DEVELOPMENT OF PERSUASIVE APPLICATION FOR REDUCTION OF ALCOHOL CONSUMPTION IN NIGERIA

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ABSTRACT

The rate at which youths are being introduced to alcohol, the harm it does to their young lives together with the burden of disease created by the abuse of alcohol and the socioeconomic problems motivated the researcher to delve into the design and development of this system. This paper aims at providing a better approach for solving the problem of alcohol addiction using Persuasive Technology. It has been found that people find it easier to share their problems with a computer system more than they would to a fellow human. Again, computers are better persuaders than humans because they have some advantages like time and space which human do not have and can have access to places which human cannot physically be. Reciprocation, commitment, social proof, authority, framing and salience were persuasive strategies employed in the development of the system. Object-Oriented Analysis and Design Methodology (OOADM) was employed. Implementation was achieved using Hypertext Preprocessor scripting language and MySQL server. The result is a web-based application that provides users with not just the requisite information needed about alcohol addiction but also exercises and activities that persuades them to think deep about their addiction and work hard towards overcoming them.

Keywords: Alcohol, Persuasive Technology, Health, Alcohol Addict, Alcohol Intervention.

1. INTRODUCTION

Alcohol (ethanol or ethyl alcohol) is the ingredient found in beer, wine and spirits that cause drunkenness (Centers for Disease Control and Prevention (2010)). It is formed when yeast ferments (breaks down without oxygen) the sugars in different food. For example, wine is made from the sugar in grapes, beer from the sugar in malted barley (a type of grain), cider from the sugar in apples, vodka from the sugar in potatoes, beets or other plants. Alcohol is classed as a 'sedative hypnotic' drug, which means it acts to depress the central nervous system at high doses. At lower doses, alcohol can act as a stimulant, inducing feelings of euphoria and talkativeness, but drinking too much alcohol at one session can lead to drowsiness, respiratory depression (where breathing becomes slow, shallow or stops entirely), coma or even death (Health Promotion Agency, n.d.). Though there were no written rules prohibiting females and adolescents from drinking alcohol in the traditional era (Odejide, 2006), consumption was the reserve of men and played a crucial role in political, religious and socio-economic relationships. In this era, alcohol played complex roles in religious and communities' rituals and served as a conduit for social cohesion. Because of these ceremonial functions, adult males were expected to drink being served by the youth.

Today, the reverse has become the case as alcohol is no longer the reserve of men neither is the age of the drinker considered as so important; it is widely accepted in our society as most homes use it as a form of entertainment for their guests. Although the minimum drinking age remains 18 years, young people buy and drink alcohol freely in public places (Dumbili, 2013). It is also one of the mostly anticipated beverages at weddings, parties, child dedication and other functions. Any occasion or function as it were is never complete without the presence of alcoholic beverages. In addition, pubs and clubs serve it freely as a major recipe. Among the youths of today, it is used as a show of maturity or 'senior boy', as a youth who does not drink alcohol is looked down upon by his peers.

Although alcohol has positive benefits, its negative effects seem to outweigh the positive benefits. It is safe to say that alcohol is both a tonic and a poison. The difference lies mostly in the dose. Heavy drinking can damage the liver and heart, harm an unborn child, increase the chances of developing breast and some other cancers, contribute to depression and violence, and interfere with relationships. Heavy drinking is a major cause of preventable death in most countries. Alcohol is responsible for about half of fatal traffic accidents. Even moderate drinking carries some risks. Alcohol can disrupt sleep. Its ability to cloud judgment is legendary. Alcohol interacts in potentially dangerous ways with a variety of medications, it is also addictive, especially for people with a family history of alcoholism (Harvard School of Public Health, 2015).

A major contributor to alcohol abuse is the absence of alcohol policy in Nigeria. Globally, alcohol producers frown at strict measures to regulate the production and marketing of alcohol through legislation due to economic interest (Dumbili, 2013). Although Nigeria and many other African countries contribute to the global burden of alcohol-related problems due to increasing harmful use, only a few countries within Africa have policies to regulate alcohol use and misuse. Even those that have policies, the vested interest, which affects not just Africa, but the other part of the world can render policy ineffective and subject to misuse (Dumbili, 2013).

In developed societies, policy makers always set the standard measurement of alcohol in volume and value. This helps to determine what responsible consumption is for adults who are legally qualified to drink. In UK for instance, the standard value of the unit of alcohol is 7.8 grams and women and men's maximum of drinks per week are 14 and 21 standard drinks respectively. Against this background, pregnant women or those who are likely to get pregnant are advised not to consume alcohol within the period of conception (Farke, 2011). Therefore, before any country can determine 'responsible' or 'irresponsible drinking', there must be a clear definition of what a standard drink is for legally qualified consumers. In Nigeria, there is no definition of a standard or responsible drink by the government or the brewers and alcohol containers come in varying sizes and shapes. Even locally made alcoholic beverages are packed and served in different sized bottles and glasses. There is no basis, therefore, for judging a responsible drink (Dumbili, 2013).

Other contributors to the abuse of alcohol are the easy accessibility of alcohol and lack of implementation of the minimum drinking age by both the government and the brewers. Though an 18 years' legal limit exists (on paper), many social constraints hinder adherence in Nigeria. Presently there are no means of identification of minors (or even adults) in Nigeria due to the failure of national identity card projects and the police do not arrest those who sell to minors. In bars and restaurants, young girls are strategically employed as sales girls in order to attract males to patronize the drinking pubs. This encourages alcohol initiation, use and abuse because these young girls, who may not have been drinkers prior to their employment, may learn to drink as they serve these male patrons in order to satisfy their employers (Dumbili, 2013).

It is against this background that the researcher seeks to develop an alcohol intervention tool, to deal with this increasing issue of alcohol abuse. This tool shall be developed using an aspect of Computer Science known as Persuasive Technology and the main tool of this persuasive technology for will be tailored information.

Scholars do not agree on the precise definition for persuasion, but for the purpose of this work, persuasion is a non-coercive attempt to change attitudes or behaviors. There are some important things to note about persuasion. First, persuasion is non-coercive. Coercion which is the use of force is not persuasion; neither is manipulation or deceit. These methods are shortcuts to changing how people believe or behave (Fogg, Cuellar, & Danielson, 2007). Persuasion is part and parcel of human interaction. From the serpent in the Garden of Eden to our modern mass-media society, persuasive efforts abound in a continuous attempt to influence our attitudes and behaviors, convincing us to spend money on one product rather than another, to vote for a particular political party, to stop smoking, to quit alcohol consumption, to exercise more, to take the stairs instead of the elevator, to fight for environmental conservation, animal well- being, better schools. (IJsselsteijn. De Kort, Midden, Eggen & Van den Hoven, 2006).

Persuasion requires an attempt to change another person. The word attempt implies intentionality. If a person changes someone else's attitude or behavior without intent to do so, it is an accident or a side effect; it is not persuasion. This point about intentionality may seem subtle, but it is not trivial. Intentionality distinguishes between a side effect and a planned effect of a technology. Finally, persuasion deals with attitude changes or behavior changes or both. While some scholars contend persuasion pertains only to attitude change, other scholars would agree that it includes behavior change as a target outcome of persuasion (Fogg et al., 2007).

Persuasive computers are defined as the computing systems, devices, or applications intentionally designed to change a person's attitudes or behavior in a predetermined way (Cheng, n.d.). Persuasive Technology (PT) is a vibrant interdisciplinary research field, focusing on the design, development and evaluation of interactive technologies aimed at changing users' attitudes or behaviors through persuasion and social influence, but not through coercion or deception. Persuasive technologies are used to change people's behavior in various domains such as healthcare, sustainability, education or marketing.

However, Persuasive technology, which can take the form of apps or websites, marries traditional modes of persuasion using information, incentives with the new capabilities of devices to change user behavior. Persuasive technology can be found in mobile downloads, or on the digital homes of tech giants like Amazon and Facebook, where behavior-oriented design persuades us to buy more often (one-click checkout) or stay logged in (manipulating social media news feeds). Many mobile apps that try to influence user behavior are either health-oriented – apps that incentivize weight loss, help to manage addictions and other mental health issues, or influence sleep practices or promote environmental awareness. Though it's been around for a while, persuasive technology is becoming increasingly popular and profitable, inviting a deeper look into its ethics and efficacy.

The continuous abuse of alcohol is not without its negative effects on health and the economy of individuals in particular and the society at large. Social effects in the sense that a young man or woman who abuses alcohol and has become an addict will soon find out that it starts affecting his studies and may lead him to drop out of school. Its health effect is obvious in that a lot of chronic diseases like diabetes have been linked to alcohol as one of its causal elements. Finally, several persuasive applications have been developed by various stakeholders in order to combat the abuse of alcohol especially among youths, but none of them is in the form of persuasive web-based application for Nigerian youths. In addition, these applications were designed for people in the western world and do not properly carry people in the society along because the alcoholic beverages used in these applications are not readily available here and the information contained therein does not apply to the Nigerian society. Although, alcohol abuse is a universal problem, the way and manner of its consumption in Nigeria is peculiar. Therefore, there is a need to develop a persuasive application that solves our problem as a people as it concerns us. More so, the websites are too wordy, boring and even tiresome for an average Nigerian who does not have a reading culture.

The aim of this work is to develop a persuasive application for reduction of alcohol consumption with the following objectives;

1. Create an efficient database for the system using MySQL database engine.

2. Integrate persuasive strategies into the system.

3. Create an efficient system that will enable users keep track of their consumption in order to make an informed decision.

4. Develop a system that will serve as a support system for alcoholics in rehabilitation

5. Evaluate the effectiveness of the application in reducing alcohol consumption using statistical analysis

This work will be of immense use to the general public and community of alcohol consumers who want to quit drinking for health reasons or other reasons as the case maybe and also for those struggling to remain

under the 'moderate' drinking limit. Of particular interest are Universities and teachers of young people who are most vulnerable to the use and abuse of alcohol. The application will offer an alternative way for institutions to make the students change their attitude towards alcohol because the application will be one that is educative and friendly to youths.

Another group of individuals who will benefit from this work are parents whose wards are addicted to alcohol or even use alcohol on a regular basis. They can introduce this application to their wards in order to catch them on time before their use of alcohol turns to abuse. The application will make them reflect and read wide about the dangers of alcohol and the damages it can do to their young lives.

More so, this work will be beneficial to the National Drugs Law Enforcement Agency (NDLEA) who are charged with the responsibility of apprehending drug offenders, as it will give them an opportunity of not only apprehending them, but also rehabilitating them.

2. REVIEW OF RELATED WORKS

Persuasion has been part and parcel of human relations. From the days of Eve and the serpent in the Garden of Eden to our present day mass-media society, persuasive efforts continue to thrive in diverse areas of human endeavor, in an attempt to influence our attitudes and/or behaviors. Trying to convince us to spend money one product instead of another, to eat well in order to keep fit, to reduce alcohol consumption, to take the stairs instead of the elevator, to exercise more, to work hard now and rest at old age, etc.(IJsselsteijn et al., 2006) .

For so long, media technology has played an important role in aiding the dissemination of persuasive messages from megaphones to billboards to televisions, Technology becomes a more powerful tool when it allows the persuasion to be interactive instead of one directional, that is, altering and adjusting the pattern of interaction based on the characteristics or actions of the persuaded party – the user's inputs, need and context. It is this realization that led to the investigation of persuasive technology (IJsselsteijn *et al*., 2006).

Persuasive computers are the computing systems, devices, or applications intentionally designed to change a person's attitudes or behavior in a predetermined way (Cheng, n.d.). In the same way, (Khaled, Barr, Noble, Fischer & Biddle, 2006) asserted that Persuasive Technologies are interactive computing systems designed to change attitudes or behaviours, which are utilized in areas as diverse as marketing, health, safety, environmental conservation, politics, religion, gaming, self-efficacy, occupational effectiveness among a list of others. Similarly, Persuasive Technology is a term used to describe technologies that change behavior and/or attitude in an intended way without the use of deception or coercion (Orji, Vassileva & Mandryk, 2012). Also, Persuasive technologies can be said to be defined as computerized software or information systems designed to reinforce, change or shape attitudes or behaviours or both without using coercion or deception (Lehto & Qinas-Kukkonen, 2009).

Humans are one of the strongest persuaders. They have an obvious social presence and impact, can sense the proper timing, mood and context as opportunities for another person to be persuaded, and have an ardent, mostly intuitive sense of the social psychological principles of persuasion, such as praise, reciprocation, similarity, or authority. However, computers can have a number of distinct advantages over human persuaders. They can be more persistent, they can allow anonymity, they can access and control a virtually unlimited store of data, and they can use many modalities to create a seamless and convincing experience. Moreover, successful pieces of persuasive software can be easily replicated and distributed (addressing large numbers of people at the same time), and, with computers becoming increasingly ubiquitous and embedded, persuasive technology may gain access to areas where human persuaders would not be welcomed (e.g., bedroom, bathroom) or are physically unable to go (e.g., inside clothing or household appliances) (IJsselsteijn et al., 2006).

From the above definitions of Persuasive Technologies, it can be deduced that the main aim of Persuasive Technologies is to bring about a change in attitude or behavior, which will eventually result in a change of character of its users. Persuasive Technology is fundamentally about inducing behavior and/or attitude change using computers.

Although the most frequent application of persuasive technology today is the use of computers to sell products and services, there is great beneficial potential in applying persuasive technologies to increase human health and well-being. The use of interactive technology in the health arena is still in its early stages, with e-care and tele-care programmes to extend healthcare into people's home environments not yet living up to their full potential. Arguably, one of the strongest areas of innovation for persuasive technology in the near future will be preventive health engineering (IJsselsteijn et al., 2006). Technological developments in ubiquitous computing and ambient intelligence allow for new opportunities in this area (Intille, 2004). In particular, the development of new sensor technologies and algorithms that allow for context-aware computing, will make it possible to infer elements of a person's context and activity, and deliver appropriate persuasive health-related messages to that person at the right time when decisions are made or behaviour is executed, i.e., just-in-time messaging (Intille, 2002). Moreover, the embedding of computational power and interactive displays in our everyday environment (**Aa**rts & Manzano, 2003) as well as the ubiquity of mobile computing devices worn or carried by an increasing number of users, makes it feasible to provide persuasive feedback at the appropriate place where the user is likely to benefit most.

In all persuasive technologies, motivation is a very important element that leads to initiation of behavior change actions, continuation of the actions and maintenance of the behavior over time (Orji et al., 2012). The researcher will look at two important topics which are important to the design of persuasive technologies for wellbeing namely: Social Influence (social competition, collaboration, and comparison) and Learning and Reflection.

Social influence is defined as change in an individual's thoughts, feelings, attitudes, or behaviors that results from interaction with another individual or a group. It is the process by which individuals make real changes to their feelings and behaviors as a result of interaction with others who are perceived to be similar, desirable, or expert. People adjust their beliefs with respect to others to whom they feel similar in accordance with psychological principles such as balance. Individuals are also influenced by the majority: when a large portion of an individual's social group holds a particular attitude, it is likely that the individual will adopt it as well. Additionally, individuals may change an opinion under the influence of another who is perceived to be an expert in the matter at hand (Rashotte, 2015).

Systems that use social influence as a motivator typically focus on sharing information about one's physical activity with one's social groups such as friends, coworkers, neighbours and family. In these systems, social competition, collaboration, and social comparison are often an explicit design goal or a consequence of how the systems are used. Chick Clique and Houston are examples of systems in this category. Chick Clique uses a mobile phone and pedometer to help teenage girls track and share their step counts with their friends. Houston, similar to Chick Clique, encourages groups of users to track and share their step counts as recorded in a pedometer via their mobile phone (Orji et al., 2012).

The difficulties associated with making people change their behavior using an approach that causes immediate performance of the behavior led to a search for an alternative way of effecting behavior change. For example, persuasive approaches based on tracking of behavior might require that the user continuously uses the application to enact the desired behavior. It remains to be seen for how long the users will use these applications. It will not be realistic to expect that users will use these applications for their life- time (Orji et al., 2012). For instance, in the evaluation of the HealthyEdge persuasive application (Xu, Chen, Uglow, Scott & Montague, 2011), the participants expressed discomfort that they experienced when they attached the device to their body. Therefore, a number of studies have looked at emphasizing reflective thinking about health as an approach to behavior and attitude change that indirectly impacts the behavior. The work based on this approach uses both personal prompt and group discussion as a mechanism to trigger reflective thinking. For example, the participants in the evaluation of a persuasive game (Grimmes et al., 2010) reported how playing the game prompted group discussions (in line with social learning theory) that facilitated reflection about healthy eating. Playing the game increased the consciousness of the players toward what they eat, which also led to increased personal reflection about their diets. The increasing interest in reflective approaches to behavior change is due to its potential to intrinsically motivate and thereby results in a long-term behavior change (Colineau & Paris, 2010). This approach is supported by a research finding that critical reflection is a key to transformative learning (Taylor, 2000).

Healthcare systems are experiencing severe financial stress as age demographics shift upward, leading to a larger percentage of older adults needing care (Intille, 2004). Of the more than 1.7 trillion dollars spent nationally every year on healthcare in the United States, less than 4% is spent on prevention and public health. Consequently, the overburdened healthcare system will face a worldwide wave of retirees who will live longer, cost more to treat and demand new goods and services to help them stay healthy, active and independent. Research in persuasive technologies and the associated usage of a computing system, device or application intentionally designed to change a person's attitude or behavior in a predetermined way is showing the potential to assist in improving healthy living, reduce the costs on the healthcare system, and allow the aged to maintain a more independent life (Chatterjee & Price, 2009).

Technologies that motivate and support healthier lifestyle decisions related to diet, exercise, smoking, sexual behaviour, TV and internet use, stress management, and maintaining social relationships could delay or even prevent the onset of a variety of medical problems, and improve the quality of life. Other problems may be prevented through a continuation of already existing healthy behaviours, such as maintenance of an active social network and engaging in leisure activities. Persuasive technologies can have a positive, supportive role by convincing, stimulating or motivating adult users to engage in healthy behaviours, and instantly rewarding such behaviours when they occur. Paradoxically, in order to be effective, persuasive Gerontechnology should perhaps not focus primarily on the older adult, but should start already much earlier in life, as trajectories leading to chronic diseases in later life (e.g., cardiovascular diseases, Alzheimer's disease) are severely influenced by one's lifestyle choices as a younger adult .

Although different technologies for preventive healthcare abound, but the one that is frequently used is; just-In-Time-Messaging.

2.3.1   Just-In-Time Messaging and Behaviour Change Motivation

Two ubiquitous computing trends are converging to create a new preventive healthcare opportunity. The first trend is the rapid adoption of powerful mobile computing devices. Mobile phones, personal digital assistants, and watches are becoming sophisticated mobile computing devices that can collect and process sensor data from wearable wireless sensors and convey information to a user via audio and bright liquid crystal display (LCD) touch screens. Future devices will be smaller, lighter, inexpensive, and available in a variety of convenient form factors (e.g., wristbands). Mobile computing devices are carried nearly everywhere by an increasing percentage of the population and can, therefore, be used to convey motivational health messages at an appropriate place (Intille, 2004).

The second ubiquitous computing trend that will lead to this new preventive care opportunity is the emergence of real-time context-aware computing. A context-aware computer system can automatically infer what a person is doing from sensor data. The user's activity can then be used to present a health-related message at

an appropriate time—specifically, a point of decision or behavior when an easy-to-understand message might have an impact on behavior. For example, two or more accelerometers worn on the body can be used to infer posture, ambulation, and various household activities that involve physical activity (e.g., scrubbing, vacuuming) (Boa & Intille, 2004).

These activity detection algorithms run on mobile phones and acquire sensor data from wearable wireless accelerometers attached to objects worn or carried such as watches or key chains. Sensors placed in the home may allow other everyday activities (e.g., cooking) to be automatically detected as well (Tapia, 2004). These two trends will enable a new class of just-in-time persuasive interfaces to be created that motivate behavior change by providing well-timed information to users at points of decision, behavior, or consequence. Researchers in a variety of non-information technology fields have convincingly demonstrated the power of point-of-decision messaging to motivate behavior change (e.g., improving workplace safety, encouraging seat belt usage and public recycling, reducing electricity consumption, and encouraging exercise in public spaces. Although the systems only work for some of the people, some of the time, studies have consistently shown that context-sensitive information presentation can alter behavior (e.g., doubling the number of people who take stairs, reducing air conditioner use). A review of the preventive health prompting literature suggests that there are four components to an effective strategy to motivate behavior change using just-in-time information:

1) Present a simple, tailored message that is easy to understand,

 2) At an appropriate time,

 3) At an appropriate place,

4) Using a nonirritating strategy (even after possibly hundreds of presentations).

2.1.1　Persuasive Strategies

2.1.1a Reciprocation

The reciprocity principle is one of the basic laws of social psychology: It says that in many social situations we pay back what we received from others. In other words, if John does you a favor, you are likely to return it to him (Budiu, 2014). The principle tells us that if we feel we have been done a favour, we will want to return it. If somebody gives you a gift, invites you to a party or does you a good turn, you feel obliged to do the same at some future date (Travis, 2010).

2.1.1.b.　　Commitment

This principle tells us that we like to believe that our behaviour is consistent with our beliefs. Once you take a stand on something that is visible to other people, you suddenly feel a drive to maintain that point of view to appear reliable and constant (Travis, 2010). When people agree to an idea or goal, they will probably honor

that commitment later. They will even do that if the original incentive or motivation is removed. This is because people come to see the commitment as congruent with their self-image (Baas, 2012).

2.1.1.c Social Proof

Even though people think they want to be original, all human beings somehow crave for acceptance and validation from the group (Baas, 2012). This principle tells us that people like to observe other people's behaviour to judge what's normal, and then they copy it. Persuasion architects apply this principle by showing us what other people are doing on their web sites. For example, researchers at Columbia University set up a web site that asked people to listen to, rate and download songs by unsigned bands. Some people just saw the names of the songs and bands, while others the "social influence" group also saw how many times the songs had been downloaded by other people.

2.1.1.d Authority

This principle is about influencing behaviour through credibility. It works with the reasoning that people are more likely to take action if the message comes from a credible and authoritative source. That is why you will hear people name dropping and it is also what drives retweets on Twitter (Travis, 2010).

2.1.1　Scarcity

This principle tells us that people are more likely to want something if they think it is available only for a limited time or if it is in short supply. Intriguingly, this isn't just about the fear of missing out (a kind of reverse social proof). Scarcity actually makes stuff appear more valuable. For example, psychologists have shown that if you give people a chocolate biscuit from a jar, they rate the biscuit as more enjoyable if it comes from a jar with just 2 biscuits than from a jar with 10 (Travis, 2010). The scarcity principle is a well-documented social-psychology phenomenon that causes people to assign high value to things they perceive as being less available. In real life, Black Friday is a good example of scarcity: a sale that occurs on only one day of the year (the day after Thanksgiving in the United States) and consists of a limited number of products offered at discounted prices (Cardello, 2014).

2.4.6　Framing

The framing effect is the idea that manipulating the way information is presented can influence and alter decision making and judgment about that information. Through the use of images, words, and by presenting a general context around the information presented researchers can influence how people think about that information (Bradley, 2010). This principle acknowledges that people are not very good at estimating the

absolute value of what they are buying. People make comparisons, either against the alternatives you show them or some external benchmark (Travis, 2010).

One example is the way a restaurant uses an "anchor" dish on its menu: this is an overpriced dish whose sole aim is to make everything else near it look like a relative bargain. Another example is the Goldilocks effect where you provide users with three alternative choices. However, two of the choices are decoys: one is an overpriced, gold plated version of your product; another is a barely functional base version. The third choice — the one you want people to choose — sits midway between the other two and so feels "just right" (Travis 2010).

2.1.1.g Salience

This principle tells us that people are more likely to pay attention to elements in your user interface that are novel (such as a coloured 'submit' button) and that are relevant to where there are in their task. For example, there are specific times during a purchase when shoppers are more likely to investigate a promotion or a special offer. By identifying these seducible moments you will learn when to offer a customer an accessory for a product they have bought (Travis, 2010).

2.2 Knowledge Gap

From the review of works related to this study, it was discovered that previous persuasive applications for reduction of alcohol consumption made use of the one-size-fits-all approach, that is, they used the same solution for different alcohol users. Nevertheless, research has shown that there are three group of drinkers

1. hazardous or risk drinkers who consume alcohol above recommended limits without noticeable harm.

2. harmful drinkers who have experienced some physical, social or psychological harm without meeting the criteria of dependence, and

3. alcohol abusing or dependent drinkers who meet these criteria and sustain consuming alcohol regardless of substantial negative consequences.

This new solution makes a provision for different solutions for these three group of drinkers, which is; it provides different menus for the three groups of alcohol users. This will be an improvement on the previous designs that used one menu for different classes of alcohol drinkers.

3. METHODOLOGY AND SYSTEM ANALYSIS

3.1 Methodology Adopted

The methodology adopted for this research work is the Object Oriented Analysis and Design Methodology (OOADM) with the Unified Modeling Language (UML) as the modeling language for the research work.

3.2 Analysis of the Existing System

Traditional treatment facilities for alcohol problems tend to concentrate on the heavy dependent drinkers. They do not suit everyone. There are many people who drink hazardously but do not present themselves for treatment, they find that the prospect of discussing their private drinking problem with anyone at all is often deeply unappealing and not taken up. The social and health costs associated with drinking are very high and it is important to find new ways to provide hazardous drinkers with help to control their consumption. In the existing system, members are placed firmly in control of the program, they set their own drinking targets, decide when and where to complete the program and receive individual feedback. Information is provided in a neutral way without 'preaching' and to ensure confidentiality, members choose their own alias username just for the program and are not required to surrender their private personal details. Throughout the program, users are encouraged to discuss any medical problems they may have with their doctor. As a follow up to the program, users are invited to join an online email discussion group. The following weaknesses were found in the existing system;

i.   Persuasive strategies were sparingly used in the development of the applications.

ii. The applications were designed mainly for non-Nigerians, this is evident in the setting of the application and the alcoholic beverages used.

iii. The existing system uses the one size fits all approach in the design of the system. It does not take into consideration the different classes of alcohol abusers.

iv. The applications are too wordy, boring and even tiresome for the average Nigerian who does not have a reading culture.

3.4 Analysis of the New System

A persuasive web-based application for alcohol intervention was developed. This application is called WineChase. It is a website where participants in the alcohol intervention programme signs up to the portal and each participant shall be assigned menus according to their level of addiction. These menus contain interactive activities and educational materials which the new participant uses to start up on the journey. This application employed persuasive principles, bearing in mind the fundamental aim of persuasive technology which is to cause a change of behavior or attitude in an individual without the use of deception or coercion. The new system accommodates different types of problem drinkers. It was found from research that there are three groups of problematic drinkers as listed before. Moreover, the application consists of four major sections

namely; Alcohol Overview, Are You Addicted, Cutting Down and Staying on Track. These sections shall contain series of activities and educational information that a new user shall make use of in the course of the intervention program.

3.5 Use Case Diagram of WineChase

A use case diagram is a dynamic or behavior diagram in UML. Use case diagrams model the functionality of a system using actors and use cases. Use cases are a set of actions, services, and functions that the system needs to perform. In this context, a "system" is something being developed or operated, such as a web site. The "actors" are people or entities operating under defined roles within the system. Figure 3.1 shows the use case diagram for WineChase.
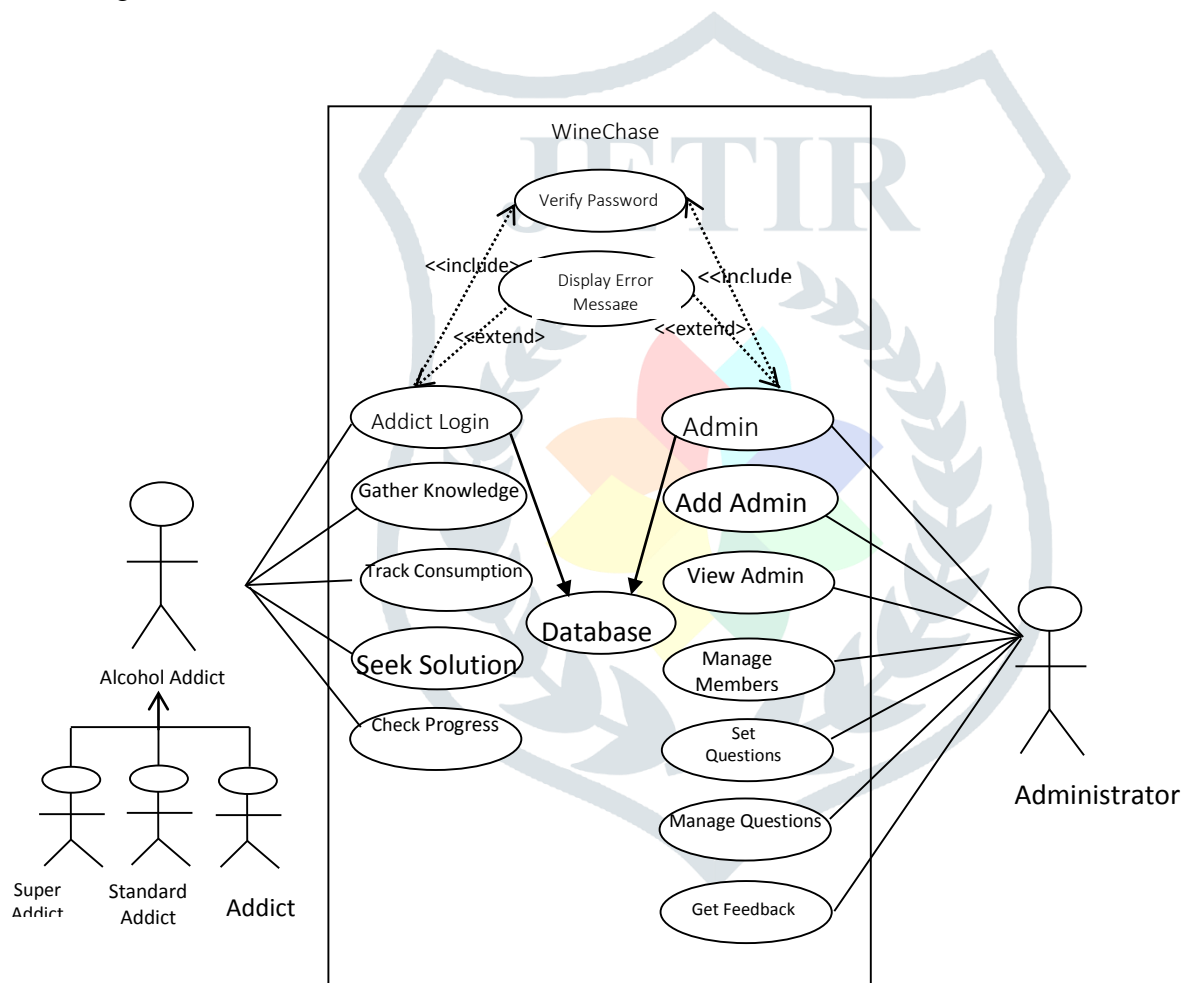

Figure 3.1 Use Case diagram of the new system

3.6 State Machine Diagram of WineChase

All objects have state, which is the value of its attributes at one point in time. An object changes state when something happens or when the value of one of its attributes changes. This change in state is triggered by an event. A state diagram models the life cycle of a single object. It depicts the different states an object can

have, the events that cause the object to change state over time and the rules that govern the object's transition between states. State diagrams are not required for all objects. Typically, a state diagram is constructed only for those objects that clearly have identifiable states and complex behavior. Figure 3.2 shows the state machine diagram for WineChase.
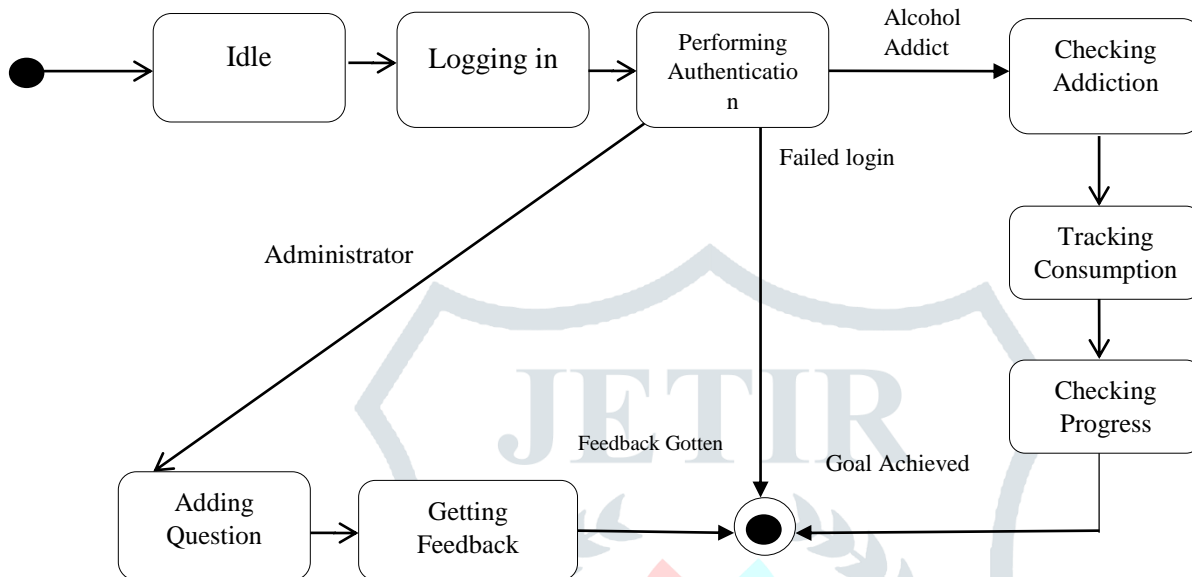

Figure 3.2

Figure 3.2 State Machine diagram of the new system

Result and Discussion

Research Question 1: How Does Using WineChase Increase Users' Factual Knowledge about Alcohol?

The analysis shows users' perception about WineChase increasing factual knowledge about alcohol. The users agreed on all the items that WineChase increases their knowledge about alcohol with all the mean scores being above 2.5. The Grand mean of 3.7 indicates that with the use of WineChase, users are better informed about alcohol and its danger and become desirous to learn more about alcohol.

Research Question 2: How Does Using WineChase to Deep Reflection?

Analysis shows users' perception about WineChase Causing Deep Reflection. The users agreed on all the items that WineChase made them to reflect deeply about their drinking habit with all the mean scores being above 2.5. The Grand mean of 3.36 indicates that with the use of WineChase, cause users to reflect deeply about the costs and benefits of alcohol to them.

Research Question 3: How Does WineChase Produce a Favourable Attitudinal Change?

Analysis shows users' perception about WineChase Producing Favourable Attitudinal Change. The users agreed on all the items that WineChase produces a positive attitudinal change in them with all the mean scores being above 2.5. The Grand mean of 3.28 indicates that with the use of WineChase, users are able to avoid occasions that leads them to excessive consumption of alcohol and are also able to keep track of the alcohol consumption.

Research Question 4: What are the Motivational Features of the Application?

Analysis shows users' perception about WineChase being able to motivate them. The users agreed on all the items that WineChase them to reduce their consumption of alcohol, with all the mean scores being above 2.5. The Grand mean of 3.25 indicates that with the Forums, SetGoal, Feedback and Evaluation features of WineChase, users are motivated to keep to their goal thereby reducing their consumption.

4   Conclusion

The abuse of alcohol especially among the youths has been a source of concern to all stakeholders concerned. This study has shown that the fight against alcohol abuse can be won with the use of persuasive technology that is; tailoring information, persuasive strategies. The study therefore concludes that, with persuasive technology for alcohol behaviour change, users are able to increase their factual knowledge of alcohol and a new desire to learn more is ignited.

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