

Assessing teachers' acceptance of educational technologies: Beware for the congruency between user acceptance and actual use

Bram PYNNOO^{a,b*}, Jo TONDEUR^{b,c}, Johan VAN BRAAK^b, Wouter DUYCK^b, Bart SIJNAVE^d, Philippe DUYCK^a

^a*Radiology and Medical Imaging, Ghent University Hospital, Belgium*

^b*Psychology and Educational Sciences, Ghent University, Belgium*

^c*Research Foundation Flanders*

^d*Department of ICT, Ghent University Hospital, Belgium*

*Bram.Pynoo@UGent.be

Abstract: In this study, we investigated the extent to which self-reported measures for user acceptance (attitude, behavioral intention, self-reported frequency of use), added to the prediction of several aspects of use of a portal for education. Data from 835 teachers was collected: questionnaire "acceptance" data on one occasion and five parameters for observed use (number of logins, downloads, uploads, page views, and reactions) were extracted on two occasions from the portal database. We found that the self-reported measures for acceptance primarily predicted search behavior (monthly number of logins, downloads and page views), and not share behavior (monthly number of uploads and reactions). So, researchers aiming to assess teachers' acceptance of a technology to contribute information, should adjust their measures for user acceptance so that these correspond with the targeted actual behavior.

Keywords: TAM, portal for education, acceptance testing, actual use

Introduction

In education, teachers are constantly exposed to new technologies and they are strongly encouraged by educational authorities and their school superiors (to start) to use these new technologies. Examples are interactive whiteboards, intranet portals, presentation software, et cetera. As these new technologies may require teachers to develop new skills or adopt other work routines, it is vital that they accept and use that technology. A plethora of studies - also in education, e.g. [4, 5] - has been setup in the past to assess user acceptance, in which in most cases self-reported measures of user acceptance serve as proxies for actual use. Yet, little attention is paid to the congruency between the measure for acceptance and the actual usage of the technology. For instance, a word processor such as Microsoft Word, can be used to read, print, type, et cetera. This raises the question: when assessing users' acceptance of MS Word, which aspect of use is measured? Reading, printing, typing...? This study aims to fill in this void by assessing to what extent self-reported measures for teachers' acceptance of an educational portal can predict different aspects of actual use.

1. Background

Several models have been developed to explain and predict technology acceptance (see [6] for an overview), the most prominent being the Technology Acceptance Model (TAM) [2]. According to TAM, the acceptance of a technology depends upon that technology's perceived usefulness and perceived ease of use.

Technology acceptance is typically measured as attitude towards use of the technology (e.g. "Using [the technology] is a good / bad idea") [1, 5], behavioral intention (e.g. "I intend to use [the technology] in the next month") [3, 6], and / or self-reported use (e.g. "I use [the technology] ... hours per week") [4, 6]. In the case where these measures coexist, attitude is an antecedent to behavioral intention, while the latter serves as antecedent to use [4]. These generic measures contrast with the rich variety of actual use possibilities. In this study, an educational portal is studied, in which the most important (and opposing) use aspects are searching in order to download, and sharing. In this study, we will assess the extent to which attitude, intention and self-reported use can predict these different aspects of portal use.

2. Material and methods

2.1 Technology

The portal under study, KlasCement (<http://www.klascement.net>), is an educational portal targeted at Flemish and Dutch teachers, yet everybody can join. Enrollment is mandatory in order to obtain full access to all aspects of the portal. Upon enrollment, a limited amount of points is received to download material and consult specific parts of the portal, while points can be gained by contributing (= uploading information or reacting on uploaded information). To retain membership, a member has to login at least once per six months. Members can use the portal in several ways, the main being: (a) searching for information posted by other members or by the portal administrators in order to download the retrieved material; and/or (b) sharing information or knowledge, either by uploading, or by reacting on earlier uploads.

2.2 Data Collection

The acceptance data were collected online, as part of a user-satisfaction survey. Three operationalizations for acceptance were measured: attitude (4 items), behavioral intention (2 items) and self-reported frequency of use (1 item). 7-point Likert scales, anchored between "completely disagree (1)" and "completely agree (7)" were used for scoring, except for use which was anchored between "never (1)" and "several times a day (6)". The actual use was collected on two occasions: upon completion of the survey (March-April 2009, T1), and about 2 years later (January 2011, T2). The following use parameters were extracted: number of logins, downloads, pages viewed, uploads, and reactions. An important note is that the first three parameters are incremental, while the latter two depict a moment in time as members can remove their own contributions in which case the associated reactions are also removed.

2.3 Research model and research questions

For this study we focus on predicting the future use at T2, therefore the use parameters extracted at T2 will serve as dependent variables. To account for the differences in duration of membership, the absolute number of logins, downloads,... will be divided by the number of months between enrollment and completion of the questionnaire (T1), or by the number of months between completion of the questionnaire and date of last login (T2). Five research questions are put forward, the research model is in Figure 1.

Controlling for the actual use of the portal, to what extent can attitude towards use of the portal, behavioral intention to use the portal, and self-reported frequency of portal use predict the average number of ...

RQ1: ... logins into the portal.

RQ2: ... downloads teachers make.

RQ3: ... uploads teachers contribute.

RQ4: ... pages viewed by teachers while browsing the portal.

RQ5: ... reactions made by teachers.

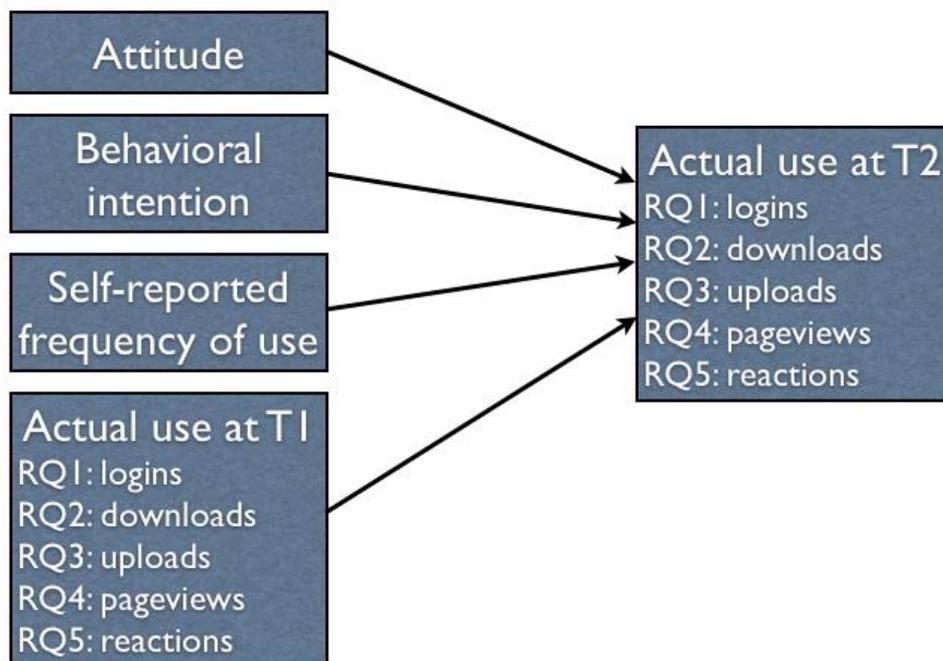


Figure 1. Research model

Hierarchical linear regressions will be run in SPSS 15 to assess these research questions, with the actual use at T1 in the first block, and the other variables in the second.

3. Results and discussion

The survey was completed by 919 teachers. Prior to the analysis, two groups were removed from the dataset: teachers that completed the questionnaire at their first login (N=37), and teachers who abandoned use of the portal between T1 and T2 (N = 47). This led to a final dataset of 835 teachers. Sample characteristics and descriptive statistics (mean and standard deviation) are displayed in Table 1. The results of the hierarchical linear regressions are in Table 2.

From Table 1, we learned that the portal is primarily used to search for and download information rather than for contributing (uploads & reactions). We also observed a close

correspondence between self-reported frequency of use and average number of logins (at both times), as a score of “3” on self-reported frequency of use corresponded with the response category “I use the portal about once during a regular workweek”. Furthermore, we also found that the average number of reactions at T2 was negative, indicating that a lot of contributions have been removed from the portal between T1 and T2.

Table 1. Sample characteristics and descriptive statistics (Mean and Standard Deviation)

	T1	T2
N	835	
Gender (female / male)	586 / 249	
	Mean (SD)	Mean (SD)
Age (in years)	39.68 (10.37)	
Length of membership (in months)	26.08 (16.51)	
Attitude	5.98 (0.94)	
Behavioral intention	4.32 (1.53)	
Self-reported frequency of use	2.95 (0.91)	
Monthly logins	3.33 (8.23)	3.87 (8.36)
Monthly downloads	4.74 (12.52)	7.16 (12.61)
Monthly uploads	0.11 (0.53)	0.06 (0.51)
Monthly page views	52.26 (118.99)	43.93 (78.33)
Monthly reactions	0.13 (0.78)	-0.10 (0.39)

Table 2. Results of hierarchical linear regressions

Dependent: Monthly ... at T2	logins	downloads	uploads	page views	reactions
Block 1					
Monthly ... at T1	.32***	.40***	.24***	.39***	-.43***
Adj. R ²	.10	.16	.06	.15	.18
Block 2					
Attitude	.05	.05	.03	.05	-.05
Behavioral intention	.02	.11**	-.01	.08*	-.05
Self-reported use	.28***	.19***	.05	.26***	-.08*
Monthly ... at T1	.25***	.32***	.23***	.31***	-.41***
Adj. R ²	.19	.24	.06	.25	.20
Sig F change	p<.001	p<.001	p=.38	p<.001	p<.001

Adding attitude, behavioral intention and frequency of use led in four cases to a significant increase of variance explained. In the case of search behavior (a teacher who logs in, views pages to find the desired information, and downloads the retrieved information), this led to an increase by 8 to 10%. This was not the case for share behavior (uploading and reactions on posted material) in which no increase in variance explained was observed for uploading, and only by 2% for reacting. Two unexpected findings from this analysis deserve some further elaboration. First, it was found that, uploading at T2 could hardly be predicted by the uploading behavior observed at T1 (Adj. R^2 of .06). This indicates a lack of consistency into why and how frequently teachers upload. Deeper analysis of data collected through the satisfaction could shed light on this issue. Second, negative β standardized regression coefficients were observed in the regression with reactions as dependent variable. As Table 1 shows, the average number of reactions was negative, so the negative β 's reflect that the more a teacher had reacted at T1, the more reactions could have been deleted by T2. The best predictor of actual use was self-reported frequency of use, while behavioral intention was only significant for predicting the number of downloads and page views. Attitude had no direct influence on actual use, path analyses could reveal indirect influences of both attitude and behavioral intention.

4. Conclusion

In this study, we investigated the extent to which commonly used self-reported measures for acceptance (attitude, behavioral intention, self-reported frequency of use) added to the prediction of different aspects of actual use behavior (monthly number of logins, downloads, uploads, page views, and reactions). The self-reported measures were especially predictive for search behavior (logging in to search for and download material) and not or to a lesser extent for share behavior (upload material or react to uploaded material). So, when studying technology acceptance in a population of teachers, researchers should be aware of the different uses of a technology and direct their questions to the actual behavior / use aspect of interest. Further analyses taking more data into account will be performed, especially with respect to the prediction of upload behavior.

References

- [1] Brown, S. A., Massey, A. P., Montoya-Weiss, M. M., & Burkman, J. R. (2002). Do I really have to? User acceptance of mandated technology. *European Journal of Information Systems*, 11(4), 283-295.
- [2] Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer-Technology - A Comparison of 2 Theoretical-Models. *Management Science*, 35(8), 982-1003.
- [3] Marchewka, J. T., Liu, C., & Kostiwa, K. (2007). An application of the UTAUT model for understanding student perceptions using course management software. *Communications of the IIMA*, 7(2), 93-104.
- Ngai, E. W. T., Poon, J. K. L., & Chan, Y. H. C. (2007). Empirical examination of the adoption of WebCT using TAM. *Computers & Education*, 48, 250-267.
- [4] Pynoo, B., Devolder, P., Tondeur, J., van Braak, J., Duyck, W., & Duyck, P. (2011). Predicting secondary school teachers' acceptance and use of a digital learning environment: a cross-sectional study. *Computers in Human Behavior*, 27(1), 568-575.
- [5] Teo, T., Lee, C. B., & Chai, C. S. (2008). Understanding pre-service teachers' computer attitudes: applying and extending the technology acceptance model. *Journal of Computer Assisted Learning*, 24, 128-143.
- Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. *Decision Sciences*, 39(2), 273-315.
- [6] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *Mis Quarterly*, 27(3), 425-478.