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ML-BASED META MODEL EVALUATION OF MOBILE APPS EMPOWERED USABILITY OF DISABLES

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Abstract

People with disabilities have a variety of obstacles and barriers in their daily life, making it difficult to execute routine tasks. The purpose of this paper is to improve their living conditions by empowering existing apps and creating an app that delivers up-to-date, accurate, and user-friendly accessibility information. Mobile adaption is incredibly beneficial for expanding mobile learning opportunities for children, adults, partially abled people, and people with disabilities. Smart mobile phones offer a variety of fundamental functions that can help you manage your hectic calendar, numerous errands, and free time. Numerous organizations developed portable applications in response to customer feedback and interests. These applications provide information, but since the market is evolving, so are people's needs over time. Applications rely on a certain point of contact that is not timed with the current period. As a result, there is a gap between users, programs, and utilities for smartphones that have been partially disabled or disabled. Everyone finds using the same interface to be unsatisfactory; they prefer alternative variations, such as customization or adaption. According to client requirements, the study built a few adaptable highlights with a change application. In this work, the study introduces a flexible element that offers applications the option to alter the connection point according to the user, partially disables, and disables necessities by using a new proposed model for evaluating mobile apps for smart mobile phones. In the context of mobile apps for disabled users, the Response Surface Method (RSM) design is utilized to forecast the real usability attributes. These apps and their features are assessed using a Meta Model analysis, which results in the delivery of an approved assessment equation. The study and inferred conclusions improved the usefulness

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of mobile apps for users, while also partially disabling and completely disabling them. Only 25% of Spaniards have sufficient accessibility, 40% can do so with assistance, and 35% are inaccessible and unable to reach a store. Convenience sampling was used to draw a convenience sample of 100 persons with disabilities. The study was done for the rehabilitation of special communities to make them functional and effective citizens of society. Questions about user experiences and needs for a variety of mobile health solutions are included in the survey. The researchers wanted to determine if mobile applications might be used to track a person's physical activity, rehabilitation, and education while they were living with intellectual and/or other disabilities. The study used records acquired following the performance of various disabled students from Asian educational institutions to explore this issue. A large number of studies appear to confirm that the use of mobile applications is designed to assist persons with impairments in their rehabilitation. The study used the response surface method to calculate the usability of mobile apps used by the disabled. This method found the relation between different attributes and their effects on usability through a proposed K-W-P feasibility model.

1. INTRODUCTION

As existing and developing technologies grow increasingly capable of supporting the population's health monitoring and feedback, education, and motivation needs, mobile health (health) technology is adopting an increasingly essential role in fitness, health maintenance, and health services. People can benefit from fitness and activity sensors, biosensor technology, and platforms for remote patient coordination by health providers in managing their overall health and fitness, as well as other chronic illnesses. These health technology solutions could be extremely beneficial to people with disabilities. Higher rates of sedentary lives, obesity, lower levels of exercise and community engagement, and limited access to transportation are frequently associated with disability. Consumers with impairments, on the other hand, use mainstream ICT (smartphones and tablets) to access health technology with the advancement of technology that helps health and fitness, difficulties remain. While encouraging, these advanced technologies are still restricted by limited functionality, app and sensor high precision concerns, poor durability and usability, and high user abandonment rates. Limited functioning - People with disabilities and chronic conditions are concerned about the lack of integration into a more comprehensive care approach, who generally have multiple diseases, restrictions, and conditions. This paper presents findings from a countrywide survey of persons with physical, cognitive, sensory, and emotional disabilities' experiences, needs, and potential solutions using health technology [1]. The ability to access and use mainstream wireless technology has become critical for social and economic involvement. Digital exclusion leads to reduced independence and increased social isolation. You are not part of the conversation, both literally and symbolically, if you do not have access to popular consumer information and communication technology. Access to these important technologies is largely determined by ownership rates. Analysis of technology users' behaviors, on the other hand, can provide a more complete assessment of the kind and extent of technology access. The Rehabilitation Engineering Research Center for Wireless Technologies performed the Survey of User Needs (SUN) for Wireless Technologies, a major, multi-year survey on the use and usability of mainstream wireless technologies by individuals with disabilities [2].

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Different people have different types of impairments or diseases. Some people are deaf, blind, or have no legs or limbs, among other disabilities. As a result of these kinds, the majority of disabled people rely on their parents or other family members or guardians. Parents or guardians may want to ride with their children at times. Of these responsibilities, these issues have some solutions, which are as follows: This paper discusses it. If we try to educate these crippled people, who are interested in our proposed mobile application the life of these disabled people and their guardians will become more comfortable. Mobile technology was first developed in 1973. So much work has been done so far on its applications, such as the Internet. SMS, Calls, MMS, GPRS, Mobile TV, Mobile Banking, and other services are available. Around 650 million people, or 10% of the world's population, live with a handicap, according to the United Nations. Furthermore, the most vulnerable social groups or minorities, such as those with lower incomes, those with lesser levels of education, the elderly, women, and street youth, tend to have higher rates of impairment, putting them at an even greater disadvantage. For visually challenged and blind people, gaining complete freedom when doing everyday duties and activities is difficult. Everyone's vision modality is necessary for acquiring new abilities, reacting to surrounding spaces, and enjoying the human activity. Blind people's capacity to function is affected by their loss of vision, which impairs everyday living activities, academic progression, work opportunities, and social inclusion. According to a recent WHO factsheet, there are 2.2 billion individuals worldwide who are visually impaired or blind, with at least 1 billion of them potentially treatable or preventable (WHO 2019). This increase in the number of blind people will have an impact on people's quality of life and create a societal imbalance [3].

New research on health and travel, four out of five disabled people are nervous about taking public transportation, while three out of five are afraid. In a Business Insider piece, Sarah Katz explains how she is often refused access to essential services that are available to non-disabled visitors. Ignoring the fact that travel is a fundamental element of modern life that connects people to jobs, education, and leisure activities, she believes that many types of public transportation are still inaccessible to the deaf community. She also notes that inaccessibility harms their livelihood, mental health, and physical health. The difficulties faced by deaf people on public transportation are exacerbated by the attitude of transit operators [4]. People with disabilities admit that if employees were better prepared to cope with their needs, they would use public transit more. To manage public transit, the deaf and hard of hearing must rely on visible road signs and the help of fellow travelers [5]. Deaf persons must rely on lip-reading to hear announcements given by transit operators. However, According to studies, just 30 to 45 percent of the English language can be read on the lips. A real-time sign language translator would be essential for deaf people and the general public to communicate. Many countries developed tools and software (assistive technologies) to help hearing-impaired people to communicate.

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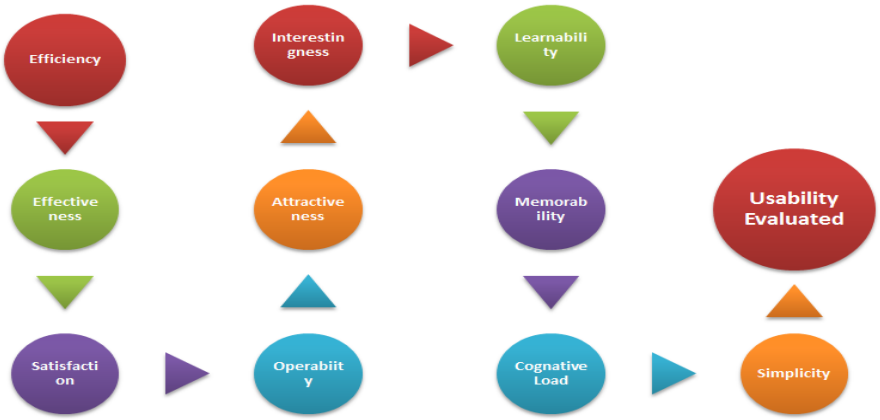
Figure 1: K-W-P Feasibility Model



The K-W-P Feasibility Model depends on seven usability attributes from the PACMAD model and three attributes added. The Usability Requirements Catalog (USB-CAT) is proposed for health mobile devices [6]. This catalog supports the review of existing applications as well as the development of outstanding new software apps. This catalog's usability criteria are based on the ISO/IEC/IEEE 29148 (2011) standard and the SIREN methodology; additionally, the catalog's usability requirements are:

Requirements for ease of use

- Requirements for personalization and internationalization.
- Training skills.
- Requirements for readability and courtesy
- Requirements for accessibility.

The Best Disability-Friendly Apps for 2020-2021

Petralex

Petralex was created with the express purpose of assisting anyone who might have difficulty hearing clearly, particularly in social situations.

Be My Eyes

Be My Eyes is a free app that uses a live video conversation to connect blind and low-vision persons with adopters and industry experts for visual aid.

Voice Dream Reader

Voice Text-to-speech technology in Dream Reader allows you to listen to any document or ebook. In 81 countries, Apple named it the Best New App and App of the Day, and it's now part of the App Store's Permanent Collections in Education.

Miracle Modus

When suffering from sensory overload, the creator, who has autism, discovered that repeated patterns and forms were relaxing. They developed Miracle Modus, an app that

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allows users to choose from a variety of relaxing patterns and noises to deliver calming effects.

JAB talk

For adults and children who are non-verbal, JABtalk is a free open-source Android speech communication tool. JABtalk is frequently cited by speech therapists as an accessible and efficient augmentative and alternative communication (AAC) method.

2. BACKGROUND

Individuals' health benefits from social activity. People with impairments that limit their mobility, on the other hand, have lower levels of social involvement. Information and communication technologies (ICTs), such as the OnRoule mobile application (app), can aid in the promotion of social involvement. Objectives: To gather feedback on the OnRoule app's usability and content for giving accessibility information, as well as its potential to improve social involvement. Materials and Procedures: A cross-sectional study of user-centered design. Community groups were used to recruit people with physical limitations, who were then, questioned using a semi-structured guide. Thematic analysis was used to study the recorded, transcribed, and analyzed interviews. User-friendliness, "balance between the volume and relevancy of information," and "possible using the app" was highlighted as three basic elements. The findings of this study revealed that the app was simple to use, included useful information, and provided a favorable information-gathering experience. However, other development opportunities were recognized, including element clarity, information structure and quantity, feature optimization, and inclusivity. Apps like Oriole might improve social involvement by making it easier to access resources in the community and fostering a feeling of community among users [7]. People with impairments such as deafness, blindness, and mental illness face a variety of challenges. Smartphones and mobile phones are quickly becoming an indispensable part of our everyday lives. This article advocates for the use of mobile phones for people with disabilities. Mobile device usage is on the rise. Today, a layperson may benefit from these technologies. Disabled folks require the usage of this equipment as well. Parents and guardians are concerned about how to safeguard their impaired relative from harm. We have discussed ways to make smartphones helpful and safe for handicapped persons in this post. We presented an application for impaired people in this study that would assist and track their actions. We also discussed how to utilize sensors and mobile devices to build helpful applications for impaired persons in this post. We can construct a wide range of applications for impaired individuals by combining mobile sensors. This is an uncharted territory that deserves further investigation. A critical analysis of existing technology is offered in this study article, and several difficulties with handicapped individuals and mobile phones are highlighted for future development. We provide a dynamic, mobile application for the acute need and security of handicapped people in this research. Furthermore, the suggested strategy has the potential to improve quality and reliability [8].

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3. LITERATURE REVIEW

In their daily lives, people with motor disabilities experience several challenges and impediments, making it difficult to complete routine chores. The goal of this project is to enhance their living situations by developing an app that provides updated, reliable, and friendly accessibility information. The system's development incorporates national and regional accessibility regulations, architectural aspects, substantial fieldwork, and a long-term software development method. The various levels the project's usability and application requirements are specified in the early stages. The examination of 357 commercial establishments in Murcia was part of the fieldwork.

Only 25% of Spaniards have acceptable accessibility, 40% can be done with assistance, and 35% are inaccessible unreachable stores. The suggested system meets its sustainability and accessibility goals. Furthermore, the system can serve as a powerful motivator for firms to increase their accessibility. Finally, emerging technologies must play a larger role in promoting universal accessibility. These instruments must also take into account the needs of long-term development [9].

This paper presents findings from a countrywide survey of persons with physical, mental, sensory, and emotional disabilities' perspectives, needs, and potential solutions using mHealth technology. A convenience sample of 377 adults with impairments was drawn using convenience sampling. From February through August 2017, data was collected. The Rehabilitation Engineering Research Center for Community Living, Health, and Function conducted the survey. The questionnaire includes questions about user experiences and needs for a variety of mHealth solutions.

This article examines the sorts of health/wellness mobile applications currently in use by persons with disabilities, as well as satisfaction levels with the use of healthcare apps, Interest in an online library of information/reviews ease/difficulty in discovering useable and effective healthcare apps [10]. Technology, particularly mobile technologies, has evolved greatly in recent years, while the cost of utilizing mobile devices has reduced significantly. This rapid technological evolution is thought to offer an outstanding opportunity to improve a handicapped person's independence. It can, however, be a source of social isolation. Certain barriers, such as a lack of built-in accessibility options, can limit the usage of smart devices by this vulnerable demographic. As a result, the usefulness and practicality of mobile phones should be considered. The goal of this study was to see if mobile applications are used to track a person's physical activity, rehabilitation, and education while they are living with intellectual and/or other disabilities. We used the datasets from the National Center for Biotechnology Information (NCBI), with a concentration on the PubMed database, to investigate this issue. We qualified for further examination of the results, which appeared when searching for key phrases and expressions, based on the process of finding and selecting results (mobile applications, disability, rehabilitation, intellectual disability. We discovered 115 scientific papers. We chose 23 publications from this sample that were relevant to our research. A considerable number of researches appear to confirm that the usage of mobile applications is intended to aid in the rehabilitation of people with disabilities [11].

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The Rehabilitation Engineering Research Center for Wireless Technologies performed the Assessment of User Needs for Wireless Technologies, a major, multi-year survey on the use of consumer wireless technologies by individuals with disabilities. It is important for social and economic inclusion, of access to mainstream use of wireless technology, is especially difficult for people with disabilities. Technology ownership rates indicate how widely these key technologies are used. Analysis of technology users' behaviors, on the other hand, can give a more complete evaluation of the kind and extent of technology access.

Smartphones have become the focal point of many people's digital lives due to their adaptability (connectivity, size, and mobility).disabled people now use their cell phones, including voice calls, text messaging mobile email using social networking, etc. Adults with physical, cognitive, and sensory impairments are evaluated as a group for the influence of important demographic characteristics such as age, race/ethnicity, and family income on smartphone activity by disability type (blindness, deafness, difficulty speaking, etc.)[12]

The goal of this scoping review is to describe the present state of cognitive, motor, and sensory disorder mobile applications in terms of access to the person. Mobile devices have proliferated in recent years, allowing for new methods of communicating, managing, and working. Mobile devices strive to democratize access to knowledge on many issues in this context; nevertheless, accessibility requirements are not followed. The reviewers culled the most relevant publications from the ACM Digital Library, IEEE Xplore, Science Direct, Scopus, and Web of Science databases between 2000 and 2020. The PRISMA-ScR checklist was used to retrieve scientific publications in this scoping review; Cohen's kappa coefficient = 0.4117 was employed, indicating moderate reviewer concordance, and 22 primary studies were extracted from a total of 211. The findings of this study imply that mobile applications should use WCAG 2.1 to attain a sufficient degree of accessibility. Future research indicates that review tools with machine learning based on artificial intelligence algorithms are being developed.[13] The use of ubiquitous technology like smartphones, smartwatches, and wearable assistance bands is becoming more common. Smartphones and smartwatches have become indispensable tools for visually impaired and blind persons to carry out everyday tasks, boosting independence, productivity, and self-reliance. Accessibility features like talkback and voice assistants make it easier for blind individuals to use smartphones to do things like make phone calls, share photos, read books, and send messages. Existing accessibility services, on the other hand, confront several challenges, including late learning, accessing, and choosing non-visual elements on the screen, locating objects of interest in a complicated layout, multimodal engagement, and managing several linked devices. Designing a blind-friendly interface to simplify and distribute User Interface Artifacts (UIAs), such as labels, buttons, layouts, and panels across multiple devices is one solution to these problems. The framework customizes UI components for smartphones and smartwatches, resulting in a better user experience. This practically studies included 49 blind persons and this significantly improved the productivity of the user experience work completion accuracy [14-16].

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4. METHODOLOGY

The reason for usability testing is to perceive the way that well individuals can comprehend and utilize an item to achieve their objectives. It likewise connects with the degree of satisfaction that users have with the technique. To test the usability assessment of portable applications different reviews are finished on numerous instructive, persuasive, gaming, and Islamic children applications to work on their efficiency, unwavering quality, and user satisfaction. A group is separated into 4 gatherings to encounter the working and criticism of various applications as per various ages 40 participants participated in usability testing for each gathering. As per activity, at least eight to ten people are important to give solid appraisals to uncover the usability issues of a connection point. The members were a blend of young partially disabled, disabled boys and girls with fluctuating degrees of involvement, going from fledgling to progress. The young people were all in education, 10 to 25 years of age, and were chosen from different special education institutes. For the trial of usability, every member was permitted to give a shot at both educational and entertainment applications. Every one of the members needed to follow through with 7 jobs. Both applications have their arrangements of highlights. Individuals that went to were permitted a wide opportunity to research before playing out the exercises; you should initially introduce the projects. Equivalent time is given for various applications to satisfy the errands. In the wake of finishing the job, Following Questionnaire and assignment list are expected to finish closing the usability assessment given in the annexure [17]. The study also proved and validate the proposed K-W-P feasibility model through the formal method by using data gathered after the performance.

4.1 Efficiency

Efficiency alludes to the quantity of consumption made concerning the accuracy and culmination with which clients satisfy their goals. The overall usability of mobile learning applications for youngsters is a basic issue since kids would rather not try hard with the applications because the UI is not intriguing to them. Under the efficiency aspect, three sub-aspects were recognized (Compatibility, Time Loading, and Accuracy) [18].

$$\text{Time Based Efficiency} = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{n_{ij}}{t_{ij}}\right) \qquad \textbf{(1)}$$

N= Number of Jobs

R= Number of Contestants

nij = Job I result by contestants j (For successful nij= 1 and unsuccessful nij = 0)

tij = Time to complete job j by contestant i (in case of unsuccessful contestant time taken till the quitting of a job)

Eq. (1) represents the formula of time-based efficiency to calculate the efficiency of different tasks performed by participants.

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4.2 Effectiveness

The exactness and consistency with which clients accomplish given objectives are characterized as effectiveness. In most examinations, it is calculated by the number of right responses. These two sub-factors were joined to assess the efficiency of the application interface: (Navigation and Presentation) [18].

$$\text{Effectiveness} = \frac{\text{Total Number of Successful Participants}}{\text{Total Number of Participants}} * 100 \quad (2)$$

Eq. (2) represents the effectiveness of the adaptive features of smart cellular phones in terms of easiness and successfulness behavior of the features adopted.

4.3 Operability

Operability is defined as how much an item or framework has features that simplify it to utilize and control. It is Error insurance for clients. [19].

4.4 User Satisfaction

The degree to which an item can be used by unambiguous clients to accomplish explicit objectives in a particular setting with viability, efficiency and satisfaction, so User Satisfaction is only one of the significant components of usability, as per the ISO definition [20].

4.5 Attractiveness

The attractiveness of the model upgrades the usability of the framework it acquires the client's interest individuals will show close-to-home reactions [21].

4.6 Awareness (Interestingness)

The rising popularity of adaptive features is a promising entryway for self-organization. Applications that can accommodate more users can be created with relative ease if the arrangement and usability are understood. This study aims to perceive, separate, and coordinate the state of the art in the fields of (a) arrangement approach and (b) usability assessment of distress the leader's practical applications [22].

4.7 Learnability

"How easy is it for the user to learn to operate the system?" is the definition of the learnability property. It is possible if our software has an easy-to-use interface and traditional resemblance to other software. Due to lessons learned from prior experiences, individuals are not exerting themselves beyond what is necessary to use technology, and they also dislike completely original software [23]. Different users have varying levels of difficulty, and it is also clear that the learnability trait of mobile banking apps must be achieved or evaluated[24].

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4.8 Memorability

The capacity to retain, when leaving and later returning, the operations and features made available by a website or application. It is one of the usability principles that Jakob Nielsen outlined.

4.9 Cognitive Load

Cognitive Load Theory (CLT) postulates that human beings possess a limited capacity for working memory and, if presented with information that exceeds this capacity, information overload occurs. In the case of disabled, which have lower capabilities as compared to normal ones then, they cannot handle the apps

4.10 Simplicity

The term "simplicity" is used broadly to describe the requirement to reduce the number of stages in a process, to employ vocabulary and symbols that make the interface as clear as possible, and to make it challenging for users to make mistakes.

5. EXPERIMENTATION AND SAMPLING

Data that is used for the methodology is primary data that is gathered during and after the activity performed that can be used by anyone. In this review, members were cell phone users with no less than one year of involvement. A per-questionnaire was created to figure out the significant members for the best user trial and error. At first, 100 members were found through a questionnaire in which 20 users were disposed of in the initial step due to the short of one year of involvement in cell phone use. A few members were rejected because of different reasons, explicitly 19 users were willfully not willing, 11 with other issues, and 10 were incapable to figure out the versatile elements. The excess 40 members were chosen for the trial and partitioned into four gatherings. Each gathering was relegated to a particular undertaking that contained 10 members in equivalent orientation proportion. Besides, all undertakings were acted in four meetings with and without versatile highlights. The members went to a basic exhibition in the lab for the two meetings independently for each undertaking. They exhibited the importance and proportions of doled-out errands momentarily. The period of members for the initial three gatherings went from 10 to 25 years [25-29].

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ANOVA for Linear Model

Response 1: Usability

Transform: Square Root, Constant: 0

Source	Sum of Squares	Df	Mean Square	F-value	p-value	
Model	1.36	10	0.1364	14411.29	< 0.0001	significant
A-Effectiveness	0.1858	1	0.1858	19630.41	< 0.0001	
B-Efficiency	0.0424	1	0.0424	4480.35	< 0.0001	
C-Satisfaction	0.0056	1	0.0056	590.57	< 0.0001	
D-Learnability	0.0401	1	0.0401	4239.75	< 0.0001	
E-Memorability	0.0302	1	0.0302	3192.42	< 0.0001	
F-Simplicity	0.0341	1	0.0341	3597.46	< 0.0001	
G-Attractiveness	0.0332	1	0.0332	3509.21	< 0.0001	
H-Operability	0.0396	1	0.0396	4178.24	< 0.0001	
J-Cognitive Load	0.0972	1	0.0972	10265.20	< 0.0001	
K-Interestingness	0.0074	1	0.0074	786.08	< 0.0001	
Residual	0.0003	29	9.467E-06			
Cor Total	1.36	39				

Factor coding is coded.

The sum of squares is Type III – Partial

The model is implied to be significant by the Model F-value of 14411.29. An F-value this large might happen to owe to noise only 0.01% of the time.

Model terms are considered significant when the P-value is less than 0.0500. In this instance, key model terms include A, B, C, D, E, F, G, H, J, and K. Model terms are not significant if the value is higher than 0.1000. Model reduction may enhance your model if it has many unnecessary terms (except those needed to maintain hierarchy).

Build Information

File Version	**13.0.5.0**		
Study Type	Response Surface	**Subtype**	Randomized
Design Type	Central Composite	**Runs**	40.00
Design Model	Reduced Quadratic	**Blocks**	No Blocks

Factors

Factor	Name	Units	Type	Sub Type	Minimum	Maximum	Coded Low	Coded High	Mean	Std. Dev.
A	Effectiveness		Numeric	Continuous	40.00	80.00	-1 ↔ 1.00	+1 ↔ 100.00	61.11	13.59
B	Efficiency		Numeric	Continuous	40.00	76.57	-1 ↔ 1.00	+1 ↔ 100.00	55.31	8.25
C	Satisfaction		Numeric	Continuous	40.00	58.00	-1 ↔ 1.00	+1 ↔ 100.00	49.52	4.58
D	Learnability		Numeric	Continuous	54.00	75.00	-1 ↔ 1.00	+1 ↔ 100.00	64.72	6.37
E	Memorability		Numeric	Continuous	50.00	68.00	-1 ↔ 1.00	+1 ↔ 100.00	59.30	4.57
F	Simplicity		Numeric	Continuous	51.00	70.00	-1 ↔ 1.00	+1 ↔ 100.00	61.45	5.32
G	Attractiveness		Numeric	Continuous	48.00	70.00	-1 ↔ 1.00	+1 ↔ 100.00	58.80	6.32
H	Operability		Numeric	Continuous	49.00	68.00	-1 ↔ 1.00	+1 ↔ 100.00	58.40	5.83
J	Cognitive Load		Numeric	Continuous	0.0000	68.00	-1 ↔ 1.00	+1 ↔ 100.00	57.58	10.59
K	Interestingness		Numeric	Continuous	49.00	68.00	-1 ↔ 1.00	+1 ↔ 100.00	59.95	4.90

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Responses

Response	Name	Units	Observations	Minimum	Maximum	Mean	Std. Dev.	Ratio
R1	Usability		40.00	49	65.8	58.62	2.83	1.34

Fit Statistics

Std. Dev.	**0.0031**	**R^2**	**0.9998**
Mean	7.65	**Adjusted R^2**	0.9997
C.V. %	0.0402	**Predicted R^2**	0.9990
		Adeq Precision	691.6785

The discrepancy between the Predicted R^2 of 0.9990 and the Adjusted R^2 of 0.9997, which is a reasonable agreement, is less than 0.2.

The ratio of signal to noise is measured by Adeq Precision. A ratio of at least 4 is preferred. Your signal is strong enough based on your ratio of 691.678. To move around the design space, utilize this model.

Final Equation in Terms of Coded Factors

Sqrt(Usability) = +7.12 + 0.3237*A +0.3182* B +0.3191* C +0.3220* D +0.3194* E +0.3209* F +0.3205* G +0.3324* H +0.3421* J +0.3163* K

It is possible to anticipate the reaction for specific levels of each element using the equation expressed in terms of coded factors. By default, the factors' high levels are coded as +1 and their low levels as -1. By contrasting the factor coefficients, the coded equation can be used to determine the relative importance of the elements.

Figure 2: Normal Plot for Checking the Significance of the Model

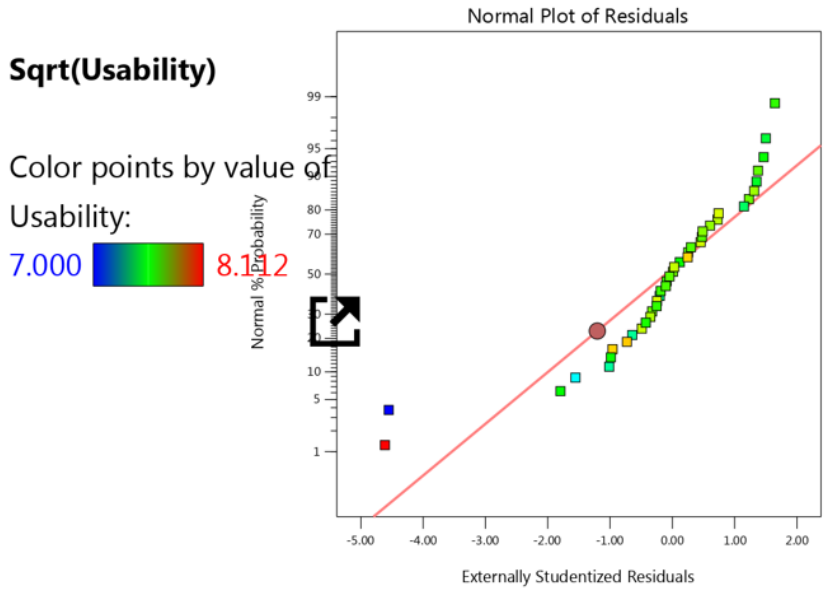

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Figure 3: Effect of Efficiency and Effectiveness on Usability

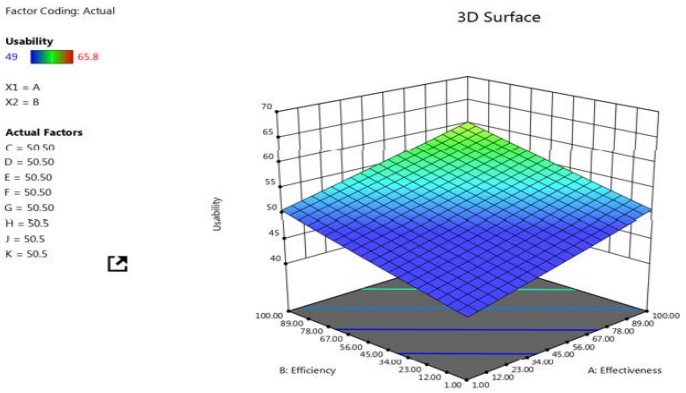

Figure 4: Effect of Effectiveness and Satisfaction on Usability

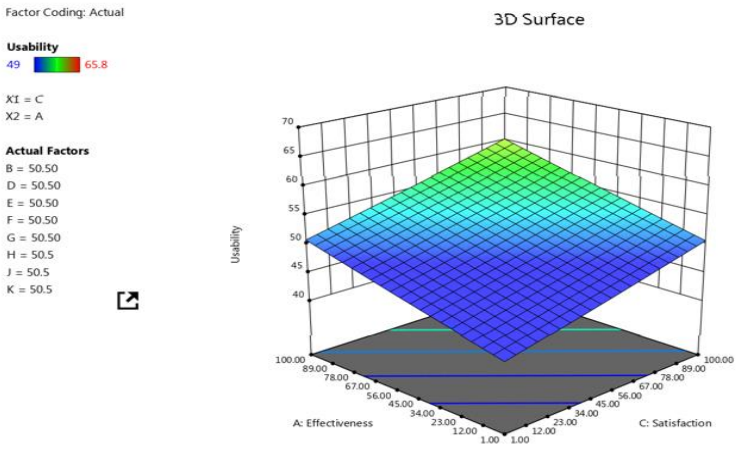

Figure 5: Effect of Effectiveness and Learnability on Usability

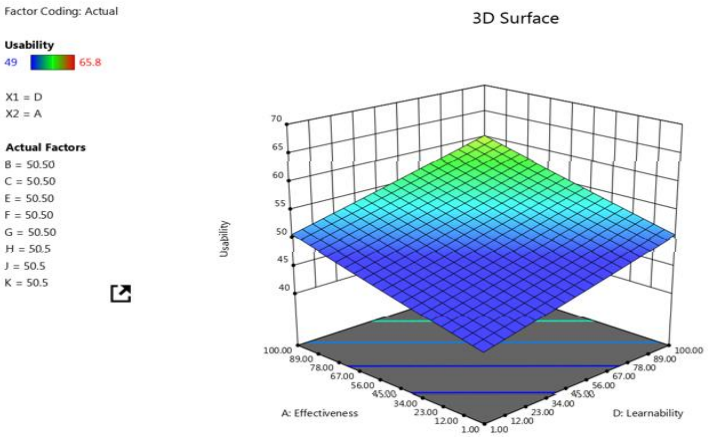

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Figure 6: Effect of Effectiveness and Memorability on Usability

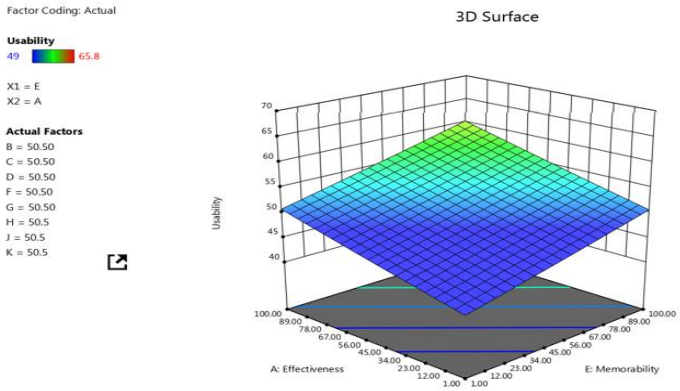

Figure 7: Effect of Effectiveness and Simplicity on Usability

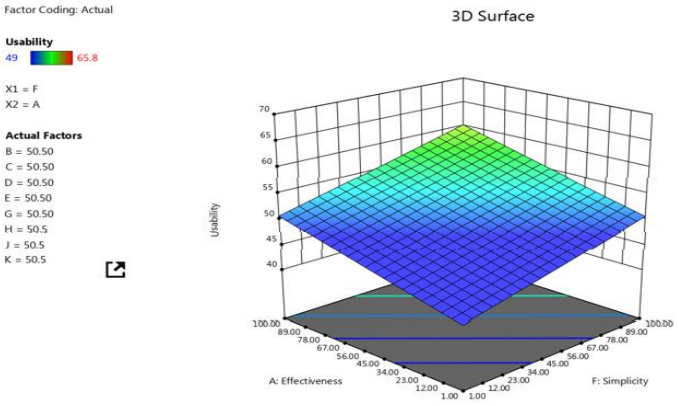

Figure 8: Effect of Effectiveness and Attractiveness on Usability

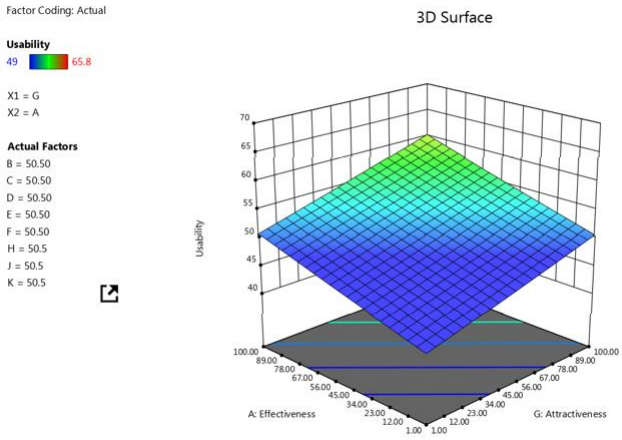

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Figure 9: Effect of Effectiveness and Operability on Usability

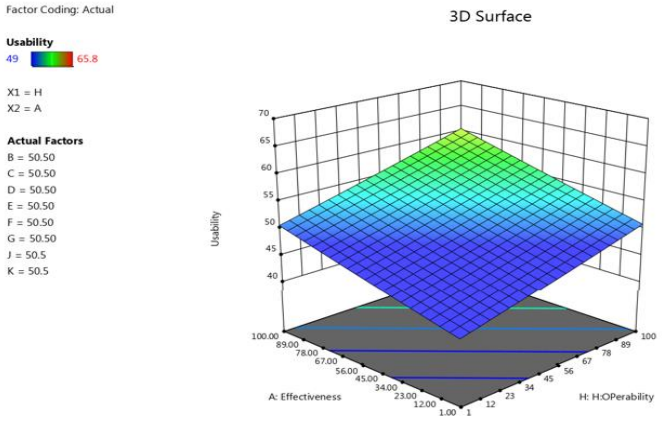


Figure 10: Effect of Effectiveness and Cognitive Load on Usability

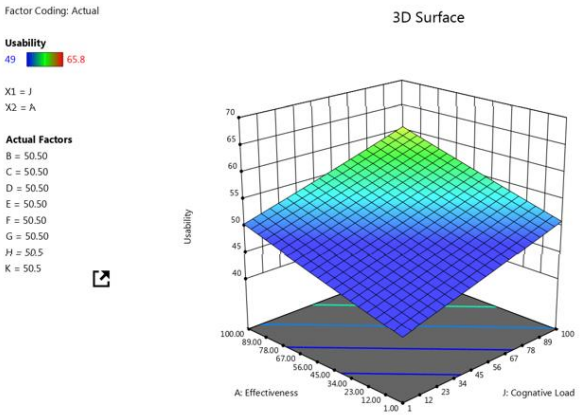
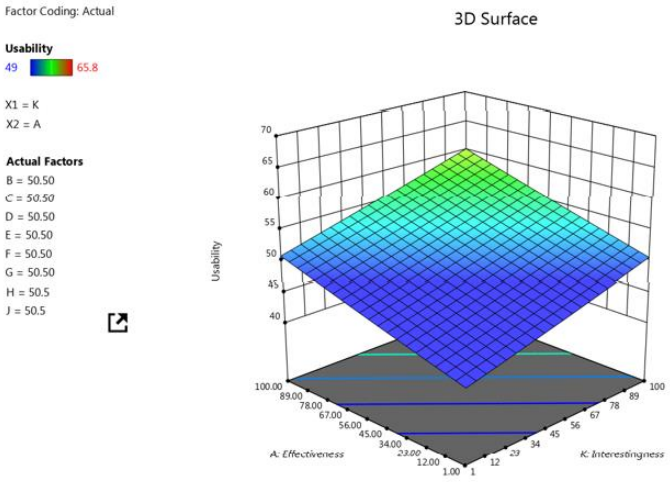


Figure 11: Effect of Effectiveness and Interestingness on Usability



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6. ANALYSIS

As seen from table Response that the usability of concerning apps needs to be improved. In the support Satisfaction level is also very low. It should be increased by understanding the psychology and cognitive load of the disabled when developing mobile apps. The recommended qualities have a stronger impact on usability when assessed on features of mobile apps for smartphones designed for disabled people, as can be seen in the usability with attributes figures. As a result, the study's suggested model is realistic, and the usability equation it generates can be used to assess more mobile apps for the disabled and users of diverse demographics. These findings also demonstrate that usability is closely related to, and has a significant impact on, effectiveness, efficiency, attractiveness, satisfaction, interestingness, learnability, memorability, cognitive load, simplicity, and operability.

The study in this paper looks at commonly used modern mobile phone apps for disabled people. Smart mobile devices to satisfy the needs of both regular and disabled users, businesses have produced a small number of cell phones with apps. The study inspired this analysis to examine whether or not smartphone applications satisfy the requirement of Users' Satisfaction Levels. The following reading will focus on three boundaries. Regardless of whether smartphone applications satisfy current client requirements, effectiveness, satisfaction, and efficiency levels are measured. To conduct this study, a small number of clients are involved. We start by taking 100 users and then filtering out 40 of them. These clients were divided into 4 groups: Group A, Group B, Group C, and Group D. Each group has ten participants.

The study looked at voice instructions, had people execute another assignment that involved gesture-based navigation, play out another assignment that involved LED notifications, perform one-hand mode repeatedly, and check to see if the application was opened swiftly. Results indicate that only a small number of people have completed this task; nonetheless, some of them have failed on numerous fault bases. The advanced technologies are nonetheless limited by limited functionality, app and sensor high precision problems, poor durability and usability, and high user desertion rates, which are all promising. 650 million people, or 10% of the world's population, live with a handicap, according to the United Nations.

We distinguished that usability issues of adaptivity still exist because of uniform adaptive features given by the smartphone developers paying little mind to client capacity and task context. Right now, the user decides to turn on or off any adaptive features while performing any specific task. The trial result infers that the adaptivity in the user interface has a more noteworthy capacity to build the convenience of smartphones whenever applied in a reasonable context. Finally, I would like to recommend that the interface of smartphones should be more adaptive, easy to use by everyone, and customizable. There are 2.2 billion individuals who are visually impaired or blind, with at least 1 billion of them potentially treatable or preventable. This increase in the number of blind people will have an impact on people's quality of life and create a societal imbalance. Many types of public facilities are still inaccessible to the deaf community in Asia. Inaccessibility hurts

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their livelihood, mental health, and physical health. The difficulties faced by deaf people in learning and daily usable gadgets and apps are exacerbated. A real-time sign language translator would be essential for deaf people and the general public to communicate. The graphical results of the study show that the K-W-P feasibility model is validated as all attributes of usability are directly related to usability except Cognitive load where little bit of reverse effect with usability.

7. CONCLUSION

Mobile health technology is adopting an increasingly essential role in fitness, health maintenance, and health services for the normal and disabled. People can benefit from fitness and activity sensors, biosensor technology, and platforms for remote patient coordination by health providers.

The Meta Model analysis opens gaps to improve the usability of mobile apps for effective use and find the relationships between different attributes with usability. The Meta model applied is more appropriate and significant shown in Table. Further exploration should be on the awareness (interestingness), attractiveness satisfaction, and some extent to efficiency in a few cases of the parts of mobile apps; limit the gap between users (like children, disabled, and understudies those for whom these applications are created) and specialists (like IT specialists and developers) to improve interfaces and features. It is suggested that usability evaluation of smartphones and their applications be led sub-task-wise in each interaction to further develop the satisfaction level of users because some users cannot focus on tasks the same as others. In this paper, the study took a look at the convenience of disabled mobile apps given by sellers on smartphones. The study assessed these apps because of efficiency, productivity, and fulfillment. We have followed the User Centered Design (UCD) to break down the Usability of mobile apps. It is observed that the purpose for less efficiency is trouble in acknowledgment of the emphasis of most clients. On the other hand, the study validated the K-W-P feasibility model in the context of usability with all its attributes.

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