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Perceived Captology Strategies in Mobile Applications: Do they Differ?

N.A. Abdullah, N.A. Abdul Hamid, C.C. Siew, A. Shamsuddin and E. Wahab
Faculty of Technology Management, Universiti Tun Hussein Onn Malaysia,
86400 Parit Raja, Batu Pahat, Johor, Malaysia

Abstract: Studies on various captology applications have indicated the importance of its integration to ensure mobile application's success. However, statistics have shown that 53% of mobile applications users had problems with mobile applications and discontinue their use. This raises a question whether incorporating captology strategies has varying effectiveness. Moreover, the studies on captology strategies of mobile application have not been sufficiently researched on as majority of existing studies have been focusing on single application only. Therefore, this study aimed to examine whether there are significant differences of captology principles (reduction, tunneling, tailoring, suggestion, self-monitoring, surveillance and conditioning) between two popular mobile applications which are WhatsApp and Telegram. Using a cross sectional online survey, 364 users of both applications had participated. Descriptive finding indicates that WhatsApp had higher mean values for all captology principles compared to Telegram. T-test result shows significant differences of reduction, tunneling, tailoring, suggestion, self-monitoring, surveillance and conditioning between WhatsApp and Telegram. The higher means obtained by WhatsApp indicated that users of WhatsApp perceive captology principles as being incorporated more effectively in WhatApp compared to Telegram. This implies that any incorporation of captology principles requires in-depth understanding about the dynamic of each principles and how it could improve mobile application's users acceptance, attitudes and behavior.

Key words: Captology, mobile applications, persuasive technology, application's users, attitudes and behavior, Malaysia

INTRODUCTION

Captology or sometimes interchangeably termed as persuasive technologies, focuses on design, research and analysis of interactive computing products such as computers, mobile phones, websites, wireless technologies, mobile applications and video games (Fogg, 2003) in shaping user's attitude and behavior. Central to this concept is how computing products interact with users while simultaneously motivate, persuade and eventually change their behavior. This relatively new area of study describes the area where technology and persuasion (increasing awareness, influence, motivation, change behavior and so forth) overlap (Othman and Yahaya, 2013).

Captology has been applied in various fields such as health, safety, environment, personal relationships, consumerism, education, community involvement and any areas of human-human or human-computer interaction (Yeo *et al*., 2009). It is claimed to help users to achieve their goals better (Kukkonen and Harjumaa, 2008) such as motivate teams to increase efficiency at work or to encourage kids to achieve better study habits at homes (Rosmani and Wahab, 2011). As its importance being widely acknowledged, empirical studies has also proliferated.

However, studies on the application of captology in mobile applications have been very limited despite it being omnipresence (ITUGMS., 2014). Not only the empirical evidence on its effectiveness to improve application's success and performance has been scarce, majority of them had been focusing on single application only.

According to Dimensional Research (2015) despite more than 2000 applications being released every day, not all of them have strong practical value and are well designed. The 53% of users experienced "Severe" application issues. Consequently, users might delete or uninstall the mobile applications or give them bad reviews. Of those surveyed 55% hold the application responsible for performance issues and 37% users blamed the mobile application and stated that mobile application

Corresponding Author: N.A. Abdullah, Faculty of Technology Management, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Batu Pahat, Johor, Malaysia

errors make them prefer not to apply the company's product. The mobile applications performance failures are significant issues to developers and marketers. Therefore, it is important to examine whether incorporation of captology strategies could improve mobile application performance as perceived by the users.

In order to investigate the extant of captology strategies being incorporated in mobile applications, this study focuses on two most popular mobile applications called WhatsApp and Telegram. As of January 2015, WhatsApp was reported to have 700 million monthly active users while Telegram which has similar functions, only had 35 million monthly active users (The Telegram Team, 2014). The stark difference between users of these two similar function applications raised a question of whether both applications incorporate the captology strategies and how they affect the user's perception. Thus, this research compared the seven captology strategies which are reduction, tunneling, tailoring, suggestion, self-monitoring, surveillance and conditioning in both Telegram and WhatsApp.

Captology: The term captology was derived from an acronym: "Computers as Persuasive Technologies" = CAPT by Fogg (2003) a professor at Stanford University. Persuasion in captology is defined as "A drive to improve attitudes or behaviors or both (without using coercion or deception)" (Fogg, 2003). This implies that captology focuses on the planned persuasive effects of computer technologies, not on side effects (Fogg, 2003). In short, captology focuses on attitude or behavior change resulting from human-computer interaction. Yeo *et al.* (2009) claimed that persuasive technology benefits from the applications of rich graphics, textual information, audio/video and interactivity to provide smooth and impressive experience to users. Othman and Yahaya (2013) concluded that persuasive technology connects computers and persuasion as a functional tool.

Functional triad for captology illustrated three basic roles computing products-as tools as media and as social actors (Fogg, 2003). Firstly, the computer as a tool to persuade people by making target behavior easier to do an example is a pocket calculator. Secondly, the computers function as a medium, allowing people to explore the cause and effect relationships, for example, simulations and games. Thirdly, the computer as a social actor can persuade people to change their attitudes or behaviors by rewarding them with positive feedback, an example is a digital pet. In this study, mobile applications were identified as a persuasive tool where it is designed to change attitudes and behaviors of users to lead people through a process and to motivate people in specific ways.

Captology strategies: There are seven types of persuasive technology strategies which include reduction, tunneling, tailoring, suggestion, self-monitoring, surveillance and conditioning (Fogg, 2003).

Reduction: Principle of reduction used computer technology to simplify the complicated behavior and affect user's behavior in order for them to implement the behavior (Fogg, 2003). In the process of reducing a complex behavior or activity, reduction technologies make an individual believes that he or she is able to accomplish a specific behavior. According to, a review research on full papers published at the first three International Conference on Persuasive Technology, reduction has been the most studied principle for persuasion (Torning and Oinas-Kukkonen, 2009). Many persuasive application studies used principle of reduction in primary task support. For instance, an interactive persuasive learning system for elder used principle of reduction (ease of use) in promoting older people on learning to apply computer based learning tools (Zulkifli *et al.*, 2013). Besides, a mobile application for healthier eating habits applied persuasive reduction principle by listing out suitable food options at fast food restaurants to help the consumers in monitoring their caloric balance. Moreover, the Fit4Life system used persuasive reduction principle in trailing the capability of all appropriate groups to simplify the sophisticated job of weight management on behalf to reach the user's weight target (Purpura *et al.*, 2011).

Tunneling: Principle of tunnelling used computer technology in leading users via. a process or experience, step by step (Fogg, 2003). Tunnelling technologies make user's behaviour easier to go through a sequence of actions by monitoring what the user experiences. Tunnelling technologies are effective as user's value consistency. Once users adapt to the nature of the activities, most of them would continue perform it.

Tunneling was shown among the ten most used persuasive principles in applications from 2006-2010, according to Wiafe and Nakata (2012) and Kraft *et al.* (2007). The Fit4Life system applied persuasive tunnelling principle in persuading users to get suitable Fit4Life decisions about diet and exercise which related information is shown instantly to the particular users (Purpura *et al.*, 2011). In the digital therapy, Kraft *et al.*

(2007) tunneling create a simple process for the customer by presenting a constant level of self-determination in the information for the client in an advance arrangement when the program begin. Thus, the principle of tunneling assures that the customers got the most relevant information, assistance and treatment at the right time.

Tailoring: Principle of tailoring refers to the ability of computer technology to give related information to people for improving their behaviors and attitudes (Fogg, 2003). For computer users who refuse to trudge through a number of generic information to search information related to them, tailoring technologies simplify their lives. According to, a persuasive technologies research in education (Lucero *et al*., 2006) principle of tailoring was used in encouraging children to make their reading and writing skills better because it is expected that kids would focus more when they know that the contents are tailored for them. Besides, principle of tailoring was applied to shape the exercise behavior of beginning athletes in which virtual coach provides feedback to the user based on heartbeat and performance (Eyck *et al*., 2006). Segerstahl and Oinas-Kukkonen (2007) stated that persuasion principle of tailoring could be applied in personalizing fitness programme for clients based on their present fitness level and his/her personal targets by proposing the user a personalized training programme.

Suggestion: Principle of suggestion used computer technology to suggest a behavior at the most appropriate time. Suggestion technologies always go on the motivation people being have such as to have financial stability to maintain body in good condition to live happily and so on. The suggested action must be coercing and users have enough time to perform it in order for the technology to be outstanding (Fogg, 2003). Lee *et al*. (2006) used persuasive suggestion principle by suggesting that feed children fruits rather than sweets at informal meal session. Besides, the Fit4Life system always used persuasive suggestion principle through the Fit4Life earpiece in instantly presenting persuasive suggestion including information for users about the number of calories they are about to take in and advices about their diet determinations (Purpura *et al*., 2011).

Self-monitoring: Principle of self-monitoring let the individuals to control themselves in modifying their behaviors and attitudes to reach a proposed objective. Self-monitoring technologies allow the users to easy understand on how good they are in accomplishing the aim behavior, developing the possibility that they will remain with the behavior (Fogg, 2003). In a persuasiveness mobile lifestyle coaching application (Gasser *et al*., 2006) principle of self-monitoring was used in providing the players to track record their food and physical activity practices in an easy points system way. Apart from that, Rosmani and Wahab (2011) developed principle of self-monitoring in persuading children to learn Arabic characters where children can engage themselves in the learning process.

Surveillance: Principle of surveillance refers to computer technology that allows one party to learn the bahavior of another in a particular method (Fogg, 2003). According to Jespersen *et al*. (2007) principle of surveillance was used in educational systems to train staff and to observe the improvement level of them. In security system, persuasive surveillance principle was applied in protecting staff office of which a small card with a chip and pin-code was used for the management to track the location of every staff.

Conditioning: Principle of conditioning refers to computer technology that applies principles of behaviorism to improve user's behavior or attitude. In other words, principle of behaviorism is a method that involves positive reinforcements or rewards to figure complicated behaviors. According to Bang *et al*. (2006) persuasive conditioning principle is mostly applied in computer games such as positive sound, visual reinforcements, accumulated points, level progressions, high score lists and game comparisons. Besides an interactive persuasive learning system for elder used principle of conditioning in designing and establishing interactive media systems that promote and operate learning process among older people (Zulkifli *et al*., 2013).

Studies on captology applications: Dolhalit conducted a systematic review based on Springer, IEEE Explore and ACM Digital Library databases on captology studies and found that majority of these studies was in health, followed by environmental, security and safety and lastly on community/social field. Majority of studies on captology in Malaysia have focusing on issues such as child sexual abuse awareness, health-promoting, smoke shooter, persuasive multimedia stress awareness and so on. Table 1 showed the summaries of these issues based on the persuasive strategies used by researchers.

It is evident that most studies have been focusing on incorporating the captology strategies in newly developed applications or systems rather than comparing their effectiveness.

Table 1: Summary of captology studies in Malaysia

Researchers	Application	Principles used
Othman and Yahaya (2013)	Child sexual abuse awareness	Cause and effects Simulation Similarity Virtual rehearsal
Hafiz *et al.*	Smoke shooter	Praise Cause and effects Attractiveness Mobile simplicity Information quality
Yahaya *et al.* (2012)	Persuasive multimedia stress awareness	Cause and effects Similarity Social learning
Rosmani and Wahab (2011)	i-IQRA	Similarity Information quality Contiguity Self-monitoring Praise
Yusoff *et al.* (2011)	Virtual Hajj (V-Hajj)	Cause and effects Virtual rehearsal Simulation
Yahaya and Zain (2014)	Abuse disabled parking	Virtual rehearsal Similarity Praise Social learning
Zaini and Ahmad (2011)	Mathematic learning "Li2D"	Simulation Attractiveness Praise
Zulkifli *et al.* (2013)	Persuasive learning for elder	Attractiveness Conditioning Cause and effects Simulation Ease-of-use
Zulkifli *et al.* (2012)	Islamic Sex Education (ISE) courseware	Enlightenment Threat Binding Cause and effects

MATERIALS AND METHODS

This is a quantitative study using a cross sectional online survey as data collection method. This research used purposive sampling, since, respondents participated must be the users of both WhatsApp and Telegram. In determining the sample size (Krejcie and Morgan, 1970) table was used. Since, the population size of mobile applications users in the area of Kuala Lumpur, Malaysia was 1,711.8 (28) the number of sample size was set at 384. However, only 364 set of questionnaires were returned at a percentage of return of 94.8%. The 23 responses were considered invalid yielding a final total of 341. The questionnaire consists of 21 self-developed items which are conceptualized and operationalized from the seven Fogg's captology strategies. The scales for each items ranged from 1 (strong agree) to 5 (strongly disagree).

Two main functions of WhatApp and Telegram were chosen which were voice calls and text messages, since, these are the most commonly used features of mobile applications. Reliability items of each strategy ranged from 0.821-0.899 which are deemed acceptable (Nunnally *et al.*, 1967).

Table 2: Respondent's profiles

Demographic information	f-values	Percentage
Gender		
Male	133	39.0
Female	208	61.0
Age (years)		
18-30	288	84.5
31-42	40	11.7
43-54	13	3.8
Ethnic category		
Malay	77	22.6
Chinese	218	63.9
Indian	37	10.9
Others	9	2.6
Highest level of education		
Primary school	1	0.3
Secondary school	33	9.7
Diploma	52	15.2
Bachelor's degree	232	68.0
Master's degree	18	5.3
Certificate	5	1.5
Current occupation		
Employed	123	36.1
Seld-employed	44	12.9
Students	154	45.2
Others	20	5.9
Average income per year		
<RM 15,000	192	56.3
RM 15,000-RM 25,000	36	10.6
RM 25,000-RM 35,000	47	13.8
RM 35,000-RM 45,000	29	8.5
RM 45,000 and above	37	10.9
Types of smartphone		
iPhone/iPad	112	32.8
Windows phone	20	5.9
Android phone	187	54.8
Blackberry	20	5.9
Others	2	0.6
User's duration of using smartphone (years)		
<1	40	11.7
1-3	148	43.4
3-5	118	34.6
≥5	35	10.3

RESULTS AND DISCUSSION

Descriptive analyses showed that 61.0% of respondents were female and 39.0% of respondents were male. Majority of respondents were from the age group of 18-30 years old (84.5%) followed by 31-42 years old (11.7%) and small fraction were from 43-54 years old (3.8%). Chinese respondents made up the majority of the responses (63.9%) followed by Malay (22.6%) Indian (10.9%) and other races (2.6%). There were 187 respondents or 54.8% using android operating platform, 32.8% iPhone/iPad users, 5.9% windows phone and blackberry users and 0.6% was other types of smartphone users. Details of respondents are shown in Table 2.

In terms of mean values in WhatsApp, reduction has the highest mean (M = 4.425) followed by tailoring (M = 4.292) conditioning (M = 4.250) self-monitoring (M = 3.987) surveillance (M = 3.897) tunnelling (M = 3.754) and suggestion (M = 3.533). Mean values for all

Table 3: T-test results

	WhatsApp		Telegram				
Captology/Strategies	M	SD	M	SD	t-test	df	p-values
Reduction	4.425	0.472	3.753	0.906	17.181	1026.121	0.001
Tunnelling	3.754	0.748	3.329	0.775	10.307	1360.225	0.001
Tailoring	4.292	0.549	3.726	0.901	13.997	1126.211	0.001
Suggestion	3.533	0.816	3.112	0.733	10.027	1346.661	0.001
Self-monitoring	3.987	0.785	3.495	0.928	10.574	1325.803	0.001
Surveillance	3.897	0.769	3.410	0.879	10.874	1338.462	0.001
Conditioning	4.250	0.702	3.667	1.001	12.455	1220.968	0.010

captology strategies in Telegram were lower ranging from the highest mean of 3.753 for reduction to M = 3.112 for suggestion. Respondent's overall answers were closer to "Strongly agree" as the Likert scale was measured from 5 being "Strongly agree" and 1 being "Strongly disagree".

T-test results as shown in Table 3 indicate that there were significant differences in the persuasive technology principles between WhatsApp and Telegram at $p<0.05$ significance. The higher mean obtained by WhatsApp indicated that WhatsApp incorporate captology principles more effectively than the Telegram.

The impact of the research would eventually help in motivating or persuading mobile users when they connecting with a computing system, device or application. The attitudes or behavior of mobile phone users could be changed to some extent as effective as human being by persuasive technology (Othman and Yahaya, 2013). Mobile users could improve their motivation and achieved their goals through the utilization of computer technology.

Besides, this study is useful for mobile application developers in developing appropriate and effective principles for improving the attitudes and behavior of mobile users to ensure higher acceptance of mobile users. Eventually, people were going to use the applications and would continue using it.

RECOMMENDATIONS

In addition, this research could serve as a guideline for future research or reference purposes. Future researchers are essential to ensure the continuity of ongoing research on captology. It is also, important to ensure that this study does not end here. Hopefully, this research could assist the future researchers by making it more transparent and specific as well as having a better approach. In addition, future researchers could make this thesis as a source of reference and learning resource for their undergraduate projects. The findings in this study may serve as a literature base for the future researchers on identifying and comparing the persuasive technology principles in WhatsApp and Telegram based on user's perception.

CONCLUSION

This study implies that both WhatApps and Telegram incorporate captology principles at varying degrees. The more effective the captology principles being incorporated, the more effective is the functions as perceived by the users which is consistent with previous studies. Thus, this study supports the application of captology applications in the context of mobile applications. However, deeper analysis is required since this research was conducted cross-sectionally rather than longitudinally. Thus, generalization should be done with caution.

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