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Effect of System Response Time on Mobile Learning User Satisfaction at Universities in Nakuru County, Kenya

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Abstract
System Response Time has been increasingly recognized as a significant quality dimension in determining the usability of mobile applications. Learning institutions in Kenya especially, universities have implemented these scientific innovations as alternative approaches to teaching and learning. The uptake was accelerated more with the advent of the coronavirus pandemic which saw the education sector close down. As a way of having their students back to class, the majority of the Universities in Nakuru County adopted online technologies. It is from this backdrop that the study sought to evaluate the effect of system response time on user satisfaction in the ICT department in Nakuru County in Kenya. To serve this purpose, survey questionnaires were issued to a sample of university students in the ICT department in Nakuru County in Kenya. The study revealed that system response time was an insignificant positive influencer of user satisfaction. The findings from this study contribute to the body of knowledge by coming up with several usability guidelines as a significant quality dimension for the design of usable applications in mobile learning that can help improve user satisfaction and reductions in training costs. The study recommends that given the kind of empirical evidence from the university consider having a system that is designed with quicker response time much as it is an insignificant predictor of satisfaction among the users.

Introduction
Studies by Shneiderman (1991) in China demonstrate that response time not only adversely affects the user experience of mobile applications but that this effect is not homogeneous across the three dimensions of tolerance, acceptance and satisfaction. The findings also illustrate that gender moderates the effect of response time on user experience. However, the negative influence is more salient for males than females, which contradicts our hypothesis. Unlike this study conducted in China, the proposed study wanted to establish the relationship between user models and users' satisfaction at Universities in Nakuru County, Kenya.

This study showed that satisfaction does decrease as response time increases. It also showed that there appears to be a level of intolerance in the 12-second response range for discretionary browser-based applications. Some response time delays contributed to perceived ease of use. The Internet will not deliver these kinds of response rates any time soon. However, there may be other things that browser-based applications can provide to the user without lowering satisfaction or losing the customer.

Miller (1968) Studied user perception of computer system response time and suggested that a model of user perception is central to the design effort. Computer system response time is generally defined as the number of seconds it takes from when users initiate an activity until the computer begins to

present results on the display or printer, Shneiderman (1991). User initiation could be a keystroke, mouse click, touch screen, or voice instruction. Shneiderman defines "user think time" as the number of seconds the user thinks before entering the following command.

Pro Linthicum (1997) posed the ideal response time of around two seconds. He also speculated, purely by observation, that a user could detect a change of +-8% in the 2-4 second response time category. Shneiderman agrees with Miller's findings that a two-second limit is appropriate for many tasks if the monetary cost is not excessive (1998). However, there is a wide discrepancy between what is relevant and acceptable. According to Shneiderman (1998), response times longer than 15 seconds are disruptive. However, very rapid responses can be unsettling and lead to higher error rates, Linthicum (1997).

In the past 25 years, research in system response time has pointed to a very short (1-2 seconds) response time being satisfying to the user. But how long will a user wait for a system to respond before becoming dissatisfied and frustrated? System response time doesn't draw as much attention in the research spectrum for all the controversy it raises. In a 1994 Computerworld survey, Burden describes ratings for popular system management software (1994). Survey results showed that one of the primary items of importance in a systems management package is performance, a view shared by client/server trade press Sahilu, Wan Ahmad and Nazleeni (2011).

Method

According to Chung, Chen, and Kuo (2015), a research design is a data collection and analysis strategy that generates answers to the research problem. This study will employ a survey design. According to Best and Kahn (2011), survey design is about conditions that prevail, rehearses that win, convictions, perspectives or mentalities that were held, forms that are going on, and impacts that are being felt or developing patterns. The study target population were a cross-section of the ICT department in the school sciences at Egerton University. According to the Egerton University ICT department, there were 100 first-year students, 121 second-year students and 206 and 101 third-year and fourth-year students, respectively, with a suitable sample of 228 identified to represent the study population. Questionnaires were used as the primary tool for data collection.

Results

It is essential to clarify how the mean values were interpreted in this study. Mean values closer to the upper end of the scale (near 5) represent a high level, while those closer to the lower end (near 1) signify a low level. This approach to interpreting the mean is consistently applied throughout the study. Additionally, the standard deviation for each item is reported to assess the degree of variation (agreement or disagreement) in respondents' views on each variable.

Table 1: System response time on mobile learning user satisfaction

	Mean	**Std. Deviation**	**Skewness**		**Kurtosis**	
Variable	**Statistic**	**Statistic**	**Statistic**	**Std. Error**	**Statistic**	**Std. Error**
Response Time	2.21	1.297	.891	.172	-.437	.343
Satisfaction	2.43	1.383	.355	.172	-1.488	.343

Table 1 revealed that most respondents recorded low means towards mean 1, indicating low levels of dissatisfaction. For instance, with a mean of 2.21, this variable also received low ratings, suggesting dissatisfaction with response time. The standard deviation (1.297) shows moderate variability. The positive skewness (.891) suggests most ratings were below the mean, and the kurtosis value (-.437) suggests a somewhat flat distribution, indicating spread-out responses. A further level of satisfaction attracted a mean of 2.43, the highest among the variables but still low, reflecting overall dissatisfaction.

The standard deviation (1.383) points to moderate variability. The positive skewness (.355) suggests a slightly higher concentration of responses below the mean. The negative kurtosis (-1.488) shows a flatter distribution, suggesting a more comprehensive range of responses across the scale.

Regression analysis

Table 2: ANOVA for system response time and satisfaction

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	258.673	1	64.668	85.680	.000[b]
	Residual	145.670	193	.755		
	Total	404.343	197			

Table 2 revealed that the ANOVA results show that the regression model is highly significant, with an F-value of 85.680 and a p-value of .000. This indicates that the independent variables collectively explain a substantial portion of the variance in the dependent variable. The model as a whole is a good fit for the data.

The model summary regression was computed to establish the model estimates and adequacy, and the result is shown in Table 3.

Table 3: Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.800[a]	.640	.632	.869

Table 3 revealed that the regression analysis produces model estimates and model adequacy statistics. The R square provides the model's goodness by showing the variability in the DV accounted for the model predictors. Based on the findings, the model accounts for 64.0 per cent of the variance in satisfaction (R square=.640). When adjusted for the number of predictors, the model accounts for 63.2 per cent of satisfaction (R square=.632, adjusted). The results are significant given that it accounts for more than 60 per cent, yet there are possibly more satisfaction enablers.

Table 2: Coefficient of regression for system response time

	B	Std. Error	t	P
(Constant)	4.084	.579	7.054	.000
System Response Time	.079	.063	1.250	.213

Table 2 observes that the Pearson coefficient for system response time was (B = .079, p = .213). The coefficient for Response Time is positive but not statistically significant (p = .213), indicating that changes in Response Time have a weak and statistically insignificant effect on the dependent variable. Thus, Response Time may not have a meaningful impact on the outcome within this model. Since the t-value (1.250) is relatively low and the p-value (.213) is more significant than 0.05, we **fail to reject the null hypothesis.** This suggests that **Response Time** does not have a statistically significant effect on the dependent variable. The coefficient BBB of 0.079 is not different enough from zero to conclude that Response Time is meaningful in explaining changes in the dependent variable within this model.

Discussion

The study's results could contribute to refining the Technology Acceptance Model (TAM), mainly the perceived ease of use (PEOU) dimension. System response time, as a technical aspect of mobile learning platforms, can directly affect how users perceive the ease of interacting with the system. Slow response times might lead to frustration, negatively impacting satisfaction, while quicker system responses could enhance user experience, thereby increasing acceptance. This study relates to Haxmeier and Dicesare (2000), who, in their investigation of System response time and user satisfaction, found system response time influences user satisfaction. Lengthy system response times may cause lower satisfaction and poor productivity among users. Lowered user satisfaction may lead to learners jetting out to other universities, especially for parallel or self-sponsored students, which are great financing sources. Hence, the study supported the hypothesis that system response time is a significant positive predictor of mobile learning user satisfaction at universities in Nakuru County, in Kenya.

Conclusion

The study findings conclude that system response time is a significant predictor of user satisfaction among the university students under study. The result specifies that improving system response time may improve user satisfaction as well. If the system response time is slow and users wait for several seconds, it can impact their perceived usage experience and satisfaction.

References

Ali, A., Ouda, M. A., & Capretz, L. F. (2014). A study of the interface usability issues of mobile learning applications for smartphones from the user's perspective. *International Journal on Integrating Technology in Education, 3*(4), 1-16.

Best, J. W., & Kahn, J. V. (2011). *Research in education* (10th ed.). PHI Learning Private Limited.

Chung, H.-H., Chen, S.-C., & Kuo, M.-H. (2015). A study of EFL college students' acceptance of mobile learning. *Procedia - Social and Behavioral Sciences*, *176*, 333-339. https://doi.org/10.1016/j.sbspro.2015.01.478.

Dongsong, Z., & Boonlit, A. (2005). Challenges, methodologies, and issues in the usability testing of mobile applications. *International Journal of Human-Computer Interaction*, *18*(3), 269–292. https://doi.org/10.1207/s15327590ijhc1803_3

Geist, R. A., & Nowaczyk, R. (1987). Towards a model of user perception of computer system response time: User-system interaction. *Proceedings of the ACM CHI+GI'87 Conference on Human Factors in Computing Systems and Graphics Interface*, 249-253.

Gupta, A., Ahlawat, K., & Sagar, K. (2014). A critical analysis of a hierarchy-based usability model. *Proceedings of the 2014 International Conference on Contemporary Computing and Informatics (IC3I)*, 255–260. https://doi.org/10.1109/IC3I.2014.7019585

Harrison, R., Flood, D., & Duce, D. (2013). Usability of mobile applications: Literature review and rationale for a new usability model. *Journal of Interaction Science*, 1(1), 1. https://doi.org/10.1186/2194-0827-1-1.

Hoxmeier, J, & Dicesare C. (2000). *Manager, System Response Time and User Satisfaction: An Experimental Study of Browser-based Applications*. Proceedings of the Association of Information Systems Americas Conference.

Miller, J. (1968). Response time in man-computer conversational transactions. *Proceedings of the Spring Joint Computer Conference*, Montvale, NJ, AFIPS Press, 267-277.

Linthicum, D. (1997). *Performance anxiety*. DBMS Online. http://www.intelligententerprise.com/

Parsazadeh, N., Ali, R., Rezaei, M., & Tehrani, S. Z. (2018). The construction and validation of a usability evaluation survey for mobile learning environments. *Studies in Educational Evaluation, 58*, 97–111.

Sahilu, F., Wan Ahmad, & Nazleeni, S. H. (2011). Development and usability evaluation of platform independent mobile learning tool. *International Journal of Computer and Information Engineering, 5*(8), 956–967.

Sarrab, M., Elbasir, M., & Alnaeli, S. (2016). Towards a quality model of technical aspects for mobile learning services: An empirical investigation. *Computers in Human Behavior, 55*, 100–112. https://doi.org/10.1016/j.chb.2015.08.041

Shneiderman, B. (1991). Human values and the future of technology: A declaration of responsibility. *ACM SIGCHI Bulletin, 23*(1), 6-10.

UNESCO. (2012). *Workshop report: International workshop on mobile learning for expanding educational opportunities,* 16-20 May 2005, Tokyo, Japan.

Yu, M., Zhou, R., Cai, Z., Tan, C.W., & Wang, H. (2020). Unraveling the relationship between response time and user experience in mobile applications. *Internet Research, 30*(5), 1353-1382. https://doi.org/10.1108/INTR-05-2019-0223