UNIVERSITY OF CAPE COAST

ROAD SAFETY EDUCATION IN THE ASHANTI AND GREATER ACCRA REGIONS, GHANA: DRIVERS' PERSPECTIVES

GODFRED AKYEA-DARKWAH

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BY

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Thesis submitted to the Department of Geography and Regional Planning of the Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Doctor of Philosophy Degree in Geography.

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature ..... Date 25th August 2017

Candidate's Name: Godfred Akyea-Darkwah

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast

Principal Supervisor's Signature ..... Date 25/08/2017

Professor Albert M. Abane

Co- Supervisor's Signature ..... Date 25-8-17

Dr. Edem Kwesi Amenumey

ABSTRACT

The study assessed road safety education in the Greater Accra and Ashanti Regions in Ghana from the drivers' perspective. Defensive driving course model, Bergs Theory and Bloom's Taxonomy Domain for a choice guided the study. This culminated in the use of mixed method approach comprising qualitative and qualitative sources of data such as in-depth interviews and questionnaire administration. Five hundred drivers were selected through quota, accidentally and purposively sampling techniques for the questionnaire administration and fifteen in-depth interviews were conducted. Instruments used were questionnaire and in-depth interviews. Whereas the qualitative data were manually transcribed and SPSS was used to analysed the quantitative data. The results of the study revealed the dominant socio-demographic characteristics of drivers in the study sites. The majority of the drivers acquired driving knowledge via the formal mode of driver education (defensive driving). The results of the analysis further revealed the strengths and shortcomings of Defensive Driving Course Model (DDCM) as against Bloom's Taxonomy of Domain. The perceptions of the drivers against attributes of road safety knowledge were also elicited across socio-demographic characteristics. And the factor analysis indicated that cognitive analysis between facts and inferences and the application of acquired knowledge were the main factors of the drivers' views on road safety. It was recommended that government through DVLA should encourage would be drivers to undergo formal mode of driver education and design graduated licensing for experienced or older drivers.

KEY WORDS

Driving

Education

Knowledge

License category

Mode of training

Road safety

Road traffic safety

Transport

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DEDICATION

This thesis is dedicated to the loving memories of my late parents Mr. Ransford Alex Atcheah & Mrs. Mary Aninwa Atcheah.

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LIST OF ACRONYMS

ABS	Anti-Braking System
ADTSEA	American Driver and Traffic Survey Education Association
DALY	Disability Adjusted Life Years
DE	Driver Education
DIA	Driving Instructors Association
DSAA	Driving School Association of the Americas
DVLA	Driver and Vehicle Licensing Authority
GDLS	Graduated Licensing System
GLP	Graduated Licensing Program
IVV	International Association for Driver Education
MSA	Motor Schools Association
NHSA	National Hellenic Student Association of America
RTCs	Road Traffic Crashes
SA	Situation Analysis
UN	United Nations
US	United States
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

Background to the Study

Globally, transport plays an important role in the socio-economic development of every nation. Intikhab (2008) asserts that efficient transportation system plays an important role in catering for the daily necessities in the lives of people. These include access to amenities and services such as employment, education, health and leisure all of which are central to the lives of people. A reliable transport network is also essential to public safety, economic vitality and the overall quality of life (Oteng-Ababio & Agyemang, 2012).

Of the various modes of transportation, the road has expanded the most both for passengers and freight. Such growth in road freight transport has been fuelled largely by trade liberalization (Rodriguez & Slack, 2009). This is the result of the growth of the loading capacity of the vehicle and an adaptation of vehicle to freight (perishables, fuel, construction materials) or passengers (school bus) demand for speed, autonomy, and flexibility. New types of challenges, such as the significant growth of fuel consumption, increasing environmental externalities, traffic congestion and a multiplication of road crashes have also emerged (Oteng-Ababio & Agyemang, 2012).

The United Nations (UN) (2013) estimated that between 2011 and 2050, the world population is expected to increase by 2.3 billion from 7.0 billion to 9.3 billion. At the same time, the population living in urban areas is

projected to increase by 2.6 billion, from 3.6 billion in 2011 to 6.3 billion in 2050. Consequently, the demand for services including public transport has to rise in response to the quest to meet the growing demands of a continually urbanized population.

In the midst of rapid urbanization and increasing motorization, a parallel trend that is emerging is road traffic crashes. Road traffic deaths and injuries are a growing public health issue, disproportionately affecting vulnerable groups of road users, including the poor. More than half of the people killed in Road Traffic Crashes (RTCS) are young adults aged between 15 and 44 years – often the breadwinners of families (WHO, 2013). Road traffic crashes constitute a global problem and one of the world's largest public health and injury prevention problems.

Serious injuries and mortality in road collisions constitute a public health problem with consequences similar to those of major diseases such as cancer and cardiovascular diseases. Following this, the World Health Organization (WHO, 2009) estimated that, annually about 1.3 million persons were killed on the roads and an additional 20 to 50 million were injured worldwide. In 2009, RTCs ranked with tuberculosis and malaria as major killers globally. In 2011, road traffic injuries were the 11th leading cause of death worldwide and accounted for 21 percent of all deaths globally (WHO, 2013).

In 2012, road traffic deaths accounted for 23 percent of all injury deaths worldwide with a significant proportion (90.0 percent) of the road traffic deaths occurring in low-income and middle-income countries, where 81.0 percent of the world's population live and own only about 20.0 percent of

the world's vehicles. The overall global increase in RTC mortality was predicted to be 67.0 percent by 2020 if appropriate action is not taken (UN, 2013).

Every day around the world, about 16, 000 people die from all types of injuries (WHO, 2013). Injuries represent 12 percent of the global burden of disease, the third most important cause of overall mortality and the main cause of death among 1–40-year olds. Those involved in RTCs dominate the category of injuries. Estimates of the annual number of road deaths vary, as a result of the limitations of injury data collection and analysis, problems of underreporting and differences in interpretation. The figure ranges from around 750, 000 to 1,183,492 annually – representing over 3000 lives lost daily (Stephens, Ogwude, Wilfred, 2013). About 90 percent of the disability-adjusted life years lost is due to crashes, and 96 percent of all children killed worldwide as a result of road traffic injuries occur in low-income and middle-income countries. Among children aged 5-14years, and young people aged 15-29 years, road traffic injuries are the second-leading cause of death.

Sub-Saharan Africa alone, with only 4.0 percent of the global registered vehicles accounts for 10.0 percent of the total RTCs fatalities, and the economic, social and health consequences are grave. Conversely, high-income nations, with 60.0 percent of the total global vehicle fleet, contribute only 14.0 percent of the annual road deaths. (UN, 2013).

Six countries in Africa (Angola, Libya, Burkina Faso, Uganda, Guinea-Bissau, and Nigeria) are among the first eleven countries out of forty-three countries with high rate of RTCs globally (UNWC 2014). Ghana is ranked 38th among 43 countries with worse RTCs rate in the world, with 24.6

per 100,000 populations (UNWC 2014) and was rated as the second highest RTC prone country among six West African countries, with 73 deaths per 1000 accidents in 2001 (Sarpong, 2011; Haadi, 2014). From 2001-15, an estimated average of 6 and 1,900 deaths daily and annually are recorded in Ghana (Abane, Akyea-Darkwa & Amenumey, 2010; Teye Kwadjo, Knizek & Rundmo, 2013).

In economic terms, the cost of RTC injuries is estimated at roughly 1.0 percent of Gross Domestic Product (GDP) in low-income countries, 1.5 percent in the middle- income countries and 2.0 percent in high-income countries (Peden, 2004). Ghana loses about 1.7 percent of its Gross Domestic Product (GDP), which is over $230 million dollars every year besides the loss of lives to RTCs (Afukaar, Damsere-Dery and Mock, Ackaah; NRSC, 2009, 2012).

Available statistics in Ghana reveals that 53% of the fatalities involved are occupants of vehicles (NRSC, 2012, 2013, 2014; Thompson 2014). Thus, many travellers never return home alive, end up being hospitalized for months/years, and sometimes suffer long-term disability (Ackaah & Adonteng, 2011; Yankson, Browne, Tagbor, Donkor, Quansah, Asare & Ebel 2010). Commercial drivers are overtly involved in such RTCs (Ackaah & Adonteng, 2011; NRSC, 2006; 2009).

There is a school of thought that says, as the world's roads become improved with the postmodern state of the art road designs, millions and millions of vehicles produced each year and national population figures keep on rising; then the road crashes situation will become worse. Road safety education aims to reduce the harm (deaths, and injuries) resulting from motor

vehicle crashes. Harm from road traffic crashes is greater than that from all other modes of transportation namely air, sea, space, off-terrain combined. Road safety deals exclusively with road traffic crashes and how to reduce their number and their consequences. There are different actors in ensuring road safety-regulators, drivers and other road users. Amongst all these groups of users, the driver is at the forefront.

Road safety in Ghana

Statistics on RTCs in Ghana paint a rather gloomy picture of the road safety situation (Abane et al., 2010). On the average, 1600 deaths and over 15,000 injuries were recorded in 2005 as a result of road traffic crashes. These cost the nation 1.6 percent of its annual Gross Domestic Product (GDP) (NSRC 2006). In 2009, the total number of RTCs recorded in the country was 12,299 resulting in 2,237 fatalities and 16,259 injuries. In 2010, 11,506 RTCs was recorded, resulting in 1,986 fatalities and 14,918 injuries (NRSC, 2010). In 2011, there were 13,572 recorded road traffic crashes in which 2,330 people died, and 13,272 people injured.

The vehicle and population ratio in Ghana have been growing steadily over the years. For instance, in 2002, the vehicle/population ratio was around 31 vehicles per 1,000 persons. This increased to around 44 vehicles per 1,000 persons in 2008 (NRSC, 2009). According to the NRSC the increase in vehicle population in the period 2001 to 2010 was 61,427 as against 43,825 in the period 1991 to 2000, indicating approximately 41.0 percent increase in the annual rate of vehicle growth rate in the country. Just as the rate of vehicle/population has grown, so have the absolute fatality rates been rising.

Within the five-year period from 2006 to 2010, the number of people killed on Ghana's roads averaged 2,012 annually (NRSC, 2010).

Driver characteristics have been recognized as a major factor of RTCs. Illiteracy, impacting on lack of or poor understanding of the road code, driving under the influence of alcohol and or cannabis, knowingly overloading vehicles (especially commercial drivers), blatant disregard of the road code, bribing of enforcement personnel (in cases of traffic infringement), road rage, unlicensed drivers and speeding are some of the driver associated factors in Ghana having an effect on RTCs (Mensah-Bonsu, 2009).

National Road Safety Commission also identified drunk-driving, fatigue, dangerous driving, careless and inconsiderate, speeding, wrongful overtaking, poor vision of drivers, unqualified driver, overloading, disregard and lack of knowledge for road signs and markings, poorly designed roads, non-maintained roads, sleep driving, poorly maintained vehicles (unworthy), pedestrian/vehicle conflicts, adverse weather conditions (NRSC 2010).

When it comes to the effect of vehicular traffic regulation on RTCs, a major troubling factor is the issue of corruption especially in the police service and public life (Amo & Meirmanov, 2014). This is a pervasive problem with extreme consequences largely because it undermines the whole exercise of vehicle and driver regulation. This is due in part to the ease with which road traffic offenders especially drivers knowingly bribe their way out of infringement situations, hence setting up scenarios for flaunting the driving code, leading to crashes. Lack of adequate personnel capacity in the enforcement agencies constitutes another issue facing the enforcement sector in a lot of developing countries including Ghana (Coleman, 2014). This factor

impacts on the adequate and exact documenting of facts, and collection of data to derive appropriate statistics to inform decision-making. The urgency for containment of the RTC situation in Ghana is important particularly so as the United Nations considers the problem of RTC containment as a global public health priority and a threat to human security, and it has declared the decade 2011 to 2020 as the "decade of action for road safety".

Evidently, Ghana has considerable problems with road safety, which manifest in the numerous incidences of RTCs. Additionally, there are legislative, institutional, administrative and procedural inadequacies. The effects of these challenges are often aggravated by problems of inadequate logistics and funding for road safety activities (Abimah, 2013). The process of appraising current road safety performance involves multi-sectoral strategic examination of a range of activities from key government agencies such as Ministries of Transport and Education, Ghana Police Service (GPS), and Driver and Vehicle Licensing Authority (DVLA) as well as all stakeholders who can contribute to the delivery of road safety results. They produce the interventions to achieve the desired long and medium-term road safety results.

Road safety interventions seek to manage exposure to the risk of crashes, prevent crashes, and reduce crash injury severity and the consequences of crash injury (Abane et al., 2010; Abimah, 2013). Interventions comprise standards and rules specifying how the road network is to be used safely by setting speed and alcohol limits, occupant restraint and helmet requirements, vehicle standards and vehicle and driver licensing requirements (Abane, et al., 2010). They also comprise systems for ensuring compliance with standards and rules using a combination of education,

enforcement and incentives (Breen, Howard & Bliss, 2008). Success in managing road safety outcomes requires a systematic and planned response and strengthening the road safety management system. Road safety is viewed by several international organizations as a production process, where institutional management functions provide the engine room to deliver a range of effective, system-wide interventions to achieve results, expressed as long-term goals and interim quantitative targets.

An in-depth analysis of incidents on the road network reveals that RTCs are the consequences of one or more faults in a complex system involving drivers, vehicles, the road and its surroundings. However, human factor remains the principal factor in road crashes (Jorgensen & Abane, 1999). Hence, any effort to increase the level of road safety has to be primarily aimed at the prevention of this type of error as well as at ways to reduce the consequences without, however, ignoring other factors linked to the infrastructure and to vehicles.

Road safety education is a topical issue in reducing the spate of RTCs. There is a need to understand the concepts of road safety and road crashes. The attempt to curb the incidence of road crashes caused by a human is termed as road safety education. In the past, road safety efforts addressed the environment of road safety, focusing mainly on engineering, safer cars, and highways (Lonero, 2007). In recent years, the emphasis has shifted towards encouraging safer road user behaviour and measures to change road user behaviour focused on four practical approaches: legislation, enforcement, reinforcement and education (Lonero, 2007; Abimah, 2013).

Driver education teaches traffic code or laws, vehicle operation and proper driving strategies and the consequences for not observing the rules. According to Mayhew and Simpson (2002), the main goal of driver education and training is to produce 'safer' drivers, defined regarding absence of collision involvement.

Road safety education programmes must be explicit about educational objectives, and these should include intermediate measures as well as measures aimed at reducing collision losses. A programme must relate directly to those tasks a road user needs to learn. Programme objectives must also take into account the skills and motives road users already have.

Enforcement should not be relied upon as the sole means of reducing RTCs. Rather, high levels of public and driver education and programme evaluation should support enforcement, good roads and good road signs. In line with this, publicity and education are essential requirements to raise community awareness and improve the effectiveness of enforcement operations. Thus, public education plays a big part in educating drivers on safety and getting them to obey traffic laws.

Education as a prevention approach was used in an attempt to reduce alcohol-impaired driving by altering social norms, changing risky or dangerous behaviours and creating safer environments. Communication and education also provided information to the public about the dangers and the consequences of alcohol-impaired driving. While education and public information are necessary to improve public awareness, and supporting enforcement policies, they need to be part of a comprehensive strategy, and they seem to work best when linked with highly visible enforcement efforts.

Driver education

Studies by road safety researchers including Nichols, Parenteau, Viano, Shah et al. (2003) and Williams, Oesch, McCartt, Teoh and Sims (2009) have provided a concise and detailed history of driver education. Some of these studies describe and compare driver education in different countries (Lynam & Twisk, 1995; Lonero & Mayhew, 2010). These studies further presented similarities and differences between the systems in different countries.

Driver education started in the United Kingdom in 1909-1910. Hugh Stanley Roberts founded the British School of Motoring (BSM) in 1910 in South London. It was to offer hands-on training and courses in driving skills (managing the controls and road aptitude) and repairs. Similarly, the first known driver education programmes were developed between 1910 and 1920, but it was not until the 1930s that formal courses were offered by the State College Areas School District. There are two associations governing driver education in the UK namely Driving Instructors Association (DIA) and Motor Schools Association (MSA). In the US, American Drivers and Traffic Safety Education Association (ADTSEA) were formed in 1956 to represent the interests of the driver education community. There has been an astronomical increase in high school driver education courses enrolment over the years in the US (Williams et al., 2009).

International Association for Driver Education (The IVV) was founded in 1957 and to this day is the only worldwide association representing the interests of professional driving instructors, driving schools and their associations. Since its launch more than 50 years ago, new educational

methods and curricula have been implemented in numerous countries with great success, and conferences have been held in that regard in many parts of the world.

Driver education in developed countries such as the US has usually been applied to programmes for beginning drivers of both "theory" instruction in the classroom and practical training in a vehicle (Lonero & Mayhew, 2010). In the developed countries, there have been some changes in how driver education is delivered. There are changes in instructional method and program delivery (Lonero & Mayhem, 2010). Traditionally, all driver education activities involve face-to-face interaction between instructor and learner, although classroom instruction was often supported with film and video media, and sometimes simulators. More recently self-instruction, computer-based instruction, simulation, and even web-based instruction have become prevalent, particularly in parts of the United States.

Most of the changes have been the result of technology "push" rather than having been pulled by pedagogical, epistemological, or evaluation research on driver education and its target audiences. Nevertheless, as a result of recent changes, driver education is now quite diverse in its delivery and organization. For traditionally high school driver education, evaluators must recognize the growing importance of driving schools, home schooling, and computer- and web-based instruction.

Driver education is meant to prepare beginners for license testing. In both developed and developing countries, most beginner drivers receive some instruction from a paid professional instructor. Before the 1980s, driver education was widely available in public secondary schools in North America.

However, the pervasiveness of driver education was more diverse in high schools' driver education and has remained strong in some provinces in Canada. Traditional high school driver education of 30 hours in the classroom and six hours in the car is still common in the United States, with some notable exceptions. In some Canadian jurisdictions, the "behind-the-wheel" in-car requirements have been expanded to 8 or 10 hours. In most jurisdictions, classroom methods have typically consisted of teacher-centred lectures, with some discussion supported by film and video. Many commercial driver education providers use similar program structures.

The current training system of driver education in some countries in developing countries such as South Africa and Nigeria is confronted with the following challenges:

- There is no proper regulation that is enforceable
- No standard for driver education
- No formal syllabus to be followed
- Corruption at testing stations is rife
- Learning time too short and not compulsory

As an effective behaviour change intervention, a driver education's potential seems good, at least on the surface. The typical face-to-face instructional setting provides an opportunity for two-way communication and feedback, as well as rehearsal and practice opportunities. It seems that it ought to provide strong support for forming appropriate habits and skills, as well as reinforcing healthy beliefs, attitudes, and values.

Williams, Preusser and Ledingham (2009) provided a cogent summary of the reasons why traditional driver education may have had less effect than

expected:

> *The courses are of short duration, and always spend teaching basic vehicle handling skills. This leaves less time to try to teach safe driving skills. The audience for driver education may also be relatively unmotivated regarding safety, the primary motivation being to learn enough to get a driver's license. Probably the biggest impediment to driver education effectiveness involves the inherent difficulties in affecting lifestyle and developmental factors: the attitudes, motivations, peer influences, and cognitive and decision-making skills that are so influential in shaping driving styles and crash involvement (p.11).*

While driver education traditionally meant instruction only before the new driver was licensed to drive independently, a less-common but potentially important form of instruction is marketed to drivers after they are licensed to drive independently. The distinction between beginner driver education and "advanced" training have become somewhat blurred (Lonero & Mayhew, 2010). A need has long been recognized for additional instruction after a driver has mastered the basics (Lonero et al., 1995). In a few jurisdictions, such as Michigan in the US, Finland, and Luxembourg, new drivers are required to take the second stage of training after they have been driving as licensed drivers for a short period (Shope & Molnar, 2003).

Lonero and Mayhew (2010) posited that if driver education is to meet its safety goals, there is a need to be more firmly based on research and theory concerning driver skills, behaviour, motivation, and risk, and the best ways of

influencing them. Attempts at evaluating driver education should include changes in behaviour, knowledge, attitudes and exposure to risk.

Lonero (2007) provided guidelines on developing road safety education programmes. They said road safety providers must ensure the following:

- Try to create more than short-term knowledge gains; make sure media expenses are cost effective; target children for complete road user skills;
- Integrate education into broader-based programming that uses a variety of methods such as social action, support for legislation and enforcement, incentives and publicity campaigns;
- Support community awareness of road safety and the development of local standards of behaviour; support the development of a more constructive role for the news media;
- Redesign driver education to recognize the protracted process of learning to drive and the need to use driver education in conjunction with other motivational influences.

In summary, driver education entails the conscious training of drivers of motor vehicles and motorcycles towards proper and lawful behaviour on public highways. According to Oni (2000), this should involve:

- Knowledge of road traffic laws and highway code;
- Comprehension of road signs and traffic signals;
- Knowledge of one's responsibilities while driving;
- Respect for other road users;
- Proficiency in driving; and

- Respect for traffic control officers and their directives.

Statement of the Problem

Driver education has a long history as a road safety strategy, and considerable effort has been given to evaluating its effectiveness (Lonero & Mayhew, 2010). However, road safety education for drivers who are more culpable to RTCs is still not substantial because there is no documentary proof of the success of the available road safety educational models being used in Ghana (Abane et al., 2010).

Drivers are frequent users of the road, as such they are expected to have adequate knowledge and information on road safety practices (Afukaar et al., 2003; Malik, 2008; de Ona, Eboli & Mazzulla., 2014). Gregersen, Brehmer and Moren (1996) noted that driver training/education helps in reducing RTC. This is because, in Ghana three passengers are killed when a driver is killed in a RTC (Ackaah & Adonteng, 2011).

In recognition of this road safety concern road safety practitioners/advocate and stakeholders have been employing various educational methods such as driver training, group discussions, campaigns and bonuses to stop or reduce the deaths and injuries on the roads by drivers (Mayhew & Simpson, 2002; Afukaar et al., 2003; Lonero & Mayhew, 2010).

This study seeks to consider four modes of driver education-mate system, defensive driving course model, parent and relationship training in Ghana because of the length of time involved. These modes of driver education are widely used in developing countries such as Ghana and Nigeria (Afukaar et al., 2003; Johnson & Adebayo, 2011). However, effects of these

modes on road safety acquisition knowledge have not been thoroughly evaluated in Ghana (Abane et al., 2010). A content analysis of DVLA syllabus by Abane et al. (2010) showed a substantial proportion of the necessary ingredients to produce a comprehensive driver are seriously lacking when compared to Berg's (2006) Goals for driver education framework. But the current study seeks to compare the DVLA syllabus with the classic model Bloom's taxonomy of learning domain.

Objectives of the Study

The main objective of the study was to examine the type and extent of knowledge in road safety education for drivers. Specifically, the study sought to achieve the following:

a. Ascertain drivers' socio-demographic characteristics (such as gender, age, educational background, method used in training, driving category, and class of driving license) and mode of training in the driving profession;
b. Conduct content analysis of defensive driver education in Ghana;
c. Assess the effects of mode of driving education on perception of road traffic safety in Ghana; and
d. Assess the modes and level of road safety knowledge of drivers.

Research Questions

The following research questions guided the research:

1. What is the relationship between socio-demographic characteristics of drivers and the modes of driver training?

2. What are deficiencies in defensive driving education in Ghana?
3. How do modes of driver education affect the perception of road traffic safety in Ghana? and
4. What is the relationship between modes of driver education and level of road safety knowledge of drivers?

Significance of the Study

Findings of the research will add to the knowledge and understanding of the subject matter of road safety education in Ghana and its application by drivers.

The study has the potential to enrich and fix any road safety educational gap identified in the existing theories and models that will enhance safety on the roads in Ghana in the following ways;

- Create awareness among the stakeholders and the general public on road safety.
- It will inform DVLA, NRSC and other stakeholders in the formulation of Road safety educational policy.
- It could further lead to the adoption of a successful road safety framework in Ghana.
- The findings will add to the existing knowledge and literature and provide basis for further research.
- The framework could serve as yet another model for driver education in Ghana.

Organization of the Study

This study is divided into eight chapters. Chapter one contains the introduction to the study comprising statement of the problem, objectives, hypotheses, significance of the study and study area. Chapter two presents the concepts of road traffic crashes, road safety education, driving license, and conceptual framework for road safety education.

Chapter three presents the different models and theories in driver education and training. Chapter four contains the research methodology such areas as research design, target population, sample size, sources of data collection, and types of data, field challenges, and ethical considerations for the study. Chapter five elucidates the socio-demographic characteristics of drivers and means of acquiring driving knowledge. Chapter six addresses the content analysis of defensive driving module in Ghana. Chapter seven discusses the views or perception of road safety education and how these affect the affective, cognitive and psychomotor behaviour of drivers. The last chapter presents the summary of findings, conclusion, and recommendations.

CHAPTER TWO

CONCEPTUAL ISSUES IN ROAD TRAFFIC SAFETY EDUCATION

Introduction

The chapter contains concepts of road traffic crashes, road safety education, and driver licensing. The chapter also presents the conceptual framework guiding the study. Causes of RTCs and typologies of crashes are reviewed to throw light on and assess the nature of course, content to adopt in formulating a road safety education model for road safety education in Ghana.

The Concept of Road Traffic Crashes

A traffic collision, also known as a Motor Vehicle Collision (MVC), traffic accident, motor vehicle accident, car accident, automobile accident, road traffic collision, road traffic accident, wreck, car crash, RTC, or car smash occurs when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree or a utility pole. Traffic collisions may result in injury, death, and damage of property.

RTCs and their associated consequences of deaths and injuries have become a serious global challenge. Every year, more than a million people lose their lives on the world's roads (WHO, 2013) while the non-fatal injuries are between 20 to 50 million. The Global Status Report on Road Safety 2015, reflecting information from 180 countries, indicates that worldwide the total number of road traffic deaths has skyrocketed to 1.25million per year, with the highest road traffic fatality rates in low-income countries.

Causes of road traffic crashes

Research on the causes of RTCs and general safety issues is very extensive even though a substantial proportion of the studies continue to focus on countries in the developed parts of the world. Causes of RTCs can be broadly grouped into four namely environments, human, vehicular and enforcement (Chin & Quddus, 2003; Odero, Khayesi & Heda, 2003; Jha, Srinivasa, Roy, Jagdish & Minocha 2004; Abdel-Aty, 2003; Tsala, Makomra & Ohandja, 2015). Of all these typologies, human factors contribute more than 85.5%, vehicular defects (5.1%), environment (2.9%) and other factors including enforcement (6.4%) (Odero, et al., 2003).

RTCs might occur due to shared common cause(s) whereas human error and mechanical failure constitute a large chunk of causes of the crash. Tsala et al., (2015) identified the quality of road signing, the visibility of the latter and their interpretations by drivers are factors related to enforcement. Environmental causes include such things as weather condition, lighting condition and time and day of the crash (Abdel-Aty, 2003).

Petridou and Moustaki (2000) classified human factors as behavioural factors, which are:

- Those that reduce capability on a long-term basis (inexperience, aging, disease and disability, alcoholism, drug abuse);
- Those that reduce capability on a short-term basis (drowsiness, fatigue, acute alcohol intoxication, short-term drug effects, binge eating, acute psychological stress, temporary distraction,
- Those that promote risk taking behaviour with long-term impact (overestimation of capabilities, macho attitude, habitual speeding,

habitual disregard of traffic regulations, indecent driving behaviour, non-use of seat belt or helmet, inappropriate sitting while driving, crash proneness);

- Those that promote risk taking behaviour with short-term impact (moderate ethanol intake, psychotropic drugs, motor vehicle crime, suicidal behaviour, compulsive acts).

Typologies of road traffic crashes

Most countries use similar typology of crash types with a different number of crash types considered. For example, in Germany, there are seven less basic crash types - (Mom, 2007) as discussed below:

Driving crash

This is a type of crash in which the driver loses control of the vehicle because he or she is driving at a speed which is inappropriate for the layout, the cross-section, the incline or the conditions of the road, or because he or she does not realize how the road is laid out or that there is a change in the cross-section until it is too late. Driving crashes are not always "one-party crashes" in which the vehicle leaves the road. They can also result in a collision with other road users.

Turning-off crash

Turning-off crashes are those triggered by a conflict between a vehicle turning off a road and a road user traveling in the same or the opposite direction. This can happen at junctions and intersections on the roads, at field tracks or cycle tracks, or at entrances to properties/car parks.

Turning-into/crossing crash

This crash triggered by a conflict between a vehicle, which is obliged to give way, turning into a road or crossing the path of other traffic, and a vehicle, which has the right of way, is referred to as a "turning-into/crossing crash." This can happen at junctions and intersections with roads, field/cycle tracks and railway crossings, or at entrances to properties/car parks.

Crossing-over crash

A crash is triggered by a conflict between a pedestrian crossing the road, and a vehicle provided the vehicle had not just turned off a road. This rule applies irrespective of whether the crash occurred at a site without any special pedestrian-crossing facilities or a zebra crossing, a light-controlled crossing or similar installation.

Crash caused by stopping/parking

A "crash caused by stopping/parking" is a crash triggered by a conflict between a vehicle in moving traffic and a vehicle which is parked (parking) or has stopped (is stopping) on the road. Such crashes involve the moving traffic conflicting with a vehicle manoeuvring into/out of a parking position. It does not matter whether stopping/parking was permitted.

Crash in longitudinal traffic

A "crash in longitudinal traffic" is a crash triggered by a conflict between road users moving in the same or opposite directions, provided the conflict is not the result of a manoeuvre that corresponds to another crash type.

Concept of Driver Education

Redelmeier, Tibshiran and Evans (2003) state that driver education is a programme that prepares a new driver to obtain a learner's permit or driver's license. It may take place in a classroom, in a vehicle, online, or a combination of these. Topics of instruction include traffic codes or laws and vehicle operation. Typically, instruction will warn of dangerous conditions in driving such as road conditions, driver impairments, and hazardous weather. Instructional videos may also be shown, demonstrating proper driving strategies and the consequences for not observing the rules. Driver education is intended to supplement the knowledge obtained from government-printed driving handbooks or manuals and prepare students for the test to obtain a driver's license or learner's permit (Addo, 2010).

The concepts of driver training and driver education have been used interchangeably; the former is embedded in the latter as a subset (Christie, 2001). But each has a distinct definition. Driver training focuses on the development of specific skill sets; initially, it is focused exclusively on procedural skills such as vehicle manoeuvring and handling (Hornerman, 1993), but more recently, it has been expanded to higher-order cognitive skills (Isler, Starkey & Sheppard 2011) including hazard perception and situation awareness. Driver education is broader, often involving long-term processes and typically focuses on the acquisition of knowledge about driving and road safety (Christie, 2001).

Primary driving tasks are functions that are central to driving and without which moving a vehicle to a destination safely would be impossible. The primary tasks are divided into three broad categories: navigation and

routing, guidance and manoeuvres, and control. Driver education is also a significant tool to improve driver performance and increase driver responsibility (Verma et al., 2011).

- It helps drivers to adhere to rules and regulations as consciously as possible;
- It can provide primary prevention in reducing crash risks, and
- It obligates new drivers to use safety equipment provided in vehicles and to do so in a correct manner (Nyberg, 2007).

The three cornerstones of driver education are, the goal of driver education, content and method of driver education, and the testing procedure (Verma, Velumurugan, Chakrabarty & Srinivas, 2011). All of these should form a harmonized entity for effectiveness. The importance of each part should be reflected in the other parts. Such type of harmonization requires the involvement of qualified instructors, examiners having necessary knowledge, competence and teaching skills to fulfil all aspects of driver training (Nyberg & Gregersen, 2007). Any disruption may cause a negative impact on the content of driver education. For example, Nyberg and Gregersen (2007) emphasizes that all aspects of driver education should be given equal attention from both instructors and learners. Aspects of training that cannot be tested should be obligatory elements within training.

Two socio-demographic characteristics have been identified to be important in driver education namely age and educational level. The age at which one can apply for driver education or training differs from one country to another. For instance, in Ghana and India, the licensee must be 18years and above (Addo, 2010). In Canada, Malaysia, Pakistan, France, Norway, and

New Zealand the lowest minimum driving age ranges from 14 to 16 years. The British overseas territory, Gibraltar, has the highest minimum driving age at 19. Aside from age, educational level has been found to be critical in driver training.

One of the reasons for the increase in the number of crashes, even with added safety features is that the competency of drivers has not necessarily improved (Malik, Rosenthal, Majeroni, & Pretorius 2008). This implies that driver perception and learning of a particular driving hazard remains a key factor impacting road safety. For a country to tackle road safety issues, a complete and integrated framework needs to be developed that would include and examine all the parameters that influence driving (i.e. cues related to road, vehicle and driver) as shown in Figure 1.

Goals of driver education

In most cases, driver education is targeted at achieving some very important means, which are meant to drastically reduce road mishaps. Johnson and Adebayo (2011) stated that driver education is carried out towards three major goals. These are safety, smooth traffic, and enjoyable driving.

Safety

Driver education stresses safety. Thousands of people die in traffic crashes every year while millions of people suffer disabling injuries. The major reason for these is bad driving. Only effective driver education can drastically reduce these tolls.

Smooth traffic

In most developing nations, the majority of people depend on highway transportation for the essentials of life, which make an efficient and smooth

movement of traffic an absolute necessity. Delay or interruptions of traffic flow can be costly. Smooth movement of the great volume of traffic depends on efficient and skilful driving of every vehicle on the highway by each driver.

Enjoyable driving

Driver education also aims at the enjoyment of driving. Individuals and families should be able to drive among other courteous, sportsmanlike drivers, free from the crowding, abuse and even threats that are most times part of driving on our roads. Mayhew and Simpson (2002) highlighted the following values that could be derived from driver education:

- It promotes the safe, efficient and rewarding use of the automobiles.
- It fosters a strong sense of personal responsibility for traffic conditions and improvement.
- It develops pride in high standards of performance and conduct.
- It encourages cooperation in solving public problems.

Forms of driver education

Lonero (2007) provided guidelines on developing road safety education programmes. They cautioned that road safety providers must: try to create more short-term knowledge gains; make sure media expenses are cost effective; target children for complete road user skills; integrate education into broader-based programme that uses a variety of methods such as social actions, support for legislation and enforcement, incentives and publicity campaigns; support community awareness of road safety and the development of local standards of behaviour; support the development of a more constructive role for news media and redesign driver education to recognize

the protracted process of learning to drive and the need to use driver education in conjunction with other motivational influences. Tronsmoen (2008, 2010, 2011) and Berg (2006) also observe that there are two forms of driver education namely formal and informal.

Formal driver education

The value of formal training has become the subject of debate (Mayhew, Simpson, Williams & Ferguson, 1998) culminating into two forms namely pre-licensing and post-licensing (Tronsmoen, 2011). Pre-license training involves teaching basic skills to learners before they obtain a driver's license. Berg (2006) noted that many years ago, most people accepted as axiomatic the premise of pre-license driver training leading to increase driving skills and fewer crashes in the US. This led to the creation of driving school industry in the United States during the 1930s. Driver training (classroom and on-the-road) was included into the curricula of many high schools, and by 1960, many US states required teenage drivers to complete a certified classroom and behind the school programme before receiving their original license.

The modules consisted of a 30-hour classroom education and six hours of the road instruction (Clinton & Lonero, 2006). This training was assumed to reduce young driver crash rates (Berg, 2006). Owing to that, some insurance companies offered discounts to teenage drivers who had completed driver training (Nichols et al., 2003). However, Berg (2006) faulted the studies that support this effectiveness due to socio-demographic characteristics such as gender, social adjustment, grade point average and intelligence.

Berg (2011), in a bias-adjusted and violation means by gender and training status, revealed that driver training appears to have had a significant effect on crashes and violations for males and females. He observed that there had been major changes in the role of gender in driving and involvement in the crash.

Informal driver education

Informal training includes mate or apprentice training, relationship training, parental training and other means of training. This has been the system of training drivers before and after the introduction of driving schools in the 1960s. It is the practice where a self-acclaimed driver passes on his best knowledge in driving to an apprentice. This type of training is such that whatever he thinks right is what is passed on to the learner mate/apprentice. The quality and the extent of the drivers' knowledge to be passed on are by self-standards and practices that are scientifically tested to ascertain its potency.

In relationship training, a boy/girlfriend, family member, or a possessor of a vehicle, without DVLA approval and authorization, teaches a learner how to drive. The trainer trains do so what he knows or what he thinks is right but does not use any syllabus.

On the part of parental training, a mother or father trains his or her son or daughter driving based on his/her knowledge and experience, which may not be in consonance with standard driver training practices.

Categories of Licensing Systems

Traditional licensing systems include only one phase of theoretical and practical training that ends with a written and a driving test. The

traditional licensing system is often called 'single- phase licensing system.' This system is quite common in Europe. For example, in countries such as Belgium, Denmark, France and Netherlands this trend is common. In other systems, probationary license systems, which very similar to single- phase but the candidate must complete a provisional phase of driving before becoming a fully licensed driver. Countries following this single-phase system with probationary license include Germany, Ghana, Austria, Norway, and Sweden. The last general variant of traditional driver licensing is the two-phase system, where the candidate receives a provisional or probationary license after passing written and practical driving tests, which ends the first phase. This provisional license is valid for a certain period. After that, a full license is issued on completion of the second phase of theory and training, but without further testing. Finland and Luxembourg follow this kind of system (Engstrom, Johanson & Ostlund, 2005; Nyberg & Gregersen 2007).

Relevance of licensing in driver education

According to Fensham (2002) before 1905, everybody was free to operate a motor vehicle in any way. That year, Connecticut and Massachusetts in the United States of America became the first states to require a license to drive. By 1953, the last of the 48 American States passed the driver licensing law. Drivers' licenses were originally a source of making money. They were issued without any test. This is no more like that all over the world. Traffic authorities now have the feeling that only qualified persons should be allowed to drive. They now believe that tests should be conducted for every applicant for a license for the following reasons:

- To ensure that the applicant does not have some serious physical

disability for which there is no compensation.

- To ensure that the applicant knows the traffic rules and that he is familiar with safe driving practices.
- To ensure that each applicant has the necessary skills to make him a safe driver.
- To ensure that the applicant has the proper mental attitude towards safe driving.

However, any state that issued drivers licenses to persons that have passed the required tests also has the reserved right to withdraw the licenses from any of the drivers for any of the following reasons:

- If a driver repeatedly violates the traffic laws.
- If the driver is involved in too many crashes.
- If the driver shows in other ways that he is irresponsible as regards his obligations as a driver. It is, therefore, only effective driver education that can assist drivers in fulfilling the obligations expected of them as drivers.

Empirical Evaluation of Driver Education

A great number of driver education programmes have been formally evaluated and are severely limited in scope, power and scientific rigor (Lonero & Mayhew, 2010) using three basic types of study as follows:

- Experimental studies-students are assigned to different training conditions;
- Quasi-experimental studies-naturally occurring groups are compared; and

- Ecological studies-assessment of changes in driver training requirements or programme differences across different jurisdictions.

Since the mid-1990s, a number of broad reviews of evaluation studies of beginner driver education have appeared using any of these three basics types of study (Christie 2001; Mayhew & Simpson 2002; Engström et al. 2003; Nichols et al., 2003; Siegrist 2003; Smiley, Beijer & Eizenman, 2004; Williams et al., 2009). Some of the recent reviews have approached driver education evaluation from a health perspective, essentially trying to determine its effectiveness as injury prevention "treatment." Others have addressed driver education in conjunction with other forms of driver instruction or as an adjunct to Graduated Driver Licensing (GDL). Elvik and Vaa (2009) provided a single quantitative meta-analysis of the evaluation literature has been provided by.

In an evaluation research in British Columbia (Wilson, Meckle, Wiggins & Cooper 92006), new drivers who used a driver education certificate to shorten their learner license period in Graduated Licensing Programme (GLP) crashed 26% more than the first year of unsupervised driving side by side those who did not present a certificate. Wilson et al. further notes that there are other reasons, which may not make driver education in British Columbia, operate at a level consistent with the new GLP standard as observed in Ontario and Nova Scotia.

Potvin, Champagne and Laberge-Nadeau (1988) used a time-series design to evaluate the impact of introducing a mandatory driver-training requirement for all new drivers in Québec. The researchers theorized that the increase in early licensure occurred because there was no longer any economic

advantage to waiting until age 18 to be licensed. The effect was stronger in females because it was mainly females who had previously waited until after age 18 to become licensed.

Carstensen's (2002) examined the effect of a new mandatory driver education programme in Denmark consisting of classroom and in-car training that differed from traditional courses by more strongly emphasizing defensive driving and including motorway driving and night driving. Unlike many other studies, Carstensen checked for differential changes in driving exposure. Such changes were ruled out as explanations of the new programme's greater crash reduction among new drivers. Other factors in addition to the driver education requirement, however, could have contributed to a decline in young driver crashes. The new training requirement, for example, made becoming licensed more expensive, which may have prevented or delayed licensing for some potential new drivers, perhaps resulting in a higher percentage of older, and lower-risk, new drivers.

Masten and Chapman (2004) carried out a product evaluation that focused on training methods measured against specific intermediate measures of knowledge and attitudes. It is a well-planned and controlled design, but using reasonably well tested psychometric measures of intermediate criteria, which in turn had some plausible, although not proven, relation to safe driving. Like Woolley (2000), in Australia, they concluded that non-skills factors are the keys to resolving road safety problems and that no conclusive link exists between skills-based training and crash involvement. Rather, motivation and risk-taking propensity are more important than any skills-based training, and driver education should be developed to address these critical factors.

Lonero and Mayhew (2010), conducted a review of a wide range of driving instructions, concluded that seven studies showed a positive effect, 16 showed no effects and about seven others showed a negative safety effect. They later summarized their findings as follows:

> *On balance, the weight of the available evidence does not favour the hypothesis that formal instruction has safety benefits. Indeed, there is precious little in the way of reliable evidence to show that formal instruction provided safety benefits. As counterintuitive as this may seem, it is difficult to reach a different conclusion in the face of the total body of evidence (*also see Mayhew and Simpson, 2002*).*

Mayhew and Simpson (2002; 2003) also offered some recommendations for future improvement of driver education as presented below:

- Driver education should be multi-phased
- Graduated Licensing System systems should give a "time discount" for driver education; and
- Specific changes should be implemented in the content and delivery of driver education.

Some of these issues have broadly shaped the methods adopted for both data collection and the analyses in this study. Each of the chapters has also incorporated aspects of the reviewed literature as much as they relate to the themes discussed.

CHAPTER THREE

MODELS AND THEORIES IN ROAD SAFETY EDUCATION

Introduction

There are some models and theories applicable to driver education. These include Keskinen's Hierarchical Behaviour Model, Educational Quality Framework, Defensive Driving Course Model, and Driving Management Science. This chapter focuses on some models and theories in road safety driver education. The two conceptual and theoretical frameworks adopted for the study are also outlined.

Berg's Goals for Driver Education (GDE) Framework

Berg's (2006) goal for educational framework was to complement Keskinen's model, which has been criticized for failing to completely address the issue of driving and driver safety. Berg reveals that good manoeuvring skills alone cannot ensure road traffic safety. The driver has to be courageous to put up decent behaviour as well as the experience to interpret conditions on the road appropriately (Berg, 2006). Table 2 shows that there are four hierarchical levels of behaviour - goals for life and skills for a living (general), goals and context of driving (trip related), mastery of traffic situation and vehicle manoeuvring.

Table 1: Goals for driver education framework

Hierarchical level of Behaviour	Essential contents (examples knowledge and skills)	Risk increasing factors	Self-evaluation
Goals for life and skills for living (general)	Knowledge about/control over how life goals and personal tendencies affect driving behaviour • Lifestyle/life situation • Group norms • Motives • Self-control, other characteristics • Personal values etc.	Risky tendencies • Acceptance of risks • Self-enhancement through driving • High level of sensation seeking etc. • Complying with social pressure • Use of alcohols/drugs	Self-evaluation/awareness of • Personal skills for impulse control • Risky tendencies • Safety negative motives • Personal risky habits
Goals and context of driving (trip related)	Knowledge and skills concerning • Effects of trip goals on driving • Planning and choosing routes • Evaluation of social pressure in car • Evaluation of necessity to trip	Risks connected with • Driver's condition (mood, BAC etc.) • Purpose of driving • Driving environment (rural/urban) • Social context and company • Extra motives (competing etc.)	Self-evaluation/awareness of • Personal planning skills • Typical goals of driving • Typical risky driving motives etc.

Table 1: cont'd

Mastery of traffic table situations	Knowledge and skills concerning • Traffic rules • Observation/selection of signals • Anticipation of cause of situations • Speed adjustment • Communication • Driving path • Driving order • Distance to others/safety margins etc.	Risks caused by • Wrong expectations • Risk increasing driving style (e.g. aggressive) • Unsuitable speed adjustment • Vulnerable road users • Not obeying rules/unpredictable behaviour • Information overload • Difficult conditions (darkness etc.) • Insufficient automatism/skills etc.	Self-evaluation/awareness of • Strong and weak points of basic traffic skills • Personal driving style • Personal safety margins • Strong and weak points for hazard situations • Realistic self-evaluation etc.
Vehicle manoeuvring	Knowledge and skills concerning • Control of direction and position • Tyre grip and friction • Vehicle properties • Physical phenomena etc.	Risks connected with • Insufficient automatism/skills • Unsuitable speed adjustment • Difficult conditions (low friction etc.)	Awareness of • Strong and weak points of basic manoeuvring skills • Strong and weak points of skills for hazard situations • Realistic self-evaluation

Source: Berg (2006), p. 1

Each of these requires some level of knowledge and skills. Besides each level of behaviour attracts a certain level of risks. To succumb these increasing risk, there should be a form of self-evaluation. The cumulative hierarchical framework consisting of six categories each requiring achievement of the prior skill or ability before the next, more complex, one remains easy to understand. Out of necessity, teachers must measure their students' ability. Accurately doing so requires a classification of levels of intellectual behaviour important in learning.

Level 1: Goals and context of driving

The first and lowest level as shown in Table 1 is focusing on the vehicle and its properties, with emphasis on skills that have to do with car control and manoeuvring. This includes not only basic skills such as knowledge of controls, driving off, braking, gear shifting, parking, etc., but also more complex knowledge such as keeping the car under control, evasive manoeuvring, free space requirements and understanding the concept of traction. Driver education on this level focuses in a sense on the interaction between driver, vehicle and the physical environment in a more direct sense than on the other levels.

Vehicle manoeuvring is the traditional cornerstone of driver education. Although goals and motives on a higher level have been emphasised in many studies (Berg, 2006). The importance of basic vehicle manoeuvring skills should by no means be underestimated as they have an executive role about the higher levels. The components that are found on this level can be learned through repetition; bit-by-bit, from single items to combinations, from basic to

complex, and in different settings and on different road surfaces. It is a question of motor learning, of doing things over and over again until they can be done automatically without conscious effort. Sufficient repetition is needed to achieve automatism of performance.

Knowledge and skills

The first column on level 1 focuses on how to use the car and its controls in a technical sense. The issues to be covered include:

- Use of vehicle controls: basic mechanics, starting the car, applying the clutch, gear changing, braking (foot and hand brake), sitting position and seat adjustment and adjustment of rear-view mirrors.
- Knowledge of vehicle properties: tyre grip and friction, front wheel drive vs. rear wheel drive, manoeuvrability and stability, effect of in-vehicle load (on e.g. stability or fuel consumption);
- Control of driving direction and position on the road: driving straight, keeping the car in the lane, turning, under-steer or over-steer, reversing and parking, the need of free space around the vehicle, turning radius.

As far as educational methods are concerned, fairly simple training methods, traditional practising in the car and repetition, probably produce good results. Appropriate timing of exercises should be emphasised: different aspects of training should follow in logical order and support each other. For example, there is little use in trying to teach coping in traffic situations (level 2) if one has not yet acquired automatism in basic vehicle handling.

Self-evaluation

Self-evaluation, as shown in Table 1, is to a high degree about making connections between action and outcome of that action. When talking about

manoeuvring, this is closely connected to the concept of risk-awareness, or "why am I doing X in this way and not in that way" and "what did I do to make the car go so and so." The idea should be that the learner reflects upon the risks involved in working the car as a machine but also, and most importantly when manoeuvring this machine. Learners could also be encouraged to reflect upon such things as the "showing-off" aspect of vehicle handling.

Level 2: Mastery of traffic situations

This level focuses on competence that is in the relationship with driving in certain traffic situation in different conditions and other road users. This level emphasises the technical level as it affects negotiating in a traffic situation and road designs. The skills learned (vehicle manoeuvring) are now applied in practice. The concept of speed is extended to cover appropriate use of speed, gear shifting is trained in various situations, the car is kept under control on different road surfaces and in different driving conditions, and so forth.

Increased technical skills are likely to lead to increased self-confidence so that the driver takes on more difficult driving tasks such as driving faster, overtaking in heavier traffic, or accepting additional secondary tasks, rather than simply to an increase in safety (Evans, 1991).

Level 3: Goals and context of driving

Level 3 focuses on the goals behind driving and the context in which it is performed, i.e. why a driver is driving on a certain occasion, where and when, and with whom. Included is planning of driving route and driving time

as well as a choice of driving state and driving company. Decisions made at this level have important consequences not only for traffic safety but also for matters such as fuel economy, pollution and traveling comfort. Choices are made between whether to go by car or walk, driving in rush-hour traffic or not and decisions to drive under the influence of alcohol or stress. All such choices are related to the purpose of the trip and directed by general motives of a higher order.

Level 4: Goals for life and skills for living

Whereas level 3 is connected to a specific journey, level 4, the highest level in the hierarchy, is to some extent disconnected from traffic as such as it contains the preconditions that ultimately shape a person's life in a global sense. Traffic is only one part of this total.

The hierarchical view stresses the importance of personal motives, tendencies and social relations of a driver in a broader sense. These not only include personality factors such as self-control, but also life-style, social background, gender, age, group affiliation and other preconditions that have an influence on attitudes, motives, choices and behaviour as a driver.

Complete understanding of behaviour (e.g. fast acceleration) is impossible without understanding the goal or motivating factors (e.g. time pressure or wish to demonstrate the car's performance). Furthermore, modification of inappropriate behaviour is not possible without modification, or at least, awareness of personal goals. Mere awareness of the behaviour itself is according to the hierarchical view not possible in that the motives that dictate the behaviour have overriding authority. As far as driver training is concerned, there is the need to emphasise methods that are capable of dealing

with motivational and other factors connected more widely with drivers' strategies, motives, and skills for life. The clientele in driver education consists mostly of youngsters who are in some respects still in the midst of an identity-creating process.

From the preceding, it can be concluded, firstly, that driving skill may be conceptualised as a broad set of skills that are used according to drivers' goals and motives. Secondly, from this arise a need for versatile use of pedagogic methods. No single theory or method can alone be expected to cover all levels of the hierarchy of driving behaviour, even though certain features of training may do so. The goals of training and the level that is being focused on should determine the optimal learning method. The key to the higher levels in the hierarchy and to an increase in self-evaluative skills lies in the activity of the learner him-/herself.

Defensive Driving Course Model

Defensive Driving Course Model (DDCM) is the type of driver training model, which is used in training drivers both learners and the 'professional drivers' in the driving schools in Ghana. This is guided by the detailed syllabus designed and prepared by the Driver Vehicle Licensing Authority (DVLA) as a prescribed educational curriculum for use in driving schools in Ghana. Lund and Williams (1986) reviewed the defensive driver programmes and concluded that the courses are largely ineffective. Similarly, Hall and West (1996) revealed that informal driving practice had a greater impact on instructor ratings of learners' driving skill and safety than formal driving lesson. These authorities had challenges with the programme being used in Ghana. Among the issues raised were:

- Defensive driving model fails to teach the knowledge and skills critical for safe driving;
- The model fails to teach road risk management practices;
- It fails to address attitudinal and behavioural defects of drivers
- Defensive driving model does not impact safety motivational skills on its students;
- The model fails to adequately address lifestyle issues; and
- Defensive driving model fails to tailor content to students' needs.

Bloom's Taxonomy of Learning Domain

This model was initially (the first part) published in 1956 under the leadership of American academic and educational expert Dr. Benjamin S Bloom. The model was created in and for an academic context when Benjamin Bloom chaired a committee of educational scholars in American education, whose aim was to develop a system of categories of learning behaviour to assist in the design and assessment of educational learning.

According to Krathwohl (2002), the Taxonomy of Educational Objectives is a scheme for classifying educational goals, objectives, and, most recently, standards. It provides an organizational structure that gives a commonly understood meaning to objectives classified in one of its categories, thereby enhancing communication. The original taxonomy consisted of six major categories, nearly all with subcategories as shown on Table 2. The categories were *Knowledge, Comprehension, Application, Analysis, Synthesis,* and *Evaluation.* With the exception of *Application*, each of these was broken into subcategories (Krathwohl, 2002). The complete

structure of the original Taxonomy is shown in Table 2. The categories were ordered from simple to complex and from concrete to abstract. Further, it was assumed that the original Taxonomy represented a cumulative hierarchy.

As at when this bloom's taxonomy was introduced, term taxonomy was unfamiliar term in educational studies (Krathwohl, 2002). This made potential users not to understand what it meant and this resulted in the little attention that it attracted. The framework became popular after it was translated into 22 languages.

Bloom's taxonomy of learning domain contains subjects or attributes such as evaluating, synthesis, analysis, application, understanding and knowledge to create a classic learning situation (see Table 2). These have meanings and synonyms as follows:

- **Evaluation**: analyse, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, integrate, outline, question, separate, and test.
- **Synthesis**: appraise, argue, assess, attach, choose, compare, defend, estimate, judge, justify, rate, recommend, select, support, value, evaluate.
- **Analysis**: arrange, assemble, collect, compose, construct, create, design, develop, formulate, hypothesize, invent, monitor, organize, plan, prepare, propose, setup, and test.
- **Application**: clarify, classify, describe, discuss, explain, express, Identify, illustrate, indicate, locate.

- **Understanding**: apply, choose, construct, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, and write.
- **Knowledge**: arrange, define, duplicate, identify, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce, and retrieve. State, write.

Table 2: Structure of the original taxonomy

Knowledge
Knowledge of specifics
Knowledge of terminology
Knowledge of specific facts
Knowledge of ways and means of dealing with specifics
Knowledge of conventions
Knowledge of trends and sequences
Knowledge of classifications and categories
Knowledge of criteria 1.25 Knowledge of methodology
Knowledge of universals and abstractions in a field
Knowledge of principles and generalizations
Knowledge of theories and structures
Comprehension
Translation
Interpretation
Extrapolation
Application
Analysis
Analysis of elements
Analysis of relationships
Analysis of organizational principles
Synthesis
Production of a unique communication
Production of a plan, or proposed set of operations
Derivation of a set of abstract relations
Evaluation
Evaluation in terms of internal evidence
Judgments in terms of external criteria

Source: Krathwohl, (2002).

Bloom's taxonomy domain is a simple but complex structure, which is logical. Education or training designs and evaluation need not cover all aspects of the taxonomy domain but must make sure that there is a coverage of the aspects that are appropriate for the course of study. The three principal structures of the domain to which educational content must conform with is as shown below:

- Cognitive domain (intellectual capability, i.e., knowledge, or 'think')
- Affective domain (feelings, emotions and behaviour, i.e., attitude, or 'feel')
- Psychomotor domain (manual and physical skills, i.e., skills, or 'do')

The required content of driver education in Ghana needs to be in conformity to the above domain or structure. To Forehand (2010), with the dramatic changes in society over the last five decades, the Revised Bloom's Taxonomy provides an even more powerful tool to fit today's driver educational needs. The structure of the Revised Taxonomy Table matrix "provides a clear, concise visual representation" (Krathwohl, 2002) of the alignment between standards and educational goals, objectives, products, and activities.

Conceptual Framework

Socio-demographic characteristics such as age, gender, marital status and level of education are very important not only in transport studies in general (Olumami, Ojo &Mireku, 2014) but also driver education studies (Lonero & Mayhew, 2010; Williams et al., 2009). The understanding of these varying characteristics may help in driver education because studies have

shown its correlation with the spate of RTCs are exposed to different forms of driver education as shown in Figure 1 which comprises defensive driving, relationship training, parental and mate system training. Defensive driving training is a formal mode of driver education. This is majorly tailored to train new/novice drivers. The training content uses words like stay alert, look well, observe, decide on, maintain, slow down, reduce, avoid and make sure for psychomotor learning development. The new drivers are to undergo three month of training on road signs and markings. However, according to Bloom's Taxonomy of Domain, for learning to be complete the cognitive and affective domains have to be covered.

Learner drivers are to go and write a theoretical test at the DVLA office with a cut-off point of 70 per cent. Successful candidates proceed to undergo 1-2 week in-traffic exercise and are enrolled for an in-traffic test at the DVLA designated driving test sites. These tests are taken by all new drivers irrespective the mode of driver education. Successful candidates are then issued a 3-month provisional license.

Studies have also shown the dominance of mate system by commercial drivers in Ghana and Nigeria (Poku-Boansi & Adarkwa, 2013; Olumami et al., 2014) as a form of informal driver education. Other forms of informal driver education include relationship and parental training. These two types of driver education should have effects on driving knowledge namely affective and psychomotor. The inability to impact adequate knowledge will result in the driver being involved in RTCs. Invariably, the driver may also learn from the occurrence of a road crash if he/she or happens to survive the incident.

The evaluation of driver education by Lonero and Mayhew (2010) and Williams et al. (2009) have indicated that driver education has not significantly contributed to reducing road crashes. This is because most driver education programmes are centred on novice drivers or to-be drivers, neglecting licensed or experienced drivers.

Theoretical Framework

For the purpose of this study the standard road safety education is expected to eradicate or reduce the spate of road crashes in Ghana. Bergs (2006) model was analysed and it came out that the four levels described in his model cannot be accepted and imported for wholesale use in Ghana. Although levels 1 and two as he explained may be applicable in Ghanaian context, the 3 and 4 are only applicable in a postmodern road user context.

Because of this, the classic model of Bloom's Educational Taxonomy Domains was adopted for the study. Bloom's Taxonomy of learning domain is a classical model for developing any educational curriculum. As a result, any driver educational model should be subjected to the test of Bloom Taxonomy domain.

Summary

This chapter has presented Berg's Goal for Driver Education Framework, which was to complement Keskinen's model meant to address the issue of road safety driver education. The chapter contained Defensive Driving Model used in training both learner and professional drivers in Ghanaian driving schools.

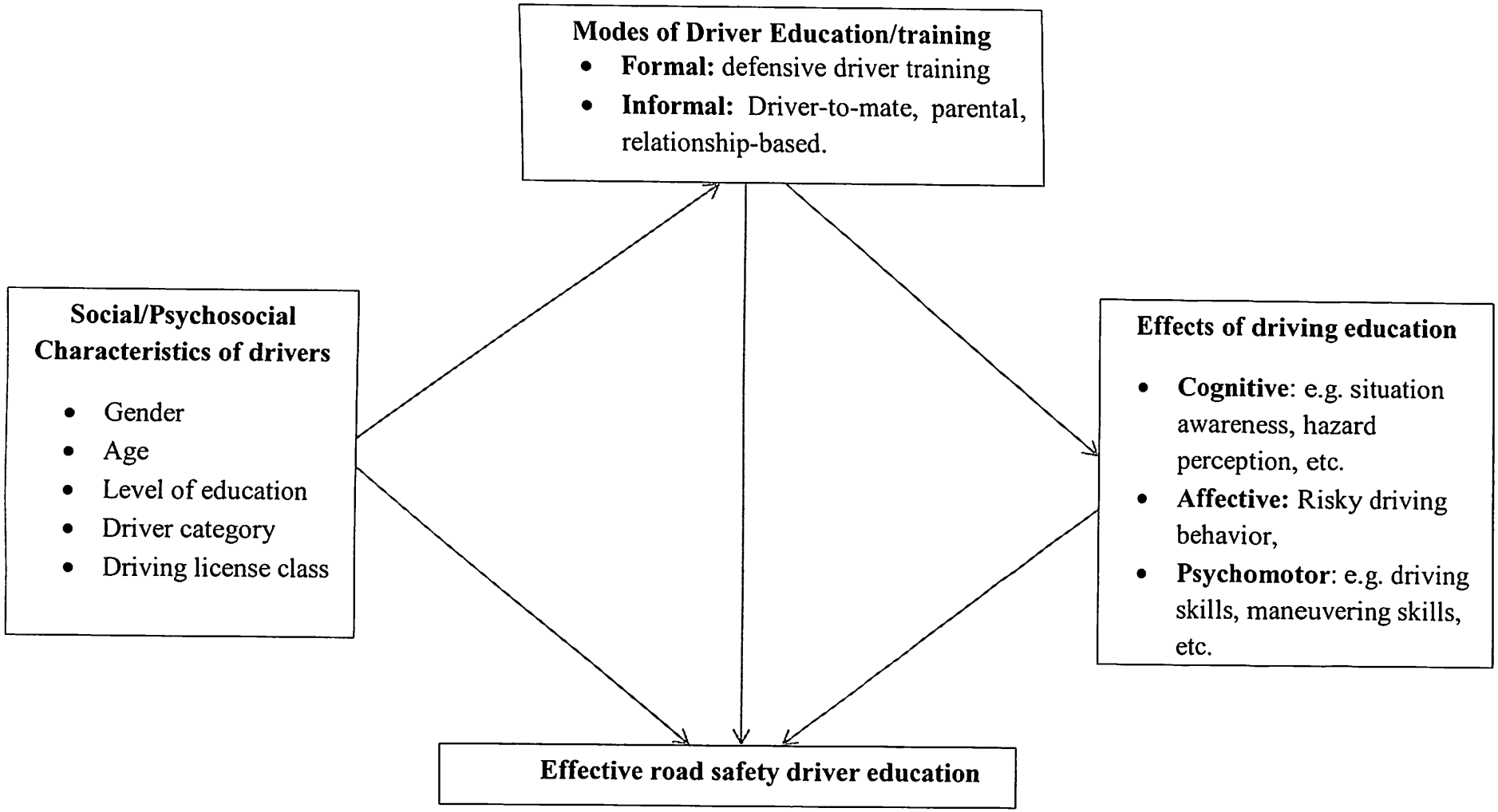

Figure 1: Framework for driver road safety education
Source: Adapted from Bloom (1948); Bergs (2006)

The implementation of Defensive Driving model is fraught with some challenges as exposed in the chapter when compared to the Taxonomy of Learning Domain. Therefore, Bloom's Taxonomy of Domain was adopted for the study. Socio-demographic characteristics such as gender, age, marital status, level of education have been found to influence mode of driver education as presented in the conceptual framework. Eventually, this is expected to help in reducing RTCs.

CHAPTER FOUR

RESEARCH METHODOLOGY

Introduction

This chapter outlines the study area, research philosophy, research design, target population, sample size, sampling techniques, and method of data collection, ethical considerations and method of data analysis. The challenges that confronted this study were ethically circumvented without undermining the originality of the thesis.

Study Area

First, two regions namely Greater Accra and Ashanti Regions as shown in Figure 2 were covered. The Greater Accra Region has three DVLA vehicle registration centres, namely Head office, Tema, and Weija. These three vehicle registration centres recorded a total of 936,491 representing a 61.12percent of the total national number of registered vehicles between 1995 and 2012. The Ashanti region also registered a total number of 211,638, which represents 13.8 per cent of the total national number within the same period under review.

Secondly, the capitals of these two regions, namely Accra and Kumasi were selected for the study. The two regions represent approximately 75percent of the transport concentration in the country. The selection of the Accra and Kumasi Metropolis for the study is deemed to be substantial for any statistical investigation (Berg, 2006). Besides, most studies on road safety in

Ghana focused on these two metropolitan Cities as a panacea to making intervention.

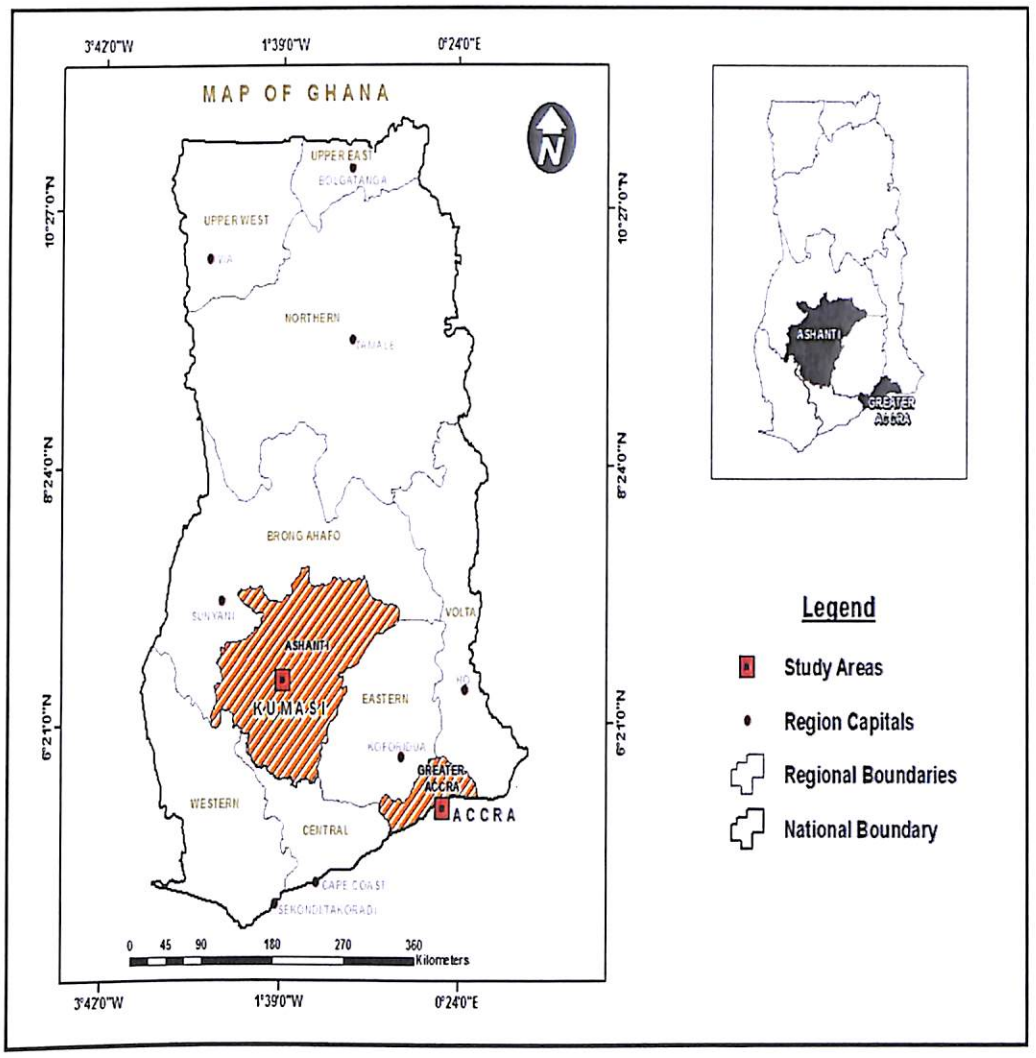

Figure 2: Map of Ghana showing the Study Regions

Source: GIS and Cartography Unit, Department of Geography and Regional Planning, University of Cape Coast.

Greater Accra Region (GAR) has 16.26 percent of the national population with Accra having 54.56 percent of the GAR's population. The Greater Accra Region accommodates 61.12 percent of the national registered vehicles and 40.7 percent of DVLA national licensed drivers. GAR is the second highest annual fatality records and first in annual road injuries.

Ashanti Region (ASR) also accommodates 19.06 percent of National population. Its capital, Kumasi contains 46.06 percent of the region's population, 43 of the registered vehicles and 12.7 percent of DVLA licensed drivers from 1995-2012. The region records the highest road fatalities in Ghana and ranks second to GAR in incidence of road injuries (DVLA, 2012).

Research Philosophy

Different research paradigms underpinning the chosen research methods have been considered in this study. This was to ensure that a balanced view is achieved in the research approach. In doing this the ontological and epistemological perspective in social science research were explicated. The methodological perspectives for investigating social phenomena are sharpened by the ontological and epistemological philosophies. But more importantly, these terms relate to the development of knowledge and the nature of the acquired knowledge in social science research (Saunders, 2011).

Ontology

According to Blaikie (2007) ontology as the science or study of being. In social science research, ontological assumptions are concerned with what we believe constitutes social reality (Blaikie, 2007). The key question underlying ontology is 'What is the nature of the social reality to be investigated?' (Bryman, 2008). Blaikie (2010), offered various options for tackling the question of what constitute social reality, arguing that the reasonable assumptions are concerned with what exists, what it looks like, what units make it up, and how these units interact with each other.

It is undisputed that all individuals exhibit a number of deeply embedded ontological assumptions, which tend to influence their personal stance on what is real or not. Hence, in social science research, their ontological perspectives may influence respondents' agreement with some statements over others. This explains why similar research studies may come up with varying findings. Thus, it is important to consider the ontological stance of research subjects, which to a large extent can influence their different views on social phenomena. Having recognised the fact that different views always exist regarding what constitutes reality, an important question that comes up is 'How is that reality measured?'. Both quantitative and qualitative approaches were employed to arrive at a holistic interpretation of the results.

Epistemology

The epistemological perspective in social science is concerned with understanding the nature of knowledge, its scope and how it is acquired Saunders, 2011). It considers views about the most appropriate ways of enquiring into the nature of the world (Denzin & Lincoln, 2003). Thus, our ability to enhance or expand our understanding of existing knowledge concerning phenomena is underpinned by epistemological philosophy that there are possible ways of gaining knowledge of social reality, whatever it is understood to be. Blaikie (2010) argued there is potential to deepen our knowledge about reality, if it is assumed to exist. Thus, the scientific approach to gaining knowledge recognises diverse ways of gaining knowledge of social

reality. Invariably then, data collection becomes the focal point of epistemology as this pave the way to gain insights into reality.

One of the key purposes of social research is to acquire knowledge about things that are happening (or have already happened) in the real world (Bryman, 2008). Thus in a typical study, epistemology considers the research methods that are employed as it defines how knowledge can be produced and argued for (Eriksson & Kovalainen, 2015). Certainly, this study and its related findings will be shared with stakeholders in the road safety and transportation industry, including drivers, transport owners, policy makers, planners, NGOs, and road users. It is anticipated that findings of this study will be useful insights into driver training and the associated issues that confront stakeholders in their quest to reduce road traffic incident and make our roads safe for all users.

According to Blaikie (2007: p.6) methodological perspectives are defined in terms of their ontology and epistemology, and include reference to the logic of theory construction, what counts as data, explanations and theory, criteria of validity, and views on the particular nature of social reality and the relationship between the natural and social sciences.

Research Paradigm

Ultimately, the discussions about the ontological and epistemological positions lead to the research paradigms (Blaikie, 2010). Denzin and Lincoln (2003) describe research paradigm as an 'interpretative framework' that helps the researcher to address the research questions underpinning any particular study. This notwithstanding, there are constraints in any paradigm with respect

to the types of research questions that are deemed legitimate. In line with triangulation as the underlying philosophy guiding this study, the positivism and the interpretivism approaches are discussed in the section that follows.

With respect to the nature of humans, positivists contend that the relationship between man and society is deterministic, that is, humans are born into a world in which there are causal laws that explain the patterns to their social behaviour (Saunders, 2011). The epistemological position of positivist is that researchers should eliminate their biases, remain emotionally detached and uninvolved with the objects of study and test or empirically justify their stated hypotheses (Owwuegbuzie & Comb, 2009). This position reinforces the positivist stance that research should remain value-free. In this way, the researcher should adopt a posture of objective scientist and informer of decision makers, policy makers and change agents.

Positivists perceive knowledge to be non-falsified hypothesis that are probably facts or laws. Often, the positivist position is characterised by the testing of hypotheses; which are developed from existing theory through the measurement of observable social realities. Thus, the approach is tilted towards predicting outcomes. A number of authors ascribe the positivist approaches to empirically grounded statistical analyses including quantitative methods, surveys and experiments (Blaikie, 2007; Saunders, 2011; Eriksson & Kovalainen, 2015;; Hatch & Cunliffe, 2006).

The positivist approach to conducting research is noted to have some limitations particularly its ontological and epistemological stance. As noted by Owuegbuzie and Comb (2009), positivism is a poor choice for labelling quantitative research because it has long been replaced by newer philosophies

of science. The term is more of a straw man (easily knocked down) for attack than standing for any actual practising research. On this basis, Phillips and Borbules (2000: 24) contend that a term that better represents today's practising research is post-positivism.

The interpretive/constructive approach

The interpretive approach is a reaction against positivism and suggests that social reality is subjective. Hatch and Cunliffe (2006) described this approach as anti-positivist and as post-positivist by Blaikie (2007) since it is contended that there is a fundamental difference between the subject matters of natural and social sciences. Although post-positivist researchers believe that there is an independent reality that can be studied, they assert that all observation is inherently theory-laden and fallible and that all theory can be modified (Owwuegbuzie, & Comb, 2009). Besides, due to variations in cultural experiences and worldviews, people are always partially biased in their objective perceptions of reality. Hence, these inherent biases, perceptions and observations about reality imply that ensuing constructions are not perfect (Phillips & Borbules, 2000).

The main standpoint of interpretative approach is that the truth about reality can, at best, only be approximated but can never be explained perfectly or completely (Owwuegbuzie, & Comb, 2009). Bryman, (2001, p. 12) describes interpretivism as a strategy, which takes into account the differences between people. He contends further, that, this approach requires the social scientist to grasp the subjective meaning of social action. Social reality is based on experience, memories and expectations. Thus, knowledge is

constructed overtime as result of constant reconstructions influenced by experience that leads to varying interpretations. Interpretivism perceives knowledge to be individual and collective reconstructions that may unite around consensus (Denzin & Lincoln, 2003), hence the task of social scientist should not be to gather facts and measure how often certain patterns occur, but to appreciate the different constructions and meanings that people place upon their experience (Noor, 2008).

The post-positivists are viewed as properly embracing contextualism as the solution to the fatal limitations of the positivist agenda, replacing quantitative methods with rich, contextualized, qualitative accounts of psychological phenomena (Creswell, 2002). They perceive the interpretivism model as the basis of the natural scientific subjects' ability to generate reliable knowledge about the real world (Denzin & Lincoln, 2003).

Intepretivists consider that there are multiple realities (Denzin & Lincoln, 2003) and hence research is value-bound. In the opinion of Denzin and Lincoln (2005), truth is multiple contradictory, but equally valid accounts of the same phenomena representing multiple realities. Since 'all knowledge is relative to the knower' interpretivists aim to work alongside others as they make sense of draw meaning from and create their realities in order to understand their points of view and to interpret these experiences in the context of the researchers academic experience (Hatch & Cunliffe, 2006), and hence is inductive or theory building. In the research process, Interpretivists view the researcher as a passionate participant and facilitator of multivoice reconstruction. The focus of the researcher is on understanding the meanings and interpretations of 'social actors' and to understand their world from their

point of view is highly contextual and hence is not widely generalizable (Saunders, 2011).

Hatch and Cunliffe, (2006) have drawn attention to the fact that understanding what people are thinking and feeling form important benchmarks of interpretism. Eriksson and Kovalainen (2015) associated the interpretivist approach with qualitative research techniques, maintaining that this approach is very subjective in nature. Indeed the interpretive approach presents a closer relationship between the researcher and the respondents, a situation that has the potential of blinding the researcher and hence leading to subjective judgement being passed on social phenomena. Even then, the interpretive approach can be adapted to generate equally reliable knowledge about human behaviour and since the approach has the ability to generate reliable knowledge about the real world.

Notwithstanding the strengths of interpretivism paradigm as a vital tool for generating knowledge in social science, it has some limitations. The approach has been criticized for producing findings, which lack reliability (Owwuegbuzie, & Lincoln, 2009). The inherent subjectivity associated with interpretivism lends credence to this criticism. In our quest to understand the way people make sense of the social world, the propensity to generate contradictory and inconsistent explanations to explain social phenomena is possible. This originates from the failure of interpretivists to record and take note of trivial but often crucial pauses and overlaps which count towards giving accurate and balanced views about the 'aspect of social life under investigation, as positivists do (Nudzor, 2009). Consequently, to offset the inherent limitations associated with interpretivism, this study draws from the

philosophical stance of both positivism and post-positivism (interpretavism). The positivist and the interpretivists approaches seem appropriate because they consider human as self-interested in pleasure seeking and rational individual. This revolves around their livelihoods, copping strategies, decision-making and perceptions about the mining industry.

Philosophical context

Johnson, & Adebayo (2011) suggest that social science researchers should adopt a problem-focused methodological pluralism in which divisive theoretical alliances would be overcome in the quest for usable knowledge. They add that instead of privileging qualitative or quantitative methods a priori, researchers need to carefully fit the questions they pose to the most appropriate methods for addressing those questions and these could sometimes be qualitative, sometimes quantitative and often a combination of qualitative and quantitative. Most of the studies that have been conducted on livelihoods in the mining industry exemplify problem-focused methodological pluralism, blending methods from the positivist and interpretivist traditions in creative ways to address important research questions that have produced usable knowledge. Overall, the mixture of these two research orientations resulted in a mixed method study. Mixed method research allowed a combination of elements of elements of qualitative and quantitative research approaches for the purposes of breadth and depth of understanding and corroboration (Johnson & Adebayo, 2011).

The approach is considered as the third methodological movement in research and is tagged in literature with various terms including 'multiple

research strategies', 'multi-methods research' and 'integrated research' (Cresswell, 2002) 'combined methods research' 'mixed-methods research' (Tashakkori & Teddlie 2003) 'cross over mixed analysis' (Onwuegbuzie & Combs, 2009) and 'multi-analysis research'(Owwuegbuzie, & Combs, 2009).

Saunders (2011) argued that the use of the mixed method enables triangulation to be applied in one research. Rationalise the use of the mixed method from four perspectives: participant enrichment; instrument fidelity; treatment integrity and; significance enhancement. Participant enrichment involves using both quantitative and qualitative techniques to optimize the sample. Instrument fidelity involves the use of both methodologies' techniques in maximizing the instrument(s) appropriateness. Treatment integrity involves mixing both techniques for assessing the fidelity of interventions, programmes, or treatments. Lastly, significance enhancement involves mixing both methodologies' techniques for maximizing interpretation of findings (Leech & Onwuegbuzie, 2010).

Mixed method approach has been criticised on the basis for failing to recognise existing incompatibility between qualitative and quantitative research. The incompatibility thesis posits that qualitative and quantitative research are fully incompatible and cannot, in any useful way, be used in combination in social or behavioural research (Owwuegbuzie,& Comb, 2009). On this score, Leech and Onwuegbuzie, (2010) admonish mixed method research arguing that methodology should not be conflated with technical aspects of method just because researchers with different ontological or epistemological stances can use the same method. Contrastingly, the incomparability thesis has been denounced by Onwuegbuzie and Combs

(2009) arguing that it is an a-priory argument, based on rationalistic, foundational and deductive logic, and not based on observation of social and behavioural research.

Similarly, Denzin and Lincoln (2003) call for the adoption of mixed methods approach intimating that it accommodates variations and inconsistencies that prevail in social and behavioural research by incorporating group influences on methodological decisions and allowing methods to be chosen based on their practical value for addressing a research problem. Besides, Owwuegbuzie, and Comb (2009:129) argued for the use of mixed methods justifying that the approach offers an important platform for generating important research questions and providing warranted answers to those questions, particularly so when the nexus of contingencies in a situation, in relation to one's research questions suggest that mixed methods is likely to produce superior research findings and outcomes.

Leech and Onwuegbuzie, (2010) looked at some of the benefits of using the mixed method and found that the approach can be particularly helpful in confirming, explaining, verifying and generating theory all at the same time. They also contend that if social phenomena tend to have multiple empirical appearances, then using only one method in each study can lead to the unnecessary fragmentation of explanatory models, and that in circumstances such as this, using mixed methods research is most appropriate. To this end Hurmerinta-Peltornaki and Nummela (2006) concluded that research strategies that combined both types of quantitative and qualitative data and analysis gained the most from validity through triangulation, and from a more comprehensive illustrative description of the phenomenon.

Target Population

This comprised mainly drivers, officials of state institutions responsible for road management and safety. Since the study focused on drivers' education, empirical evidence on licensed drivers in the country as well as the selected two metropolises was ascertained from the DVLA sources. The DVLA 2012 report indicated that the total number of licenses issued out to drivers in Ghana from 1995 to 2012 was 1,027,379. According to the report, Accra and Kumasi metropolitan assemblies issued out a total of 246,277 and 78, 671 licenses respectively, both totalling 324,948. This formed the basis for the target population, as DVLA does not have any information on the volume of drivers before 1995. Aside from the drivers, major stakeholders such as officials/ representatives of DVLA, NRSC, MTTD, GPRTU and GDSA were targeted.

Sample Size

To arrive at a reasonable sample size that could be subjected to statistical test, Epi Info 7 statistical sample size calculator was employed, with a confidence interval of 95 percent, expected frequency of 50 percent, confidence limits of 5 percent and design effect of 1. The total sample size obtained for the population of 324,948 was 384 as the minimum sample size. However, since this indicated a minimum, the researcher decided to round it up to 500 respondents. A simple proportion was then calculated for Accra and Kumasi-based on the licensed drivers available in each metropolis Accra with the licensed driver's population of 246,277 had 75 percent of the respondents and Kumasi with 78,678 was allotted 25 percent of the respondents. In

absolute terms, the figures were 379 for Accra and 121 for Kumasi. Fifteen representatives from corporate, commercial and private drivers and the representatives from NRSC, MMTD, DVLA, and Ghana Driving School Association (GDSA) were also purposively interviewed.

Sources of Data

Data were from two main sources: primary and secondary. The primary sources of data comprised information from the field through the administration of questionnaires, and in-depth interviews. Secondary data on the hand were sourced from various governmental and non-governmental avenues including Parliament Acts, relevant research and seminar papers, annual reports, statistical abstract, magazines, newspapers, and journals. Information was also obtained from relevant stakeholders such as NRSC, MMTD, DVLA, and GDSA.

Pre-testing of Instruments

The instruments were pre-tested with the drivers of Electricity Company of Ghana (ECG) who were attending a workshop in Winneba. With this exercise, it came up that the questions were too many. Hence, there was a need to revise them. More so, the questionnaires were tailored to address specific issues involving road safety education in Ghana. A pre-test of the in-depth interview was carried out on the officials of MTTD, DVLA and NRSC. This was to fine-tune the in-depth guide. The responses obtained were coded and analysed and they helped to discover the ambiguities, poorly worded questions and questions that were not understood or unclear to the

respondents. The pre-test helped in restructuring the instruments.

Reliability and Validity

The cron bach alfa of the pre-test (0.79) revealed the reliability of the study as it was above the recommended 0.7 (Pallant, 2005). Using triangulation method which involves not only the use of both primary and secondary sources of data but also different means of the primary source of data such as questionnaires and in-depth interviews afforded the researcher the opportunity to confirm results from different sources. This invariably lent credence to the gathered data. The transcriptions of the interviews were subjected to content checking. The recorded interviews were played back to the respondents for any addition or omission.

Methods of Data Collection

First, two sets of key stakeholders were identified in the study-drivers and officials of Ministries or agencies responsible for road safety education. Three forms of drivers also form the purview of the study-commercial, private and corporate. All the three categories of drivers were served the same set of questionnaires. However, the questionnaires for commercial drivers were administered at the transport terminals in the two capital cities. These commercial drivers were from GPRTU and Cooperative Society of Ghana. Questionnaires for corporate drivers were sent to the Transport sections of Corporate Organisation in the two cities. The questionnaires were later retrieved from the Transport Officers of these corporate organizations. The heads of these transport sections also served as a means to have access to

individual private drivers in their organization. Copies of the questionnaires were handed to these private drivers through the referral of the Transport Officers (TO). Secondly, individual in-depth interviews were conducted with representatives from NRSC, MMTD, DVLA, and GDSA.

Instruments and Data Collection Methods

The main instruments used for the data were the questionnaire, IDI, course content analysis, and personal observations. The questionnaire was divided into five sections, each covering items specific to the section containing both closed and open-ended questions. The first section contains the personal profiles of the respondents and assessment of general driving knowledge. The second section addresses cognitive (knowledge) nature of driver education acquired and its impact on behaviour. It also contains drivers' views about road safety. Section three dwells on the affective (attitude) aspect from road safety education obtained. Section four touches on skills development acquired from driver education affecting driver behaviour. Section five contains institutional issues.

The interviews focused mainly on the content, detail, and structure of road safety education and training and how these impact on the attitudes and behaviour of drivers to crash free. It also sought information on the driving schools, transport organizations and the core functions of state institutions responsible for licensing of vehicles, management of transport and road safety in the country and their extent of utilization of road safety education and training as a function of curbing road crashes

Sampling Techniques

The study adopted a multi-stage sampling technique involving the use of both probability and non-probability sampling techniques. Firstly, quota sampling technique was used to identify the contribution of the two regions to the overall sample frame for the questionnaire administration. Accidental sampling technique was used in the administration of the questionnaires at the selected garages/stations/terminals/workplaces. For the conduct of the in-depth interviews purposive sampling technique was used to identify the drivers. But the relevant stakeholders nominated their representatives to be interviewed.

Response Rate

In an attempt to get 500 questionnaires, more than 530 questionnaires were administered. Eventually, 508 questionnaires were returned, and the researcher screened the remaining ones to arrive at the targeted sample size (500). All the representatives of the stakeholders were interviewed. Meanwhile, all the 15 drivers that were approached for the in-depth interview agreed to participate in the exercise. Thus, there was a 100 per cent response rate.

Field Challenges

The research team encountered some challenges, which have been highlighted to inform future studies of this nature. For instance, some members viewed the researcher himself in the road safety and transport organizations as a strong road safety education advocate and a competitor.

Secondly, the researcher has a road safety educational institution in Ghana and is viewed by the driving schools especially the top-up institution as a competitor and were not willing to make needed information readily available.

Thirdly, the difficulty of dealing with the illiterate drivers in assessing acquired educational content and if given the opportunity to complete the questionnaires themselves was a real challenge. Some of the respondents expected gifts for engaging in the exercise. However, some of the drivers were given gifts for taking parts in the exercise.

Ethical Issues

A letter of introduction was obtained from the Department of Geography and Regional Planning at the University of Cape Coast in a bid to show that the researcher is a student. The researcher also had to carry his identity card for easy identification by the respondents. At the outset of the survey, the researcher after introducing himself explained the rational of the study to the respondents. The respondents were informed that all information proffered would be held in utmost confidentiality and any respondents could opt out if they deemed necessary

The intention of providing some stipends for some of the drivers was not known to them until the end of the survey. This applies mostly to the drivers.

Data Analysis

Quantitative data were coded and analysed using SPSS version 21. The preliminary data were presented using frequencies, percentages, and means. The relationships between independent and dependent variables were ascertained using Pearson chi-square coefficient and Factor Analysis (Varimax rotation). Meanwhile, qualitative data were manually analysed based on their respective themes.

Summary

This chapter described the methods used for the study. Whereas the study areas were the greater Accra and Ashanti Regions, the main philosophies behind this study were the positivist and intepretivist theories which gave rise to the adoption of mix method as the research paradigm. The study though targeted drivers in the Accra and Kumasi, the sample were five hundred (500) while fifteen (15) IDIs were used on the key stakeholders in the driving profession. The study used both primary and secondary data and pretested the instrument with the ECG drivers at Winniba. Reliability and validity test was tested with the crom bach alpha and the result was 0.79. Methods of data collection were the interview schedules and interview guides whiles questionnaires and IDIs were the instruments. Sample techniques were the quota, accidental and purposive and the analytical tools were descriptive and inferential using SPSS.

CHAPTER FIVE

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF DRIVERS AND MODES OF ACQUIRING DRIVING KNOWLEDGE

Introduction

This chapter contains the socio-demographic characteristics of drivers such (as gender, age, educational level), and the methods used in training, driving category, and class of driving license. The chapter also presents drivers' modes of acquiring driving knowledge. This eventually informed the examination of the relationship between these identified socio-demographic characteristics and modes of acquiring driving knowledge.

Socio-Demographic Characteristics of Drivers

Lonero, (2007) Slater and Wiggins (2005) enumerated some socio-demographic characteristics such as age and gender, marital status, education level and other background characteristics such as personality, intelligence and learning style, diseases and impairments, group norms and peer pressure, lifestyle and socioeconomic position related to safe driving.

Of all the socio-demographic characteristics, Arthur, Barret, and Alexander (1991) saw age and education to be very important when studying issues bothering on road safety. According to Table 3, about 92% of the respondents were males with the remaining being females. Bekibele (2007) in a study on drivers of public institutions in Ibadan noted that all the respondents were males. Similarly, Asiamah, Mock and Blantari (2002)

revealed that all their Ghanaian respondents were males and further noted that, female commercial drivers are rare in Ghana.

In Ghana, age, weight or class of vehicle, and the minimum of basic education of the driver underpin the basic requirement for the issuance of a driving license. A licensed driver must attain the age of 18 years for private vehicles and 25 years for commercial vehicles before one is permitted to drive. Hence the categorisation of age groups in the study starting from respondents aged <18. A driver in the study was found below 18 years old. In Sweden and Norway, sixteen years-age limit is set for learner drivers (Gregersen et al., 2000; Nolen & Nyberg, 2001).

Table 3 further shows that almost two-thirds (61.2%) of the respondents were married followed by those who were single (33.8%) with the rest divorced (1.2%), separated (2.4%) or cohabiting (1.4%). The analysis of the respondents' educational level as indicated in Table 3 showed that 43.6% of the respondents had tertiary education, with a third having secondary education and a little more than a one (1.2%) having no formal education. This shows that the majority of the respondents could read and write and a confirmation of the increase in literacy rate in Ghana. However, incidence of illiteracy pervades among commercial drivers. But in the current study there were also private and corporate drivers who had a minimum of secondary school education before been employed by corporate organizations.

Table 3: Socio-demographic characteristics of driver

Variables	Frequency	Percent (%)
Gender		
Males	460	92.0
Females	40	8.0
Age group		
<18	1	0.2
18-22	15	2.7
23-27	44	8.8
28-32	101	20.3
33-37	97	19.4
38-42	63	12.6
43-47	68	13.6
48-52	52	10.5
53-57	38	7.6
>57	21	4.3
Marital status		
Single	169	33.8
Married	306	61.2
Divorced	6	1.2
Separated	12	2.4
Cohabiting	7	1.4

Table 3: cont'd

Educational level		
None	6	1.2
Primary	29	5.8
JHS	91	18.2
SHS	156	31.2
Tertiary	218	43.6
Driver category		
Learner	11	2.2
Private	162	32.4
Commercial	106	21.2
Corporate	221	44.2
Class of driving license		
Not yet	10	2.0
A	52	10.0
B	182	36.6
C	88	17.6
D	73	14.6
E	29	5.8
Total	500	100

Source: Fieldwork, 2013

On the educational background of commercial or professional drivers, a respondent noted:

> *Now, when you look at the educational background of our drivers and how some of them acquire their license, you realise that a high percentage of our drivers were not trained properly, but they are on our roads. The DVLA within 2008 decided to take off all illiterate drivers on our roads but, they*

are still there, they haven't attended any training to change their attitude and behaviour.

In Table 3, 44.2% of the respondents were corporate drivers, with more than a fifth (21.2%) being commercial drivers and almost a third (32.4%) were private drivers. The class of driving licenses is categorized by weight of the vehicle. The weight of the vehicle is the horsepower of the vehicle. Every vehicle has a gross weight, and a net weight and the level of license to a person must be in line with these attributes. The net weight of a vehicle is the normal weight of the vehicle without any load. The maximum weight a vehicle has with a load is referred to as its gross weight.

In Ghana, the driving license is categorized into seven (Addo, 2010). By this classification, Table 3 shows that more than a third of the respondents (36.4%) were holders of license B meant to drive only automobiles. These are the private automobile, taxi and hiring drivers who are to drive cars not exceeding 2950kg. About a fifth (17.8%) of drivers were holders of category C license and eligible to drive only vehicles of 2950-5500kg (DVLA, 2014). Less than a fifth (16%) of the respondents are holders of category D license that enable them to drive vehicles not exceeding 8000kg. Holders of a higher driving license can, however, drive lesser category of vehicles. For instance, holders of combination can drive all vehicles except Class E vehicles and they accounted for 13.1% of the respondents. Almost a fifth (17.6%) were category C holders with just 2.0% yet to get their licenses. Those that were yet to acquire licences were learners.

The vast majority of new drivers, as explained by Msten and Chapman (2004), are young. Having passed the practical driving test newly qualified drivers are immediately entitled to drive unaccompanied, and they find themselves without the support of an experienced and qualified driver. They now face a plethora of new and demanding challenges such as navigation to destinations without instructions, decision making for road and traffic hazards, and coping with situations not experienced during their driving lessons.

In the recent past, gender analysis has become a major issue in the transport sector (Odufuwa, Oriola & Otubaga 2012). Gender differences are important features of road injury and death, with male youth particularly vulnerable (Walker, Stanton, Kazi, Salmon, & Yata, 2009). Based on this, there was a need for an adequate understanding of gender differences in road safety education. Only one male respondent was <18 years. The majority of males and females were between 28-32 years of age as shown in Table 4.

More than 60% of the respondents were males (Table 4). More than half (52.5%) and almost two-third of the female and male respondents were respectively married. Almost half (45%) and 32.8% of the female and male respondents were single respectively.

Table 4: Gender against selected socio-demographic characteristics

Socio-demographic	Gender	
	Females (F/%)	Males (F/%)
Age group		
<18	0(0)	1(0.2)
18-27	13(30.0)	49(10.2)
28-37	19(45.0)	184(39.0)
38-47	9(20.0)	125(26.8)
48-57	2(5.0)	76(16.1)
>57	0(0)	22(4.6)
Marital status		
Single	18(45.0)	151(32.8)
Married	22(52.5)	285(62.0)
Divorced	1(2.5)	4(0.9)
Separated	0(0)	12(2.6)
Cohabiting	0(0)	7(1.5)
Educational level		
None	2(5.0)	4(0.9)
Primary	1(2.5)	28(6.1)
JHS	0(0)	91(19.8)
SHS	10(25.0)	148(32.2)
Tertiary	27(67.5)	191(41.5)

Table 4: cont'd

Driver category		
Learner	0(0)	11(2.4)
Private	26(65.0)	136(29.6)
Commercial	5(12.5)	101(22.0)
Corporate	9(22.5)	212(46.1)
Class of driving license		
Not yet	0(0)	10(2.2)
A	0(0)	52(11.3)
B	30(75.0)	152(33)
C	5(12.5)	83(18.0)
D	1(2.5)	72(15.7)
E	0(0)	29(6.3)
Combination	4(10.0)	62(13.5)
Total	500	100

Source: Fieldwork, 2013.

Tables 4 further reveals that more than 90% of the female had at least JHS education. Also, the majority of the male and female respondents (67.5%, 41.5%) had tertiary education. Furthermore, almost two-thirds of the female respondents were private drivers whereas the majority of male respondents are corporate drivers. As expected, less than a fifth of the female respondents were commercial vehicle drivers. No female respondents had a category A license.

Furthermore, Table 4, the only respondent aged <18 was a private driver. Almost half (49%) of 18-27 years old respondents were also private drivers. This analysis connotes that, most corporate bodies require experienced drivers for employment and age somehow also has a bearing on one's years of driving. Furthermore, on Table 5, the only respondent <18 years old possessed

a category B license. The majority of 48-57 and >57 years old respondents possessed category D and combination license.

In Table 6, more than two-thirds of the respondents without formal education, primary, and JHS education were married whereas the majority of respondents with SHS and tertiary education were married. Furthermore, the majority of respondents with no formal education and primary education were commercial vehicle drivers.

Abimah (2013) revealed that more than a third of the respondents who were within the age brackets of 15-34 years had their education up to JHS level whereas more than half within the age range of 35-65 years attended middle school. Abimah further revealed that almost all the respondents had one form of education or the other as confirmed by Asiamah et al. (2002).

Similarly, Ipingbemi (2010) revealed that more than 90% of commercial drivers in South Western Ibadan, Nigeria had not more than secondary education. On the other hand, the majority of respondents with SHS and tertiary education were corporate and private drivers. In Asiamah et al. (2002), a significant percentage of the commercial drivers had no formal schooling and most had only basic primary education.

Table 7 indicates that the majority of the learners were single while most of the private, commercial and corporate drivers were married. As it is in the DVLA (2014), learner drivers were yet to receive driving licenses with the majority of the private and commercial drivers holding driving B license.

Table 5: Age against socio-demographic variables

	Age groups									
Variables	<18 (F/%)	18-22 (F/%)	23-27 (F/%)	28-32 (F/%)	33-37 (F/%)	38-42 (F/%)	43-47 (F/%)	48-52 (F/%)	53-57 (F/%)	>57 (F/%)
Educational level										
None	0(0)	1(6.7)	1(2.3)	1(0.1)	0(0)	0(0)	0(0)	1(1.9)	1(2.6)	1(4.8)
Primary	0(0)	0(0)	2(4.5)	4(0.4)	7(6.9)	4(6.3)	4(5.9)	4(7.7)	3(7.9)	0(0)
JHS	1(100)	1(6.7)	2(4.5)	8(0.8)	12(12.4)	13(20.4)	18(26.5)	12(23.1)	13(34.2)	11(52.4)
SHS	0(0)	8(53.3)	11(25)	28(27.7)	30(30.9)	17(27)	21(30.9)	23(44.2)	13(34.2)	5(23.8)
Tertiary	0(0)	5(33.3)	28(63.6)	60(59.4)	48(49.5)	29(46)	25(36.8)	12(23.1)	8(21.1)	3(14.3)
Marital status										
Single	1(100)	13(86.7)	34(77.3)	65(64.4)	32(33)	13(20.6)	6(8.8)	3(5.8)	1(2.6)	1(4.8)
Married	0(0)	2(13.3)	9(20)	31(30.7)	58(59.8)	45(71.4)	58(85.5)	48(92.3)	37(97.4)	18(85.7)
Divorced	0(0)	0(0)	0(0)	0(0)	3(3.1)	1(1.6)	1(1.5)	0(0)	0(0)	1(4.8)
Separated	0(0)	0(0)	0(0)	3(3)	1(1)	3(4.8)	3(4.4)	1(1.9)	0(0)	1(4.8)

Table 5: cont'd

Cohabiting	0(0)	0(0)	1(2.3)	5(5.0)	3(3.1)	1(1.6)	0(0)	0(0)	0(0)	0(0)
Driver category										
Learner	0(0)	0(0)	1(2.3)	5(5)	3(3.1)	1(1.6)	1(1.5)	0(0)	0(0)	0(0)
Private	1(1000	7(46.7)	20(45.5)	42(41.6)	38(39.2)	22(34.9)	16(23.5)	10(19.2)	6(15.8)	0(0)
Commercial	0(0)	6(40.0)	10(22.7)	22(21.8)	18(18.6)	13(20.6)	15(22.1)	10(19.2)	9(23.7)	3(14.3)
Corporate	0(0)	2(13.3)	13(29.5)	32(31.7)	38(39.2)	27(42.9)	36(52.9)	32(61.5)	23(60.5)	18(85.7)
Class of driving license										
Not yet	0(0)	0(0)	1(2.3)	5(5)	2(2.1)	1(1.6)	1(1.5)	0(0)	0(0)	0(0)
A	0(0)	0(0)	7(15.9)	10(10.0)	12(12.4)	3(4.8)	4(5.9)	3(5.8)	8(60.5)	5(23.8)
B	1(100)	12(80.0)	22(50.0)	47(46.5)	41(42.3)	17(27)	20(29.4)	14(26.9)	6(15.8)	2(9.5)
C	0(0)	3(20.0)	6(13.6)	13(12.9)	24(24.7)	16(25.4)	12(17.6)	7(13.5)	5(13.2)	2(9.5)
D	0(0)	0(0)	3(6.8)	7(6.9)	9(9.30	14(22.2)	16(23.5)	12(23.1)	9(23.7)	3(14.3)
E	0(0)	0(0)	0(0)	1(1)	1(1)	6(9.5)	7(10.3)	6(11.5)	5(13.2)	3(14.3)
Combination	0(0)	0(0)	5(11.4)	18(17.8)	8(8.2)	6(9.5)	8(11.8)	10(19.2)	5(13.2)	6(28.6)

Source: Fieldwork, 2013

As it is in different parts of the world such as Australia (Potvin et al., 1988), driver-training courses are mandatory for any person seeking a first driver's license. According to Table 8, modes of acquiring driving knowledge can be grouped into five. This is contrary to the views of Williams, Oesch, McCartt, Teoh and Sims (2014) who broadly categorised driver education into formal and informal.

Abimah (2013) on the other hand, divided the mode of driving into driver apprentice, fitter/mechanic, family/friend, self-taught and driver schools. The last on the list represents defensive or formal training. The defensive means of driving denoted formal means of acquiring driving knowledge in Ghana and accounted for 42.6% of responses. Potential drivers undergo both classroom and in-traffic training for 3 months. After six weeks of classroom training, the candidate would be exposed to in-traffic training assigned to the three stages of training (DVLA, 2014). One instructor takes charge of the classroom exercise; another instructor is responsible for preliminary in-traffic training.

This preliminary training exposes the candidate to steering handling and observation of road signs. Upon the satisfaction of the second instructor, the candidate is promoted to the last stage. However, it is under one condition that by this time, the candidate would have successfully undertaken the theory test. The last instructor is to polish the candidate for the practical test. The candidate is exposed to a 15-hour driving time, and upon satisfying the third instructor, he or she is recommended for the practical test.

Table 6: Education level against socio-demographic characteristics

	Educational level				
Variables	None (F/%)	Primary (F/%)	JHS (F/%)	SHS (F/%)	Tertiary (F/%)
Marital status					
Single	1(16.7)	6(20.7)	21(23.1)	53(34)	88(40.4)
Married	4(66.7)	19(65.5)	67(73.6)	93(56)	123(56.4)
Divorced	1(16.7)	0(0)	0(0)	1(0.6)	4(1.8)
Separated	0(0)	3(10.3)	2(2.2)	5(3.2)	2(0.9)
Cohabiting	0(0)	1(3.4)	1(1.1)	4(2.6)	1(1.8)
Driver category					
Learner	0(0)	0(0)	0(0)	1(0.6)	10(4.6)
Private	1(16.7)	7(24.1)	15(16.5)	42(26.9)	97(44.5)
Commercial	5(81.3)	13(44.8)	28(30.8)	28(17.9)	32(14.7)
Corporate	0(0)	9(31.0)	48(52.7)	85(54.7)	79(36.2)
Class of driving license					
Not yet	0(0)	0(0)	0(0)	1(0.6)	9(4.1)
A	0(0)	3(10.3)	9(9.9)	17(10.9)	23(10.3)
B	3(50)	12(41.4)	24(26.4)	54(34.6)	89(40.8)
C	2(33.3)	6(20.7)	14(15.4)	34(21.8)	32(14.7)
D	0(0)	5(17.2)	25(27.5)	20(12.8)	23(10.6)
E	0(0)	2(6.9)	6(6.6)	9(5.8)	12(5.5)
Combination	1(16.7)	1(3.4)	13(14.3)	21(13.5)	30(13.8)

Source: Fieldwork, 2013

To enhance the passing rate of candidates, the driving schools expose the candidates to the specific sites that the practical tests would likely be conducted. There are no fixed dates for the practical test, but each driving school sets a day on which their candidates undergo the practical tests. There are times where a candidate is allowed to bring his or her vehicle for the practical test but this is to the cost of the candidate.

The DVLA officials use the vehicles operated by the driving schools to test their candidates. There have been a lot of concerns regarding the efficacy of defensive driving training. Mate or apprentice driving system predates the advent of driving schools in Ghana. Abane (1993; 2011) confirmed the assertion that commercial drivers are the ones caught in this web of training.

On Table 8, a quarter of the respondents learned how to drive through the mate system. Respondents who acquired driving knowledge through this means had at one time or the other acted as bus or vehicle conductors (Abane, 2011; Abimah, 2013; Olumami et al., 2014). The conductors are taught how to drive according to seniority on weekends. Some acquire the knowledge by just observing their boss driving. Incidentally, the mate may be asked to park the vehicle very well in the absence of the boss.

On Table 8, 15.4% of the respondents acquired driving knowledge via parental training. These respondents might be children of parents who own or have access to cars, buses or any form of vehicle. As in Williams et al. (2014) and Abimah, (2013), families use driver education as a way to prepare their sons and daughters for licensing.

Wolley (2000) investigated the role of formal instruction and informal practice in learning how to drive. The study suggested that informal practice constitutes an important element of the process of learning to drive in the UK. The results further indicated an increase in instructor ratings of pupil skill with both increasing practice and tuition. However, the relationship between tuitions and instructor rated skill was observed in pupils who had had no practice.

Table 7: Category against marital status and driving license category

	Driver category			
Variables	Learner (n/%)	Private (n/%)	Commercial (n/%)	Corporate (n/%)
Marital status				
Single	6(54.5)	62(38.3)	36(34.0)	65(38.5)
Married	5(44.5)	89(54.9)	152(68.8)	93(56.0)
Divorced	0(0)	2(3.1)	2(1.9)	2(0.9)
Separated	0(0)	5(3.1)	6(5.7)	1(0.5)
Cohabiting	0(0)	4(2.5)	2(1.9)	1(0.5)
Class of driving license				
Not yet	9(81.8)	0(0)	0(0)	1(0.4)
A	0(0)	20(12.3)	4(3.8)	28(12.6)
B	2(18.2)	91(56.2)	42(38.7)	47(21.3)
C	0(0)	24(14.8)	32(30.2)	32(14.5)
D	0(0)	10(6.2)	20(18.9)	43(19.5)
E	0(0)	2(1.2)	3(2.8)	24(10.9)
Combination	0(0)	15(9.3)	5(4.7)	46(20.8)

Source: Fieldwork, 2013.

Table 8: Modes of acquiring driving knowledge

Modes of acquiring driving knowledge	Frequency	Percentage
Defensive driving	213	42.6
Mate system	125	25.0
Parental training	77	15.4
Relationship training	85	17.0
Total	500	100

Source: Fieldwork, 2013.

On comparing modes of acquiring driving knowledge an official of MTTD of the Ghana Police Service remarked as follows:

* *Parental: The parent will just teach the child only basics.*

**Apprenticeship or driver to mate system: This is not the best in my opinion.*

**Defensive Driving: You are taught how to sit behind the steer and drive.*

Similarly, Williams et al. (2014) remarked that despite the widespread appeal of driver education, scientific evaluations have indicated that it does not produce safer drivers (i.e. drivers less likely to be in crashes than comparable drivers without formal training). This is based on studies of a wide variety of driver education programmes around the world.

According to Table 9, the dominant mode of driving knowledge by gender was defensive driving. The analysis further indicates that more than a third (36.4%) of males and almost two-thirds (64%) of female respondents respectively acquired driving knowledge through the defensive driving mode.

Of late, Metro Mass Transit Ltd has female conductors out of which 90 have been trained as drivers of big buses (MMT Head office 2013). A substantial number of male respondents (10%) acquired driving knowledge

through other means such as driver management training and self-thought driving. The self-taught drivers read textbooks and start driving on their own. Williams et al. (2014) acknowledged that professional instruction should be superior to learning from family and friends.

Abimah (2013), in a study of commercial drivers in the Ho Municipality, revealed that more than half of the respondents across all the age groups learned driving through driver apprenticeship, with more than a third between 35-44 and 55-64 years trained as driver mainly through various informal methods. Barely, a tenth of the respondents in the age groups 15-34 and 45-54 learned driving through formal means of driving.

Despite the statutory age of driving pegged at 18 years in Ghana, one<18-year-old respondent was surveyed in the study. Incidentally, in Table 9, this <18 years old driver acquired the driving knowledge via the mate system. The rest of the age groups in Table 10 acquired their driving knowledge mostly through defensive training. Almost two-third (61.9%) of respondents within >57 years acquired their driving training through mate system.

In Abimah (2013), the majority of the respondents with JHS and Middle school education learned driving as driver apprentice, but almost a fifth of them learned driving from friends and family members. This is contrary to the stated requirements for acquiring driver license that a candidate must have a minimum of basic education to be eligible to acquire a driver's license (Abimah, 2013). In other words, these drivers in the first place should not have been given a license. About a third (2.3%) of the respondents having primary education acquired driving knowledge through the defensive system.

About a third (2.8%) of JHS and 30.1 per cent of SHS respondents acquired driving knowledge through the mate system and defensive driving respectively. About sixty (57.7%) of respondents who had tertiary education went through defensive driving training.

Table 9: Modes of acquiring driving against selected socio-demographic characteristics

Variables	Modes of acquiring driving knowledge			
	Defensive F/%	Mate system F/%	Parental F/%	Relationship F/%
Gender				
Males	184(86.4)	125(100)	70(0.9)	81(95.3)
Females	29(13.6)	0(0)	7(9.1)	4(4.7)
Age group				
<18	0(0)	1(0.8)	0(0)	0(0)
18-27	37(17.3)	8(6.4)	10(13)	10(11.8)
28-37	114(53.5)	30(24)	21(27.3)	34(28.2)
38-47	40(18.8)	34(27.2)	20(26)	23(27.1)
48-57	27(12)	29(24.2)	17(22.1)	16(18.8)
>57	2(0.9)	5(4)	4(5.2)	1(1.2)
Marital status				
Single	96(45.1)	32(25.6)	30(39)	33(38.8)
Married	111(52.1)	87(69.6)	42(54.5)	48(56.5)
Divorced	4(1.9)	2(1.6)	1(1.3)	0(0)
Separated	1(0.5)	4(3.2)	3(3.9)	1(1.2)
Cohabiting	3(1.4)	0(0)	0(0)	1(14.3)
Educational level				
None	3(1.4)	3(2.4)	0(0)	1(1.4)
Primary	5(2.3)	10(8)	4(5.2)	4(4.7)

Table 9: cont'd

JHS	18(8.5)	35(2.8)	14(18.2)	16(18.8)
SHS	66(30.1)	38(30.40	21(27.3)	24(28.2)
Tertiary	123(57.7)	39(31.2)	36(46.8)	41(48.2)
Driver category				
Learner	4(1.9)	3(2.4)	0(0)	1(1.2)
Private	80(37.6)	34(27.2)	28(36.4)	30(35.3)
Commercial	40(18.8)	22(17.6)	11(14.3)	12(15.3)
Corporate	91(42.7)	66(52.8)	38(49.4)	42(49.4)
License grade				
Not yet	5(2.3)	3(0.2)	0(0)	0(0)
A	29(13.6)	15(12)	7(0.9)	6(7.1)
B	72(33.8)	37(29.6)	32(41.6)	31(36.5)
C	47(22.1)	18(14.4)	16(20.8)	13(15.3)
D	22(10.3)	24(19.2)	11(14.3)	23(27.1)
E	7(3.3)	14(12.2)	5(6.5)	2(2.3)
Combination	31(14.6)	14(11.2)	6(7.8)	11(12.9)

Source: Fieldwork, 2013

As part of the process of enhancing the quality of the results, a chi-square was conducted to determine the statistically significant relationship between socio-demographic variables and means of road safety education.

Pearson's chi square statistic showed that there was a significant relationship between socio-demographic characteristics (such as gender, age, and educational level) and modes of driver education with $p<0.005$ (Table 10). Similar studies such as Turner and McClure (2003), Ozkan and Lagunen (2006) and Abane et al. (2010) have confirmed that gender, age and educational level have relationship with driver education.

Table 10: Chi-square test

Variables	df	Significant value
Gender	1	0.004
Age	5	0.002
Marital status	4	.232
Educational level	5	.000
Driver category	3	.554
License grade	6	.342

Source: Fieldwork, (2013).

Summary

The chapter revealed dominant socio-demographic characteristics of respondents in the study. The majority of the respondents were males aged mostly between 23-44 years old. The majority were also married and had tertiary education. Furthermore, the majority were corporate drivers and possessed license B category. To understand the dynamics of these socio-demographic characteristics, a cross tabulation was done between/ among selected socio-demographic variables. Four modes of acquiring driving license emerged in the study-defensive, mate system, parental and relationship training. Of these, defensive driving was the dominant mode of acquiring driving knowledge among the respondents. It was also found out that there was a significant relationship between socio-demographic characteristics (such as gender, age, and educational level) and modes of driver education.

CHAPTER SIX

CONTENT ANALYSIS OF DEFENSIVE DRIVING COURSE MODEL (DDCM) (DVLA SYLLABUS)

Introduction

This chapter is on content analysis of defensive driving course model in Ghana. This is achieved by comparing the programme courses with Bloom's Taxonomy. Bloom's Taxonomy is seen as a classic model in knowledge acquisition, which has to be effective and to be able influence the psychomotor. The shortfalls of the defensive driving programme are also examined.

Comparing Defensive Driving Programme with Bloom's Taxonomy Learning Domain

The standard safety practices for motor vehicle operations, ANSI/ASSE Z15.1, defines the defensive driving course as 'driving to save lives, time, and money, in spite of the conditions around you and the actions of others.

The Driver and Vehicle Licensing Authority (DVLA) was established in 1999 by an Act of Parliament (Act 569) to replace the then Vehicle Examination and Licensing Division (VELD). By the Act, DVLA (under the Ministry of Transportation) was to provide the legal and administrative framework for an enhanced and more effective agency to regulate the activities of road users through licensing of drivers and certification of

vehicles. Its major stakeholders include the MTTD of the Police Service, Transport Unions, NRSC and Motoring public.

By the Act that established the Authority, DVLA's mandate is to promote good driving standards in the country and ensure the use of roadworthy vehicles on the roads and other public places. Specifically, the Act spells out the functions of the Authority which include:

- Establishing standards and methods for the training and testing of driver instructors and drivers of motor vehicles and riders of motor cycles;
- Establishing standards and methods for the training and testing of vehicle examiners;
- Providing syllabi for driver training and the training of driving instructors;
- Issuing driving licenses;
- Registering and licensing driving schools;
- Inspecting, testing and registering motor vehicles;
- Issuing vehicle registration certificates; and
- Maintaining registers containing particulars of licensed motor vehicles, driving instructors and drivers of motor vehicles.

Since its establishment in 1999, the DVLA has introduced some interventions to improve its services. The major ones are:

- Revision of its syllabus for driver instructors;
- Introduction of learner syllabus;
- Regularization of the use of 'L' plates, 'DP' plates and 'DV' plates

- Improvement in service delivery by reducing significantly downtime for end users through streamlining its procedures;
- Setting up of a client service unit in the Accra Office;
- Improvement in record management system for quick retrieval of files for transfers; and
- Collaboration with The Trust Bank (TTB) for efficient cash collection system.

DVLA offers services associated with driver licenses and vehicles inspection and registration. For vehicles, the services include (1) inspection for roadworthiness and certification for all types of vehicles; (2) registration of new vehicles (regional offices); (3) change of ownership for vehicles and motor cycles (regional offices); (4) physical conversion of vehicles such as from a van to passenger bus; (5) compilation of road accident reports; and (6) provision of international vehicle permit (Accra, Tema, Kumasi, Takoradi, Bolgatanga). In the case of driver services, these are issuance and renewal of learner licenses.

The subjects taught in registered driving schools by DVLA vary but mostly include the following subjects:

1. Legal obligations of a learner driver;
2. The theoretical aspect of how the vehicle works;
3. Routine checks;
4. Highway code and road regulations;
5. Driving in traffic; and
6. Maintenance and mechanical principles.

According to Verma et al. (2011) the three cornerstones of driver education are: the goal of driver education, content and method of driver education, and the testing procedure. By law and DVLA policy, the defensive driving course in Ghana must be taught for three months before the actual licence could be applied for by writing a theoretical examination at the DVLA office. A passing score of 70% is needed to allow for a further two-week period for the conduct of the practical session toward attaining a valid driving licence. The above process is designed for learner drivers only.

This process is a significant tool to improve driver performance and increase driver responsibility (Verma et al., 2011) because:

- It helps drivers to adhere to rules and regulations as consciously as possible;
- It can provide primary prevention in reducing crash risks, and
- It obligates new drivers to use safety equipment provided in vehicles and to do so in a correct manner (Nyberg & Gregersen, 2007).

Secondly, as the defensive driving course in Ghana is not structured, driving schools design courses for the professional defensive driving training course for commercial and other professional drivers. A critical look at the structure of the defensive driving course is geared towards the psychomotor skills development of the Bloom's taxonomy learning domain and leaves out the essential aspect of cognitive and affective learning domains (Table 11).

The training content of defensive driving course uses words like stay alert, look well, observe, decide on, maintain, slow down, reduce, avoid, make sure and others. These words are used for the skill training in the psychomotor

learning development. However, for learning to be complete, the cognitive and affective domains need to be covered.

According to Blooms' taxonomy of domain, the learning outcomes must exhibit knowledge and understanding by using words like 'apply, choose, demonstrate, dramatize, employ, illustrate, use, write, solve, interpret, practice, schedule and sketch, for understanding of issues and creation of knowledge by using words like 'arrange, define, duplicate, identify, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce, retrieve, state, write'.

In DDCP, a driver has to apply Mirror Signal and Manoeuvre (MSM) when overtaking a slow-moving vehicle ahead of him/her. The driver only needs to look into his driving mirror, signal the vehicle ahead for his overtaking and then manoeuvre to overtake. These actions are deficient in a normal highway driving technique as it may cause an unsafe driving situation. MSM cannot meet the standards expected by road risk management practices.

The MSM is deficient in discussing the two-second-rule distance before overtaking. It also fails to teach the overtaking driver to alert the vehicle ahead by press the horn to provide an audio warning signal to the vehicle ahead. It also fails to teach the driver the second safe distance rule before cutting into the driver's lane. The MSM rule does not teach the drivers how to cancel the signal after overtaking. These shortfalls in MSM application in the DDCP have called for the introduction of DMSLMDSRCS (distance, mirror, signal left, manoeuvre, distance, signal right, cancel signal).

The vehicles used to train drivers based on defensive driver education are manual. Automatic vehicles are not allowed. The present choice by vehicle

users is the automatic transmissions vehicles but its usage is not adequately taught in driving schools in Ghana since it is not part of the defensive driving syllabus. Therefore, drivers use their subjective thinking and experience to drive such vehicles by themselves. There is a differential sequence of the operations of automatic and manual transmission vehicles. For example, in traffic light situation, when a manually operated vehicle stops ahead of automatic transmission vehicle in the same lane, and the traffic light shows green ready to move, if care is not taken the two vehicles may have rear-on head-on collision. This is so because automatic vehicles move faster while the manual vehicle is slow in picking up. Defensive driver education does not teach drivers how to operate 4WD and AWD (All While Drives) vehicles.

In changing of the lane, defensive driving does not teach the driver how to change lanes in theory. It is only taught in practice. This is a cognitive deficit. On lesson 4, the syllabus does not indicate the teaching of driving under the influence of alcohol and drugs and other socio-demographic characteristics that can be psychological.

Module 2 on Table 11 is not for professional drivers but driver trainees. These are elementary and focus on knowledge about vehicle maintenance and control as well as parts used to control vehicles. Extant literature notes that more experienced drivers are involved in accidents than learner drivers. Despite this phenomenon, all pieces of training are designed for learner drivers. Activities three and four on module 2 are attributable to teaching learner drivers and not meant for upgrading driving license from category C upwards. The reason is that the type of vehicle used for license C and above will have a different or additional dashboard or engine components.

This also requires professional training to understand the use of these additional components, which the defensive driver educational model fails to cover. Most motor vendors train the users about the new vehicle component, but this is not an in-depth training.

Activity five addresses issues on power training from the engine to transmission to the shaft. The treatment of activities 6-9 in defensive driver education is restrictive to the type of vehicles used during the in-traffic training. Drivers graduating from B to C need to have higher training for lighting, mirror, breaking system and clutching. The defensive driver educational model does not emphasize the training of 4x4 or 4-wheel drive vehicles. The training involves the use of standard vehicles meant for category B license. Until quite recently, all 4-wheel drive vehicles were driven by class C license holders and were in category C, which should not be the case.

Road signs and markings are bound to increase in their numbers based on the development of the nation. In Ghana, due to the wholesale importation of new road designs for construction, the attended road signs and markings are mostly left out. For example, the design and construction often leave out some road signs like FORD sign in places like Mallam Junction, Accra. FORD is a sign that warns road drivers of the possibility of a place getting flooded. As a result, vehicles and drivers are left stranded when there is a heavy downpour. It is, therefore, clear that in Ghana our road signs are inadequate.

Defensive driver module training does not cover bus and articulator truck drivers. This is not so in advanced countries like the UK where the articulated truck and other freight carrying vehicle drivers undergo specialized training. Turning, reversing, parking, negotiating a curve or roundabout using

class B vehicles is quite different from those of Class D and F vehicles. The shortfall is problematic in road safety terms.

As noted by Williams et al. (2014) and Lonero and Mayhew (2010) the distinction between beginner driver education and "advanced" training is blur in relation to defensive driver training. As such there is the need for additional instruction after a driver has mastered the basics (Lonero et al., 1995; Williams et al., 2014; Lonero & Mayhew, 2010).

Defensive driving lessons also cover road accidents, human limitations and driving emergencies. However, it leaves out critical components of enforcement and judiciary issues in its training programme. DDCM does not identify the role of attitudinal and behavioural defects in reducing road crashes (Abane et al., 2010). This defines the drivers' role in contributing to road crashes. This makes the drivers irresponsible on the road. A lot is already known about the relationship between socio-demographic characteristics of drivers and RTCs (Lonero, Clinton, Sleet, Gielen & DieClement, 2005; Slater & Wiggins, 2005). The emphasis has always been on gender, age, educational level, and occupational status. It is important for any driver education program to cover them.

Another subject, which is inadequately taught in DDCM is the teaching of First AID as indicated in Table 11, lessons four under the heading 'Driving in-traffic'. DDCM only teaches First Aid and leaves out post-crash victim management, which is much comprehensive and details out what an injured person can do to save a crash victim. For example, CPR is not taught in most driving schools in Ghana. DVLA only conduct eye screening for drivers when acquiring a driving license. However, DDCM fails to teach the

need to understand good sight for driving. ENT test for drivers, which is equally essential for safe driving, is neither taught in the DDCM nor is DVLA syllabus, but hearing and sore throat critical in safe driving manoeuvres.

The following deficiencies were associated with the DDCM when compared to Berg's (2006) Goals for driver education framework (Abane et al., 2010):

1. **Knowledge and skills**

- Communication in driving
- Observation/selection and processing of signals
- Evaluation of necessity of trip
- Evaluation of social pressure in vehicle
- Planning and choosing of route
- Self-control & personal values
- Group norms
- Life style/life situation

2. **Risk increasing factors**

- Insufficient automatism/skills
- Wrong expectations in driving
- Social context and company
- Purpose of driving
- Values, attitudes towards society
- Self-enhancement through driving

3. **Self-evaluation**

- Personal safety margins
- Typical goals for driving
- Personal skills for impulse control
- Realistic self-evaluation

Table 11: Comparing modules in DDCM with Bloom's taxonomy

Modules	Lessons/Activities	Blooms' Taxonomy	Gaps	Remarks
Legal obligations	1. Users of The Road – • Motorists (Driver) Regulations on the rights of users of the road. **2**. Regulations on driver licensing	(1) Cognitive Driving laws and regulations provide standard expected behaviours for road users and adequate knowledge (2) Affective Psychomotor	It leaves the critical leaning component of motor risk and insurance.	The focus of the study is on drivers (motorists). Part 1 talks about principal road safety provision
How a vehicle works & simple routine checks	**1: Definition of a vehicle** 1. Main components of vehicle 2. Vehicle controls 3. Dashboard indicators 4. Components of the engine compartment **5** - Power Train 6. -Lighting System 7 - Mirrors 8 - Braking System 9 - Clutching	Cognitive This topic is technical and deeper understanding of the basic and intermediate physics (kinetics, gravitational forces, laws of motions, etc.), mathematics (speed and its calculations, time and stopping distance, etc.,) and chemistry (the fluids) of that mechanical device must be taught in deeper details and to cause a deeper assimilation of the subject by the student. Affective Learners everywhere love to learn new things and for a discussion of car dashboard for instance and a modern dashboard in a modern car must be used to teach students. Psychomotor Skill must be acquired through knowledge and to create an interest in the subject. This will motivate driving students to appreciate the needed road safety on the roads.	Demonstrating per se creates a psychomotor activity and not a cognitive Most driving schools use old and use sub-standard vehicles to educate on the use of dashboard without using latest vehicles that have a deeper and broader instruments and gauges in the displays.	Most driving schools do not teach the functions of vehicle parts but make an attempt to mention only some basic parts of the vehicle. The defensive driver educational model was developed for learner drivers. In Ghana, there are only seven registered top-up professional driving schools.

Gaps

eaves the critical The focus

Table 11: cont'd

Highway Code & Road Regulations	Lesson 1 - The highway code Activity 3- Rules for road users on wheels. **Lesson 2- Road signs** Activity 1- need for road signs Activity 2- Warning signs Activity 3 - Regulatory signs Activity 4 - informatory signs Activity 5 - miscellaneous signs **Lesson 3- road markings** **Activity 1** - Markings across Activity 2- Markings along middle of carriageway Activity 3 - Marking along the edge of the carriageway Activity 4 - Other markings (arrows) Lesson 4 - Arm signals **Activity 1** –Use of arm signal	Cognitive The highway code is one of the most important knowledge that must be acquired by drivers to minimize road crashes. There is, therefore, the need for critical thinking but not just memorizes it for the purpose of examinations. Affective The teaching of these topics must cause amiability in the attitude of a driver and not only as he does it because he has to do it. Psychomotor The driver must acquire this topic as a skill and not merely as a learning snapshot	Drivers may find it difficult to comprehending these signs and pose road safety threat. Driving schools must exhibit a deeper way of demonstrating a graphical presentation of the subject than showing driving students with cards of symbols without demonstrating the rationale.

Table 11: cont'd

	Lesson 5- Traffic light signals **Activity 1** - Traffic signals in Ghana Lesson 6 - Traffic control signals by authorized persons. Lesson 7 - Road junctions and taking turnings Activity 1 - Safety measures Activity 2 - Making a right turn Activity 3 - How to make a left turn **Activity 4** - Making a U-turn			
Driving in Traffic	Lesson 1: Starting a car Lesson 2: Driving Practice Lesson 3: In-traffic practice Lesson 4: Defensive driving	Cognitive Affective Psychomotor	On Lesson 4: The syllabus fails to take a critical look at the human factors causing road crashes. Rather, it makes road and vehicle factors as examples of human factors. There is a hidden factor which is not mentioned and can be classified as	2. Attitude and behaviour plays a critical role in driving, but the topic is not discussed in the DDCM neither is it provided for in the Act nor the Regulation, for example, womanizing is an attitudinal issue which has a negative effect on driving but such important crash causing source is never mentioned anywhere in the DDCM, alcoholism, other substances of abuse all have attitudinal effect on safe driving. 2. DDCM only teaches First Aid which is woefully inadequate and does not create

Table 11: cont'd

	natural causes of accidents. It does not discuss terrain management	cognitive development for both learner and professional drivers in understanding driver occupational health which has a negative effect on driving. DVLA only conduct eye screening for drivers when acquiring a driving license. However, DDCM fails to teach the need to understand good sight for driving. Also, Audiology which is equally essential to safe driving is neither taught in the DDCM nor DVLA syllabus, but hearing is very critical in safe driving

Source: Author's compilation, 2013

Summary

The chapter has elucidated the objectives of DDCM as a precursor to the formal mode of acquiring driving knowledge. Its shortcomings have been highlighted in the study. However, its strengths and shortcomings were compared to Bloom's Taxonomy of Domain from cognitive, affective and psychomotor motor perspectives. It can be said that DDCM when compared to Blooms' taxonomy domain of learning leaves out the cognitive and the affective domains and concentrates on the psychomotor and this makes it an incomplete model for training of both learner and professional driver.

CHAPTER SEVEN

DRIVERS' LEVEL OF KNOWLEDGE ON ROAD SAFETY

Introduction

This chapter encapsulates the views of drivers on the acquired driving knowledge and perceived road safety. Some of these views are pedagogic and may have been acquired prior to driving training or education. The views have a direct link with the perception of road safety and in-traffic behaviour of drivers. These are invariably tied to the causes of road crashes.

Assessment of General Driving Knowledge

Sivak (1996) noted that 90% of information that drivers use is visual. He went further to say that although the information relevant to driving is likely to be dominantly visual, any claim about the precise percentage attributable to vision is premature.

According to Table 12, the majority of the respondents agreed that driver's education and training must not only be based on practical but also on theory and risk management principles. In this wise, the drivers see this attribute to be very important in the acquisition of driving knowledge. A driver's attitude influences his driving skill and must be a serious issue to be addressed in driver training and education.

Table 12: Perception of driving knowledge

	General knowledge	Agree	Not sure	Disagree
		F/%	F/%	F/%
1	Driver's attitude influences his driving skill	445 (89.0)	25 (5.0)	30 (6.0)
2	Driver's behaviour is influenced by his level of knowledge	406(80.2)	31(6.2)	63(12.6)
3	Drivers' attitudes and behaviour are influenced by their level of knowledge	413(82.6)	31(6.2)	56(11.2)
4	The higher ones knowledge the better one's driving.	354(70.8)	49(9.8)	97(19.4)
5	Driver's education and training must not only be based on practical but also on theory and risk management principles	435(87.0)	19(3.8)	46(7.2)
6	Lack of maintenance is a human factor	426(85.2)	26(5.2)	48(11.6)
7	Badly designed roads should not cause crash per say.	281(56.2)	48(9.6)	171(34.3)
8	Drivers must have ethical standards beyond the full knowledge of driving laws and regulations	425(85.0)	28(5.6)	47(9.4)
9	Driver's education and training must be continuous until their attainment of high safety standards.	422(84.4)	33(6.6)	45(9.0)
10	Professional drivers must show further certificate of competence at every license renewal date.	356(70.2)	58(11.6)	86(17.2)

Source: Fieldwork, 2013.

Socio-Demographic Characteristics and General Driving Knowledge

Lancaster and Ward (2002) identified how socio-demographic characteristics such as gender, age, education, and personality influence driving knowledge. The following section addresses the influence of socio-demographics such as gender, age and education on driving knowledge as that relate to our environment.

Gender and general driving knowledge

According to Table 13, general driving knowledge for males differs from females. Females revealed higher percentage of agreement to the attributes that male driver's attitude influences her driving skill (95%), a driver's behaviour is influenced by their level of knowledge (87%), the higher one's knowledge the better one's driving (77.5%) and drivers must have ethical standards beyond the full knowledge of driving laws and regulations (97.5%) and that professional drivers must show further certificate of competence at every license renewal date (87.5%)." than males.

On the other hand, more males than females revealed higher level of agreement on these attributes: drivers' attitudes and behaviour are influenced by their level of knowledge (83.4%) driver's education and training must not only be based on practical but also on theory and risk management principles (97.3%), lack of maintenance is a human factor and badly designed roads should not cause crash per se (58.7%) than females.

Table 13: Gender and general knowledge

General knowledge	Males			Females		
	Agree F/%	Not sure F/%	Disagree F/%	Agree F/%	Not sure F/%	Disagree F/%
1.Driver's attitude influences his driving skill	414 (90.0)	24(5.2)	22(4.7)	36(95.0)	2(5.0)	0(0)
2. Driver's behaviour is influenced by their level of knowledge	378(82.2)	34(7.4)	48(10.5)	35(87.0)	1(2.5)	4(10.0)
3. Drivers' attitudes and behaviour are influenced by their level of knowledge	384(83.4)	31(6.7)	45(9.7)	36(80.0)	3(7.5)	1(2.5)
4. The higher one's knowledge the better one's driving.	331(72.1)	50(10.9)	78(17.0)	31(77.5)	2(5.0)	7(17.5)
5. Driver's education and training must not only be based on practical but also on theory and risk management principles	411(97.3)	21(4.6)	38(8.2)	37(92.5)	2(5.0)	1(2.5)
6. Lack of maintenance is a human factor	398(86.6)	26(5.7)	36(7.8)	29(77.5)	6(15)	3(7.5)
7. Badly designed roads should not cause crash per say.	270(58.7)	47(10.2)	143(31.0)	22(55.0)	1(2.5)	17(42.5)
8. Drivers must have ethical standards beyond the full knowledge of driving laws and regulations	393(85.4)	34(7.4)	33(7.2)	39(97.5)	0(0)	1(2.5)
9. Driver's education must be continuous until attainment of high safety standards.	393(85.2)	34(7.4)	36(7.4)	36(90.0)	1(2.5)	3(7.5)
10. Professional drivers must show further certificate of competence at every license renewal date.	326(70.8)	60(13.0)	74(16.0)	35(87.5)	3(7.5)	2(5.0)

Source: Fieldwork, 2013

Educational level and general driving knowledge

According to Table 14, respondents with tertiary education revealed that drivers' attitude influences driving skills (1.54), driver's behaviour is influenced by their level of knowledge (1.68), drivers' attitudes and behaviour are influenced by their level of knowledge (1.80), the higher one's knowledge, the better one's driving (1.25), driver's education and training must not only be based on practical but also on theory and risk management principles (1.25), badly designed roads should not by themselves cause crashes (2.63), drivers must have ethical standard beyond the full knowledge of driving laws and regulations (1.76), drivers education and training must be continuous until their attainment of high safety standards (1.66), and professional drivers must show further certificate of competence at every license renewal date (1.89). On the other hand, respondents with primary education revealed that lack of maintenance is a human factor (1.48).

Modes of Acquiring Driving Knowledge and Perception of Driving Knowledge

Early driver education evaluations were reviewed by Nichols, Parenteau, Viano, Shah, Gopal, Davies & Broden (2003) and summarized as follows: (1) while the effects may be short-lived, driver education students had fewer crashes and violations than non-students; (2) complete courses involving both classroom and behind-the-wheel training were more effective than classroom-only courses; and (3) High school driver education was more effective in reducing road crashes.

Table 14: Education attainment and perception of driving knowledge

Perception of driving knowledge	Education attainment				
	None mean	Primary Mean	JHS mean	SHS mean	Tertiary mean
1.Driver's attitude influences driving skill	1.71	1.90	1.90	1.58	1.54
2. Driver's behaviour is influenced by their level of knowledge	2.57	1.89	1.89	1.86	1.68
3. Drivers' attitudes and behaviour are influenced by their level of knowledge	2.14		1.92	2.08	1.86
4. The higher one's knowledge the better one's driving.	2.57	2.62	2.0	1.91	1.25
5. Driver's education and training must not only be based on practical but also on theory and risk management principles	1.43	1.92	1.77	1.44	2.50
6. Lack of maintenance is a human factor	2.29	1.48	1.62	1.71	1.56
7. Badly designed roads should not cause crash per say.	3.71	3.31	2.69	2.72	2.63
8. Drivers must have ethical standards beyond the full knowledge of driving laws and regulations	2.00	1.75	1.74	1.79	1.76
9. Driver's education and training must be continuous until their attainment of high safety standards.	2.14	2.46	1.70	1.56	1.66
10. Professional drivers must show a further certificate of competence at every license renewal date.	2.29	1.85	2.39	1.82	1.89

Source: Fieldwork, 2013

From Table 15, respondents who acquired driving knowledge through defensive driving training revealed a very high agreement on all but one attribute used to measure perception of general driving knowledge. The highest was in the fact that the higher one's knowledge, the better one's driving (88.7%). Respondents showed the highest level of disagreement on the claim that "drivers' behaviour influenced their level of knowledge" with 56.3 per cent agreement. There were other attributes such as "Drivers' attitudes and behaviour are influenced by their level of knowledge" and "badly designed roads should not cause crash per se which showed more than a third level of disagreement".

In Table 16, the majority of the respondents who acquired driver education through the mate system exhibited highest agreement with the following statements: professional drivers must show further certificate of competence at every license renewal date (89.6%); drivers must have ethical standards beyond the full knowledge of driving laws and regulations (53.6%); lack of maintenance is a human factor (96.8%); and the higher one's knowledge the better one's driving (89.6%).

Some 5.6% of the respondents were not sure that "Drivers' attitudes and behaviour are influenced by their level of knowledge." Indeed, the majority of the respondents disagreed even with attributes which claim that driver's level of education and training must not only be based on practical but also on theory and risk management principles (63.8%).

Table 15: Defensive driving and general driving knowledge

	General driving knowledge	Defensive Driving		
		Agree F/%	Not sure F/%	Disagree F%
1	Driver's attitude influences his driving skill	154(72.2)	15 (7.0)	44 (20.7)
2	Driver's behaviour is influenced by his level of knowledge	79 (37.1)	14(6.6)	120 (56.3)
3	Drivers' attitudes and behaviour are influenced by their level of knowledge	121(56.8)	12(5.6)	80 (37.6)
4	The higher one's knowledge, the better one's driving.	189 (88.7)	16 (7.5)	8 (3.8)
5	Driver's education and training must not only be based on practical but also on theory and risk management principles	136 (63.8)	13 (6.1)	74 (34.7)
6	Lack of maintenance is a human factor.	169 (79.3)	13 (6.1)	30 (14.1)
7	Badly designed roads should not cause crash per se.	120 (56.3)	15 (7.0)	78 (36.6)
8	Drivers must have ethical standards beyond the full knowledge of driving laws and regulations	143 (67.1)	25 (11.7)	45 (21.1)
9	Driver's education and training must be continuous until their attainment of high safety standards.	155 (72.7)	10 (4.6)	48 (22.5)
10	Professional drivers must show the further certificate of competence at every license renewal date.	109 (51.2)	34 (16)	70 (32.9)

Source: Fieldwork, 2013

Table 16: Mate system and general driving knowledge

	General Driving Knowledge	Mate System		
		Agree F/%	Not sure F/%	Disagree F%
1	Driver's attitude influences his driving skill	89 (71.2)	15(12.0)	21(16.8)
2	Driver's behaviour is influenced by his level of knowledge	77 (61.6)	21(16.8)	27 (21.6)
3	Drivers' attitudes and behaviour are influenced by their level of knowledge	91(72.8)	20(16.0)	14 (11.2)
4	The higher one's knowledge, the better one's driving.	112 (89.6)	5 (4.0)	8 (6.4)
5	Driver's education and training must not only be based on practical but also on theory and risk management principles	90 (72.0)	15 (12.0)	20(16.0)
6	Lack of maintenance is a human factor.	121 (96.8)	3 (2.4)	1 (0.8)
7	Badly designed roads should not cause crash per se.	56 (44.8)	34 (27.2)	35 (28.0)
8	Drivers must have ethical standards beyond the full knowledge of driving laws and regulations	67 (53.6)	30 (24.0)	28 (22.4)
9	Driver's education and training must be continuous until their attainment of high safety standards.	45(36.0)	24 (19.2)	56(44.8)
10	Professional drivers must show further certificate of competence at every license renewal date.	112(89.6)	7(5.6)	6(4.8)

Source: Fieldwork, 2013

In Table 17, the majority of respondents who had parental training of driver education expressed agreement with the claim of general knowledge such as a driver's behaviour is influenced by his level of knowledge (77.7%%), lack of maintenance is a human factor (58.4%) and badly designed roads should not cause accident per se (49.4%).

As shown in Table 17, the majority of respondents who acquired driving knowledge through relationship training expressed agreement with the claim that general knowledge such as driver's attitude influences his driving skill (78.8%), a driver's behaviour is influenced by his level of knowledge (50.6%) and a driver's education and training must not only be based on practical but also on theory and risk management principles (52.3%).

All the modes of acquiring driving knowledge posit the high level of understanding on attributes on general driving knowledge. The analysis of Tables 14-17 shows the differences in the level of agreement on ten attributes of general driving knowledge against modes of driving education.

Driver Perception of Road Safety

Driver perception of road safety is an important influence on driving behaviour and task performance. However, how is the perception of safety measured? De Ona et al., (2014) selected and investigated five aspects used in measuring their perception. These involved the application of different methods for analysis and the understanding of the influence of these aspects on driver perception of the risk of road crashes.

Table 17: Parental training and general driving knowledge

	General driving knowledge	Parental training		
		Agree F/%	Not sure F/%	Disagree F%
1	Driver's attitude influences his/her driving skill	43(55.8)	12(15.6)	22(28.6)
2	Driver's behaviour is influenced by his/her level of knowledge	56(77.7)	10(13.0)	1(1.3)
3	Drivers' attitudes and behaviour are influenced by their level of knowledge	37(48.1)	34(44.2)	6(7.8)
4	The higher one's knowledge, the better one's driving.	54(70.1)	9(11.7)	14(18.2)
5	Driver's education and training must not only be based on practical but also on theory and risk management principles	34 (44.1)	7(0.9)	36(46.8)
6	Lack of maintenance is a human factor.	45(58.4)	10(13.0)	22(28.6)
7	Badly designed roads should not cause crash per se.	51(66.2)	9(11.7)	15(19.5)
8	Drivers must have ethical standards beyond the full knowledge of driving laws and regulations	29(37.7)	15(19.5)	33(42.9)
9	Driver's education and training must be continuous until high safety standards.	56(72.7)	0(0)	21(27.3)
10	Professional drivers must show further certificate of competence at every license renewal date.	43(55.8)	12(15.6)	22(28.6)

Source: Fieldwork, 2013

Table 18: Relationship training and general driving knowledge

	General driving knowledge	Relationship training		
		Agree F/%	Not sure F/%	Disagree F%
1	Driver's attitude influences his/her driving skill	67(78.8)	2(2.4)	15 (17.6)
2	Driver's behaviour is influenced by his/her level of knowledge	43(50.6)	4(4.7)	38(44.7)
3	Drivers' attitudes and behaviour are influenced by their level of knowledge	29(34.1)	12(14.1)	44(51.8)
4	The higher one's knowledge, the better one's driving.	33(38.8)	21(24.7)	31(36.5)
5	Driver's education and training must not only be based on practical but also on theory and risk management principles	45(52.3)	12(14.1)	28(32.9)
6	Lack of maintenance is a human factor.	56(63.5)	1(1.2)	18(21.2)
7	Badly designed roads should not cause crash per se.	42(49.4)	10(11.8)	33(38.8)
8	Drivers must have ethical standards beyond the full knowledge of driving laws and regulations	56(65.8)	3(3.5)	26(30.6)
9	Driver's education and training must be continuous until their attainment of high safety standards.	39(45.9)	32(37.6)	14(16.5)
10	Professional drivers must show the further certificate of competence at every license renewal date.	48(56.5)	35(41.2)	2(2.3)

Source: Fieldwork, 2013

Many studies have been carried out to analyse the human factors that affect road crashes and their severity (Ferguson, Robinson & Cohen, 2003; Eiksund, 2009; Abane et al., 2010). These researchers have found that crash risk particularly depends on driving experience (in terms of license status, years of driving, crash involvement in the last few years, distance drove in mile\km), drivers' socio-economic characteristics (gender, age, personal or family income, commuter status, educational level, current marital status), and deviant driving behaviour (in terms of traffic offences in the last few years, physical condition of the driver, use of alcohol and drugs, use of seatbelt, driving in excess of posted speed limit, failure to remain in the proper lane, passing where prohibited by posted signs, use of cell phone,(Wang, Aufrere, Gowdy, Mertz, Thorpe & Yata 2002; Lu, Xiang, Dissanayaake, Pernia, 2004; Clarke, 2006; Lambert-Belanger et al., 2012; de Ona et al., 2013; Tractinsky, Ram & Shinar, 2013).

Also, the psychological state of the driver while driving was also investigated. For instance, Wang et al. (2002) introduced respondents' self-description of their psychological state in most driving situations. These researchers chose five categories: an aggressive driver, an impatient driver, a hesitant driver, a slow driver, and a highly cautious driver. Clarke (2006) reported on the intentions and behaviours of drivers as interpreted by the attending police officer regarding the presence or absence of aggressive recklessness. Jamson, Wardman, Batley, and Carsten (2008) focused on driver awareness and distinguished a range of categories from poor (driver is cognitively inattentive) to excellent (driver is fully concentrated on the driving task).

Verma, et al. (2011) equated psychomotor factors as psychophysical factors affecting road safety. The human factors governing road user behaviour predominantly include the following: visual feedback, visual performance, speed judgment, speed adaptation, judgment of relative speed, judgment of spacing, overtaking, reaction time, etc. Some personality factors of the driver may contribute in a significant way towards road traffic crash involvement. Driving is a serious responsibility, and it demands and deserves full and undivided attention. However, there are many driver distractions, which contribute to crashes and injuries. The driver plays a crucial role in road safety through scanning, processing and applying appropriate action patterns towards oncoming stimuli.

Driving is a skill that calls for the constant and complex co-ordination of mind and body of the driver. It is multi-tasked involving operating heavy machinery at high speed, navigating across changing terrain, calculating speed and distances and responding to all the other drivers and obstacles. Verma et al. (2011) identify the skills needed by a driver that include visual skill, as well as auditory skill and biomechanical and cognitive.

This section focuses on drivers' views of road safety as depicted in Table 18. One of the most important influences on driving ability is a driver's attitude towards driving and the resultant behaviour on the road. Attitudes towards the road environment and driving can impact on our driving behaviour. Traditionally, risk attitudes of drivers have been investigated using survey data gathered through "self-reported risky driving behaviour".

Some other authors proposed studies of risky driving behaviour in young people to analyse the relationship between personal characteristics and traffic crashes (Eiksund, 2009; Scott-Parker, Watson & King 2009; Daignault & Delhomme, 2011). Lancaster and Ward (2002) identify the individual differences that are associated with driving behaviour and road safety-age, gender, ethnicity, education, personality, risk perception, social deviance, previous crash involvement, experience, stress, life events, fatigue, and physiology. In the current study, gender, age, marital status, occupational level, the level of education, driving license, mode of acquiring driving knowledge were used to identify the in-traffic behaviour of drivers (Table 18).

Male and female exhibit different driving behaviours that affect their attitudes and safety. Many factors underpin these differences, including neurochemical structures and hormonal processes shaped by evolution, and global socialization practices. Each of these plays a part in explaining why male and female drivers have very different records about crashes and insurance claims (Economic and Social Research Council, 2002).

Differences between male and female regarding their driving behaviour and crash rates have long been demonstrated in the UK, mainland Europe, the United States, Australia and in many other countries. In all studies and analyses, without exception, males have been shown to have a higher rate of RSCs than females. This gender difference is most marked in the population under the age of 25 years but is also evident among older drivers. The difference between the sexes regarding the number of fatalities

resulting from road crashes is similarly marked (Abel-Aty & As-Saidi, 2000; Waylen & McKenna, 2002; Lancaster & Ward, 2002).

Table 19: Drivers' views on road safety

	Views on road safety	Mean
	a. **Application of acquired driving knowledge**	
1	To maintain smooth flow of traffic, one must ignore several traffic regulations	1.69
2	It makes sense to increase speed and drive past vehicles which are moving slowly	2.69
3	People violate speed limit because the limits are too low	2.41
4	It is reasonable to drive through just before it switches to red light	1.99
5	One can ignore red light if there are no vehicles in sight	2.39
6	Speed bumps increase chances of traffic crashes	3.98
	Cognitive analysis of facts and inferences	
7	On a highway, if your brake fails to apply is better to use the gears than handbrake to stop the car	3.98
8	Two-second rule principles of safe braking distance is difficult in its application	2.66
9	MSM in defensive driving is adequate principle for overtaking	4.36
10	Using mobile phone while driving does cause a great risk to driving	4.25
11	Margin of Safety around the vehicle is necessary for consideration when driving	4.24
12	If everyone were knowledgeable, there would be fewer traffic crashes	3.98

Table 19: cont'd

	Driver synthesis to promote road safety	
13	Process of a vehicle overtaking another must be done in a more systematic manner	4.28
14	Driving within towns and villages requires continues scanning for hazards.	4.05
15	The continuous use of driving mirrors in driving tends to affect driver's concentration	2.34
16	A general reduction of speed limits in a highway will generally reduce crashes	3.68
17	A professional driver must have some level of academic knowledge to drive crash-free.	4.19
	Evaluation about the value of ideas	
18	Overtaking could be done anyhow provided it does not cause a crash	1.79
19	Drunk driving is found more with young drivers	3.18
20	Young drivers tend to beyond speed limit	3.78
21	Sending SMS text while driving is not a dangerous act to many	1.82
22	Coasting while descending a hill is better to reduce fuel cost.	2.49
23	An educated driver may avoid road crashes better than the uneducated	4.09

Source: Fieldwork, 2013.

The scale of this difference between the sexes is very substantial. Chipman, MacGregor, Smiley and Lee-Gosselin (1992), for example, show that males have double the number of crashes (per 1,000 drivers) than females. Waylen and McKenna, (2002) also noted that in addition to having a higher number of crashes, males incur their first crash earlier in their driving career and are more likely than women to be held to blame for the incident. Norris, Matthews and Riad (2000) and others attribute this greater level of the crash- proneness to higher driving speeds among males and less regard for traffic laws.

Waylen and McKenna (2002) also note that the pattern of road crash involvement also differs between the sexes. Males are more likely than females to be involved in crashes that occur on bends, in the dark or those that involve overtaking. Females, on the other hand, have a greater frequency of crashes occurring at junctions than males.

Safely driving a vehicle on public roads requires a wide range of skills and abilities. Driving does not always take place in ideal conditions in which a well-rested, well-trained and well-behaved individual interacts with a simple and, undemanding road environment. One issue that can make driving performance sub-optimal is a distraction, both from within and from outside the road environment. The US NHTSA recognizes driver distraction as a high priority area (Stutts & Wilkins, 2003). One of the most frequently reported sources of distraction is the use of mobile phone (Horberry et al., 2005; Olumami et al., 2014). Burns, Stevens, Quimby, Board, and Kersloot (2002) and Haigney, Taylor and Westerman (2000) revealed that drivers using a hand held mobile phones were on the average 50% slower to

respond to hazards than when driving without using a phone.

The use of mobile has attracted the greatest media interest, (Olumami et al., 2014) so it was not surprising that it became an issue in this study. However, there are other advanced electronic devices that also have the potential to increase perceptual and cognitive demand when driving. Tuning or adjusting the vehicle radio, cassette or CD player have been found to be among the major causes of distraction-related crashes (Stutts et al., 2001). The ability to recognize road signs and comply with them is another very important component of road safety education (Johnson & Adebayo 2011). That explains why some of the respondents expressed worry about drivers lacking adequate knowledge of road signs and markings. A study on the knowledge of and attitude towards road traffic codes among commercial motorcycle riders in Eastern Nigeria also showed that two-thirds of the respondents had poor knowledge of traffic codes and safety (Adogu & Ilika, 2006).

Borosky, Oron-Gilad and Parmet (2009) demonstrated how age and skill affect hazard perception in driving. Young-inexperienced drivers, experienced and elderly experienced drivers revealed different hazard perceptions in driving. The study further showed that experienced drivers learn to avoid hazards to which inexperienced drivers must respond. Moreover, the ability to perceive and recognize potential hazards before they become hazardous situations depend on experience in similar situations where hazards materialized.

Table 20: Gender and views on road safety

	View	Males Mean	Females Mean
	Application of acquired driving knowledge		
1	To maintain smooth flow of traffic, one must ignore several traffic regulations	4.30	4.47
2	It makes sense to increase speed and drive past vehicles which are moving slowly	3.41	3.23
3	People violate speed limit because the limits are too low	3.61	3.34
4	It is reasonable to drive through just before it switches to red light	4.02	3.93
5	One can ignore red light if there are no vehicles in sight	4.34	4.41
6	Speed bumps increase chances of traffic crashes	3.59	3.83
	Cognitive analysis of facts and inferences		
7	On a highway, if your brake fails to apply is better to use gears than hand brake to stop the car	1.99	2.46
8	Two-second rule principles of safe braking distance is difficult in its application	3.41	2.81
9	MSM in defensive driving is adequate principle for overtaking	1.99	2.37
10	Using mobile phone while driving does cause a great risk to driving	2.22	1.80
11	Margin of safety around the vehicle is necessary for consideration when driving	1.65	1.55
12	If everyone were knowledgeable, there will be fewer traffic crash	1.73	2.00
	Driver synthesis to promote road safety		
13	Process of a vehicle Overtaking another must be done in a more systematic way	1.73	1.66

Table 20: cont'd

14	Driving within towns and villages requires continues scanning for hazards.	1.97	1.72
15	The continuous use of driving mirrors in driving tends to affect driver's concentration	3.67	3.61
16	A general reduction of speed limits in a highway will generally reduce crashes	2.30	2.51
17	A professional driver must have some level of academic knowledge to drive crash free.	1.81	2.02
	Evaluation of the value of ideas		
18	Overtaking could be done anyhow provided it does not cause a crash	4.20	4.27
19	Drunk driving is found more with young drivers	2.81	2.95
20	Young drivers tend to go over speed limit	2.17	2.77
21	Sending SMS text while driving is not a dangerous act to many	4.19	4.12
22	Coasting whiles descending a hill is better to reduce fuel cost.	3.55	3.07
23	An educated driver may avoid road crashes better than the uneducated	1.89	2.27

Source: Fieldwork, 2013

Endsley (1995) also noted that young, inexperienced drivers perceived the materialized hazards as extremely dangerous and ignored other less obvious hazards that appeared following the planned hazardous event. In Wang et al (2002), the more experienced drivers were more familiar with the environmental constraints.

On the relationship between educational level and in-traffic behaviour, Lancaster and Ward (2002) noted that drivers with a higher level of education were more likely to report speeding and reported use of seat belts increased with increasing education.

Age and Views on Road Safety

From Table 21, respondents aged >57 years revealed the highest mean score on attributes which relate to the following: "to maintain smooth flow of traffic, one must ignore several traffic regulations (4.64), it is reasonable to drive through just before it switches to red light (4.85) and one can ignore red light if there are no vehicles in sight (4.50) for application of acquired driving knowledge.

Respondent aged <18 perceived that on a highway if your brake fails to apply, it is better to use gears than hand brake to stop the car (2.69). Meanwhile, those aged 43-47 and >57 years showed the highest mean score on the attribute that "two-second rule principles of safe braking distance are difficult in its application (3.54) and using a mobile phone while driving does cause a great risk to driving (2.57).

From Table 22, respondents with tertiary education expressed the highest mean score on the following attributes: to maintain smooth flow of traffic; one must ignore several traffic regulations (4.50), among the age cohorts, those aged >57 score (4.71) highest on the statement that sending SMS text while driving was not dangerous. Meanwhile, respondents aged >57 scored (1.40) lowest "on a highway, if your brake fails to apply it is better to use gears than hand brake to stop the car.

In Table 23 those aged >57 again scored (4.50) highest on the statement that "to maintain smooth flow in traffic, one must ignore several traffic regulations" and also scored (4.50) highest on the statement that "one can ignore red light if there is no vehicle in sight". The implication could be

that, the aged out of their experience turn to underestimate road traffic regulations though they know all about the regulations.

As shown in Table 24, respondents who are corporate drivers expressed the highest mean scores on the following attributes: to maintain smooth flow of traffic, one must ignore several traffic regulations (4.47), people violate speed limit because the limits are too low (3.80) and it is reasonable to drive through just before it switches to red light (4.17). On the other hand, commercial drivers expressed the highest mean scores on attributes such as "on a highway if your brake fails to apply it is better to use gears than hand brake to stop the car (2.33), using mobile phone whilst driving does not cause a great risk in driving (2.46) and margin of safety around the vehicle is necessary to consider when driving (1.90).

On the affective aspects of road safety education obtained (Table 24), respondents expressed above average mean scores for all the attributes except drivers' attitude is everything in driving (2.19). However, attributes such as "increase speed to pass a vehicle in front (2.77), and use of horns to attract the attention of potential passengers (2.98) revealed low mean scores.

Effect of Skill Development Acquired from Driver Education on Driver Behaviour

Zhao et al. (2006) surveyed Ontario High Schools students as to their driving behaviour and related factors such as the class of graduated license held, amount of driving and crashes. The results showed that among drivers who held Ontario's first stage (Learners) license (GI), significantly fewer driver education graduates reported having crashes than those who had not taken driver education.

Table 21: Age and views on road safety

		Age									
	Views on road safety	<18	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	>57
	Application of acquired driving knowledge	Mean									
1	To maintain smooth flow of traffic, one must ignore several traffic regulations	3.00	3.75	4.49	4.47	4.20	4.13	4.35	4.13	4.51	4.64
2	It makes sense to increase speed and drive past vehicles which are being driven slowly	3.54	2.36	3.47	3.61	3.51	2.85	2.78	3.19	3.76	3.73
3	People violate speed limit because the limits are too low	1.92	2.75	2.98	3.43	3.48	3.85	3.81	3.90	3.89	3.92
4	It is reasonable to drive through just before it switches to red light	4.00	3.25	3.85	3.94	3.94	3.76	4.10	4.17	4.54	4.85
5	One can ignore red light if there are no vehicles in sight	3.77	4.50	4.30	4.38	4.41	4.19	4.36	4.48	4.35	4.50

Table 21: cont'd

6	Speed bumps increase chances of traffic crashes	3.08	3.82	3.77	3.65	3.84	3.71	3.66	3.30	3.40	3.50
	b. **Cognitive analysis of facts and inferences**										
7	On a highway, if your brake fails to apply is better to use gears than hand brake to stop the car	2.69	2.45	1.96	2.16	1.92	1.99	2.00	2.11	2.11	1.40
8	Two-second rule principles of safe braking distance is difficult in its application	3.08	2.82	3.26	3.31	3.42	3.47	3.54	3.35	3.31	1.40
9	MSM in defensive driving is adequate principle for overtaking	2.85	2.42	2.13	2.00	1.91	1.87	1.97	2.27	1.86	2.07
10	Using mobile phone while driving does cause a great risk to driving	2.46	2.08	2.26	2.26	2.15	2.25	2.26	2.17	1.87	2.57
11	Margin of Safety around the vehicle is necessary to consider when driving	2.00	1.75	1.82	1.67	1.59	1.70	1.55	1.75	1.53	1.43

Table 21: cont'd

c. Driver synthesis to promote road safety										
12	If everyone were knowledgeable, there would be fewer traffic crash	2.54	2.58	1.69	1.80	1.73	1.73	1.77	1.79	1.55	1.36
13	Process of a vehicle Overtaking another must be done in a more systematic manner	3.00	1.75	1.62	1.62	1.79	1.98	1.83	1.62	1.62	1.14
14	Driving within towns and villages requires continues scanning for hazards	2.08	2.08	2.07	2.04	1.92	1.95	1.91	1.83	1.81	1.86
15	The continuous use of driving mirrors in driving tends to affect driver's concentration	2.92	3.33	3.44	3.50	3.68	3.55	3.86	3.71	3.97	4.00
16	A general reduction of speed limits in a highway will generally reduce crashes	3.38	2.27	2.22	2.41	2.19	2.24	2.42	2.28	2.28	2.21

Table 21: cont'd

17	A professional driver must have some level of academic knowledge to drive crash free	1.85	1.92	2.48	1.91	1.77	1.57	1.66	1.71	1.95	1.93
18	Overtaking could be done anyhow provided it does not cause a crash	3.69	3.67	4.09	4.24	4.13	4.09	4.31	4.27	4.22	4.57
	d. Evaluation about the value of ideas										
19	Drunk driving is found more with young drivers	3.31	2.25	2.61	2.87	2.81	2.70	2.58	3.21	2.97	3.71
20	Young drivers tend to over speed more than older drivers	2.75	2.00	2.62	2.21	2.23	2.11	2.00	2.48	1.92	2.36
21	Sending SMS text whilst driving is not a dangerous act to many	3.46	3.67	4.27	4.10	4.14	4.34	4.14	4.10	4.45	4.71
22	Coasting whiles descending a hill is better to reduce fuel cost	2.67	3.36	3.20	3.44	3.43	3.39	3.51	3.98	3.67	4.36
23	An educated driver may avoid road crashes better than the uneducated	2.46	2.17	1.84	2.02	1.73	1.82	2.04	2.02	2.00	1.50

Source: Fieldwork, 2013

Educational level				
None	Primary	JHS	SHS	Tertiary
Mean	Mean	Mean	Mean	Mean
4.43	4.14	4.18	4.18	4.50
3.86	5.04	3.24	3.35	3.29
3.00	3.25	3.87	3.52	3.60
4.00	4.04	4.12	3.96	4.02
4.29	3.96	4.30	4.28	4.48
2.86	3.75	3.44	3.55	3.71

Table 22: cont'd

	b. **Cognitive analysis of facts and inferences**					
7	On a highway, if your brake fails to apply is better to use gears than hand brake to stop the car	2.86	2.43	1.77	2.03	2.02
8	Two-second rule principles of safe braking distance is difficult in its application					
9	MSM in defensive driving is adequate principle for overtaking	1.86	2.15	1.91	2.10	2.00
10	Using mobile phone while driving does cause a great risk to driving	2.86	2.54	2.25	2.16	2.10
11	Margin of Safety around the vehicle is necessary to consider when driving	2.00	1.64	1.66	1.73	1.56
12	If everyone were knowledgeable, there would be fewer traffic crash	2.29	1.96	1.75	1.83	1.64
	c. Driver synthesis to promote road safety					
13	Process of a vehicle Overtaking another must be done in a more systematic manner	1.86	1.74	1.61	1.84	1.67
14	Driving within towns and villages requires continues scanning for hazards	2.14	2.04	1.83	2.06	1.91
15	The continuous use of driving mirrors in driving tends to affect driver's concentration	3.14	3.96	3.61	3.72	3.63

Table 22: cont'd

16	A general reduction of speed limits in a highway will generally reduce crashes	2.43	2.19	2.33	2.28	2.33
17	A professional driver must have some level of academic knowledge to drive crash free	1.86	2.07	1.89	1.92	1.72
18	Overtaking could be done anyhow provided it does not cause a crash	4.14	4.15	4.32	4.16	4.22
	d. Evaluation about the value of ideas					
19	Drunk driving is found more with young drivers	3.00	2.88	3.11	2.93	2.65
20	Young drivers tend to over speed more than older drivers	4.00	3.89	4.43	3.99	4.26
21	Sending SMS text whilst driving is not a dangerous act to many	2.86	3.33	3.56	3.57	3.50
22	Coasting whiles descending a hill is better to reduce fuel cost	2.86	2.44	2.22	1.96	1.69
23	An educated driver may avoid road crashes better than the uneducated					

Source: Fieldwork, 2013

able 23: Type of driving license and views of road safety

	Views on road safety	Class of driving license						
		Not yet	A	B	C	D	E	comb
		Mean scores						
a.	**b. Application of acquired driving knowledge**							
1	To maintain smooth flow in traffic, one must ignore several traffic regulations	4.31	4.7	4.32	4.8	4.0	4.17	4.27
2	It makes sense to increase speed and drive past vehicles which are being driven slowly	3.42	3.33	3.37	3.40	3.70	3.10	3.27
3	People violate speed limit because the limits are too low	3.46	3.65	3.42	3.75	3.77	3.83	3.69
4	It is reasonable to drive through just before it switches to red light	3.80	4.24	3.84	3.90	4.08	4.39	4.13
5	One can ignore red light if there are no vehicles in sight	4.44	4.57	4.21	4.53	4.15	4.35	4.50

Table 23: cont'd

	b. **Cognitive analysis between facts and inferences**							
6	Speed bumps increase chances of traffic crashes	3.66	3.16	3.63	3.72	3.70	3.67	3.52
7	On a highway, if your brake fails to apply is better to use gears than hand brake to stop the car	2.01	1.72	2.21	2.04	2.13	1.70	1.84
8	Two-second rule principles of safe braking distance is difficult in its application	3.41	3.68	3.14	3.11	3.69	3.13	3.65
9	MSM in defensive driving is adequate principle for overtaking	2.01	1.98	2.13	1.89	2.07	1.87	2.01
10	Using mobile phone while driving does cause a great risk to driving	2.21	2.24	2.35	1.97	2.19	2.45	1.94
11	Margin of Safety around the vehicle is necessary to consider when driving	1.64	1.48	1.79	1.68	1.66	1.50	1.42
12	If everyone were knowledgeable, there would be fewer traffic crash	1.75	1.48	1.92	1.67	1.94	1.47	1.53

Table 23: cont'd

c. Driver synthesis to promote road safety							
13	Process of a vehicle Overtaking another must be done in a more systematic manner	1.77	1.61	1.70	1.77	1.84	1.86	1.70
14	Driving within towns and villages requires continues scanning for hazards.	2.09	2.33	1.91	1.82	2.00	1.79	1.97
15	The continuous use of driving mirrors in driving tends to affect driver's concentration	3.64	3.40	3.62	3.42	3.83	3.93	4.06
16	A general reduction of speed limits in a highway will generally reduce crashes	2.34	1.98	2.45	2.29	2.49	2.34	2.04
17	A professional driver must have some level of academic knowledge to drive crash-free.	1.82	1.82	1.96	1.86	1.73	1.93	1.59
18	Overtaking could be done anyhow provided it does not cause a crash	4.13	4.30	4.11	4.19	4.14	4.17	4.41

Table 23: cont'd

d. Evaluation of the value of ideas							
19	Drunk driving is found more with young drivers	2.79	3.12	2.76	2.69	2.82	2.68	3.09
20	Young drivers tend to over-speed more than older drivers	2.25	2.00	2.34	2.37	2.12	2.17	2.07
21	Sending SMS text while driving is not a dangerous act to many	4.14	4.52	3.93	4.17	4.36	4.34	4.31
22	Coasting whiles descending a hill is better to reduce fuel cost.	3.38	3.71	3.29	3.47	3.52	3.93	3.82
23	An educated driver may avoid road crashes better than the uneducated	1.90	1.65	2.13	2.03	1.94	1.66	1.64

Source: Fieldwork, 2013

Table 24: Driver category and views on road safety

	Views on road safety	Driver category Learner	Private	Commercial Mean scores	Corporate
	a. Application of acquired driving knowledge				
1	To maintain smooth flow of traffic, one must ignore several traffic regulations	4.36	4.22	4.11	4.47
2	It makes sense to increase speed and drive past vehicles which are being driven slowly	3.82	3.35	3.04	3.58
3	People violate speed limit because the limits are too low	2.82	3.41	3.49	3.80
4	It is reasonable to drive through just before it switches to red light	3.91	3.92	3.83	4.17
5	One can ignore red light if there are no vehicles in sight	4.73	4.34	4.06	4.48
6	Speed bumps increase chances of traffic crashes	3.45	3.64	3.43	3.68
7	On a highway, if your brake fails to apply is better to use gears than hand brake to stop the car	1.36	2.22	2.33	1.77
8	Two-second rule principles of safe braking distance is difficult in its application	3.73	3.13	3.08	3.65

Table 24: cont'd

9	MSM in defensive driving is adequate principle for overtaking	1.45	2.18	2.15	1.87
10	Using mobile phone while driving does cause a great risk to driving	1.55	2.18	2.15	1.87
11	Margin of Safety around the vehicle is necessary to consider when driving	1.36	1.68	1.90	1.51
12	If everyone were knowledgeable, there would be fewer traffic crash	1.55	1.91	2.04	1.51
13	Process of a vehicle Overtaking another must be done in a more systematic manner	1.20	1.75	1.94	1.61
14	Driving within towns and villages requires continues scanning for hazards	1.82	1.93	1.90	1.98
15	The continuous use of driving mirrors in driving tends to affect driver's concentration	3.09	3.53	3.42	3.89
16	A general reduction of speed limits in a highway will generally reduce crashes	2.27	2.38	2.43	2.23
17	A professional driver must have some level of academic knowledge to drive crash free	1.55	1.93	2.19	1.60
18	Overtaking could be done anyhow provided it does not cause a crash	4.64	4.07	4.02	4.38

Table 24: cont'd

19	Drunk driving is found more with young drivers	2.64	2.82	2.79	2.85
20	Young drivers tend to over speed more than older drivers	2.00	2.40	2.33	2.04
21	Sending SMS text whilst driving is not a dangerous act to many	4.40	4.12	4.10	4.26
22	Coasting whiles descending a hill is better to reduce fuel cost	3.36	3.32	3.30	3.75
23	An educated driver may avoid road crashes better than the uneducated	1.45	1.89	2.45	1.72

Source: Fieldwork, 2013

Table 25: Affective (Attitudinal) aspects from road safety education obtained

Attitudes	Mean
1. Increase speed in built up and densely populated areas	3.34
2. Increase speed to pass vehicle in front of you	2.77
3. Force your way into traffic	3.42
4. Tailgate vehicle in front of you such that is will be difficult for you to brake suddenly if necessary	3.43
5. Get distracted by other events in the environment while driving	3.14
6. Create dangerous traffic situation due to inattentiveness	3.13
7. Keep on driving even if tired	3.57
8. Drive over distances (short/long) without wearing seatbelt	3.43
9. Take the wrong exit at interchange	3.44
10. Increase speed as vehicle behind you is trying to overtake	3.38
11. Drive after taking in alcoholic beverage	3.41
12. Use drugs to keep you awake when driving (e.g. snuff)	3.42
13. Fail to check your mirror before taking off	3.28
14. Make or receive a telephone call while driving	3.43
15. Hit something or someone while reversing	3.41
16. Engage passengers in a heated argument while driving	3.49
17. Use the horn as a musical tool when driving	3.44
18. Use the horn to attract the attention of potential passengers	2.98
19. Run red light to avoid getting caught up in traffic congestion	3.44
20 Drivers attitude is everything in driving	2.19

Source: Fieldwork, 2013

The psychomotor domain includes physical and muscular skills. This means much more than the gaining of skills in driver education but its application to real driving life experience. Every driving act has a psychomotor component. Safe driving psychomotor skills must be acquired in driver education and training if a driver is to function successfully in our society.

On the relationship between modes of acquiring driving knowledge and driver behaviour, respondents who acquired driving knowledge through relationship training revealed the highest mean score (4.59) on attributes such as "negotiating a sharp curve with excessive speed is not risky" a conscious driver cannot be distracted by a mobile phone (2.96) and improper seat belt adjustment to fit the driver can be dangerous (2.23). Meanwhile, respondents with defensive training background expressed lowest mean scores on the following attributes driving application of common sense and the law (1.59), and a conscious driver cannot be distracted by a mobile phone (2.85) (Table 25).

In the driving learning situation, there is again a progression from mere physical experience such as seeing, touching, moving, manoeuvring, etc. - through the carrying out of complex skills under guidance, to the performance of skilled driving activities independently. On the foregoing, a DVLA official observed that driver education might influence the following issues:

> *Basic knowledge about the mechanics of the vehicle, how to relate with other road users, road conditions including signs and makings and how to handle emergence situations.*

Table 26: Effects of driving knowledge on driver behaviour

	Items	Defensive Mean	Mate Mean	Parent Mean	Relationship Mean
1	Driving is the application of common sense and the law	1.59	1.61	1.61	1.60
2	A conscious driver cannot be distracted by a mobile phone	2.85	2.85	2.85	2.96
3	Negotiating a sharp curve with excessive speed is not risky act if the car is in good working condition	4.19	4.41	4.41	4.59
4	Some level of auto-mechanics will help avoid crashes	2.67	2.34	2.34	3.07
5	Speeding in a curve is affected by some external forces	3.02	3.69	3.69	3.21
6	Improper seat adjustment to fit the driver can be dangerous	1.92	1.85	1.85	2.23

Source: Fieldwork, 2013

Ranking of Variables on Views on Road Safety of Drivers

It was crucial to identify and rank among others the most critical areas within the driver's views on road safety issues which to a wider extent contribute to crashes in the Accra and Kumasi. In so doing, responses for the selected items in the questionnaire which focused on driver's views on road safety including

application of acquired driving knowledge, cognitive analysis of facts and inferences, driver's synthesis to promote road safety and evaluation about the value of ideas were subjected to factor rotation. The rotation yielded a three-factor solution which was determined based on the scree plot, eigenvalues and parallel analysis (see Table 27 and Appendix C).

The 23 items of the views on road safety were subjected to Factor Analysis (FA) using IBM SPSS v 23. Prior to performing FA the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Mayer-Oklin value was .769 exceeding the recommended value of .6 and the Bartlett's Test of Spherecity reached statistical significance ($p = .001$), supporting the factorability of the correlation matrix (Appendix C).

Factor analysis revealed the presence of six factors with eigenvalues exceeding 1, explaining 16.4 per cent, 9.3 per cent, 6.2 per cent, 5.4 per cent, and 5.1 percent of the variance respectively. An inspection of the scree plot revealed a clear break after the third factor scree test. Using scree test, it was decided to retain three factors for further investigation. This was further supported by the results of Parallel Analysis, which showed only three factors with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (23 variables * 500 respondents) (see Appendix C for details).

Table 27: Results of factor analysis (n = 500)

Measure	Factors		
	Factor 1	Factor 2	Factor 3
Process of a vehicle overtaking another must be done in a more systematic manner	.569		
If everyone were knowledgeable, there will be fewer traffic accidents	.574		
Margin of safety around the vehicle is necessary to consider when driving	.541		
A professional driver must have some level of academic knowledge to drive crash free	.498		
On a highway if your brake fails to apply it's better to use gears than hand brake to stop the car	.478		.402
An educated driver may avoid road crashes better than the uneducated	.476		-.448
Using mobile phone whilst driving does cause a great risk to driving	.449		
Driving within towns and villages requires continuous scanning for hazards	.320		
MSM in defensive driving is an adequate principle for overtaking			
A general reduction or speed limits in a highway will generally reduce crashes		.565	
People violate speed limits because the limits are too low		.542	
To maintain smooth flow in traffic, one must ignore several traffic regulations		.526	
One can ignore a red light if there are no vehicles in sight		.519	
The continuous use of driving mirrors in driving tends to affect drivers' concentration			

Table 27: cont'd

Overtaking could be done anyhow provided it does not cause a crash	-.316	.516	
It is reasonable to drive through just before it switches to red light		.508	
Speed bumps increase chances of traffic crashes		.444	
Sending SMS text whilst driving is not a dangerous act to many	-.342	.441	
Coasting whiles descending a hill is better to reduce fuel cost		.441	
It makes sense to increase speed and drive past vehicles which are being driven slowly		.384	
2-second rule principles of safe braking distance is difficult in its application		.384	
Young drivers tends to over speed more than older drivers			.694
Drunk driving is found more with young drivers			.670

Source: Fieldwork, 2013.

To aid in the interpretation of these three factors, Varimax rotation was performed. The rotated solution revealed the presence of simple structure with the three factors showing a number of strong loadings and all variables loading substantially on only one factor. The three orthogonal factors together explained a total of 31.94 per cent of the variance, with factor 1 contributing 12.56 per cent, factor 2 contributing 12.14 per cent and factor 3 contributing 7.24 per cent.

Meanwhile, the first factor showed high loadings for variables that described respondents' cognitive analysis between facts and inferences and the driver synthesis to promote road safety ("process of a vehicle overtaking another must be done in a more systematic manner" and "if everyone were knowledgeable, there will be fewer traffic accidents"). Likewise, the factor 2 showed strong loadings for variables explaining application of acquired driving knowledge ("people violate speed limits because the limits are too low" and "to maintain smooth flow in traffic, one must ignore several traffic regulations"). Whereas the factor 3 identified strong loadings for variables explaining evaluation of the value of ideas ("young drivers tend to over speed more than older drivers" and "drunk driving is found more with young drivers"). The finding is consistent with Keskinen and Berg models in that a higher percentage of the drivers on our roads face challenges with the road safety practices. The result is also consistent with Abane et al. (2010) who found similar results in Ghana at large.

Summary

This chapter presented drivers' level of knowledge on road safety. The majority of the respondents agreed that driver education and training must not only be based on practical but also on theory and risk management principles. Furthermore, drivers' attitude influences their driving skill and must be a serious issue to be addressed in driver training and education. As evident in the chapter, general driving knowledge for males differs from females. Similarly, general driving knowledge differs across the age groups, educational levels, and modes of acquiring driving knowledge and category of

driving license. The factor analysis revealed three main factors that influence the views of the drivers on road safety issues. Among the strong loading variables in factor one were the cognitive analysis between facts and inferences whereas the factor 2 found strong loadings for application for acquired driving knowledge and the factor 3 showing strong loadings for evaluation for the level of ideas of drivers.

CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The study aimed at assessing drivers' perspective on road safety education in the Greater Accra and Ashanti Regions. Specifically, the study sought to achieve the following objectives:

a. Ascertain drivers' socio-demographic characteristics such as gender, age group educational background, method used in training, driving category, class of driving license, year of acquiring license about their training in the driving profession;
b. Conduct content analysis of defensive driver education in Ghana;
c. Assess the means and level of road safety knowledge of drivers; and
d. Assess the effects of driving education on the perception of road traffic safety in Ghana.

To achieve the stated objectives, data on road safety education were collected from drivers, and relevant stakeholders such as Driving Schools Association of Ghana, DVLA, NRSC, and MTTD of the Ghana Police Service. The study was guided by Berg's (2006) driver education framework, Defensive Driving Model and Bloom's Taxonomy Domain for a Choice.

The study adopted a mixed method approach including the use of questionnaires, in-depth interviews, and observation and focus group discussion. The target population comprised mainly drivers, management of

driving schools and officials of state institutions responsible for road management and safety. The information from DVLA revealed that there were 246,277 and 78, 671 licensed drivers from Greater Accra and Ashanti Regions Kumasi respectively.

The study adopted a multi-stage sampling technique involving the use of both probability and non-probability sampling techniques. Quota sampling technique was used to identify the number of registered drivers in the two regions from 1995-2012, which formed the basis for the sample frame for the questionnaire administration. Whereas systematic random sampling technique was used to identify the different categories of drivers and accidental sampling technique was used during the administration of the questionnaires. For the conduct of the in-depth interviews, purposive sampling technique was used to identify the drivers and the relevant stakeholders.

Data from the in-depth interviews and observations was analysed manually by focusing on the themes that fall within the purview of the set objectives. Some statistical techniques were employed to analyse the quantitative data from the survey. Firstly, frequencies and percentages were generated for the background characteristics. Secondly, descriptive statistics such as mean scores were generated for all the attributes. Chi-square and Factor Analysis were used to show the relationship between socio-demographic characteristics such as gender, age, marital status, educational level and class of driving license and means of acquiring driving knowledge.

Summary of Findings

Results from the study revealed varying socio-demographic characteristics of drivers from the two selected regions. The results further indicated the predominant socio-demographic characteristics of the sampled drivers. The views of stakeholders including drivers were elucidated on road safety education in the study areas. Key findings of the study include:

- The socio-demographic characteristics identified are gender, age, marital status, educational level and class of driving license. These are the socio-demographic characteristics that define drivers (Lewis-Evans, 2010). The means of acquiring driving knowledge were parental, relationship, mate system and defensive training. These can be broadly divided into two: informal and formal driver education as in Lonero et al. (2005). There was a statistically significant relationship between socio- demographic characteristics such as gender, age, marital status, educational level and class of driving license and modes of driver education. This is in consonant with Lonero and Mayhew (2006), Slater and Wiggins (2005) and Abimah's (2013).
- The analysis of the DDCM revealed that all categories of license applicants are expected to use the same written manuals and tests dealing with safe driving practices. Both the Road Traffic Acts 683 (Amended 761) and the regulations (LI2180) have presumption that cannot be supported by Road Risk Management Practices, a subject not taught in DDCM but has a serious implication on practical driving and safe driving skills. DDCM is not progressive and it is modelled

for all levels of drivers whether learner or professional driver. That is not normal with any professional course of studies. DDCM is a one-off course. Should a professional driver decides to further his driving course of study or to refresh his skills in driving, he had no choice than to go through DDCM which he has already gone through earlier.

- Respondents who acquired driving knowledge through parental training observed that drivers' attitude influences their driving skill, driver's attitudes and behaviour is influenced by their level of knowledge, drivers' education and training must not only be based on practical but also theory and risk management principles and drivers must have ethical standards beyond the full knowledge of driving laws and regulations. Respondents who acquired driving knowledge through the mate system observed that drivers' behaviour are influenced by their level knowledge, badly designed roads should not cause crash per say and driver education and training must be continuous until their attainment of competence. Respondents with defensive driving training background revealed that professional drivers must show further certificate of competence at every license renewal date. Summarily, informally trained drivers experience proportionally more total traffic convictions and more, and more serious, crashes than formally trained drivers (Pezoldt, Womack, Morris, 2007).
- The three orthogonal factors determined by the factor analysis together explained a total of 31.94 per cent of the variance, with factor 1 contributing 12.56 per cent, factor 2 contributing 12.14 per cent and

factor 3 contributing 7.24 per cent. Out of the three factors, it was established that most significant variables in factors included (a) process of a vehicle overtaking another must be done in a more systematic manner (b) if everyone were knowledgeable, there will be fewer traffic accidents (c) people violate speed limits because the limits are too low (d) to maintain smooth flow in traffic, one must ignore several traffic regulations (e) young drivers tend to over speed more than older drivers (f) drunk driving is found more with young drivers.

Conclusions

The following conclusions were drawn on road safety education in Greater Accra and Ashanti Regions from the drivers' perspectives.

- The study concludes that the main socio-demographic characteristics of respondents in the Ashanti and Greater Accra Regions are males, corporate drivers, license B holders, 28-32 years old, married, tertiary education. The dominant mode of acquiring driving education is defensive training education.
- The DDCM used in Ghana is even though used by all categories of license seeking applicants, it is not progressive and hence should be for only learner drivers. DDCM when compared to Bloom's taxonomy domain of learning leaves out the cognitive and affective aspects and concentrates on the psychomotor and this makes it an incomplete model for educating both learner and professional drive.
- Knowledge of road safety acquired differs among the different modes.

- Drivers who use the Mate system of driver education have a better perception on the road traffic knowledge.

Reflections on the Conceptual Framework

The study was a methodological triangulation of assessing road safety education in Ashanti and Greater Accra Regions, from the drivers' perspective. As revealed in the conceptual model, there are two modes of driver education- formal and informal (mate system, parental and relationship). The informal modes of driver education outdate the formal mode of driver education. The formal mode of education entails the use of DVLA syllabus (DDCM) for the training of drivers. On the other hand, patrons of informal modes of education may not be exposed to this manual. Hence, the disparity in the mode of delivery. Irrespective of the mode of education, the learner, experienced or old driver, is expected to register for both written and practical tests. In the end, they are all licensed.

There are some important issues not addressed in the DDP such as the influence of socio-demographic characteristics on drivers and how these affect drivers' attitude and behaviours. Furthermore, the DDP educates the learner, experienced and old drivers with the same manual. Each group is supposed to be taught differently on design of written manual and test. Similarly, their driver exposure differs which may invariably affect their attitude and behaviour.

Contributions to Knowledge and Practice

This study like that of Potvin et al. (1988), Gregersen et al. (1996) and Roberts, Ker, Collier, Beyer, Bunn, and Frost (2008) sought to contribute knowledge to the importance of driver education in reducing road carnage. It further highlighted the relevance of formal mode of driver education as a precursor to achieving road safety.

Therefore, the study contributed to literature on driver education in a developing country like Ghana. Although studies like Obeng-Odoom (2010), Oteng-Ababio and Agyemang, (2012), Abane, et al. (2011), Addo (2010), Abimah, (2013), Poku-Boasi and Adarkwa, (2013), and Akaateba, Amoh-Gyimah and Amponsah, (2015) have addressed road safety concerns in Ghana. However, none of these studies considered the four modes of driver education which can be broadly divided into formal (defensive driving) and informal (mate, relationship and parental systems) modes of driver education.

Again, no study has ever been conducted on the content analysis of the Defensive Driving Course Programme in Ghana. The present study thus fills in an important gap.

Recommendations

After a careful examination of the findings and contributions to knowledge and practices, the following recommendations are proffered:

Despite all the evidence shown by worldwide studies, formal driver training programmes are still very popular. Professional teaching or formal training is the best way to learn how to drive, that it helps to prevent accidents, and that private driving schools produce better drivers.

- Governments through DVLA must therefore encourage would-be drivers to undergo formal mode of driver education to reduce road crashes.
- Law enforcement agencies such as MTTD of the Ghana Police Service must make their presence felt on the streets to enforce road traffic laws with possession of driver license, seat belt usage, drunk driving, etc. Offenders are to be prosecuted to act as a deterrent to others.
- The Ministry of Transport through DVLA must design written manuals and tests on safe driving practices for three categories: new drivers, renewals/experienced and older drivers. This should be progressive making reference to earlier manuals. The contents should be based on critical socio-demographic characteristics of each group. Furthermore, part of the contents of the syllabus should also address attitudinal and behavioural attributes of these categories of drivers. The current DVLA syllabus treats everyone equally.
- The DVLA must design graduated licensing for experienced or older drivers on a number of issues such as night driving and emergency driving. This could be based on individual assessment of potential driving challenges.
- More so drivers' education and training must be continuous till attainment of high safety standards. Drivers' education should not be one shot approach but periodical as to instill high road safety standards.

Limitation and Opportunities for Further Research

There was limited relevant literature in Ghana concerning informal modes of driver education such as mate system, parental or relationship. Informal modes of driver education pose a number of challenges, as there are no reference materials used by the instructors of these modes of driver education.

Content analysis is an elusive concept that cannot be accurately measured quantitatively. However, for the purpose of this study, DDP was compared to Bloom's taxonomy, which is seen as a classical model in the educational domain. Further studies can compare Ghanaian DDP to that of other developing countries and best practices adapted.

This study did not assess the strengths and limitations of the different modes of driver education in Ghana by capturing the opinions and attitudes of those who went through the process as learners. Further research can aim at assessing the strengths and weaknesses of different modes of acquiring driving knowledge.

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APPENDIX A

UNIVERSITY OF CAPE COAST

FACULTY OF SOCIAL SCIENCE: DEPARTMENT OF GEOGRAPHY & REGIONAL PLANNING:

ROAD SAFETY EDUCATION IN GREATER ACCRA AND ASHANTI REGIONS IN GHANA: DRIVERS' PERSPECTIVE.

QUESTIONNAIRES FOR DRIVERS

Introduction

The researcher is a PhD candidate who intends to study and research on the topic 'Road Safety Education in Ghana: Drivers Perspective, under the Department of Geography and Regional Planning of the University of Cape Coast. This questionnaire is designed to solicit information from you and other selected persons from Accra and Kumasi to assist us to achieve the objectives of the study, which among others is to come out with suitable road transport safety education programme in Ghana.

We invite you to share your ideas with us. Please, be as objective and candid as possible in responding to the questions, as findings will have direct bearings on your life as well as many Ghanaian passengers and pedestrians who are constantly at risk of road traffic accidents/crashes.

Note that there are no correct or incorrect answers in the survey. Our aim is to obtain your point of view and honest opinions about road safety education issues. It is therefore important that you respond to all the questions. However, if you feel strongly that you cannot answer any question, please pass it and proceed to the others.

If you have any questions/queries concerning the instrument, please contact the supervisor Professor A.M.Abane (0244 280 629) or the student Mr. Godfred Akyea-Darkwah (020 2021401).

Thank You

SECTION A 1: This initial section gathers information about the trained drivers background and its impact on driving behaviour.

Please, study (listen to) the questions carefully before responding to them

1. Age:.....
2. Sex: a. Male [ ] b. Female [ ]
3. Marital Status: a. Single [ ] b. Married [ ] c. Devoiced [ ]
   d. separated [ ] e. cohabit [ ]
4. Number of Children: a. None [ ] b. 1 [ ] c. 2-4 [ ]
   d. 5 or more [ ]
5. Educational Background: a. No education [ ] b. Primary [ ]
   c. JHS [ ] d. SHS [ ] e. Tertiary[ ]
6. Driving category: a. Self-employed [ ] b. Private [ ]
   c. Commercial [ ] d. Corporate [ ]
7. Class of driving license a. "A' [ ] b. 'B' [ ] c. 'C' [ ]
   d. 'D' [ ] e. 'E' [ ] f. 'F' [ ] g. Combination[ ]
8. Which year did you acquire this licence? .....
9. When was the last time you had it renewed or upgraded? .....
10. Have you been driving a vehicle in the last six months?
    a. Yes [ ] b. No [ ]
11. How did you go about getting the license .....
    a. Defensive Driving School lessons and test; .....

b. Which Defensive Driving School? .....

c. Mate system and test; .....

d. Parental Training system; .....

e. Relationship Training and Testing; .....

f. Others and Test (specify) .....

12. How long did you learn driving till you passed your test?

.....

13. Can you recollect some important lessons taught that is helpful for your driving life? a. Yes [ ] b. No [ ]

SECTION A 2: ASSESSMENT OF DRIVERS GENERAL DRIVING KNOWLEDGE

14. To what extent do you agree or disagree with each of the following statement about traffic and driving in general?

1. Strongly Agree 2. Agree 3. Not Sure 4. Disagree 5. Strongly Disagree

a. Driver's attitude influences his driving skill.

[1] [2] [3] [4] [5]

b. Driver's behaviour is influenced by his level of knowledge.

[1] [2] [3] [4] [5]

c. Drivers' attitudes and behaviour is influenced by their level of knowledge. [1] [2] [3] [4] [5]

d. The higher ones knowledge the better one's driving.

[1] [2] [3] [4] [5]

e. Drivers education and training must not only be based on practical but also on theory and risk management principles

[1] [2] [3] [4] [5]

f. Lack of maintenance is a human factor.

[1] [2] [3] [4] [5]

g. Badly designed roads should not cause crash per say.

[1] [2] [3] [4] [5]

h. Drivers must have ethical standards beyond the full knowledge of driving laws and regulations [1] [2] [3] [4] [5]

i. Driver's education and training must be continuous till attainment of high safety standards. [1] [2] [3] [4] [5]

j. Professional drivers must show further certificate of competence at every license renewal date. [1] [2] [3] [4] [5]

SECTION B 1: COGNITIVE (KNOWLEDGE) NATURE OF DRIVER EDUCATION ACQUIRED AND ITS IMPACT ON BEHAVIOUR

This component of the questionnaire addresses issues about the knowledge and the development of intellectual skills of the driver from lessons learnt and how you are likely to react to traffic situations. This includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of drivers' intellectual abilities and skills.

SECTION B1 a: Knowledge about safety rules:

15. How do you define road safety? .....
.....

16. Describe the processes you went through when learning how to drive

.....

17. How do you identify your risky driving behaviour?

.....

18. Do you recall any thing learnt that you have experienced in your driving life .....

19. How do you understand and apply **MSM** (Mirror, Signal & Manoeuvre) when overtaking a vehicle on the highway?

.....

20. Explain why the gearbox is attached to the engine of a vehicle.

.....

21. What do you do if you are in an unmoving in-traffic but your car is on railway crossing, tailgating other cars and a train on?

22. Will the ban of the use of mobile phone reduce crashes?.....

SECTION B 1 c: YOUR VIEWS ABOUT TRAFFIC SAFETY. Application of Knowledge Acquired from what was learnt in classroom into novel situation in the work place or driving environment.

In this section, we shall examine some statements that will bring out your general opinions about traffic safety. It is necessary to understand each statement well before indicating your preferred response.

23. To what extent do you agree or disagree with each of the following statement about traffic and driving in general?

1. Strongly Agree 2. Agree 3. Not Sure 4. Disagree 5. Strongly Disagree

a) To maintain smooth flow in traffic, one must ignore several traffic regulations

[1] [2] [3] [4] [5]

b) It makes sense to increase speed and drive past vehicles which are being driven slowly [1] [2] [3] [4] [5]

c) People violate speed limit because the limits are too low

[1] [2] [3] [4] [5]

d) It is reasonable to drive through just before it switches to red light

[1] [2] [3] [4] [5]

e) One can ignore red light if there are no vehicles in sight

[1] [2] [3] [4] [5]

f) Speed bumps increase chances of traffic crashes

[1] [2] [3] [4] [5]

25. SECTION B 1 d: Cognitive analysis distinguishes between facts and inferences.

To what extent do you agree or disagree with each of the following statement about traffic and driving in general?

1. Strongly Agree 2. Agree 3. Not Sure 4. Disagree 5. Strongly Disagree

a. On a highway if your brake fails to apply is better to use gears than hand brake to stop the car. [1] [2] [3] [4] [5]

b. Two-second rule principles of safe braking distance is difficult in its application. [1] [2] [3] [4] [5]

c. MSM in defensive driving is adequate principle for overtaking.

[1] [2] [3] [4] [5]

d. Using mobile phone whilst driving does cause a great risk to driving.

[1] [2] [3] [4] [5]

e. Margin of Safety around the vehicle is necessary to consider when driving.

[1] [2] [3] [4] [5]

f. If everyone were knowledgeable, there will be fewer traffic accident

[1] [2] [3] [4] [5]

26. SECTION B 1 e: This explores how a driver Synthesis or put parts together to form a whole, with emphasis on creating a new safer meaningful driving.

a. Process of a vehicle Overtaking another must be done in a more systematic manner [1] [2] [3] [4] [5]

b. Driving within towns and villages requires continues scanning for hazards.

[1] [2] [3] [4] [5]

c. The continuous use of driving mirrors in driving tends to affect drivers concentration [1] [2] [3] [4] [5]

d. A general reduction of speed limits in a highway will generally reduce crashes. [1] [2] [3] [4] [5]

f. A professional driver must have some level of academic knowledge to drive crash free. [1] [2] [3] [4] [5]

27. SECTION B 1 f: This section intends to evaluate or pass judgments about the value of ideas.

a. Overtaking could be done anyhow provided it does not cause a crash.

[1] [2] [3] [4] [5]

b. Drunk driving is found more with young drivers.

[1] [2] [3] [4] [5]

c. Young drivers tend to over speed more than older drivers.

[1] [2] [3] [4] [5]

d. Sending SMS text whilst driving is not a dangerous act to many.

[1] [2] [3] [4] [5]

e. Coasting whiles descending a hill is better to reduce fuel cost.

[1] [2] [3] [4] [5]

f. An educated driver may avoid road crashes better than the uneducated.

[1] [2] [3] [4] [5]

28. SECTION C: AFFECTIVE (ATTITUDE) ASPECT FROM ROAD SAFETY EDUCATION OBTAINED.

Available literature indicates that most drivers/motorist violate traffic regulations at one time or another in the course of work. Approximately how often do you act as described in each of the statement listed below?

[1] Very Often **[2] Seldom** **[3] Never** **[4] Not Often**

[5] Not applicable

(a) Increase speed in built up and densely populated areas

[1] [2] [3] [4] [5]

(b) Increase speed to pass vehicle in front of you

[1] [2] [3] [4] [5]

(c) Force your way into traffic

[1] [2] [3] [4] [5]

(d) Tailgate vehicle in front of you such that it will be difficult for you to brake suddenly if necessary

[1] [2] [3] [4] [5]

(e) Get distracted by other events in the environment while driving

[1] [2] [3] [4] [5]

(f) Create dangerous traffic situations due to inattentiveness

[1] [2] [3] [4] [5]

(g) Keep on driving even if tired

[1] [2] [3] [4] [5]

(h) Drive over distances (short/long) without wearing seatbelt

[1] [2] [3] [4] [5]

(i)Take wrong exit at interchange

[1] [2] [3] [4] [5]

(j) Increase speed as vehicle behind you is trying to overtake

[1] [2] [3] [4] [5]

(k) Drive after taking in alcoholic beverage

[1] [2] [3] [4] [5]

(l) Use drugs to keep you awake when driving (e.g. snuff)

[1] [2] [3] [4] [5]

(m) Fail to check your mirror before taking off

[1] [2] [3] [4] [5]

(n) Make or receive a telephone call while driving

[1] [2] [3] [4] [5]

(o) Hit something or someone whiles reversing

[1] [2] [3] [4] [5]

(p) Engage passengers in a heated argument whiles driving

[1] [2] [3] [4] [5]

(q) Use the horn as a musical tool when driving

[1] [2] [3] [4] [5]

(r) Use the horn to attract the attention of potential passengers

[1] [2] [3] [4] [5]

(s) Run red light to avoid getting caught up in traffic congestion

[1] [2] [3] [4] [5]

29. SECTION D: SKILLS DEVELOPMENT ACQUIRED FROM DRIVER EDUCATION AFFECTING DRIVER BEHAVIOUR

The psychomotor domain includes physical and muscular skills. This means much more than the gaining of skills in driver education but its application to real driving life experience. Every driving act has a psychomotor component. Safe driving psychomotor skills must be acquired in driver education and training if a driver is to function successfully in our society. In the driving learning situation there is again a progression from mere physical experience - seeing, touching, moving, manoeuvring, etc. - through the carrying out of complex skills under guidance, to the performance of skilled driving activities independently.

To what extent do you agree or disagree with each of the following statement about traffic and driving in general?

1. Strongly Agree 2. Agree 3. Not Sure 4. Disagree 5. Strongly Disagree

a. Driving is the application of common sense and the law.

[1] [2] [3] [4] [5]

b. A conscious driver cannot be distracted by mobile phone

[1] [2] [3] [4] [5]

c. Negotiating a sharp curve with excessive speed is not risky act if the car is in good working condition [1] [2] [3] [4] [5]

d. Some level of auto-mechanics will help avoid crashes.

[1] [2] [3] [4] [5]

e. Speeding in a curve is affected by some external forces

[1] [2] [3] [4] [5]

f. Improper seat adjustment to fit the driver can be dangerous.

[1] [2] [3] [4] [5]

SECTION E: INSTITUTIONAL ISSUES

In this section we want to talk about how you obtained information relating to the laws and regulations governing traffic in the country.

We shall also touch on the roles and responsibilities of some institutions.

30. Where did you learn traffic regulations and laws governing road traffic?

.....

31. Are you confident that what you were taught is helping you to avoid crashes in Ghana? Yes[ ] No [ ]

32. If No to Question to 31, please explain why.

.....

33. Briefly tell me what you know about the roles and responsibilities of the following state institutions/ organizations?

(a) Driver, Vehicle and Licensing Authority (DVLA)

i.....

ii.....

(b) National Road Safety Commission (NRSC)

i.....

ii.....

(c) Motor Traffic Transport Unit (MTTU)

i.....

ii.....

APPENDIX B

UNIVERSITY OF CAPE COAST

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

INTERVIEW SCHEDULE FOR KEY STAKEHOLDERS IN ROAD SAFETY EDUCATION IN GHANA

Introduction

Please, spend a bit of time with me to discuss matters concerning road safety education in Ghana. The objective is to collect as much information as possible on road safety education in Ghana with a view to identifying the nature, contend, structure of road safety education as one of the right tools as an intervention and making recommendations for the way forward.

Your participation in the exercise would be extremely appreciated. You are one of a few people with knowledge and experience in the area and your contribution should assist us in formulating the right recommendations for advocacy, planning and policy. We assure you of confidentiality in the information provided.

Thank you.

Socio-demographic data and Work Experience

1. Age:.....
2. Sex: a. Male [ ] b. Female [ ]
3. Marital Status: a. Single [ ] b. Married [ ] c. Devoiced [ ]
   d. separated [ ] e. cohabit [ ]
4. Number of Children: a. None [ ] b. 1 [ ] c. 2-4 [ ]
   d. 5 or more [ ]

5. Educational Background: a. No education [ ] b. Primary [ ]

c. JHS [ ] d. SHS [ ] e. Tertiary[ ]

6. What is your occupation .....

7. Present position occupied .....

8. How long have you worked in this organisation? .....

9. How long have you been driving .....

10. What kind of Driver training program attended?

.....

11. Period for such training.

.....

Road Safety Issues:

12. How long have you been involved in road transport and safety issues?

.....

13. In your opinion, what do you think is the main cause of road crashes in Ghana (Probe: vehicle, road, enforcement agencies, Human as a source)

.....

.....

.....

14. What is your opinion about the road safety interventions in Ghana today? (Engineering, Environment, Enforcement, Education and training; Probe: Human as the main source, education and training intervention as possibility to address crashes. In your own view, what form and structure of education must be used, the structure and contend of course, etc)

.....

.....

.....

.....

15. How would you compare these forms of education and training as means of road crash intervention today?

(a). Father to Child

.....

.....

.....

(b). Apprenticeship

.....

.....

.....

.....

(c). Defensive Driving

.....

.....

.....

.....

(d) NVTI Strategic Driver training

.....

.....

.....

.....

(e) NDA Driver Training

.....

.....

.....

.....

(f) RSTC Driving Management Science

.....

.....

.....

.....

(g) ISTC Transport Management Course

.....

.....

.....

16. What in your opinion should guide the domain structure of road safety education in Ghana? (Probe Cognitive, Affective and the true meaningful personal development and not as fact transfer and information recall only)

.....

.....

.....

.....

17. What specific road safety education have your organization implemented as a road crash intervention?

.....

.....

.....

(Probe for educational contend, structure and capabilities as an interventions;

.....

.....

.....

Nature of strategies;

.....

.....

.....

Where implemented:

.....

.....

.....

And on whom;

.....

.....

.....

Possible achievements including specific success stories if any;

.....

.....

.....

.....

Challenges in implementation;

.....

.....

.....

What next

.....

.....

.....

18. What do you think of the interventions from the NRSC?

.....

.....

.....

.....

Probe for successes,

.....

.....

.....

Failures

.....

.....

.....

Way forward

.....

.....

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19. What are your views about the country's commitment to the fight of road traffic crashes?

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20. Please comment on any other issue, which you think, needs to be considered in a study on road safety education in the country.

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21. In your own view, what intervention needs to be put in place first to reduce these crashes and why?

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THANK YOU FOR YOUR TIME AND THE INFORMATION.
WE APPRECIATE IT AND HOPE TO SHARE THE FINDINGS WITH YOU IN DUE COURSE

APPENDIX C

ADDITIONAL TABLES FOR THE FACTOR ANALYSIS

Table 1: Comparison of Eigenvalues from Factor Analysis (FA) and the Corresponding Criterion Values Obtained From Parallel Analysis (PA)

Factor Number	Actual Eigenvalue from FA	Random/Criterion value from parallel analysis	Standard Deviation	Decision
1	3.781	1.4286	.0372	Accepted
2	2.147	1.3648	.0279	Accepted
3	1.420	1.3148	.0237	Accepted
4	1.247	1.2736	.0206	Rejected
5	1.193	1.2355	.0213	Rejected
6	1.169	1.1958	.0213	Rejected
7	.977	1.1617	.0201	Rejected
8	.971	1.1294	.0168	Rejected
9	.963	1.0988	.0143	Rejected
10	.926	1.0695	.0148	Rejected
11	.829	1.0419	.0153	Rejected
12	.782	1.0143	.0139	Rejected
13	.767	0.9865	.0135	Rejected
14	.743	0.9583	.0132	Rejected
15	.692	0.9303	.0140	Rejected
16	.675	0.9062	.0139	Rejected
17	.647	0.8771	.0158	Rejected

18	.598	0.8502	.0160	Rejected
19	.554	0.8253	.0156	Rejected
20	.523	0.7986	.0153	Rejected
21	.501	0.7712	.0163	Rejected
22	.459	0.7435	.0162	Rejected
23	.436	0.7092	.0193	Rejected

Table 2: Loadings for all Variables

Measure		Factors	
	Factor 1	**Factor 2**	**Factor 3**
Process of a vehicle overtaking another must be done in a more systematic manner	-.161	.542	.037
If everyone were knowledgeable, there will be fewer traffic accidents	.195	.384	.110
Margin of safety around the vehicle is necessary to consider when driving	.002	.565	.011
A professional driver must have some level of academic knowledge to drive crash free	-.177	.508	.026
On a highway if your brake fails to apply it's better to use gears than hand brake to stop the car	-.246	.526	-.007
An educated driver may avoid road crashes	.059	.444	.053

better than the uneducated			
Using mobile phone whilst driving does cause a great risk to driving	.498	-.138	.086
Driving within towns and villages requires continuous scanning for hazards	-.063	.384	-.278
MSM in defensive driving is an adequate principle for overtaking	.320	-.088	.130
A general reduction or speed limits in a highway will generally reduce crashes	.476	.141	-.448
People violate speed limits because the limits are too low	.574	-.259	.107
To maintain smooth flow in traffic, one must ignore several traffic regulations	.579	-.110	.215
One can ignore a red light if there are no vehicles in sight	.615	-.001	-.137
The continuous use of driving mirrors in driving tends to affect drivers' concentration	.449	.029	-.135
Overtaking could be done anyhow provided it does not cause a crash	.057	.519	-.258
It is reasonable to drive through just before it switches to red light	.209	-.039	.113
Speed bumps increase chances of traffic crashes	.541	-.101	.233
Sending SMS text whilst driving is not a dangerous act to many	-.316	.516	.157

Coasting whiles descending a hill is better to reduce fuel cost	.124	.256	.670
It makes sense to increase speed and drive past vehicles which are being driven slowly	.249	.121	.694
2-second rule principles of safe braking distance is difficult in its application	-.342	.441	.027
Young drivers tends to over speed more than older drivers	-.206	.441	.013
Drunk driving is found more with young drivers	.478	-.103	.402

Table 3: Unrotated loadings

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factors	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.781	16.440	16.440	3.781	16.440	16.440
2	2.147	9.333	25.773	2.147	9.333	25.773
3	1.420	6.176	31.948	1.420	6.176	31.948
4	1.247	5.422	37.370	1.247	5.422	37.370
5	1.193	5.189	42.559	1.193	5.189	42.559
6	1.169	5.085	47.643	1.169	5.085	47.643
7	.977	4.247	51.891			

4.223	56.114			
4.185	60.299			
4.027	64.326			
3.605	67.931			
3.401	71.331			
3.334	74.665			
3.229	77.894			
3.009	80.902			
2.933	83.836			
2.811	86.647			
2.598	89.245			
2.409	91.654			

8	.971	4.223	56.114			
9	.963	4.185	60.299			
10	.926	4.027	64.326			
11	.829	3.605	67.931			
12	.782	3.401	71.331			
13	.767	3.334	74.665			
14	.743	3.229	77.894			
15	.692	3.009	80.902			
16	.675	2.933	83.836			
17	.647	2.811	86.647			
18	.598	2.598	89.245			
19	.554	2.409	91.654			
20	.523	2.274	93.929			
21	.501	2.179	96.108			
22	.459	1.997	98.104			
23	.436	1.896	100.000			

Screeplot Test

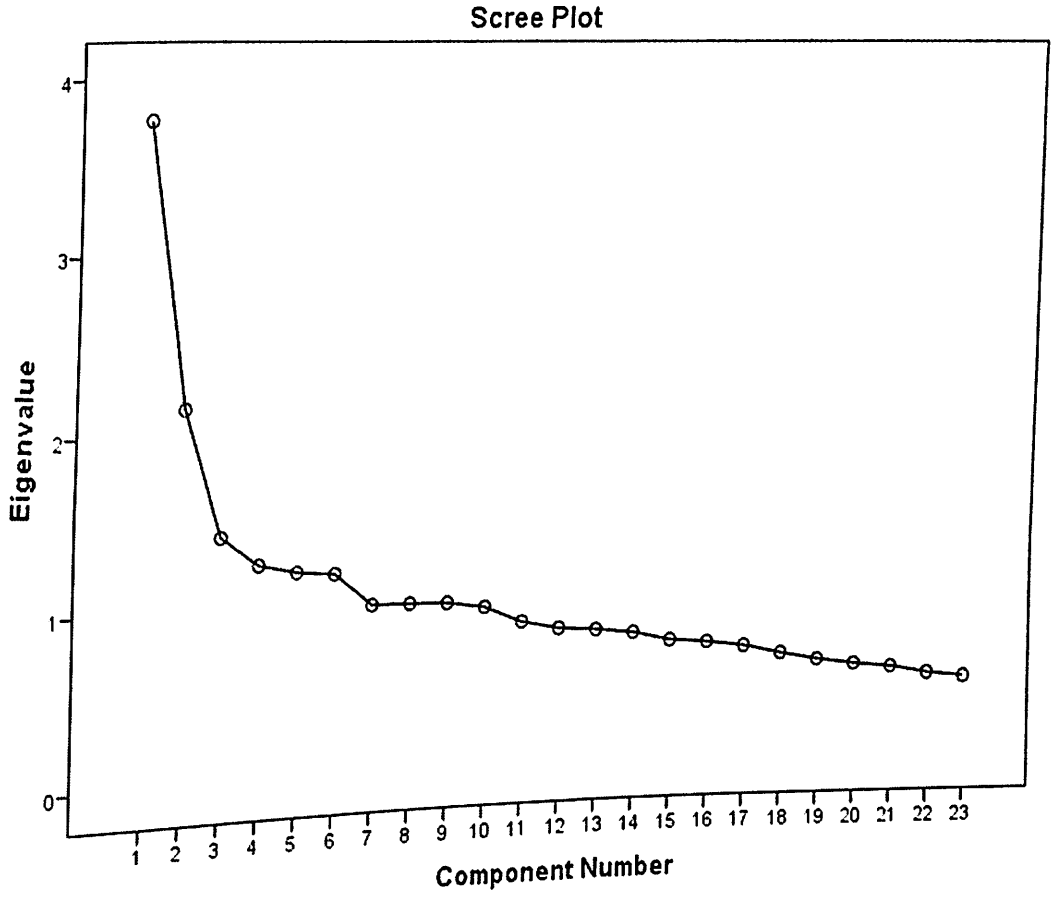

Figure 1: screenplot