advice to online reference website administrators in order to help their websites gain better traffic and higher ranking. First of all, we found that source credibility is the most important predictor influencing information usefulness. Therefore, website administrators could create a reputation system to help information users to evaluate the credibility of potential sources. On the other hand, content contributors can also use the reputation system to enhance usefulness perception of the information they produce. In fact, some reference websites, such as Yahoo! Answer, are now beginning to assign trust ratings to the individual contributors. Second, completeness and format are other two important determinants of information usefulness. Consequently, online reference website administrators should encourage contributors to provide information covering all issues of any topic and guide them to organise the papers in a readable manner as much as possible. Last but not least, trust towards Wikipedia was found to be the most powerful antecedent of information adoption in this study. In this regard, website administrators should focus on promoting users' trust towards their websites through designing user-friendly interface and improving the usefulness of the information.

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Appendix

Measurement scales

Respondents were asked to rank from 1 to 7 their agreement or disagreement with each of the following statements in relation to Wikipedia. Each item is measured with scale point anchors labeled: (1) strongly disagree; (2) moderately disagree; (3) slightly disagree; (4) neither disagree nor agree; (5) slightly agree; (6) moderately agree; (7) strongly agree.

Source Credibility (Sussman and Siegal, 2003)

SC1 People who write articles in Wikipedia are knowledgeable in specific topic.
SC2 People who write articles in Wikipedia are experts in specific topic.
SC3 People who write articles in Wikipedia are trustworthy.
SC4 People who write articles in Wikipedia are reliable.

Completeness (Wixom and Todd, 2005)

CO1 Wikipedia provides me with a complete set of information.
CO2 Wikipedia produces comprehensive information.
CO3 Wikipedia provides me with all the information I need.

Accuracy (Wixom and Todd, 2005)

AC1 Wikipedia produces correct information.
AC2 There are few errors in the information I obtain from Wikipedia.
AC3 The information provided by Wikipedia is accurate.

Currency (Wixom and Todd, 2005)

CU1 Wikipedia provides me with the most recent information.
CU2 Wikipedia produces the most current information.
CU3 The information from Wikipedia is always up to date.

Format (Wixom and Todd, 2005)

FO1 The information provided by Wikipedia is well formatted.
FO2 The information provided by Wikipedia is well laid out.
FO3 The information provided by Wikipedia is clearly presented on the screen.

Information Usefulness (Sussman and Siegal, 2003)

IU1 The information in Wikipedia is valuable.
IU2 The information in Wikipedia is informative.
IU3 The information in Wikipedia is helpful.

Trust in Wikipedia (Cheung and Lee, 2006)

TR1 Wikipedia is reliable.
TR2 Wikipedia can be trusted; there are not many uncertainties.
TR3 Anyone trusting Wikipedia is helping himself/ herself.

Information Adoption (Sussman and Siegal, 2003)

IA1 I agree with the information in Wikipedia.
IA2 I apply the information in Wikipedia to my assignments, projects or presentations.

Other Questions:

1. Gender (Male; Female); Age (18 or below; 19–25; 26–35; 36–45; 46 or above); Faculty (School of Arts; School of Science; School of Business; Others)
2. How often have you visited Wikipedia each month? (1–5 times; 6–10 times; 11–15 times; 16–20 times; More than 20 times)
3. When you are working on an assignment, a project or a presentation (individual work or group work), which of the following is your main tool for information searching? (Online encyclopedias; Related Internet sites; Reference Books; Magazines; Scholarly Journals; Newspapers; Others)
4. Why did you visit Wikipedia? (To learn more about a specific topic; To acquire information for assignments, projects or presentations; To share my knowledge in certain topics; Because of the brand name; Others please specify)
5. Which aspect(s) do you think that Wikipedia outperforms other online encyclopedias? (Open-ended Question)
6. What do you think about the design features of Wikipedia? (Open-ended Question)