ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 3 | March 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 5.614||ISI Value

CHARACTERIZATION OF USER INTERFACE PREFERENCES OF PAPUA NEW GUINEA; A CASE STUDY AT ENGA PROVINCE

Bienvenido B. Abad, Jr.
School of Information Technology,
IBS University,
Port Moresby,
Papua New Guinea

ABSTRACT

Papua New Guinea is a developing country employing ICT for development to fight problems such as low literacy, poverty and many others. However, the country is not exempted from HCI problems as other developing countries experience. ICTs that prevailing to developed countries are not familiar to the people of the country. Thus, the development of a particular ICT product is necessary to agree to the country's context. The research is a study of projects submitted by the students from the country mainly from highlands region which do not have comprehensive experience in software use and development. The review was an examination of the user interface design of the students' projects according to the Jakob and Molich's Ten User Interface Guidelines and the cultural settings in PNG. In the examined projects, many user interface elements adhered to the Jakob and Molich's Ten User Interface Guidelines and also many were missed. The shortcomings could be attributed to the case of students in the country and to being novice developers. Moreover, the developers could have done better if given a more favorable environmental setting. This further showed that students could adopt well to the user interfaces currently offered by contemporary software. The user interfaces were colorful and often mistakenly used of local language were apparent. These manifest of the country's language and culture.

KEYWORDS: ***HCI4D, PNG, User Interface, User Interface Design, HCI***

INTRODUCTION

The design, evaluation, and actual implementation of interactive computing systems to facilitate human use and with a study of significant phenomena surrounding them are dealt with by human-computer interaction discipline.

The human-centered design approach of development and use of ICT is crucial in increasing the local and global market and in the socially-responsible development of individual information in societies (Smith, et. al., 2007). Moreover, the understanding of HCI and ICT is paramount important. Consideration of localized contexts could result in fresh and appropriate ICTs. Hence, improve lives, livelihoods, and freedom (Ho, M. et al., 2009).

Many nations in the 3rd world adopt information technology as a way to lift the industrial and economic development. However, the preliminary focus generally on the technical aspects of software engineering and electronics and often HCI is neglected (Smith & Dunckley, n.d; World Bank, 1998)

Literatures invested a significant amount of work in developing countries, which is motivated by low literacy levels. Identified critical challenges of HCI in developing countries such as inadequate electricity, little exposure to computing technologies, low literacy or linguistic knowledge restricted to local languages, and differences in sociocultural practices responsible for variations in mental models between Western and non-Western users. Papua New Guinea, as one of the developing nations, is also plagued with such a situation.

This research was an examination of suitable software projects of students submitted as their capstone project. Particularly, this research exclusively examined the user interfaces of the software projects against the Jakob and Molich's Ten User Interface Guidelines and at the same time look for the clues where of HCI4D fit it. This research specifically seeks the answers to questions; how are the user interfaces developed in terms Jakob and Molich's Ten User Interface Guidelines and what are distinctive features of user interfaces in the context of PNG? In this way the user interface design preferences Papua New Guinea in Enga is characterized. Thus, this can contribute to the promotion of PNG software localization support the development of the country.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 3 | March 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 5.614||ISI Value

LITERATURE

Human Computer Interaction (HCI). Interaction Design Foundation (n.d.) defined Human-computer interaction (HCI) as a multidisciplinary field involving the fields computer science, cognitive science and human factors engineering. It is focusing on the design of computer technology and in particular the interaction between humans and computers. Expanded from its earlier concerns of computer design to almost all forms of IT design. Particularly, the field is about design, evaluation, and actual implementation of interactive computing systems to facilitate human use and with a study of significant phenomena surrounding them are dealt with (Hewett, Baecker, Card, Carey, Gasen et al., 1992, p. 5 as cited by Ho, Smyth, and Kam, Dearden, 2009).

Human Computer Interaction for Development (HCI4D). In order to make new and more user-friendly interfaces, developers must place effort in studying users' mental models. It is obvious that understanding software is dependent of context thus, different content produces various software requirements. Localization and internationalization of commercial software is now being recognized as important factor to be success in the global market. Localization includes multi-language support and date, time, & currency settings. However, many authors endorse that localization is not only a key for global software acceptability. Culture is also a vital factor influencing usability and user satisfaction (Johansson, M., 2009).

Literatures invested a significant amount of work in developing countries, which is motivated by low literacy levels. Identified critical challenges of HCI in developing countries such as inadequate electricity, little exposure to computing technologies, low literacy or linguistic knowledge restricted to local languages, and differences in sociocultural practices responsible for variations in mental models between Western and non-Western users. (Dray et al., 2003; Brewer, Demmer, Du, Ho, Kam et al. .2005; Brewer, Demmer, Ho, Honicky, Pal, et al., 2006 as cited by Ho, M. et al., 2009; Johansson, M., 2009)

The PNG Situation. The Papua New Guinea is not exempted from being subject to HCI concerns. The country is suffering, particularly the students, due to many constraints such as poor education (UNDP PNG 2014; Romansky, B., 2010) hence language (Kelegai, L., Middleton, M., 2002). As UNDP PNG (2014) quoted PNG Department of Education, lack of educational infrastructure, students' absenteeism, financial barrier and lack of parental support, low value of education due to limited jobs, as well as law and order problems are major concerns.

Galgal K (2017) on the other hand pointed that though internet access in PNG is around 7.9% of the population, this shows that PNG highest percentage within the Oceana region however the percentage of online population remains lowest. Major attribution to this is internet cost and coverage Internet rate in PNG it is expensive and among the highest in the world. Moreover, its estimated 8 million population is unevenly distributed to the provinces and only around 17-20% of its population are living in urban settlements (Galgal K., 2017; UNDP PNG 2014) and the difficult terrain hence infrastructure development has always been issue (Galgal K., 2017). More so, the power cost is high and outage is highly frequent (Dornan, 2014; ADB.org, n.d.), and cultural and tribal customs (Kelegai, L. et al., 2002; Hoffman, C., 2014).

Nielsen and Molich's Ten User Interface Guidelines. When designing interface for users' needs and expectation. Jakob Nielsen and Rolf Molich's Ten User Interface Guidelines are suitable for this. These rules can further improve usability, utility and desirability of User Interface designs (Neilsen, J, 1994).

1. **Visibility of system status.** Users always get feedback of systems operation with easy to comprehend and visible status displayed on the screen within a reasonable amount of time.
2. **Match between system and the real world.** User Interface designers reflect the language and concepts in the context of the users. It would be easier for the users to use the system.
3. **User control and freedom.** Offers undoing and redoing of previous actions.
4. **Consistency and standards.** User Interface designers ensure that graphics elements and terminologies are sustained in all the platforms.
5. **Error prevention.** Whenever possible, User Interface designers should minimize possible errors. E.g when user expected to enter a number but unintentionally entered a letter.
6. **Recognition rather than recall.** Minimize cognitive load by making sure that tasks related information within the display while users explore interface.
7. **Flexibility and efficiency of use.** using abbreviations, function keys, hidden commands and macro facilities. Users should be able to customize or tailor the interface to suit their needs so that frequent actions can be achieved through more convenient means
8. **Aesthetic and minimalist design.** The design is non-cluttered. Display must be reduced to only requirement component to complete a particular task.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 3 | March 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 5.614||ISI Value

9. **Help users recognize, diagnose and recover from errors.** Offer error messages and should always express in clear language.
10. **Help and documentation.** Though a good User Interface may easily navigate the system, depending on the type of solution documentation may be necessary.

The foregoing sections have sufficient discussion of HIC4D and current situation of the country PNG. The need for HCI evaluation is necessary for better usage of computer thus support the development of the country. Nielsen and Molich's Ten User Interface Guidelines which had been backed by authors with good command with user interface designs is good guidelines to evaluate user interfaces. The user interface design often reflects the culture of its developers or end-users. Thus, by meticulously examining the user interface using established guidelines the unique user interface requirements can be elicited.

METHOD

The research was survey of 3 software projects of final year students taking Bachelor of Information Technology (BIT) course from Enga Province. Namely (1) Enga General Hospital Patient Database System, (2) Computerized Institute of Business Studies Grading System and (3) Wabag General Hospital Pharmaceutical Inventory System.

Enga province is a secluded area so the people inhabiting in it. The students who developed the software under scrutiny in this paper took their BIT program entirely at Enga Province. Majority of the students were isolated at Enga. While few had travelled and lived in nearly provinces. This feature is worthy to note especially when examining of their culture. The software projects were characterized as user centered in nature.

The user interfaces of the three projects were evaluated based on the Nielsen and Molich's Ten User Interface Guidelines and looked in to clues pertaining to cultural and local dialect. Hence, characterized the preferences of users and developers.

Evaluation of User Interface based on Nielsen and Molich's Ten User Interface Guidelines

Visibility of system status. All the project provided suitable feedbacks mechanism. Proper prompts and after process prompts were present. The during operation status were not set as the operations were small. The prompt could be not even recognized if set. Mouse and keyboard were main input devices. While use of pop-up window were mainly used for the after-process prompts which comes with bee when triggered. All projects did not have voice feedback, touch input, and other special devices.

Match between system and the real world. For command semantics, the menus were arranged in such a way that order of actions take place during the manual operations. Attempts to use icons also showed that pictures used were those related to the common concepts that being represented.

User control and freedom. There is an intent for a user control and freedom as many functionalities in software projects support reversal of transactions in number of instances. Though in some points where reversal was necessary, projects were not included. All the three projects showed this quality.

Consistency and standards. There were observable layout inconsistencies. The icons used were consistent with the other forms. Used of color, background that are consistent to their clients. Justification, and margins were observed of all the groups while white space were not issue. It is noted that some misspelled words were present or English words replaced with Tok Pidgin words. Character set, fonts, font sizes, and styles (bold, italic, underline) are consistent for all groups.

Error prevention. There is an attempt in all the projects to include error handling and recovery procedure however they were not successful. Some observable attempts were disallowing a record to be inserted if some data can cause anomaly to the database.

Recognition rather than recall. All the groups set their menus were arranged in such a way that order of actions are followed. Each function was separated in each form. As mentioned in item #2, icons used are reflective to the functions it represents.

Flexibility and efficiency of use. For long phrases, abbreviations were used. Capitalization were observed. The three projects used menus and icons for the main functions while shortcut keys for major software functionality were set in two projects. The interfaces were customized and tailored to the user requirement however end-users did not have way to change USER INTERFACE settings.

Aesthetic and minimalist design. All of the groups used GUI. There were attempts of use of icons, graphics. Used of color, background that are consistent to their clients. screen-layout issues, menu selection, form fill-in, and dialog-box formats are all done according to usual MS office applications.

Help users recognize, diagnose and recover from errors. The projects provided error handling and recovery procedure. Often the message is too broad and could that easily understand by a common user. Moreover, it id observed that the prompts are somewhat incomplete and mixed of vernacular and English language.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 3 | March 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 5.614||ISI Value

Help and documentation. The 3 projects provided incomplete but suitable documentation.

CONCLUSION

The study found that most of the user interfaces are simple, many user interface elements were on par with the Nielsen and Molich's Ten User Interface Guidelines and many were also missed, certainly it is due to lack of experience of the developers. The shortcomings could be also attributed to the case of students in the country. Moreover, the developers could have done better if given a more favorable environment.

The clients were mostly indigenous to the locality and it was also observed that most of the project were user-centered which means they had asked the end users to evaluate the user interfaces. However, users with little computing experience may be able to evaluate designs, yet may struggle to propose design ideas (Ho, et al, 2009; Heukelman, 2006; Kimaro & Titlestad, 2008). Thus, the idea of user interface reflects mostly the idea of developers.

The interfaces were somewhat colorful, which is prevalent in their culture. The culture may not require a differentiated user interface version of commercial software as they can adopt to generally accepted user interfaces. While misspelled words were just a manifestation that developers were having stronger command in *Tok Pidgin* than English language.

RECOMMENDATION

It is recommended therefore rather than creating a specific user interface for PNG, more IT relevant trainings may be conducted to augment the use of computer. Tok pidgin may be included as options for languages in software. Moreover, test similar to this may be conducted the other provinces of PNG to properly generalize the HCI requirement of the country.

ACKNOWLEDGEMENT

Special thanks to the students who authored the project design documents for allowing me to assess their work for this research. Grace Kari, Jackson Taros and Mary Yalla, Enga General Hospital Patient Database System. Yangly John, Emma Niru, Mechancy Peter and Esmalyn Benson, Computerized Institute of Business Studies Grading System. Clinton Labidi, Diana Joseph, Londe David and Andrew Tanda, Wabag General Hospital Pharmaceutical Inventory System (see Appendix C).

REFERENCES

1. *ADB.org. (n.d.). Sector Assessment (Summary): Power. Country Partnership Strategy: Papua New Guinea,20112015.http://www.adb.org/sites/default/files/linked-documents/cps-png-2011-2015-ssa-02.pdf*
2. *Dornan, Matthew (2014, February 10). Energy poverty and access to electricity in the Pacific: Heading in the wrong direction? - Devpolicy Blog from the Development Policy Centre. Retrieved November 23, 2015, from http://devpolicy.org/energy-poverty-and-access-to-electricity-in-the-pacific-heading-in-the-wrong-direction-20140210/*
3. *Galgal Kasek (2017). The benefits and challenges of ICT in PNG. Lowly Institute Accessed at https://www.lowyinstitute.org/the-interpreter/benefits-and-challenges-ict-png*
4. *Ho, Smyth, Kam, and Dearden (2009) 'Human-Computer Interaction for Development', Volume 5, Number 4, Winter 2009*
5. *Hoffman, Carl. (2014 May 13). A Trail of Murder and Revenge in Papua New Guinea. http://www.outsideonline.com/1922566/trail-murder-and-revenge-papua-new-guinea*
6. *Johansson, Mathias. (2009) Human-Computer Interaction in a Community Development Context A case study of software utilization in Karagwe, Tanzania. Available at: http://www.skygoblin.com/wpcontent/uploads/Human-Computer-Interaction-in-a-Community Development-Context-A-case-study-of-software-utilization-in-Karagwe-Tanzania.pdf (Accessed: 6 May 2016).*
7. *Kelegai, L. and Middleton, M. (2002). Information Technology Education in Papua New Guinea: Cultural, Economic and Political Influences. Journal of Information Technology Education, 1(1), pp, 11-23*
8. *Neisen, Jacob (1994). 10 Usability Heuristics for User Interface Design. Sighted at https://www.nngroup.com/articles/ten-usability-heuristics/ on March 4, 2015.*
9. *Romanyshyn, B. &Romanyshyn, V. (2010). Obstacles to Student Success in Papua New Guinea. Retrieved at https://rausimobe.files.wordpress.com/2010/11/obstacles-to-student-success-in-papua-new-guinea1.pdf on November 16, 2015*
10. *Smith, A., Joshi, A., Liu, Z., Bannon, L., Gulliksen, J. and Baranauskas, C. (2007) 'Embedding HCI in developing countries: Localizing content, Institutionalizing education and practice', in Human-Computer Interaction – INTERACT 2007. Springer Science + Business Media, pp. 698–699.*
11. *UNDP PNG (2014). 2014 National Human Development Report Papua New Guinea. From Wealth to Wellbeing: Translating Revenue into Sustainable Human Development. Accessed at http://hdr.undp.org/en/content/papua-new-guinea-national-human-development-report-2014 on November 16, 2016*