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Web-Based Application for Alcohol Behavioral Change in Nigeria

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Abstract: Everyday young people are introduced to alcohol and this early introduction to alcohol consumption eventually leads to abuse. The burden of diseases caused by the abuse of alcohol, the harm done to their social life and the decimation of their finances are some of the motivation for this work. This paper aims at providing an alternative and better approach to solving the problem of alcohol addiction using behavioral change theories and persuasive software. It has been found that many people are extremely open and motivated when talking to a computer about personal problems. The system is designed making with human behaviour theories; Trans theoretical Model (TTM), Goal Setting Theory, Reinforcement Theory, Social Learning Theory and Knowledge-Attitude-Behaviour Model (KAB). This was done bearing in mind that proper understanding of human behaviour theories enables designers to know which theory to apply and how the application of the theory will help the user. In addition to human behaviour theories, persuasive strategies were incorporated in the design of the system. Object-Oriented Analysis and Design Methodology (OOADM) was employed. Implementation was achieved using Hypertext Preprocessor scripting language and MySQL server. The resulting system 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, Alcohol Abuse, Behaviour Change, Persuasion, Persuasive Technology

1. INTRODUCTION

Alcohol is one of the most popular psychoactive substances in the world. It can have powerful effects on your mood and mental state. By reducing self-consciousness and shyness, alcohol may encourage people to act without inhibition. At the same time, it impairs judgment and promotes behavior people may end up regretting (Arnarson, 2018). Alcohol is as old as human history and its consumption in different socio-cultural backgrounds extends beyond the last ten thousand years (Smart, 2007). Its consumption has been considered normal especially when drunk without outright intoxication in Africa and other parts of the globe. Wine, beer, spirit and other fermented alcoholic beverages were drunk in traditional societies and some of these beverages are still used in this modern era for different purposes (Dumbili, 2013). In Africa, these and other alcoholic beverages such as *palm wine, burukutu*, etc. were consumed for pleasure soon after brewing or tapping and were rarely traded in the market, [World Health Organization (WHO), 2002]. Though alcoholic beverages have been consumed for hundreds of years, the pattern and purpose of consumption vary considerably among and even within communities. Excess consumption was not widely tolerated in many societies while few communities permitted it (Willis, 2006).

Drinking alcohol in moderation has a lot of health benefits. Moderate amounts of alcohol raise levels of High-Density Lipoprotein (HDL) or 'good' cholesterol and higher HDL levels are associated with greater protection against heart disease. Moderate drinking might actually protect against erectile dysfunction in the same way that drinking red wine might benefit heart disease. It can also help reduce the risk of gallstone, help decrease the chances of dementia and lower the chances of type 2 diabetes (Bachai, 2013).

The impact of alcohol in the body starts from the moment the first sip is taken. A glass a day may do little damage to a person's overall health. But if the habit grows or if you find it difficult to stop after

just one glass, the cumulative effects can add up (Pietrangelo & Holland, 2017). Though alcohol has some benefits, its negative effects far outweighs the benefits. It's 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).

If consumed to excess, alcohol can affect all areas of a person's life, as well as the lives of their family and friends. Personal relationships can be subjected to arguments over drinking which can lead to ongoing conflict and break ups. There are also negative consequences in the workplace arising from poor performance, accidents and absenteeism as a result of alcohol. For some, drinking in excess can lead to legal problems as a result of anti-social and violent behaviour or the loss of their driving license. Alcohol consumption is also associated with noise, violence, offensive behaviour, vandalism, petty crime and motor vehicle accidents; all of which can reduce quality of life for family members, bystanders and the community. These factors are associated with social concern and presumably their presence reduces the quality of life of the affected individuals. In addition, these factors significantly contribute to the costs of welfare and policing services (Social Issues Research Centre, 2009)

In the traditional era, alcohol was consumed by the men served by the youth. Consequently, women and youths were hardly seen consuming alcohol. 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.

The new trend of alcohol consumption among young people contributes to Nigeria's ranking among thirty countries with highest per capita consumption of alcohol globally (WHO, 2004). 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).

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 together with behavior change theories fronm psychology 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).

Consequently, 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.

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 is been around for a while, persuasive technology is becoming increasingly popular and profitable, inviting a deeper look into its ethics and efficacy (Larson, 2014).

This incessant abuse of alcohol has dire consequences on the health, social life and 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 performance at work and his relationship with people. 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. The economic effect is not far-fetched because a person who keeps track of his alcohol consumption will discover after a period of time that the amount spent on alcohol would be have enough to make a reasonable investment.

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. Some of these persuasive applications did not make use of behavior change theories in their design, the concentration was mainly on persuasive strategy. The aim of this paper is to apply a web-based effect of alcohol behavioral change in Nigeria; with the following objectives; Develop a web-based application for alcoholic behavior change using behavioral change models, Implement an application that will enable users know the concentration of alcohol in their body, Create an efficient system that will enable users keep track of their consumption in order to make an informed decision, and to evaluate the effectiveness of the effects in reducing alcohol consumption using quantitative analysis.

This paper will be of enormous benefits to the general public, private and community.

Finally, this work is also significant to the government especially the Federal Road Safety Commission who deals with drunk drivers on a daily basis. Research has shown that a lot of the accidents that happen especially on weekends are as a result of drunk driving. This application will help their "Don't drink and drive" campaign and also in the rehabilitation of drunk drivers.

2. REVIEW OF RELATED WORKS

2.1 Persuasive Technology

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) .

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).

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. Developing effective persuasive technology for behavior change requires in-depth and practical understanding of human behavior theories, so that designers of persuasive intervention do not have to guess at which ad-hoc approaches will succeed. The most effective persuasive interventions for behavior change usually occur when the intervention is behaviorally focused and theory driven. Therefore, to design technologies that will successfully motivate behavior change, persuasive researchers rely on behavioral theories from psychology and social science to inform their decisions (Orji et al., 2012).

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.

2.1.1 Social Influence

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).

2.1.2 Reflection and Learning

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).

2.2 The Functional Triad

Computers play many roles, some of which go unseen and un-noticed. From a user's perspective, computers function in three basic ways: as (a) tools, as (b) media, and as (c) social actors. In the last two decades, researchers and designers have discussed variants of these functions, usually as metaphors for computer use. However, these three categories are more than metaphors; they are basic ways that people view or respond to computing technologies. These categories also represent three basic types of experiences that motivate and influence people (Fogg et al., 2007).

The functional triad is a framework for thinking about the roles that computing products play, from the perspective of the user (Fogg, 2003). Described in more detail, the Functional Triad is a framework that makes explicit these three computer functions – tools, media and social actor. (Fogg et al., 2007).

The Functional Triad is not a theory; it is a framework for analysis and design. In all but the most extreme cases, a single interactive technology is a mix of these three functions, combining them to create an overall user experience. In captology the Functional Triad is useful because it helps to show how computer technologies can employ different techniques for changing attitudes and behaviors. For example, computers as tools persuade differently than computers as social ac- tors. The strategies and theories that apply to each function differ. Below it is explained in detail the roles the computers play (Fogg et al., 2007).

2.2.1 Computers as Persuasive Tools

Computers as persuasive tools affect attitude and behavior changes by increasing a person's abilities or making something easier to do. Although one could propose numerous possibilities for persuasion in this manner, below are four general ways in which computers persuade as tools: by

- **a.** Increasing self-efficacy
- **b.** Providing tailored information -
- **c.** Triggering decision making (Fogg et al., 2007).

2.2.2 Computers as Persuasive Media

The next area of the Functional Triad deals with computers as persuasive media. Although "media" can mean many things, here the focus is on the power of computer simulations. In this role computer technology provides people with experiences, either first-hand or vicarious. By providing simulated experiences, computers can change people's attitudes and behaviors. Outside the world of computing, experiences have a powerful impact on people's attitudes, behaviors, and thoughts. Experiences offered via interactive technology have similar effects. Three types of computer simulations are relevant to persuasive technologies:

- **a.** Simulated cause-and-effect scenarios
- **b.** Simulated environments
- **c.** Simulated objects (Fogg et al., 2007).

2.2.3 Computers as Persuasive Social Actors

The final part of the Functional Triad focuses on computers as "persuasive social actors," a view of computers that has only recently become widely recognized. Past empirical research has shown that individuals form social relationships with technology, even when the stimulus is rather impoverished. For example, individuals share reciprocal relationships with computers and are polite to computers. In general, it has been found that, computers as social actors can persuade people to change their attitudes and behaviors by

- **a.** Providing social support
- **b.** Modeling attitudes or behaviors
- **c.** Leveraging social rules and dynamics (Fogg et al., 2007).

2.3 Overview of Behaviour Change Theories

Since Persuasive Technologies are designed with the intent of deliberately bringing about behavior change, designers of persuasive technologies must have an in-depth and practical understanding of behavior change theories. This is to prevent designers from guessing at which ad-hoc approach will succeed. Research has shown that the most effective persuasive interventions for behavior change is when the intervention is behaviourally focused and theory driven (Orji et al., 2012). Therefore, in order to design persuasive applications that will motivate behavior change, persuasive researchers make use of behavior theories from

psychology and social sciences. Some of the theories that will be studied in this work include; Trans theoretical Model (TTM), Goal Setting Theory, Reinforcement Theory, Social Learning Theory and Knowledge-Attitude-Behaviour Model (KAB).

2.3.1 Trans theoretical Model

The Trans theoretical Model is one of the most used model for health-related behavior change interventions (Orji et al., 2012). Stages of Change lie at the heart of the Trans theoretical model. The model believes that a change in behaviour follows five distinct stages and that while the time a person can stay in each stage is variable, the tasks required to move to the next stage are not. It recognizes that change is a process that unfolds over time, involving progress through a series of stages (Noar, Benac, & Harris, 2007). According to TTM the five (5) stages that an individual will undergo in order to attain behavior change includes: Pre contemplation (Not Ready), Contemplation (Getting Ready), Preparation (Ready), Action and Maintenance.

2.3.2 Goal Setting Theory

Goal Setting Theory is one of the theories of motivation and also a behaviorism theory. Based on hundreds of studies, the major finding of goal setting theory is that individuals who are provided with specific, difficult but attainable goals perform better than those given easy, nonspecific or no goals at all. At the same time, however, the individual must have sufficient ability, accept the goals and receive feedback related to performance (Lunenburg, 2011). A goal is the aim of an action or task that a person consciously desires to achieve or obtain (Locke and Lotham, 2002). Furthermore, Goal Setting involves the conscious process of establishing levels of performance in order to obtain desirable outcomes (Locke & Latham, 2006).

2.3.3 Reinforcement Theory

Reinforcement theory is a psychological principle maintaining that behaviors are shaped by their consequences and that, accordingly, individual behaviors can be changed through rewards and punishments (Wigmore and Rouse, 2016). Generally speaking, there are two types of reinforcement: positive and negative (Barnett and Simmering, 2016).

Positive reinforcement results when the occurrence of a valued behavioral consequence has the effect of strengthening the probability of the behavior being repeated. The specific behavioral consequence is called a reinforcer. An example of positive reinforcement might be a salesperson that exerts extra effort to meet a sales quota (behavior) and is then rewarded with a bonus (positive reinforcer). The administration of the positive reinforcer should make it more likely that the salesperson will continue to exert the necessary effort in the future (Barnett and Simmering, 2016).

Negative reinforcement results when an undesirable behavioral consequence is withheld, with the effect of strengthening the probability of the behavior being repeated. Negative reinforcement is often confused with punishment, but they are not the same. Punishment attempts to decrease the probability of specific behaviors; negative reinforcement attempts to increase desired behavior.

2.3.4 Social Learning Theory

Social Learning Theory posits that people learn from one another, via observation, imitation, and modeling. Most human behavior is learned observationally through modeling: from observing others, one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action. Social learning theory explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral, and environmental influences.

2.3.5 Knowledge-Attitude-Behaviour Model (KAB)

The Knowledge-Attitude-Behavior model emphasizes on the importance of knowledge as a prerequisite for intentional performance of health-related behavior. An acquisition of new knowledge leads to changes in attitude, which in turn leads to change in lifestyle (Orji et al., 2012). Knowledge at some level, in some form, is a logical prerequisite to the intentional performance of health-related behaviors (Baranowski et al., 2003).

The Knowledge-Attitude-Behavior (KAB) model has been proposed as a way of explaining the role of knowledge. The KAB model proposes that behavior changes gradually. As knowledge

accumulates in a health behavior domain, changes in attitude are initiated. Over some period of time, changes in attitude accumulate, resulting in behavioral change (Baranowski et al., 2003).

The primary resource in this model seems to be the accumulation of knowledge. At some point, this accumulation cascades into changes in attitudes, behaviors, or both (Baranowski et al., 2003).

2.4 Knowledge Gap

After a careful study works related to this study, it was observed that previous systems used behavior change model sparingly. Secondly, they also 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. Finally, the system incorporated the used of behavior change theories in the design of persuasive technologies.

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. OOADM is a structured method for analyzing and designing a system by applying the object-orientated concepts, and developing a set of graphical system models during the development life cycle of the software to foster better stakeholder communication and product quality.

3.2 Analysis of the Existing System

In the existing system, people who are trying to quit alcohol or people who for one reason or the other want to reduce their alcohol consumption used this website to achieve a great result. Users sign up with an alias and are given a toolbox which contains four tools. The function of these tools is to help the users start their journey towards combating alcohol, deal with challenges encountered in the process and maintain the success attained. The same toolbox is given to all the classes of alcohol users and information is presented in a plain manner without much preaching or persuasion.

One of the feature of this application is its educational email program. It sends an email to users over a period of eleven weeks with interesting facts about drinking and health. More so, there is also a provision for a diary, with which users can record their progress. Another feature of this website is the Education section where users are provided educative materials that will get them motivated for the journey towards alcohol cessation/reduction. Finally, the website offers referral services to users who have other health issues asides alcohol like depression, smoking and other problems. The following weaknesses were found in the existing system;

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

ii. Behavioural change theories were not used in the design

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 types of alcohol abusers.

iv. The tutorial parts of the applications are too lengthy for the average Nigerian lacks a reading culture.

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

3.3 Analysis of the New System

The researcher designed and developed a persuasive web-based application for alcohol intervention. In particular, system is an application for alcoholic behavior change. It is a website where participants in the alcohol intervention programme sign up to the portal and each participant is 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 employs 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. Thus, in essence the proposed system is a persuasive technology.

First and foremost, the new system employs behavior change theories; Transtheoretical Model (TTM), Goal Setting Theory, Reinforcement Theory, Social Learning Theory and Knowledge-Attitude-Behaviour Model (KAB). The need for behavior change theories is based on findings that developing an effective persuasive technology, requires an in-depth and practical understanding of human behavior theories so that designers of persuasive application do not guess at which ad-hoc approaches will succeed. Thus, the researcher adopted human beahaviour theories from social sciences and psychology in the design and development of the new system.

With the help of the Transtheoretical Model (TTM), once an individual's behavioural stage is determined, interventions are used to help facilitate progression into the next stage of TTM. On the other hand, Goal Setting Theory motivate behavior change, by encouraging individuals to set goal which in turn leads to higher performance. Moreover, the use of Reinforcement helps the researcher employ the use of incentive in reinforcing a desirable behavior. Social Learning Theory is another theory which is very important to this research work. The researcher uses it to show the point that learning a desirable behavior can occur through interactions between individuals, between individuals and groups and between different groups. Finally, Knowledge-Attitude-Behaviour (KAB) Model is used to show that an acquisition of new knowledge leads to a change in behavior.

Secondly, the proposed system accommodated different types of problem drinkers. It was found from research that there are three groups of problematic drinkers; hazardous or risk drinkers, harmful drinkers and alcohol abusing or dependent drinkers. The participants at the point of registration will chooses which category they fall into and start the intervention program from there.

Moreover, the application consists of four major sections namely; Alcohol Overview, Are You Addicted, Cutting Down and Staying on Track. These sections contain series of activities and educational information that a new user makes use of in the course of the intervention program. These activities include; Blood Alcohol Calculator, Do I Drink Too Much, Set Your Goal, Track Your Drinking, Cutting Back, Changing the Rules, The First Two Weeks, Dealing with Desires, Forums, Result Achieved and a lot of other educational information that will help the participants fight and win the battle against alcohol abuse.

The first section which is the Alcohol Overview contain information about alcohol, its effects to the health, socially and economically. Following the first section is the Are You Addicted section which helps users determine whether they are addicted and their level of addiction. Next is the Cutting Back section which helps users with actual activities needed to be performed on a daily basis while trying to quit alcohol. Finally, the researcher has the Staying on Track section which is kind of a maintenance section. When users have recorded a certain level of success, they can use the activities and exercises in this section to maintain their new found behaviour.

Finally, the proposed system adopted persuasion strategies such as framing, salience, commitment, authority, social proof and reciprocation in the design and development of the application.

3.4 Class Diagram of the New System

Figure 3.1 is the class diagram of the proposed system. It shows the building blocks of the new system. Class diagrams depict the static view of the model or part of the model, describing what attributes and behaviour it has rather than detailing the methods for achieving operations. Class diagrams are most useful to illustrate relationships between classes and interfaces.

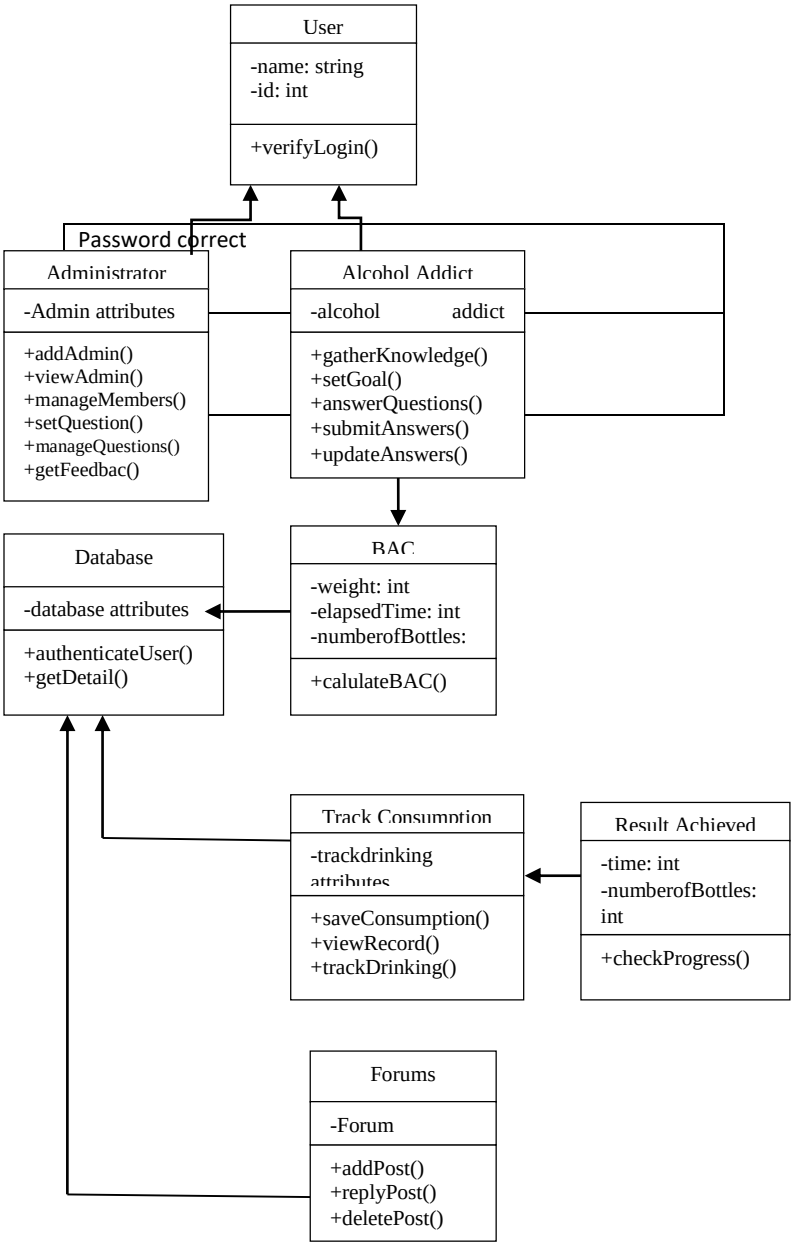

Figure 3.1: Class diagram of the new system

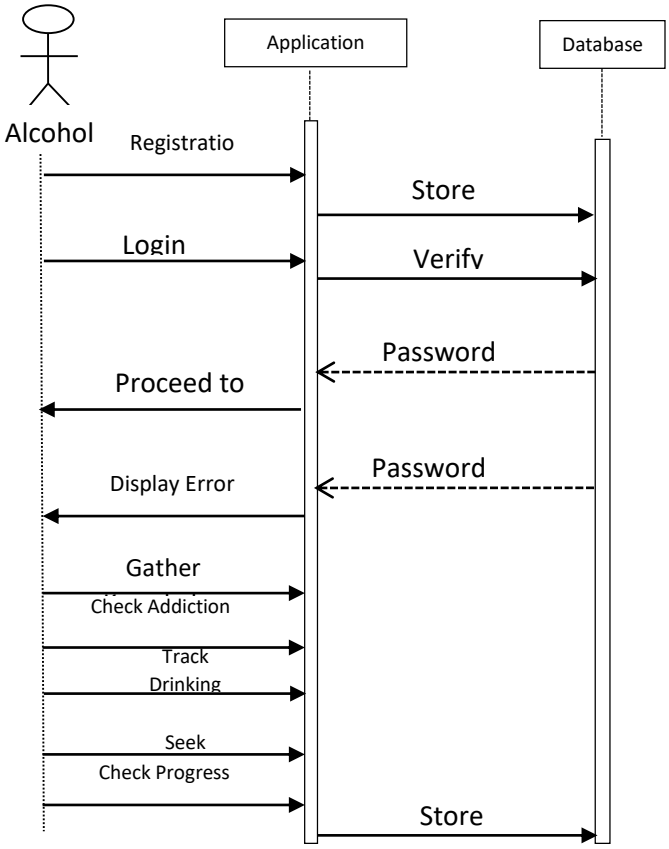

Figure 3.2 Sequence of the new system

3.5 Sequence diagram of the new system

Figure 3.1 shows the sequence diagram for the new system. A sequence diagram shows objects as lifelines running down the page and with their interactions over time represented as messages drawn as arrows from the source lifeline to the target lifeline. Sequence diagrams are good at showing which objects communicate with which other objects and what messages trigger those communications.

System Architecture and Implementation

The new system is a combination of windows project and database project hence the program development was carried out using PHP programming language. The new system was developed using windows forms which contains Graphical User Interface. The database aspect of the new system was developed using Microsoft SQL server. The system shall be in three layers architecture namely: the client-tier, the web-tier and the database management system. The client-tier components were implemented using HTML and CSS, the web-tier was implemented using Hypertext Preprocessor (PHP) Scripts version 5.4. While the database management system is a relational database designed using MySQL Database Engine Version 5.6.

CONCLUSION

For so long the abuse of alcohol has been o great worry to all stakeholders concerned. This has led to the design of a persuasive technology for alcohol behaviour in order to alleviate the problem of alcohol abuse. This work has shown that the fight against alcohol abuse can be won with the use of persuasive technology that is; tailoring information, behavior change theories and persuasive strategies. The study therefore concludes that, with persuasive technology for alcohol behaviour change, users are able to increase their knowledge about alcohol and this application has the capability to cause deep reflection on the part of the users which will in turn lead to a change in attitude of the users.

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