

USABILITY ANALYSIS OF GIS SOFTWARE ; QUANTUM GIS

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ABSTRACT

As the usage of Geographic Information System (GIS) expands in many sectors, the GIS systems' usability becomes important. If we are operating with GIS, it means that we are dealing with large and complex geographic data. Therefore, software designed for GIS users should enable fundamental GIS operations without making them suffer. However, the user interfaces of GIS software may not be helpful and they may make things even more complex. In this paper, the main aim is to address usability problems of a GIS software interface and bring some insights for GIS software interface designers. Thus, five users of GIS software participated in this study. Participants who are not experienced in using the chosen software are given a list of tasks that are commonly and basically used in GIS software. Data were analyzed in terms of usability criteria under two main headings which are performance and preference data. Suggestions driven from the results will be given to designers which can be considered for further GUI design of the GIS software.

Keywords: GIS software, Graphical User Interface (GUI), Quantum Gis (QGis), Usability

INTRODUCTION

In general, Geographic Information System (GIS) does the fundamental geospatial operations to inform naive users as well as experienced decision-makers. GIS software is designed to actuate the fundamental GIS operations. The main aim of GIS software is to assemble, store, manipulate, analyze and display geographically referenced information (Harvard Map Collection, 2009). Today, GIS software has wide usage in many sectors such as geography, remote sensing, cartography, land management, healthcare, natural resource management, city planning, army, photogrammetry, hydrology, forestry, construction, navigation, agriculture and political analysis. The operators of GIS software can also have different backgrounds such as architects, city planners, geologists, civil engineers, electric engineers, archeologists etc. Many companies maintain budgets on creating GIS software;

however, they are not getting their pay-off because of the lack of integration of user interface guidelines to these software (Hossain & Masud, 2009).

User interface design is critical for the success of the interactive computer systems (Butler, 1996). According to Butler (1996), a well-designed user interface should be able to visualize the functionality of the software and allow the user fully control over the actions of it. Within this context, usability has a major factor in the user's overall perception of the interactive systems (Dzida, Herda, Iaefeldt, 1978). The perception of GIS software interfaces is effected by how they are visualized.

“Usability refers to the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” ISO 9241-11 (1998, #2). “It is a quality or characteristic of a product” (Usability Professionals' Association, 1991, #1). There is a growing research interest in examining the issue of usability specifically to GIS applications and developments (Davies, Wood & Fountain, 2005; Haklay & Jones, 2008; Marsh & Dykes, 2005; Nielsen, 2005; Robinson, & Chen, 2005). For instance, recent usability studies of GIS can provide insights and lessons for designers in terms of usability of the interfaces. However, it is obviously seen that there are still broad problems with usability of the GIS interfaces (Haklay & Jones, 2008; Robinson & Chen, 2005). Even, some groups and forums are present on the net which are created by the users of GIS software in order to share and find answers to their problems related with the usage of the GIS interfaces (Haklay & Jones, 2008).

The aim of this study is to examine the interface of one of the GIS software which is Quantum Gis (QGis) by usability evaluation methods. Usability problems are aimed to be generated. This may give insights for further design of GIS software especially in terms of thinking common usage by different type of users. Also, as QGis software is open source and expandable, lacking issues can give suggestions for repairment of existing modules or generation of the new ones inside the software.

Description of the software

Quantum Gis (QGis) 1.6 is chosen for this study (Figure 1). The system can be downloaded free from QGis's web site. As the system is open source; when the product releases, source code and binary packages of the product becomes available for free. Therefore, the system is expandable by the users who use the source code. "Quantum Gis (QGis) is licensed under the GNU General Public License and an official project of the Open Source Geospatial Foundation (OSGeo). It runs on Linux, Unix, Mac OSX, and Windows and supports vector, raster, and database formats and functionalities" (Quantum Gis, 2010, #1).

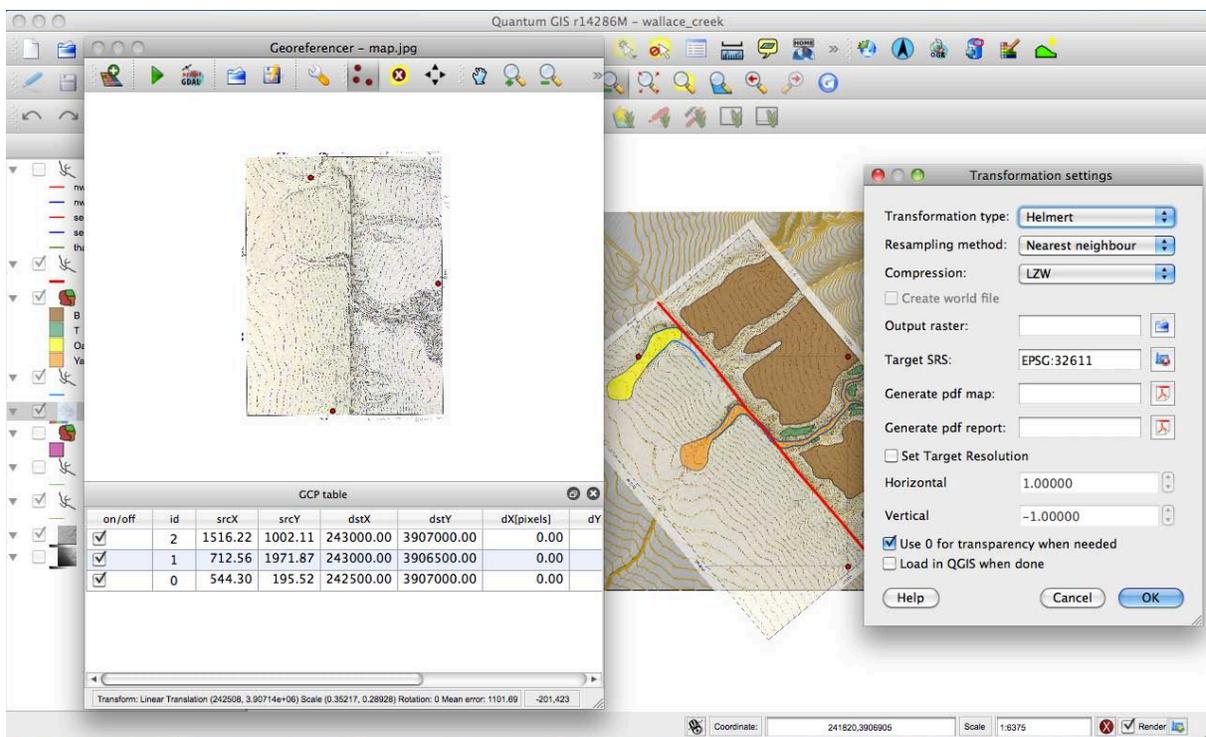


Figure 1. Screenshot from QGis 1.6

User guides, advanced search, documentation and tutorials that are given on the web are helpful for the users of the software. What is original about QGis when compared with other GIS software is that, in order to develop the QGis products, user and developer meetings are organized.

RESEARCH QUESTIONS

- What are the main usability problems related with QGIS in terms of considering performance and preference data?
- What are further inferences that can be driven from the users for better design of the GIS software?

METHODOLOGY

Sample

The participants for the study are the operators of GIS and use GIS software in their work life. However, they are inexperienced in using the chosen software. Nielsen & Landauer (1993) suggested that observing about 5 to 6 users reveals most of the problems in a usability test. For this study, the number of participants is 5 and selected from different majors. The participants are characterized according to age, gender, major, computer experience, GIS software usage experience indicating experience level and the reason of GIS software usage (Table 1).

	Participant 1	Participant2	Participant 3	Participant 4	Participant 5
Age	29	25	25	32	32
Gender	Female	Male	Male	Male	Male
Major	Geological Engineer	Civil Engineer	Mining Engineer	Landscape Architect	Geographer
Computer experience	15 years	12 years	13 years	10 years	15 years
GIS software usage experience <i>-Experience levels: Lower Intermediate-Advanced-</i>	Map Info (medium) TNT Lite (low) <i>-Lower Intermediate-</i>	Map Info (high) AutoCAD-Map 3D software (high) <i>-Advanced-</i>	Map Info (low) TNT Lite (medium) <i>-Lower Intermediate-</i>	ArcGIS (high) Map Info (medium) TNT Lite (low) ERDAS Leica (high) <i>-Advanced-</i>	ArcGIS (high) Map Info (high) TNT Lite (high) ERDAS Leica (low) NETCAD (low) <i>-Advanced-</i>
Reason of GIS software usage	Educational purposes	Educational purposes	Educational purposes	Educational purposes	Educational purposes

Table 1: Participant Characteristics

Data Collection Procedure

Each participant was welcomed and a description of what will happen during the test session was given. Each participant did the test session on the same computer in the same environmental conditions. After a brief introduction, comfort of the participant was maintained, and then test session started.

A short list of tasks were introduced and given as a handout to the participants. The tasks listed in Table 2 are selected because they are the common and main tasks that participants from different areas do in GIS software.

TASK LIST

TASK 1- Registration of the image **topographicmap.tiff** using georeferencing.

* The GCP coordinates are given in **GCPs.doc** file and GCP locations can be seen from GCPs. doc file.

* Projection of all layers: **ED50- UTM-Zone 36N**

* Transformation type: Polynomial 1

* Resampling Method: Nearest Neighbour

* Compression: None

TASK 2- Digitization of below given features as layers according to the given table structures (minimum 2 values for each attribute). Please save the layers in to your folder on the desktop.

* **Industry**

ID

Type (Tekstil Fb., Otomobil Sanayi, Makina Fb., Dişli Fb., Elektronik Fb., Gübre Fb., Akaryakıt İst., Ayçiçek Yağı Fb.)

* **Transportation**

ID

Type (highway, railway)

Width (fill this field with meaningful fictitious data)

* **River**

ID

Type (major, minor)

Flow rate (fill this field with meaningful fictitious data)

TASK 3- Edit one of the attribute entries (anyone you prefer)

TASK 4- Create a thematic map according to attribute of layers (choose one of them below)

- * According to type of industry
- * According to type of transportation
- * According to type of river

TASK 5- Create and display your own print out layout in pdf. Please name it as surname_QGis.pdf and save in to your folder on desktop.

* Please save your project in to your folder on desktop. Please name it surname.qgs.

Table 2: Task List

The participants were observed without being disturbed and also a free active window recorder program Webinaria was used to record both sound and the participants' screen movements. The participants were informed about this type of recording at the beginning of the test. During their workflow, thinking aloud protocol was used. The participants were asked to verbalize their thoughts, feelings, and opinions while interacting with the software system. Their opinions and verbal expressions were stored in Webinaria files and observation sheets for further analyses.

According to Rubin (1994), data for usability tests can be basically collected in two major categories which are performance and preference data. The data for this study holds in these two categories. Performance data includes *time to complete a task*, *percentage of tasks completed successfully* and *number of errors*. *Source of errors* is noted. Preference data includes *preference of QGis for further usage by the participant and the reasons of it*, *number of negative sentences to the software*, *appropriateness of the software functions to the tasks*, *ease of use*, *ease of learning overall* and *suggestions for improving the software*. Therefore, performance data gave results related with effectiveness and efficiency and preference data gave results related with satisfaction of the participants. Data was taken both for quantitative and qualitative analyses.

In order to actuate these, chronometer was used during getting performance data. The error sources were noted. Also, after test session, videos automatically saved by active window recorder were analyzed to generate whole data listed above related with performance. In order to get preference data, preference of the software for further usage was asked to the participants and the reasons of 0-5 aspects were asked to be written. Moreover, during think aloud protocol number of negative sentences for the software was noted. After whole tasks finished, suggestions for improving the software were directly asked. Appropriateness of the software functions to the tasks, ease of use, and ease of learning overall were rated.

The questions ended up with ranking questions that System Usability Scale (SUS) was used. The participants were asked to answer questions related with the tasks, in terms of agreement (from strongly disagree to strongly agree, in 5 steps). These questions were asked in order to compare the tasks better and understand the problematic parts of the tasks. Tasks and the questionnaire given to participants were written in English (see questionnaire in Appendix 1).

DATA ANALYSIS

Data analysis is categorized in terms performance and preference data analysis. Performance data analyses indicate efficiency and effectiveness; preference data analyses indicate satisfaction of the participants.

To begin with performance data analysis, the first *efficiency* clue is time to complete the tasks. Average time for each task indicates speed of performance. As can be seen on Table 3, average durations on the second and first tasks are much higher than the ones on other tasks. As stated before, these tasks were the most detailed ones. Also, it can be seen that there is a huge difference between the fastest times and slowest times. But this is not related with experience of the participants with other GIS software. Because as participant 1 and 3 has lower-intermediate level of experience, they are faster in some tasks when compared with the performance of the other participants who have advanced level of experience (Table 4). In

addition, it can be inferred from Table 4 that participants spent most of their time on the first two tasks even more than the sum of the time spent for other three tasks.

	Minimum (sec)	Maximum (sec)	Sum (sec)	Mean (sec)	Std. Deviation (sec)
Task 1 (Registration)	490.00	1322.00	4046.00	809.2000	374.77153
Task 2 (Digitization)	.00	1890.00	4778.00	955.6000	808.66513
Task 3 (Editing)	14.00	120.00	329.00	65.8000	38.79691
Task 4 (Thematic Map)	.00	557.00	931.00	186.2000	247.17039
Task 5 (Saving and Displaying)	90.00	290.00	889.00	177.8000	79.07085

Table 3. Task Completion Times

	Task 1 Duration (sec)	Task 2 Duration (sec)	Task 3 Duration (sec)	Task 4 Duration (sec)	Task 5 Duration (sec)	Sum Duration (sec)	Mean Duration (sec)
Participant 1	1082.00	1890.00	52.00	50.00	170.00	3244.00	648.8000
Participant 2	490.00	485.00	120.00	.00	90.00	1185.00	237.0000
Participant 3	659.00	.00	80.00	.00	290.00	1029.00	205.8000
Participant 4	493.00	1695.00	14.00	324.00	122.00	2648.00	529.6000
Participant 5	1322.00	708.00	63.00	557.00	217.00	2867.00	573.4000
Sum	4046.00	4778.00	329.00	931	889.00		

Table 4. Task Durations

Percentage of the tasks completed successfully and number of errors provides indications about *effectiveness* of the software. Total task number of this study was 25 (5 participants x 5 tasks) and 3 of this tasks were failed which means 12% of the tasks is failed. Mean task completion success is 85% (Table 5). The fails are not related with the experience level of the participants. As it is understood from the verbal clues of the participants, they gave up making these tasks because they felt stuck as they did not know what to do next

(Table 6). Two participants did all the tasks but with not specifying projection type. Therefore, their completion is considered as 95%.

	Task Completion Percentage
Participant 1	95%
Participant 2	75%
Participant 3	60%
Participant 4	95%
Participant 5	100%
Mean	85%

Table 5. Task Completion Percentages

Number of the errors and their sources also resulted in this study. Participant 1's errors are the most and participant 3's errors are least (Table 6). However participant 3 gave up two tasks so why his errors is less is understandable. No errors occurred in task 3. It was also a short task for the participants (Table 4). Most of the errors occurred in the first two tasks (Table 6). They are detailed and fundamental tasks of the list. Two participants failed in task 4, as they couldn't find the item in the task they gave up completing the task. The ones who found the item did not make many errors. Besides the first two tasks, task 5 is the one that participants made critical amount of errors (Table 6).

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Sum
Task 1 (Registration)	7	4	4	4	6	25
Task 2 (Digitization)	18	6	failed	8	1	33
Task 3 (Editing)	0	0	0	0	0	0
Task 4 (Thematic Map)	0	failed	failed	1	7	8
Task 5 (Saving and Displaying)	4	2	3	1	3	13
Sum	29	12	7	14	17	79

Table 6. Number of Errors

In terms of source of the errors, the errors can be classified in 6 groups (Table 7). By the analyses of video records and observation sheets, the error sources are clearly deducted. 59.5% of the errors occurred because of not finding the related item and trying unrelated ones. The participants said most of the negative sentences while doing this kind of errors. They felt stuck and bored. Two participants gave up some of the tasks because of not finding the related item. Moreover, skipping occurred intentionally and unintentionally. 7.6 % of errors is caused by skipping a step in the task because of not finding the related item. For example, most skipped part; projection type selection was skipped which was critical.

	Errors because of not finding the related item and trying unrelated ones	Skipping a step in the task because of not finding it	Errors during opening and closing operations	Confusion and errors during inputting data	Errors during manipulation of data	Errors caused by storing data	Sum
Task 1 (Registration)	13	3	6	1	0	2	25 (31.65%)
Task 2 (Digitization)	15	3	0	6	7	2	33 (41.78%)
Task 3 (Editing)	0	0	0	0	0	0	0 (.00%)
Task 4 (Thematic Map)	6	0	0	2	0	0	8 (10.12%)
Task 5 (Saving and Displaying)	13	0	0	0	0	0	13 (16.45%)
Sum	47 (59.5%)	6 (7.6%)	6 (7.6%)	9 (11.4%)	7 (8.85%)	4 (5.05%)	79 (100%)

Table 7. Source of Errors

Three participants stated that the interface of the software is not similar to other GIS software's interfaces. This caused confusion. For instance, in the first task which is registration, a new window opens for the registration part which is unique and unfamiliar. Also, registration is referred as georeferencing in QGIS. Although, it is stated in the task that registration should be created using georeferencing, participants couldn't easily find and use it. It took time (Table 3). Participants made errors during opening and closing window operations of this task. One participant expected to do all operations in the georeferencing

window. Same participant had to restart her registration as she lost her GCP points data after closing georeferencer window. Some unsure statements are captured during this task. For instance, one participant stated that *“I am not sure if I registered it or not”*. Another participant stated that *“Did I make it coordinated, where did I save it, should I save and open it again?”* As seen from these statements, the interface design for the function of the first task caused uncertainty.

The part of the interface for the task 2 was again unusual for the participants. Most of the errors occurred during inputting data and manipulating data in this task. During inputting data one participant did errors and blamed himself. He made errors in creating attribute table and said *“How stupid I am!”* During manipulation of the data it is understood from the verbal clues of two participants, the graphic icons of the buttons are not understandable. One participant specifically stated that *“Polygon drawing icon does not refer to that function there are other icons on the interface that are much referring to this function, so this confused me”*. That participant also couldn't find delete, crop and edit icons. She tried to finish drawing the line but she clicked escape instead of right mouse click. She was frustrated about it because she tried to do it for four times. She asked as *“How can I finish this line?”*

During this task, the data should be saved in order to progress other tasks. Two participants forgot saving and could not understand at first why they could not do task 4 which is creating a thematic map out of the shape files. No error prevention was designed in the system about it. On the other hand, there were some positive comments on task 2. One participant said *“It is different but very practical”*. Another participant said *“I liked this part very much”* No errors occurred during the editing of attribute data which is task 3.

Task 4 was easy for two participants. They did no error and did the task quickly (Table 3 & 7). However, three participants did most of the errors as they could not find related item. Two participants gave up the task because of this. One participant stated that *“It was really hard to find it I was searching it as thematic map”*. Some statements indicate that the participants felt bored as they are looking up for the item such as *“Where can find it?”* *“Where should I find it?”* *“I looked up even everywhere “and “Oh, eventually, I found the way, it was unpredictable”* Actually, in QGIS, there is no thematic map icon as there is in

other GIS software. In this software, its terminology is “unique classify” which can be found under properties of the layer. One who is familiar with the meaning of thematic map which is a way of classification may infer it. Two participants actually inferred it. Other participants were locked in the aim of finding the icon “thematic map”.

In task 5, during storing part of the task, participants did no error. However in displaying the layout part, participants made errors. 16.45% of the errors are made in this task (Table 7). When source of the errors is analyzed it is understood that the errors are caused by participants’ not finding the related item. One participant stated that “*I was expecting to find it under the file menu*” As it is observed from the video recorders, all of the participants tended to look up file menu as first intention. One participant was even sure that he said “*It should be here under the file menu*”.

It is clear that number of errors corresponds with number of negative sentences in the tasks (Table 8). Most of the errors occurred in the first two tasks and most of the negative sentences are stated during these tasks.

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Sum
Task 1 (Registration)	5	0	1	1	2	9 (31.03%)
Task 2 (Digitization)	8	0	2	2	2	14 (48.28%)
Task 3 (Editing)	0	0	0	0	0	0 (.00%)
Task 4 (Thematic Map)	0	1	0	0	3	4 (13.8%)
Task 5 (Saving and Displaying)	1	0	0	0	1	2 (6.89%)
Sum	14 (48.28%)	1 (3.45%)	3 (10.34%)	3 (10.34%)	8 (27.59%)	29 (100%)

Table 8. Number of Negative Sentences

Secondly, when we consider preference data, number of negative sentences and post questionnaire gave information about *satisfaction* of the participants. 48.28% of the negative sentences, nearly half of them, were stated during task 2 (Table 8). However, the positive sentences were also stated during this task. It can be inferred that the interface design for the

function of this task is unfamiliar to the participants. Therefore, some got used to it and found the new way practical, some did not.

In the questionnaire part, preference of QGIS for further studies was asked to the participants. Two participants answered it as “No”, three participants answered it as “Yes”. Participants who were negative about further usage of the software stated their reasons as the icons are not indicating the functions, terminology of the items is unfamiliar and hints given are confusing. According to them, there are unpractical usages and ungrouped items. One participant whose experience level is advanced stated that the software is not as comprehensive as other GIS software are. Suggestions came accordingly from these participants. One participant stated that polygon and line drawing icons should change. She also stated that “save pdf” item should be under the file list. Other participant put emphasis also on icon design change. He added that items should be well classified.

On the other hand, participants, who were positive about further usage of QGIS, stated that it is easy to learn, it is open source and free, it looks like user friendly but you need to be familiar to the menus. Especially the last comment emphasizes the inconsistency of QGIS interface with universal interface design of GIS software. According to these three participants, once someone becomes familiar to the design of the software, it is easy to use. One of the participant suggested that there should be a more useful help. Other participant stated that the items should be well grouped on the interface. Moreover, he said that thematic map menu should be created. One participant mentioned that icon design should change.

Further general ranking questions’ results are supportive to the participants’ reasons and suggestions. As stated above some participants stated negative, some stated positive about ease of use and ease of learning overall (Table 9). However, when it comes to sum, the results are positive. In terms of appropriateness of the software functions to the task, 4 of the participants did not agree. 2 participants even strongly disagreed.

	Ease of use	Ease of learning overall	Appropriateness of the software functions to the tasks
Participant 1	-2	-1	-3
Participant 2	2	2	1
Participant 3	0	3	-3
Participant 4	2	2	2
Participant 5	1	-1	-1
Sum	3	5	-4

Table 9 . Ranking Results Related with Whole Software

In the questionnaire part, the reasons of rankings were also asked. Some participants gave reasons. For instance, participant 1 stated that the software did not look like the software she used; therefore, someone who never used any GIS software before would do the tasks more easily. Participant 3 stated that at first it looks unfamiliar and disorganized, but once someone learns it, it looks easy.

In order to understand why software is not appropriate to the functions of 4 tasks, the ranking answers for each task are analyzed deeply. As it is seen, task 1 has the most negative results (Table 9). According to participants the amount of information and graphics on the interface was inappropriate. Actually, this result overlaps with the participants' comments and source of errors. According to the results, it was not an easy and enjoyable task and it was hard to find the information. Similar results can be derived for task 4 (Table 9).

Some participants' satisfaction from task 2 is high some others' is low, therefore the result is neutral. But again, the problematic issues are the same. The participants agreed all of the issues for task 3 which again coincides with previous results. The last task was a short task but participants disagreed that the information was easy to find. They also disagreed that it was enjoyable.

To conclude the ranking results looking up table 9 & 10, the participants found the whole usage as easy, easily learnable and enjoyable. But, especially in task 1, 2 and 4, the amount of information and graphics on the interface is not appropriate for them. The information was not easy to find in these tasks as well.

	It was easy	It was enjoyable	The amount of information on the interface was appropriate	Terminology on the interface was clear and precise	The amount of graphics on the interface was appropriate	The information was easy to find	Sum
Task 1 (Registration)	-2	-2	-6	-1	-5	-2	-18
Task 2 (Digitization)	1	2	-2	0	-1	0	0
Task 3 (Editing)	3	4	4	5	3	5	24
Task 4 (Thematic Map)	0	-2	-4	0	-4	-2	-12
Task 5 (Saving and Displaying)	0	-1	1	0	0	-1	-1
Sum	2	1	-7	4	-7	0	-7

Table 10. Ranking Results Related with the Tasks

DISCUSSION and CONCLUSION

This study revealed some usability problems of QGIS software. Usability problems are deducted from performance and preference data results. Problematic parts are induced from verbal cues and post questionnaire. Although there was a specific list of task that participants deal with, the participants had the chance to meet and interact with the interface. The tasks were the common and basic tasks that participants having different backgrounds had dealt before. By expanding these tasks, whole interface can be further tested with user or expert based usability tests that can reveal more comprehensive results.

The study showed up the interface of QGIS's being totally dissimilar to other GIS software the participants have experienced. The way it works, terminology, graphic icons and their placements seemed unfamiliar to them. It was out of their mental model of operating with geospatial data in a GIS software. Therefore, this could have brought negative effect.

The participants overall sum for ease of learning and ease of use may indicate that the software is easy to use once someone becomes familiar to the menus. For the first usage, doing the tasks can be difficult. Actually this can be understood more clear with further comparison of usability tests of both users of non-users of QGIS software.

It can be argued that efficiency and effectiveness are met enough in terms of completion of tasks successfully and duration times. As stated before, mean completion success is 85% and mean task durations are reasonable. However, number of errors in the first two tasks cannot be ignored. These two tasks are detailed and long tasks but even the participants who have advanced level of experience had errors. Two participants gave up task 2 as they could not do what to do next.

The most significant reason of giving up the tasks was not finding the related item on the interface. Critical steps such as determining projection type was skipped by 2 participants was also because of this. This means that even critical items are not visible enough on the interface to the users. Help menu is not adequate for explaining the place of them; therefore participants being stucked can be understandable. In some steps, errors could be prevented. One participant lost her data because of no error prevention.

As the results from verbal cues and answers to the post questionnaire revealed that participants are not satisfied with some cases. They expressed negative and unsure sentences especially during the first two tasks. They felt stucked and nervous. One participant even blamed himself when he made errors. However, according to the general results of preference data of the software, their feelings and thoughts are positive. In the study, negative sentences overlap with the source of the errors. Also, given reasons and suggestions are all on the same edge and related with the same tasks.

Considering overlapping lacks, a suggestion list can be generated. This list may be a guide for providing healing ways for problematic cases generated in this study. Nielson's ten heuristics of usability (1994) is considered in creation of these suggestions. All suggestions refer to a case occurred in the test sessions that can be found in data analysis section.

- Terminology of the items should be familiar to the user. It should GIS platform conventions. Words and phrases should be chosen from common Gis terminology usage.
- Users' work load should be minimized by making items classified according to their functions. Items having similar functions should be placed closely.
- Understandable hints should be given for the icons.
- Critical errors should be prevented by warning the user that he/she is making a critical error.
- The software should always keep users informed about what is going on.
- Graphic icons should be reconsidered especially the ones for the manipulation of the data. The graphic design of the icons should refer to their functions.
- Help menu should be more usable. Information should be easy to search and understandable explanations should be written in help documentation.

There are detailed and traditional quantitative usability studies of GIS such as studies of "Usability Evaluation of Web-based GIS Applications" by Khan & Adnan 2010 and "Iterative Usability Evaluation Methods Applied to Learning Technology Development" by Sullivan, Hilgers, Buechler, Hall, Luna & Lawrence, 2005. However, these studies are very few. There is no specific usability study testing the interface of QGis software. This study may contribute some interesting aspects of the existing GUI of QGis while conducting a traditional usability test and discussing its results. It would be better if a prototype of a suggested interface is created and usability tests are also conducted on it. In addition, the tasks should be expanded to cover all cases of the usage. For further studies, these can be generated. The importance of usability and the outcome of a usability test covering common tasks for different users of Qgis software can be obtained through this paper. This paper will be helpful for QGis interface designers.

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APPENDIX 1

Questions

1. Would you prefer QGIS software for your further studies? Please give 0-5 reasons.

Yes

No

Because,

2. What is your suggestion for improving QGIS?

3. Please rate these following questions

The software ;

is easy to use: -3 -2 -1 0 1 2 3

WHY? _____

is easy to learn: -3 -2 -1 0 1 2 3

WHY? _____

has appropriate functions according to the tasks: -3 -2 -1 0 1 2 3

WHY? _____

4. Please rank these following questions for each task.

Task 1:

- It was easy.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

- It was enjoyable.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

- The amount of information on the interface was appropriate.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

- Terminology on the interface was clear and precise.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

- The graphic design of the icons on the interface was appropriate.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

- The information was easy to find.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

Task 2:

- It was easy.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- It was enjoyable.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- The amount of information on the interface was appropriate.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- Terminology on the interface was clear and precise.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- The graphic design of the icons on the interface was appropriate.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- The information was easy to find.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

Task 3:

- It was easy.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- It was enjoyable.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- The amount of information on the interface was appropriate.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- Terminology on the interface was clear and precise.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

• The graphic design of the icons on the interface was appropriate.
Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

• The information was easy to find.
Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

Task 4:

• It was easy.
Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

• It was enjoyable.
Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

• The amount of information on the interface was appropriate.
Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

• Terminology on the interface was clear and precise.
Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

• The graphic design of the icons on the interface was appropriate.
Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

• The information was easy to find.
Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree___

Task 5:

- It was easy.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- It was enjoyable.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- The amount of information on the interface was appropriate.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- Terminology on the interface was clear and precise.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- The graphic design of the icons on the interface was appropriate.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___

- The information was easy to find.

Strongly Disagree ___ Disagree ___ Neither Agree nor Disagree ___ Agree ___ Strongly Agree ___