

Computer Usability: Interactive Challenges Faced By Less Experienced Computer Users in South Africa

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Abstract: The growing use of applications and access to the internet has increased the number of average computer users in South Africa, as people are using applications like WhatsApp, Facebook, Twitter, Instagram, and more. The goal of the study is to identify the challenges that most South African people face when they are interacting with computer applications, web applications, and mobile applications. The reason for conducting the study is that lately in South Africa we have seen an increase in South Africans who have access to computer systems, such as the use of smartphones, tablets or iPads, game consoles, and laptops. Most of the people who are using these devices or have access to them still face challenges as to how to use these devices or to use some of the applications that come with these devices. The paper will begin by introducing the topic. The paper will be followed by a literature review section, which will include four topics relating to the topic that helped the researcher to build a foundation for the research topic and to get ideas on how to do the research. The paper will then be followed by the research methodology, and the findings of, and discussions flowing from the study will then follow.

I. INTRODUCTION

The number of web and mobile applications has grown exponentially due to massive internet use. The massive growth of internet use has increased the number of internet users, including novice and experienced users, who interact with different types of applications, both online and offline. Nowadays, applications are designed to accommodate a wide range of user groups, from young people to older people. Applications are now intended for everyone; applications need to be designed in such a way that they will meet all the needs of different users, and users should be able to use these applications easily, without facing any problems. The more users interact with applications, the more problems users face due to applications being poorly designed. Studies show that there has been a large increase in application problems when users interact with applications.

A study was conducted in Taiwan, at the National Taipei University of Technology, by Sheau-Farn Max Liang, Yi-Chung Kuo, and Shu-Chin Chen, where they had to identify usability problems in a smart TV music service (Liang, and all 2013a). Thirty-one usability problems were identified by different user groups in a smart TV music service system (Liang, and all 2013b). Most application designers fail to design applications that accommodate the targeted users, because they design applications without keeping application users in mind, which leads to users facing a lot of problems when using the applications. For example, applications for a primary school child are designed with a lot of bright colours, big fonts, big icons, and so on; on the other hand, the same

application cannot be used by an elderly person to perform his or her daily operations.

The design of primary school children's applications can be too much for an elderly person in terms of colour, font, and layout. For example, the colours used in the application can be too bright or too many for an older person, and this can cause usability problems which can frustrate the users. In South Africa, most applications are designed without having users in mind, such as, for example, the South African government's applications, websites, and systems. Most of the South African government's applications are designed poorly, and most people in South Africa face difficulties in using both its educational and its informational applications. Millions of people in South Africa have internet access, and they are interacting with millions of applications every day online.

The growing use of applications and the growth in access to the internet has increased the number of average computer users in South Africa, as people are using applications like WhatsApp, Facebook, Twitter, Instagram, and more. The plain truth is that different computer users require different things from the different computer systems and applications they use, and it is the job of the designer to meet the different needs of users to make sure that they are happy and fully satisfied.

II. LITERATURE REVIEW

A. Understanding Computer Usability

Usability is defined as how well a user or client can use the product to accomplish their goals. In human-computer

interaction, the word is often used in relation to systems and software applications, and how well a user can use a software application or system to accomplish their goals or tasks (Hinrichs and Carpendale, 2011). Examples of this include the usability of a product like a car dashboard, or a smartphone's software or applications. Usability can be measured using different factors for different products. For example, one can use the following factors to measure an application's usability: ease-of-use; how easy it is to navigate information in an application; response time when a button is clicked, or an application's response time; absence or minimisation of errors; visual consistency; efficiency; and effectiveness. There are more factors that can be used to check an application's usability; those mentioned above are just a few of the possible factors.

In human-computer interaction, the word usability is used to differentiate a good design from a bad design (Diah and al, 2010). Jacob Nielsen defined usability as "one of the qualities that evaluate how easy it is for users to use interfaces, allowing users to perform tasks and meet their goals in clear, transparent, agile, and useful way". Jacob Nielsen came up with five components that define the usability of a system or software application. The five components are as follows: learnability, efficiency, memorability, errors, and satisfaction of the application or computer system.

Today's learning outcomes depend significantly on online platforms and the usability of websites, and this has encouraged designers to consider the designing of websites, especially educational websites (Vosilius and Lapin, 2015). Usability is a core component of a commercially successful website because the way a user interacts with the website has an impact on user satisfaction. Common usability problems of most websites, especially informational websites, are poor or confusing navigation, redundancy of content, and inconvenient search (Ballard, 2015). When designing educational websites that are to be viewed on tablets, there are many elements that need to be considered, because there is no consistent method focused on developing educational websites for tablets or mobile devices (Hinrichs and Carpendale, 2011b).

McCloskey, Loranger, and Nielsen published 111 website usability guidelines for designers to follow when designing teenage websites. Bailey and Seals conducted a study to evaluate one of the websites that provide health information to teenagers by using the McCloskey guidelines. The aim of the research was to validate the web interface usability of a health information website against McCloskey design guidelines. After the experiment, the results showed that the website's content was well organised and easy to use. Under the satisfaction section, the users were satisfied enough, and they would recommend the website to someone else (Doucet, 2015). For the aesthetic appeal section, teenagers rated the website lowest because they were having difficulties with website colours. In the engagement section, teenagers rated the site lowest in terms of it being fun to use, as the group felt that the website was not engaging with teenagers because it didn't include teen elements such as teen images, games, and quizzes.

This research was important because it showed that it is important to take the different age groups of users into consideration when designing applications and systems. The research showed that, if the design guidelines are properly followed during the design stage, it is easy for users from different age groups to use the application or the system (Bailey and Seals, 2016).

B. Understanding Computer Interactivity

Human-computer interaction is divided into two parts, one part being an academic discipline, and the other part being design discipline. The academic discipline focuses on how humans interact with computer systems, and the design discipline focuses on how computer systems should be designed for people to allow them to interact with computer systems successfully (Waddell and all, 2016a). A human-computer system is made up of the two core components: the user interface core and the functional core. The user interface is the part of the computer system which users use to interact with the computer system, and which accepts or captures user inputs (Kraleva, 2017). The user inputs are then processed to produce outputs or results for users via the user interface, using a functional core part of the computer system (Waddell and all, 2016b).

In the earliest years of computer systems, few people had access to computers because the only form of computer interaction was through the submission of commands to the computer system (Sinha, 2010). Computer systems were used by professionals like academics, scientists and computer programmers, or anyone who had knowledge about how to write computer commands (Myers, 2002). Computers have become part of our lives because the world we live in is flooded with computers, from home to the workplace (Waddell and all, 2016c). Computers have changed the way we do things, and they have advanced as time went. The way computers used to look and operate in the 1970s is different from how computers look and operate nowadays. Since people started using computers in the 1970s, they have raised questions about computer interfaces and how they interact with computer systems.

In simple terms, computer interactivity occurs when a computer responds to user inputs or actions (Bostan, 2015a). Waddell, Zhang, and Sunda described human-computer interaction as a "multidisciplinary topic concerned with the evaluation, design, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them" (Waddell and all, 2016c).

An example of computer interactivity is when a person plays computer games or video games; this form of interactivity requires a gamer to continue interacting with the game. Another example is when a person interacts with the web browser to fill in a form so as to register for an email account, with the browser providing output to the user. What makes a computer unique is the fact that computers are interactive. Consider the example of a person playing a computer game, where the person is consumed by the game in a way that the player sees himself or herself inside the game because the communication between the player and the game is highly responsive. In gaming, watching someone else

playing a computer game is not as interesting as when you are playing the game, the reason for this being that there is a lack of interactivity in this scenario, and this shows how important it is for computer systems to be interactive (Bostan, 2015b).

C. Computing Usability Challenges and Principles

Many systems and application designers develop systems without having users in mind, and, not getting any feedback from users on what they want, they only focus on what is documented on their requirements document. One thing that all system designers have in mind is that users don't have any technical knowledge of how systems are designed and developed. Users know exactly what they want, as much they don't have any solid technical knowledge on how systems are developed. The problem with designing systems is that users are different, and they all have different design requirements, which makes it difficult for designers to design interfaces that will accommodate all users at once. Since users have different requirements, it is impossible for designers to develop interfaces that are usable for the first time. After the first interface design, designers are likely to continue updating the interface based on user requirements.

The usability problem is defined as a set of factors that block users from meeting their goals or completing their tasks when using a system or an application, where this is caused by poor user interface design factors and factors of the usage context (Manakhov and Ivanov, 2016). The number of computer and internet users has grown exponentially, and this includes novice, average, and super-experienced users. Given the growing number of computer and internet users, applications should be easy to use and learn to use, but users face problems every time when interacting with most applications (Alarcon and al, 2014). Alarcon, Medina, and Villarroel conducted quantitative research to ensure the quality of web applications. The research analysed the usability and communicability problems of the transactional web application of an online store called "Ripley" to determine the application's quality, since the website is used by people who live in Chile.

Alarcon, Medina, and Villarroel used a heuristic evaluation testing method to test the usability of the application. The researchers found 18 usability problems. Alarcon, Medina, and Villarroel's research showed how they successfully used different methods to find the usability and communicability problems of the application, and this was significant because the research showed how each problem was identified using each method. Medina and Villarroel's research was limited, as they chose to analyse one transactional web application to identify usability problems. It may be more illustrative to broaden the scope of the study by analysing more than five different applications to identify the common usability problems found in most applications. There are many elements that separate a good interface design from a bad interface design. A good design can make communication between users and computer systems more effective and easy, and help users avoid making too many mistakes (Gong, 2009).

Gong Chao defined test methods and design principles in human-computer interface design to guide designers as to how they should develop their interfaces to meet user needs. Gong Chao's design principles are important because they give designers standard guidance on how their interfaces should look. The Gong Chao design principles agree with Schneiderman's eight golden rules of interface design. The principles specify the same rules that designers should follow when designing interfaces. The Gong Chao design principles are slightly different from the Schneiderman interface design rules because there are some design principles that Gong Chao uses that are not used by Schneiderman. For example, the following design principles, the principle of humanity that describes that the interface should be human-oriented, and the interface design should not hurt users.

D. The Importance of Computing Usability

Whenever a user buys any device or gadget, apart from price, the user's focus is on the gadget interface and how easy it is to use the gadget, before he or she purchases the gadget. Users are more focused on the usability of the device or gadget. Human-computer interaction has been part of the computing field for more than 25 years, and it has been growing ever since its original development. Khanum and Trivedi conducted a study to identify which usability evaluation methods can be used to analyse their roles in the development of technology. The research focused on the usability evaluation methods that are successfully tested on. The research conducted by Khanum and Trivedi was influential because the study showed that the usability evaluation method used for adults cannot be used with children, which gives researchers a platform to try new methods to evaluate usability for the average computer user.

This helps the researcher to note that, when doing research for different computer users, there are different methods used. The researcher needs to take note not to follow the same method used for different users. Usability helps average users who don't have writing and reading skills to know how to use an application or system without having to read a manual. A bad design can have a negative impact on the user's health if the use of an inappropriate font and colour can damage the user's eyesight or cause eyesight problems. Different user groups can be part of the technology design process, allowing users to play with applications or devices and provide comments. Different users can be testers, and they can use the prototypes and provide suggestions to improve the product by simply expressing their opinions.

III. METHODOLOGY

Research methodology helps the person who is going to read the research paper to critique the whole paper regarding its validity and reliability [16]. The methodology helps the author to answer two critical questions: How was the data collected? And how was the data analysed to come up with results? A research methodology is an approach used to identify, choose, process, and analyse information gathered about the research topic (Soiferman, 2010).

E. Research Methodology

The research methodology that was used to gather and analyse data for the research topic is a quantitative research

methodology. A quantitative methodology is an approach that deals with numeric data; the approach is used to measure the quantity of the research topic by producing numeric data that can be used for analytical and statistical purposes. A quantitative research methodology depends on standards, laws, rules, or generalisation (Slevitch, 2011). The methodology was used to collect data from average computer users in different areas around Johannesburg. The methodology was used to gather data about how users navigate through different applications and systems when they are interacting with them. The research methodology helped the researcher to focus on pointed, closed-ended questions that test specific variables which derive from the hypotheses or research questions.

F. Research Questions

Universal usability and ease of access and control are some of the guidelines that should be implemented when any computing system is developed. However, due to circumstances, some users may not have the same level of computer understanding, which would therefore limit some users and even prevent them from using the system. This study is about the evaluation of average users in computing interactions, and the identification of challenges they are facing, in order to comprehend poor user experience in some communities in South Africa.

- What are the computing usability challenges that have been identified when it comes to less experienced or average computer users?

Sub-Questions

- What is the purpose of computing interactivity?
- How can computing interactivity be evaluated?
- How can the computing usability challenges of less experienced or average computer users be addressed?

G. Data Collection Strategy

A questionnaire was used for this research to collect data from specified areas around the city of Johannesburg. The questionnaire is a data collection technique or research instrument that is used to collect data or information from one or more respondents, and consists of a set of questions that can be closed-ended questions or open-ended questions (Archarya, 2010). Questionnaires are one of the most inexpensive methods for collecting quantitative data from many people. The questionnaire allows individuals to remain anonymous and this allows participants to answer truthfully. The structured questionnaire was used to collect quantitative data. The method is used to collect very specific information, helps to verify the previous hypothesis, and validates previously accumulated data.

H. Data Analysis Technique

The data analysis technique that is used for this study is a descriptive data statistic. Descriptive analysis is an analytic

technique used to help describe and summarise the data collected from respondents into meaningful information (Rindfleisch, 2008). The type of descriptive analysis used was a measure of central tendency, which alludes to the possibility that there is one number that best summarises the whole set of measurements (Johnson, 2010). Descriptive analysis was used because the method produces results with rich data that is collected in large amounts. The method helped the researcher to describe or present the raw data found into meaningful information that people will be able to understand.

I. Population and Location

The research focused on adults between the ages of 18 and 55. The study focused on people who live in the areas of Soweto, Yeoville, Randburg, and Bellevue in the city of Johannesburg. The reason for doing the research around the specified areas is that most of the people who stay around these areas of Johannesburg are exposed to computer devices, and it was easy for the researcher to gather data from these people compared to other areas and provinces.

IV. ANALYSIS

There were 87 respondents in the survey, but only 75 provided valid responses. 63% were male respondents and 52% were female respondents, and they were all average computer users in South Africa. 81% were respondents between the ages of 18 and 23, followed by 17% who were between the ages of 24 and 29. Only a few respondents were between the ages of 30 and 45. 41% of the respondents indicated that they live in a township, and 60% of respondents indicated that they stay in the suburbs.

DIFFERENT TYPES OF COMPUTER SYSTEMS

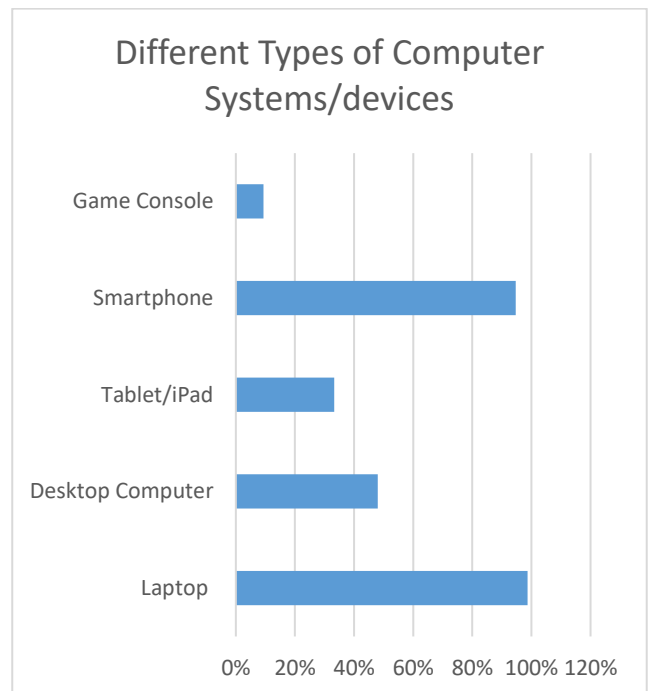


Fig. 1. Different types of computer systems and devices

As the figure above shows, the respondents were asked to select the different types of computer systems or devices they have access to; this could be at home, school, work or any place they have access to computer systems or devices. The figure shows that 99% of respondents have access to laptops in their lives, followed by 95% of respondents who have access to smartphones, 48% who have access to desktop computers, 33% who have access to tablets or iPads, and lastly, only 9% of respondents who have access to game consoles. Based on the percentages of different types of computer systems or devices that people have access to, the results showed that most people who stay in the townships and suburbs of South Africa are used to using computer systems, and that they have access to different types of computer systems.

After the respondents had finished identifying the different computer systems they have access to at home, school, work or any other place, they were then asked how comfortable they are with using computer systems. The

respondents were given different ranges of values to choose from, the values ranging from 1 to 5, with 1 indicating strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. 60% of the respondents indicated that they strongly agreed that they were comfortable with using computer systems, followed by 40% of respondents who agreed that they were comfortable using computer systems, while 11% of respondents were undecided on how often they use computer systems, and 3% of respondents disagreed with the statement that they were comfortable using computer systems. This data indicates that most average computer users in South Africa are comfortable with using computer systems on a daily basis.

TABLE I. THE RESULTS

Question Number	The questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I can find information quickly on the system, application or website.	33%	24%	10%	33%	15%
2	I need to learn before I use the application.	10%	14%	38%	19%	33%
3	The application provides feedback when an error occurs.	57%	29%	10%	10%	10%
4	The applications provide guidance or help to solve the error.	43%	24%	19%	19%	10%
5	Actions in an application can easily be reversible.	33%	33%	19%	24%	5%

Fig. 2. The Results of questions from the

Figure 2 above shows the results of questions that the users were asked in the questionnaire. The respondents were asked if they had ever used any South African government systems before. This was to find out what experiences they have had when interacting with South African government systems, because most people tend to use one of these systems when performing different activities such as applying for something, searching for information, making payments, and more. The respondents were asked if they have used any South African government system, application or website before. 67% of the respondents had used a South African government system, application or website, and 32% had never used any of the government systems before. Figure 2 above shows the statements posed, and the responses given as percentages, of the top five challenges that average computer users in South Africa face when they interact with South African government

systems and applications. The following sections explain the percentages of the five challenges in the above table.

J. I can find information quickly

The respondents were asked how easy is it for them to find information quickly in any of the South African government systems, applications or websites they had in mind when responding to this statement. 33% of the respondents found it extremely difficult to find information and navigate through the South African government systems, followed by 33% who agreed that finding information in these systems was easy for them. 10% of the respondents were not sure whether they faced problems in finding information or not. Based on the data we have gathered about finding information in the South African government systems, we can assume that 50% of people face problems in finding information in some of these systems, and the other 50% find it easy to find such information.

K. I need to learn before I use the application

The respondents were asked if they need to learn before using any of the South African government systems, applications or websites. 33% of the respondents strongly agreed that they needed to learn how to operate some of these systems. 19% agreed that they needed to learn before using some of the South African government systems, followed by 38% of respondents who were not sure if they needed to learn before using some of the systems or not. 14% of the respondents, plus a further 10% with particularly strong views on this point, said they didn't need to learn how to operate the systems before using them.

L. The application provides feedback when an error occurs

The respondents were asked if some of the South African systems, applications or websites provided feedback when an error occurred. 57% strongly disagreed that the government systems they had previously used provided them with feedback when an error occurred, followed by 29% who also agreed that the systems didn't provide feedback when an error occurred. 10% of the respondents were neutral as to whether or not some of the South African government systems they had used before had provided them with feedback when an error occurred. 10% of the respondents agreed, and a further 10% strongly agreed, that some of the government systems they had used before had provided them with some feedback when an error occurred. Most people indicated that most of the South African government systems did not notify users about errors, or provide feedback about the errors when they occurred.

M. The applications provide guidance or help to solve the error

The respondents were asked if some of the South African government systems, applications or websites provided guidance or help to solve errors that occurred. 43% of the respondents strongly disagreed, followed by 24% who disagreed that this was the case, while 19% of respondents were not sure if some of the South African government systems provided help or guidance as to how to solve an error that had occurred. 19% of the respondents also strongly agreed that some of the systems had provided them with help or guidance as to how to solve an error that had occurred, followed by 10% who simply agreed that this was the case. This shows that most of the South African government systems that people have used don't provide help or guidance to computer users on how to solve errors when they occur, because there is a big percentage difference between the number of people who used the government systems or applications and were helped, and the number of people who did not receive any help from the government systems.

N. Actions in an application or system can easily be reversible

The respondents were asked if actions in some of the South African government systems, applications or websites could easily be reversed when they made an error. 33% of the respondents strongly disagreed, followed by another 33% who disagreed, and 19% who were not sure if actions were reversible when an error occurred. 24% of the respondents agreed that some of the South African government systems

allowed actions to be reversed when an error occurred, followed by 5% who strongly agreed that this was the case. Discussion

The purpose of this study is to identify the challenges faced by average or less experienced computer users in South Africa when they are interacting with computer systems, applications, and websites. Average computer users are defined as computer users who are not first-time computer users and also users who are not super-experienced computer users. They are users who use computer systems in their daily lives, or perhaps only occasionally, but they are not experienced, computer users. Based on the responses we received, we found out that most respondents have access to different computer systems or devices such as laptops, smartphones, tablets or iPads, desktop computers, and game consoles. The laptop was the main device that most average computer users have access to, with 99% of users having access to a laptop in their lives, followed by smartphones, which 95% of people have access to. The device that is least used is the game console, which only 9% of users have access to.

Based on the results of the study, most respondents find it difficult to use some South African government systems, applications, and websites. Most of the respondents indicated that they strongly agreed that they needed additional help in order to operate some of the computer systems, applications, and websites they had previously used. Some respondents indicated or showed that before they operated some systems, applications or websites, they needed to learn how to use the system or application before they started using it. A high number of respondents indicated that some of these systems, applications, and websites don't provide feedback when an error occurs, or they are not notified that there is an error that has occurred, and this forces them to figure out a solution to the error for themselves. Another issue indicated by users was that most of these systems, applications or websites did not provide them with help or guidance as to how to solve the errors that occurred.

Lastly, a high number of users indicated that actions on some of the systems, applications, and websites could not be easily reversed so as to return to their original state, for example, by undoing some of these actions. Based on the results gathered and analysed, this research showed that most average computer users in South Africa face problems that are mainly experienced by first-time computer users, and that these users show characteristics of first-time computer users. The study showed the difficulties that most average computer users face when operating some of the South African government systems. The following elements of a system or application design were found to be the most common elements that contribute to poor system or application design among South African government systems and applications. The elements that were identified included the following: poor navigation, too much content (information all over the place), difficulties in finding information, difficulties in learning and using the application or system, difficulties in solving errors, actions not being easily reversible, and the applications and systems not providing guidelines or tips on how to perform some activities or tasks.

V. STUDY LIMITATIONS

The literature review is the most critical part of the study or research, because the literature review will help the researcher to determine the work or scope of what has been done before, and it will help the researcher to build a foundation for the research so as to meet the research goals. For this study, the researcher faced difficulties in finding articles dealing with computer usability, or any articles dealing with human-computer interaction related to the South African study. Accessing and finding average computer users residing in the specified areas was a problem because most people in these areas are super-experienced with regard to computer systems or devices due to them having easy access to computer systems. The data collected and analysed was small. If a small amount of data is collected, the results generated will be less accurate compared to having a large sample size. Quantitative methodology is more concerned with dealing with a large sample size compared to qualitative methodology.

VI. CONCLUSION

Through the introduction of smartphones, the internet, and the use of social media applications in South Africa, we have seen an increase in the number of users of computer systems and devices, and that these users face difficulties when they are interacting with computer systems, devices and applications that have been poorly designed. There has never been a study that addresses the challenges that average computer users in South Africa face when they are interacting with computer applications, web applications, and mobile applications. The goal of the study was to identify the challenges that most average computer users in South Africa face when they are interacting with computer applications, web applications, and mobile applications. The research methodology that was used to gather and analyse data for the research topic is a quantitative research methodology.

The methodology was used to gather data about how users navigate through different applications and systems when they are interacting with computer applications, web applications, and mobile applications. The questionnaire was used as a data collection instrument for this research, drawing from specified areas around the city of Johannesburg. The study showed that most average computer users in South Africa face problems that are mostly experienced by first-time computer users, and the users showed characteristics of first-time computer users when interacting with computer systems and applications. There were five challenges that were identified, which most average computer users in South Africa face when they are interacting with computer systems.

The top five challenges faced by average computer users in South Africa are the following: difficulties in finding information on the computer system or in the application, a need to learn more about applications and computer systems, an absence of feedback when an error occurs, no guidelines provided to solve errors, and actions cannot be undone once performed.

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