Software and User Based Factors Influencing Social Software Learnability

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Abstract: *Social Computing aims to support the tendency of humans to interact with mobile devices; Technology reinforces the bias toward social interaction by producing appropriate responses, it has improved the communication between humans and computational systems. Emerging trends in mobile phone technologies have opened the way for a new generation of mobile social applications that allow users to interact and share information across the globe using the shortest time possible. However, current programming platforms for mobile phones provide limited support for information management and sharing, requiring developers to deal with low-level issues of data persistence and learnability of the programs used in the social softwares, This paper evaluates the user based and software based factors affecting social software learnability. A sample of 361 respondents was selected, with 345 respondents returning feedback. The data was collected through the use of interview and questionnaires targeting mobile social users in eleven constituencies Nakuru County Kenya. The researched randomly sampled WhatsApp, Facebook, and Twitter as softwares used in this study. Descriptive statistics were used to analyse the data. This finding indicated that user- based factors affect the learnability of software, 51.6 % indicated lack of advanced IT Skills, further 56.2% of the respondents indicated some devices have small display area which hinders learnability. On software -based factors is a function of the turnover rate of software characteristics, 35.9% agreed on portability in different operating environments as a factor that will hinder learnability futher 17.1% disagreed lack of security and privacy as a factor that will hinder learnability.*

Keywords: Learnability, Social software, Technologies

1. Introduction

Social software has emerged as a driving force of Web 2.0. The term Web 2.0 was coined to describe a sea change in web services and technologies it should be noted that Web 2.0 is not a single development but rather a heterogeneous mix of new and emergent technologies. Overall, there is an increasing presence of social software applications that allow users to communicate, collaborate, and share their personal interests [1] Most data is explicitly provided by users use photos, videos, podcasts, comments, ratings, diary entries or tags, metadata which can be attached to any kind of information [2].

Social software tools associated with social software transform our capacity for civic activism. Firstly, these tools allow people to participate by creating, publishing and distributing content, such as video, pictures, music and texts through the Internet. Secondly, social software allows people with similar interests to find one another and connect through social networking sites, such as MySpace and Facebook [3].People can also use search tools and systems for collaborative tagging of information and ideas. Thirdly, people can coordinate their activities and collaborate through raising petitions and funds, and planning and conducting mobile campaigns and communities programs. Fourthly, through large-scale collaborations, people can create reliable, robust, and complex products such as open source software applications such as Linux. According to [4]The rubric of social software is contribute, connect, collaborate and create, Three characteristics commonly attributed to social software include support for conversational interaction between individuals or groups ranging from real-time instant messaging to asynchronous collaborative teamwork spaces [5] This category also includes collaborative commenting on and within blog spaces, support for social feedback that allows a group to rate the contributions of others [6] Perhaps implicitly leading to the creation of digital reputation support for social networks to explicitly create and manage a digital expression of people's personal relationships and to help them build new relationships[7].

Learnability characterizes how easy is it for users to accomplish basic tasks the first time they encounter the software application. In an increasingly technological world, software, especially mobile social applications they are becoming more varied and complex. New features are being added quite rapidly to new mobile social applications, which users are expected to use immediately [8] Learnability is a characteristic where performance improves with experience as tasks repeated, elements of the task are better remembered, prompts are more clearly distinguished, skills are sharpened and transitions between successive tasks are smoothed on the other hand the aggregation of these effects results in faster performance times, fewer errors, less effort, and more satisfied users [9].

The software learnability determines whether the software is good enough to satisfy all user needs and requirements the overall acceptability of social software is defined as a combination of its practical and social acceptability the practical acceptability is again broken down into various categories, including usefulness, reliability, and compatibility with existing systems [10].

The objective of the paper is to analyze the user-based and software-factors that have hindered the learnability of social software as learnability factors affecting mobile social software.The purpose of the study is to provide insights to assist software designers, software developers and open source owners to improve their software products in a way that best supports easy learnability of the users.

2. Literature Review

This section provides a detailed analysis of related works on learnability.

2.1 Mobile Social Software Learnability

Learnability has been defined by various authors from different angles. According to [11] defines learnability as a novice user's first experience of learning, and urges that a learnable system could be categorized as allowing users to reach a reasonable level of usage proficiency within a short time. Learnability has also been defined as the time it takes users to learn how to use the commands relevant to a set of tasks or the effort required for a typical user to be able to perform a set of tasks using an interactive system with a predefined level of proficiency[12,13]. The above definitions only consider the initial learning experiences.

Learnability has also been defined as the ease with which users can enter a new system and reach a maximal level of performance [14].Learnability comprises specific measurable attributes and a system's learnability can be effectively evaluated by measuring these attributes in a real life context [15]. Learnability is also concerned with interactive system features that assist novice users in learning quickly and also allow steady progression to expertise [16, 17].The following subsections present existing learnability factors found in the recent literature.

2.1.1 Understandability

Understandability is provided by the capability of each system component to enable the user to understand what the purpose of the component is, and how can it be used for particular tasks and conditions of use. Users should be able to select a component suitable for their intention and feel intuitively how comfortable to operate them [18] All designs and user documentation must be clearly written so that it is easily understood by end user of the software product. Understandability depend upon the following elements, these are documentation level, size and complexity. When module is well documented then understandability of the a module is high, a module having more comment line so new developer understand module code easily, since what cause function do describe in the starting of the purpose. Understandability is also dependent on the size of the module or program. If the size of the module is high and then itself difficult to understand. If the Complexity of the module is high then the module is difficult to understand [19].

2.1.2 Functionality

Functionality is the ability of the system to do the work for which it was intended. Functionality is independent of any particular structure, functionality is achieved by assigning responsibilities to architectural elements, resulting in one of the most basic of architectural structures[20].Although responsibilities can be allocated arbitrarily to any modules, software architecture constrains this allocation when other quality attributes are important. For example, systems are frequently divided so that several people can cooperatively build them. The architect's interest in functionality is in how it interacts with and constrains other qualities [21].

2.1.3 Adaptability

Software adaptability has been defined as the capability of the software product to be adapted for different specified environments without applying actions or means other than those provided for this purpose for the software considered. The adaptability of a program is the degree to which it can be transformed into another program that performs a similar, but slightly different, function [22]. Most essential aspects of the software systems adaptation include ability to observe their runtime behavior and interpret those observations in terms that permit a high-level understanding of their status ,The capability to adapt in order to accommodate variable resources, system errors, and stakeholders' changing requirements[23].

The capability to adapt their functionality, even at runtime, to behavioral and structural changes that occur either internally or externally in their operating environment and without any external human intervention, and the ability to allow components to change their pattern depending upon the environmental changes and goals of the software system, without changing the actual components themselves[24]

2.2 Technological Factors

Mobile applications also referred to software systems operating on mobile devices, are evolving rapidly, making ubiquitous information access at anytime and anywhere. Despite that the mobile devices pose a number of significant challenges for examining learnability of mobile applications [25].

2.2.1 Mobile Context

Mobile context has been defined as any information that characterizes a situation related to the interaction between users, applications, and the surrounding environment, It typically includes the location, identities of nearby people, objects, as well as environmental elements that may distract users' attention[26].Older adults generally have less experience with today's mobile technology than younger adults, which means they need more time to learn [27] In addition the older adults are generally more experienced with user interfaces of older technologies such as electro-mechanical user interfaces in which most if not all the system's functionality is accessible simultaneously through mechanical controls like push buttons, switches, and dials [28].

In contrast current mobile device user interfaces and those of other interactive computing technologies only show a subset of functions at once and often incorporate a navigational hierarchy to access specific task functions [29].

2.2.2 Different Display Resolutions

Display resolution can be defined as the number of pixels contained on a display monitor, expressed in terms of the number of pixels on the horizontal axis and the number on the vertical axis [30].The sharpness of the image on a display depends on the resolution and the size of the monitor, the same pixel resolution will be sharper on a smaller monitor and gradually lose sharpness on larger monitors because the same number of pixels are being spread out over a larger number of inches [31]The display capability of mobile devices supports much less display resolution (normally 640*480 pixels or below) in comparison with desktops [32]. Low resolution can degrade the quality of multimedia information displayed on the screen of a mobile device[33].

Different levels of display resolution on different mobile devices may cause different learnability and acceptance by the different users, If the user is comparing two screens of the same size but with different resolutions, the screen with the higher resolution will be able to show you more of what you're working on, so you don't have to scroll so much [34]. Because that screen has more pixels, the image will be sharper. However, the higher resolution also means that elements on the screen such as icons and text will look clear and presentable [35].

2.2.3 Data Entry Methods

Providing input to small devices is difficult and requires a certain level of proficiency while small buttons and labels limit users' effectiveness and efficiency in entering data which may reduce the input speed and increase errors [36] Results of a learnability and acceptance can be affected by the use of different data entry methods [37.The above problems caused by physical restrictions of mobile devices and imply that while designing and conducting learnability studies for MSS, these issues must be carefully examined [38] Multimedia mobile applications are emerging they combine voice and touch as input with relevant spoken output users are able to hear synthesized and prerecorded streaming or live instructions such as sounds or music on their mobile devices and view on screen the visual displays in order to enhance the mobile user experience[39]

2.2.4 Connectivity

Connectivity has been described as connecting devices to each other in order to transfer data back and forth. It often refers to network connections, which embraces bridges, routers, switches and gateways as well as backbone networks,The slow and unreliable wireless network connection with low bandwidth is a common hindrance for mobile applications [40]. This problem largely affects data downloading time and quality of streaming media like video and audio streams strength of signals and data transfer speed in a wireless network may vary at different time and locations, compounded by user mobility [41]. Therefore how to deal with various network conditions must be taken into consideration in a acceptability of the mobile social network.

2.2.5 Error Reporting and Recoverability

Recoverability has been defined as the ability to restore your deployment to the point at which a failure occurred, the

ability to recover quickly from a system failure or disaster depends not only on having current backups of your data, but also on having a predefined plan for recovering that data on new hardware[42].The user should be able to understand which user actions have led to the current state, and what the system did to get there, the user needs to find out if they there are somehow invisible states that lead to the current state. Unless the user can learn to remember any possible path leading up to an identifiable state and publishing of possible paths to recover the process [43].

3. Methodology

The paper adapted mixed research design. The primary data used was collected from a survey carried at Nakuru county, targeting mobile social software users. Survey was used as it allows you to measure the significance of the mobile social software on the overall population, the target population was 6,000 and the sample size 361 of respondents was selected. Interviews were used to validate the data that was collected by the questionnaires since domain experts were interviewed the sample size of 20 respondents was selected. The study achieved 95.3% response of the target. This response rate was considered appropriate for analysis and reporting as supported by [44] indicating that a response rate of 70% and above is excellent, the results are tabulated in the next section.

4. Results

4.1 User Based Factors

The results of the analyzed data demonstrated that majority (66.1%) of the respondents agreed that available information was not authentic. Similarly, respondents also affirmed that there was lack of time for exploring the social software's in detailed manner (75%) which may affect its learnability. Similarly, 61.5% accounted that they lack advanced Information technology skills. This situation may also affect its learnability. It is worth noting that 70.4% of the respondents affirmed that some devices have small display area. When the display size is small people may tend not to have enthusiasm in using given software thus affecting its learnability. 64.7% respondents affirmed that buying bundles is expensive, if the internet is not free, this also may affect learnability since respondents may spend limited time interacting with the software .Furthermore 50.1% accounted that social software's are difficult to understand and use. It was observed that 53.6% agreed that portable devices are expensive. However close to 29.3% were neutral concerning the feature that using the devices for long hours poses a health risk while 44.4% disagreed that devices battery lasts for a limited period. This may not affect learnability of social software under investigation. This finding implies that learnability of software is dependent majorly on the users characteristics such as their socio-economic status and level of academic qualifications. It means that a user with eager to use mobile social software will learn to operate as opposed to one who is non-committal due to digital divide. Table 1 shows descriptive statistics for user based factors.

Table 1: User Based Factors

Social Software Features	Strongly Disagree Percent (%)	Disagree Percent (%)	Neither Agree/ Disagree Percent (%)	Agree Percent (%)	Strongly Agree Percent (%)	Total Percent (%)
Social software is difficult to utilize		27.3	22.6	47.8	2.3	100
Available information is not authentic	3.8	18.0	12.2	58.6	7.5	100
Lack of advanced IT Skills	2.3	18.8	17.4	51.6	9.9	100
Bundles are expensive		9.9	25.5	55.7	9.0	100
Lack of time to explore new features	2.6	3.8	18.6	53.3	21.7	100
Poor network coverage	2.3	12.5	10.1	53.6	21.4	100
Portable Devices are not affordable		20.9	25.5	37.1	16.5	100
Prolonged use of devices for long hours poses a health risk	6.1	19.7	29.3	37.4	7.5	100
Some devices have small display area.		12.5	17.1	56.2	14.2	100
Devices battery lasts for a limited period.	8.7	35.7	15.9	24.6	15.1	100

4.2 Software- Based Factors

An analysis was carried out showing how software based factors affect Learnability. The results of the analyzed data revealed that a majority of the respondents affirmed that software based factors affecting learnability include complexity in coping with the rapid growth of such social media platforms (66.7%).Respondents overwhelmingly affirmed that the software is not efficient in terms of memory usage and execution time and that the software is not robust to handle invalid inputs (76.5%).

Security of people in digital platforms cannot be overemphasized. Respondents agreed that lack of security and privacy is evident. This is compounded by the fact that the software is poor fault tolerance (72.7%).Moreover, respondents avowed that accessing information is very complicated (51%) and that the software has insufficient documentation to guide a new user (40.9%).it was observed that respondents also agreed that the software is not portable in different operating environments(52.1%).However, 45.5% disagreed that the software requires regular updates thereby implying that Learnability of a given software may be affected negatively. This finding implies that learnability of software is a function of the turnover rate of software characteristics. It demonstrates that when a software undergoes periodic change due to its upgrade may affect learnability. The findings of the analyzed data are shown in Table 2.

Table 2: Software Based Factors

Software feature	Strongly Disagree percent (%)	Disagree Percent (%)	Neither Agree/ Disagree Percent (%)	Agree Percent (%)	Strongly Agree Percent (%)	Total Percent (%)
Accessing information is complicated		28.4	20.6	47.8	3.2	100
Difficult to cope several Social media platforms.	3.2	16.5	13.9	59.7	6.7	100
Lack of security and privacy	2.0	17.1	16.8	51.6	12.5	100
The software is not efficient	2.0	3.5	18.0	56.8	19.7	100
The software is not robust in error handling.	2.6	12.2	8.7	55.9	20.6	100
Portability in different operating environments	3.8	17.1	27.0	35.9	16.2	100
Lack of sufficient documentation	6.4	18.3	34.5	33.9	7.0	100
The software is poor fault handling		11.9	15.4	59.7	13.0	100
The software requires regular updates.	8.7	36.8	16.8	22.0	15.7	100

5. Conclusion and Recommendation

This study endeavored to investigate user and software based factors affecting mobile social software learnability this was done to address learnability challenges when adapting or using a new software. The results of the analyzed data revealed that a majority of the respondents affirmed that the major software based factors affecting learnability include complexity in coping with the rapid growth of such social media platforms while user based factors indicated that the user with eager to use mobile social software would learn to operate as opposed to one who is non-committal due to digital divide.

This study recommends the software developers and social software owners to develop software's that are learnable as possible so that learners with minimum technological experience they can easy utilize the social software applications also they should offer training and sufficient documentation for their products so as to enable them trouble shoot minor errors that may occur during the execution of their various tasks.

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