Good intentions to read on mobiles are not good enough: reducing barriers to m-reading is crucial

Chew, Han Ei; West, Mark

2015

Chew, H. E., & West, M. (2015). Good intentions to read on mobiles are not good enough: reducing barriers to m-reading is crucial. Proceedings of the Seventh International Conference on Information and Communication Technologies and Development, 32-.

<https://hdl.handle.net/10356/81177>

<https://doi.org/10.1145/2737856.2737859>

© 2015 Association for Computing Machinery (ACM). This is the author created version of a work that has been peer reviewed and accepted for publication by Proceedings of the Seventh International Conference on Information and Communication Technologies and Development, Association for Computing Machinery (ACM). It incorporates referee's comments but changes resulting from the publishing process, such as copyediting, structural formatting, may not be reflected in this document. The published version is available at: [<http://dx.doi.org/10.1145/2737856.2737859>].

Downloaded on 26 Apr 2023 20:22:21 SGT

Good intentions to read on mobiles are not good enough; reducing barriers to m-reading is crucial

Han Ei CHEW

Singapore Internet Research Centre
Wee Kim Wee School of Communication & Information
Nanyang Technological University
31 Nanyang Link
Singapore 637718
han.ei.chew@gmail.com

Mark West

United Nations Educational, Scientific and Cultural
Organization
7, place de Fontenoy 75352 Paris 07 SP France
m.west@unesco.org

Abstract

Drawing on the analysis of 4330 surveys on mobile reading in seven developing countries, this study found that the discrepancy between intentions to read on mobiles and actual reading can be attributed to barriers such as problematic mobile connectivity and inadequate relevant reading material. The policy implication of this research finding is clear – reducing barriers specific to mobile reading (m-reading) will improve program effectiveness. This study applied the technological acceptance model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) to the growing adoption of mobile reading in developing countries and partially verified key constructs of the theories. Findings suggest that the two models provide viable theoretical frameworks for future m-reading programs. This study is one of two companion papers to the 2014 UNESCO report on Reading in the Mobile Era. The other focuses on gender differences in m-reading.

Categories and Subject Descriptors

H.1.2 [Human computer interaction]: Ubiquitous and mobile devices - *Mobile phones, E-book readers, Empirical studies in ubiquitous and mobile computing*; HCI design and evaluation methods – *User studies*.

General Terms

Design, Human Factors, Theory

Keywords

Mobile reading, Literacy, Mobile phones, Digital books, Developing countries, Technological Acceptance Model, Unified Theory of Acceptance and Use of Technology

1. Introduction

As mobile phones edge closer to global ubiquity [6], they also offer a novel, inexpensive and easy-to-use channel to reading material for people living in book-scarce communities. Research by the United Nations Educational, Scientific and Cultural Organization indicates that hundreds of thousands of people in countries like Ethiopia, Nigeria and Pakistan are reading on mobile devices but very little is known about these readers [8]. This lack of understanding hampers efforts to expand the uptake of mobile reading and realize the educational and socio-economic benefits associated with increased reading. The 2014 UNESCO report on Reading in the Mobile Era [10] filled this knowledge gap by explaining the habits, preferences and demographic profiles of mobile readers in seven developing countries.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

ICTD '15, May 15 - 18, 2015, Singapore, Singapore
Copyright 2015 ACM 978-1-4503-3163-0/15/05...\$15.00
<http://dx.doi.org/10.1145/2737856.2737859>

The current study is one of two companion research papers to the UNESCO report and focuses on the theoretical contributions of the findings. Key constructs of the Technological Acceptance Model (TAM) [3] and the Unified Theory of Acceptance and Use of Technology (UTAUT) [9] were applied and verified in the context of m-reading in developing countries. Overall, findings indicate that (1) TAM and UTAUT provide viable theoretical frameworks for future m-reading programs and (2) the discrepancy between intentions to read on mobiles and actual reading can be attributed to barriers specific to m-reading such as problematic mobile connectivity and inadequate relevant reading material.

The current study is one of two companion research papers to the UNESCO report and focuses on the theoretical contributions of the findings. Key constructs of the Technological Acceptance Model (TAM) [3] and the Unified Theory of Acceptance and Use of Technology (UTAUT) [9] were applied and verified in the context of m-reading in developing countries. Overall, findings indicate that (1) TAM and UTAUT provide viable theoretical frameworks for future m-reading programs and (2) the discrepancy between intentions to read on mobiles and actual reading can be attributed to barriers specific to m-reading such as problematic mobile connectivity and inadequate relevant reading material.

2. Literature review

In many parts of the world, access to books is extremely limited or even non-existent. This lack of access to books hampers the acquisition of reading skills and consequently slows down learning in other school subjects and is often most severe in countries which need books the most. Studies have found that the majority of children in Africa have never owned a book of their own and it is common for ten to twenty students to share a single textbook in school [1, 10]. Another study of 16 sub-Saharan African countries found that most schools have few or no books, and in many countries these low levels are not improving [7]. Nigeria currently meets less than one per cent of its book needs, contributing to an illiteracy rate of over 40 per cent [8]. Given the deficit of physical books, m-reading is one particularly promising means of bringing books to communities in which they are scarce. In service to this objective, the current study focuses on one theory-based pathway to the adoption and use of m-reading and uses key constructs from: the theory of reasoned action (TRA) [4], the technology acceptance model (TAM) [3], and the unified theory of the adoption and utilization of technology (UTAUT) [9].

The basic tenets of the theories are that performance expectancy, effort expectancy, social influence, and facilitating conditions

determine people's behavioral intentions to adopt a technology. The intentions are then translated into and are good predictors of actual use. Although there are extent studies that use these theories, there are none to our current knowledge that has applied them to the context of mobile reading in multiple developing countries. In addition, this study follows the recommendation of the earlier TRA from which UTAUT and TAM originate and assesses specific expectancies and behavior of mobile reading. In other words, instead of asking whether "technology helps me learn", the current study would ask questions specific to mobile reading such as "reading on my mobile will help me learn". As it turns out, the application of the TAM and UTAUT frameworks yielded novel theoretical findings in terms of barriers and offers evidence-based recommendations for future mobile reading programs.

3. Method

Quantitative data were gathered in two ways: (1) a survey delivered through Worldreader Mobile, a mobile reading application and (2) usage tracking on the server end. The in-app survey was completed by 4330 existing Worldreader Mobile users in seven developing countries: Ethiopia, Ghana, India, Kenya, Nigeria, Pakistan and Zimbabwe. Two criteria determined a country's inclusion in the research: a low literacy rate and a minimum of 6,000 established Worldreader users per month [10]. Survey responses were then matched with usage data.

3.1 Operational Definitions

The following section describes the operationalization of the dependent variable – the amount of mobile reading done and the 8 independent variables. The appendix lists the independent variables and the respective items that comprise these variables using the exact wording from the in-app survey. The most common measure of reliability, Cronbach's alpha [2] is provided where appropriate.

3.1.1 Dependent variable.

The amount of m-reading done was operationalized as the sum of (1) the total number of e-book pages viewed¹ and (2) self-reported change in amount of reading before and after mobile reading.

3.1.2 Independent variables

In keeping with the tenets of the technology adoption model [3], several multi-item additive predictors were operationalized as follows: *Intention to read on mobiles* was a four-item measure that assessed plans to spend more time reading on the mobile for various purposes such as leisure, work, and school. *Expected outcomes* was a three-item measure that assessed the advantages of mobile reading from the perspective of the users. *Efficacy* was a three-item measure that assessed the users' level of competency in using the Worldreader Mobile app. *Attitude* of the users towards mobile reading was a single item measure. *Barriers* to m-reading was a two-item measure that assessed the degree to which users encounter two barriers to mobile reading – lack of content and problems with connectivity. Three demographic characteristics including age, gender, and level of education completed were also included as predictors of m-reading.

To test the comparative strength of the eight items as predictors of mobile reading, we carried out two separate hierarchical multiple regressions. The first verified that the data had a good fit with the theoretical underpinnings of TAM and UTAUT by using intentions to read on mobiles as the dependent variable. The second used the amount of m-reading as the outcome variable.

4. Results

Pearson product-moment correlations were calculated using SPSS (2011) version 20.0. Table 1 shows the Pearson product-moment correlations among the dependent and independent

Table 1. Correlation matrix of dependent and independent variables

	1	2	3	4	5	6	7	8	<i>M</i>	<i>SD</i>
1. Mobile reading done	-								3.79	1.25
2. Intentions	.130**	-							4.25	0.63
3. Expected outcomes	.113**	.612**	-						4.33	0.65
4. Efficacy	.105**	.387**	.425**	-					4.10	0.69
5. Attitude	.172**	.373**	.422**	.366**	-				4.30	0.90
6. Barriers	-.081**	.010	.022	.013	-.026	-			3.31	1.01
7. Age	-.009	.046**	.077**	-.034*	.020	-.044**	-		4.09	0.92
8. Highest education	.123**	.070**	.061**	-.075**	.009	-.026	.360**	-	3.40	1.34
9. Gender	.224**	.071**	.008	.037*	.129**	-.146**	-.015	.072**	0.23	0.42

**, Correlation is significant at the 0.01 level (2-tailed).

*, Correlation is significant at the 0.05 level (2-tailed).

¹ A logarithmic transformation was performed on total number of pages viewed in order to normalize the data and to meet the statistical assumptions of subsequent analyses.

variables

The first hierarchical multiple regression was conducted to determine the best linear combinations of the independent variables and the intentions to read on mobiles. The multiple regression used intentions to read as the dependent variable and the rest of the variables in Table 1 as the independent variables. Table 2 shows the results of this regression. Table 3 shows the results of the regression using actual m-reading done as the outcome variable.

Table 2. Hierarchical multiple regression analysis summary predicting intentions to read on mobiles

Model	Beta	t	sig
(Constant)		91.70	0.00
Age	0.03	1.67	0.09
Education	0.06	3.43	0.00
Gender	0.07	4.45	0.00
(Constant)		17.79	0.00
Age	-0.01	-0.53	0.60
Education	0.05	3.79	0.00
Gender	0.05	3.87	0.00
Expected outcomes	0.51	37.02	0.00
Efficacy	0.13	10.08	0.00
Barriers	0.01	0.62	0.53
Attitude	0.10	7.71	0.00

Dependent Variable: Intentions to read on mobiles

Table 2 shows that the entire group of variables significantly predicted intentions to read on mobiles, $F(4, 4322) = 426.72$, $p < 0.001$, The adjusted R^2 of the model was .41. Barriers were not a significant predictor of intentions to read on mobiles.

Table 3. Hierarchical multiple regression analysis summary predicting amount of mobile reading

Model	Beta	t	sig
(Constant)		40.94	0.00
Age	-0.05	-3.20	0.00
Education	0.13	7.95	0.00
Gender	0.21	14.53	0.00
(Constant)		13.03	0.00
Age	-0.06	-3.72	0.00
Education	0.13	8.09	0.00
Gender	0.19	12.68	0.00
Expected outcomes	0.02	1.12	0.26
Efficacy	0.04	2.47	0.01
Barriers	-0.05	-3.53	0.00
Attitude	0.11	6.39	0.00
Intentions	0.04	2.20	0.03

Dependent Variable: Mobile reading done

Table 3 shows that the entire group of variables significantly predicted actual m-reading done, $F(4, 4321) = 55.46$, $p < 0.001$, The adjusted R^2 of the model was .09. The most novel theoretical finding here is that barriers were a significant predictor of actual reading done. Practically, this is not unexpected – the more obstacles readers encounter, the less they are likely to read.

5. Discussion

The results from the multiple regressions are generally consistent with extant research on TAM and the more recent UTAUT. The use of mobiles for reading are predicted by factors such as expected outcomes, efficacy, attitude, and intentions as well as demographic characteristics such as age, education and gender. Behavioral intention also has a direct and positive impact on amount of m-reading done.

However, the results pertaining to barriers to m-reading are noteworthy both in terms of contribution to theory and in terms of its practical implications for future mobile reading programmes. Barriers to m-reading come closest to the theoretical construct of facilitating conditions in UTAUT. In UTAUT and TAM, facilitating conditions are framed as enhancers of the behavior rather than suppressors as was conceptualized here. It was interesting that the suppressing effects are consistent with existing theory - the barriers were a significant predictor for actual use rather than intentions to use.

Practically, this means that the twin barriers to mobile reading: lack of relevant content and issues of connectivity should be addressed in order to boost reading on mobiles. Figure 1 provides a theory-based framework for the design of future mobile reading programs based on the findings of this research.

Figure 1. Theoretical framework for design of mobile reading programs (based on TAM and UTAUT)

In terms of limitations, the findings of this study are limited to both place and time. The antecedents of mobile reading found apply to the developing countries context and whether or not the barriers play a significant role in developed countries warrants further research. This study was also conducted at a time when feature phones are just making m-reading a reality for people in developing countries and findings could be different as cheaper smartphones are acquired.

The verification of TAM and UTAUT can only be deemed as partial given the limitation in the number of questions that could be asked in an in-app survey before dropout rates became too high and invalidate the results. “Social norms” which are an integral part of TAM and UTAUT are expected to influence mobile reading habits but were not examined in this study. Questions such as the social or gender norms of reading physical books versus mobile reading could shed light on our understanding of mobile reading.

In addition, other barriers to mobile reading could be examined. This study only examined three – cost, connectivity, and content. Cultural effects could be both enabling and limiting and might be fruitful for future examinations.

6. Conclusion

This companion research article to the 2014 UNESCO report – Reading in the Mobile Era [10] – focuses on validating a theoretical framework for mobile reading and highlights a vitally-important consideration for future mobile reading programs. The study applied constructs from the classic technological acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT) to a new context – that of mobile reading in developing countries. Findings indicate that the constructs and theories serve as a viable framework for conceptualizing future mobile reading programs. Gaps in current understanding of the framework include qualitative examinations of social norms in different cultural contexts and how these affect mobile reading and a more complete explication of all the constructs in the theories. In the current study, the ambition of full theoretical validation had to be balanced with practical limitations in the number of questions that could be asked in a mobile-phone survey.

The findings not only point to the viability of using the TAM and UTAUT frameworks to inform future mobile reading programs. They also emphasize the importance of reducing the twin barriers to mobile reading which are limited relevant content and connectivity issues. In non-technical language, the findings are suggesting that intentions to read on mobiles can be elevated by improving mobile efficacy, helping users understand the positive outcomes of mobile reading, and nurturing a favorable attitude to reading on mobile. However, all the good intentions generated may not be good enough unless the barriers are reduced. There needs to be enough relevant content and stable mobile connectivity for the habits of mobile reading to be cultivated.

As cheap smartphones become a reality [5], mobile reading will only become more widespread in developing countries. It is thus important that the development and research community seize the opportunity “to evaluate, improve and facilitate this revolution as it unfolds” [10]. The potential outcomes are even more promising since the benefits of mobile reading tend to “ripple out to family and community members: parents, caregivers and teachers, use their mobile phones to read to children, and young people who read on their mobile phones may share their books with parents and siblings.” The immediate task is to ride this jet stream of mobile reading to improve literacy and education outcomes for marginalized and less privileged communities around the world.

7. Acknowledgement

This project was supported by Microsoft Corporation through a partnership with UNESCO that seeks to help governments and other organizations better utilize mobile devices for education. The UNESCO report is available at: <http://www.unesco.org/new/en/unesco/themes/icts/m4ed/mobile-reading/reading-in-the-mobile-era/>.

References

- [1] Books for Africa. (n.d.) *Why Books?* St. Paul, Minn. Retrieved October 15, 2014, from <http://www.booksforafrica.org/why-books.html>.
- [2] Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297–334.

- [3] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quart.* 13, 319–339.
- [4] Fishbein, M., & Ajzen, I. (1972). Attitudes and opinions. *Annual Review of Psychology*, 23, 487–544. doi:10.1146/annurev.ps.23.020172.002415
- [5] Grundberg, S., Gryta, T., & Connors, W. (2014). Smartphone makers aim at emerging markets with low-end devices. Retrieved November 1, 2014 from *The Wall Street Journal* online.
- [6] Partnership on Measuring ICT for Development. (2014). The Final WSIS Targets Review: Achievements, Challenges and the Way Forward, Geneva, Switzerland. Retrieved October 1, 2014, from http://www.itu.int/en/ITU-D/Statistics/Documents/publications/wsisreview2014/WSIS_2014_review.pdf
- [7] Ross, K. N. (2010). How successful are textbook provision programmes? *SACMEQ Policy Issues Series*, 6.
- [8] United Nations Educational, Scientific and Cultural Organization (UNESCO). (2014). *EFA Global Monitoring Report 2013/4. Teaching and learning: Achieving quality for all*. Paris. <http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/efareport/reports/2013>
- [9] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425–478.
- [10] West, M. & Chew, H.E. (2014). Reading in the mobile era. Paris: UNESCO. <http://unesdoc.unesco.org/images/0022/002274/227436E.pdf>

Appendix

Multi-item measures used

Intentions to read on mobiles ($\alpha = .64$)	<i>M</i>	<i>SD</i>
I plan to spend more time reading on my mobile in the coming year.	4.35	.798
I plan to read on my mobile to help me in a class.	4.17	.955
I plan to read on my mobile for pleasure.	4.18	.939
I plan to read on my mobile to help me in my job/profession.	4.29	.905
Expected outcomes ($\alpha = .70$)		
Reading on my mobile will help me learn.	4.51	.750
Reading on my mobile will help me improve my life.	4.30	.851
I have seen others benefit from reading on mobiles.	4.20	.869
Efficacy ($\alpha = .57$)		
I feel confident using the functions of the Worldreader Mobile App.	4.35	.809
I feel confident I know how to find the books I want on Worldreader Mobile App.	4.24	.893
If I had problems relating to the Worldreader Mobile App, I know I could work them out.	3.71	1.109
Barriers ($r = .22$)		

There are limited books I want to read on my mobile.	3.42	1.279
I have problems with connectivity when I read on my mobile.	3.19	1.317

Attitude

I liked reading on my mobile when I first tried it.	4.30	.901
---	------	------